Pamlico Sound Regional Hazard Mitigation Plan

HOLLAND CONSULTING PLANNERS

wood.

TABLE OF CONTENTS

1 Introduction

Section 1 provides a general introduction to hazard mitigation and an introduction to the Pamlico Sound Regional Hazard Mitigation Plan. This section contains the following subsections:

- 1.1 Background
- 1.2 Purpose and Authority
- 1.3 Scope
- 1.4 References
- 1.5 Plan Organization

1.1 BACKGROUND

This document comprises a Hazard Mitigation Plan for the Pamlico Sound Region of North Carolina.

Each year in the United States, natural and human-caused hazards take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural hazards are predictable, and much of the damage caused by hazard events can be reduced or even eliminated.

Hazards are a natural part of the environment that will inevitably continue to occur, but there is much we can do to minimize their impacts on our communities and prevent them from resulting in disasters. Every community faces different hazards, has different resources to draw upon in combating problems, and has different interests that influence the solutions to those problems. Because there are many ways to deal with hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of hazards while accounting for the unique character of a community.

A well-prepared hazard mitigation plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also coordinate activities with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity. This plan provides a framework for all interested parties to work together toward mitigation. It establishes the vision and guiding principles for reducing hazard risk and proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

In an effort to reduce the nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) to invoke new and revitalized approaches to mitigation planning. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Assistance (FMA) Program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

This plan was prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCEM) to ensure that it meets all applicable federal and state planning requirements. A

Local Mitigation Plan Review Tool, found in Appendix A, provides a summary of FEMA's current minimum standards of acceptability and notes the location within this plan where each planning requirement is met.

1.2 PURPOSE AND AUTHORITY

This plan was developed in a joint and cooperative manner by members of a Hazard Mitigation Planning Committee (HMPC) which included representatives of County, City, and Town departments, federal and state agencies, citizens, and other stakeholders. This plan will ensure all jurisdictions in the Pamlico Sound Region remain eligible for federal disaster assistance including FEMA HMGP, PDM, and FMA programs.

This plan has been prepared in coordination with FEMA Region IV and NCEM and in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007. Additionally, this plan will be monitored and updated on a routine basis in compliance with the above legislation and with the National Flood Insurance Act of 1968, as amended by 42 U.S.C. 4001 et seq, and North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act, as amended by Senate Bill 300: An Act to Amend the Laws Regarding Emergency Management as Recommended by the Legislative Disaster Response and Recovery Commission (2001).

This plan will be adopted by each participating jurisdiction in accordance with standard local procedures under the authority and police powers granted to counties as defined by the State of North Carolina (N.C.G.S., Chapter 153A) and the authority granted to cities and towns as defined by the State of North Carolina (N.C.G.S., Chapter 160A). Copies of adoption resolutions are provided in Section 9 Plan Adoption.

1.3 SCOPE

This document comprises a Regional Hazard Mitigation Plan for the Pamlico Sound Region. The planning area includes all incorporated municipalities and unincorporated areas in the region. All participating jurisdictions are listed in Table 1.1.

Table 1.1 – Participating Jurisdictions in the Pamlico Sound Regional Hazard Mitigation Plan

Beaufort County		
Washington	Aurora	Bath
Belhaven	Chocowinity	Pantego
Washington Park		
Carteret County		
Atlantic Beach	Beaufort	Bogue
Cape Carteret	Cedar Point	Emerald Isle
Indian Beach	Morehead City	Newport
Peletier	Pine Knoll Shores	
Craven County		
Havelock	New Bern	Bridgeton
Cove City	Dover	River Bend
Trent Woods	Vanceboro	
Pamlico County		
Alliance	Arapahoe	Bayboro
Grantsboro	Mesic	Minnesott Beach
Oriental	Stonewall	Vandemere

The focus of this plan is on those hazards deemed "high" or "moderate" priority hazards for the planning area, as determined through the risk and vulnerability assessments. Lower priority hazards will continue to be evaluated but will not necessarily be prioritized for mitigation in the action plan.

The Pamlico Sound Region followed the planning process prescribed by FEMA, and this plan was developed under the guidance of a HMPC comprised of representatives of County, City, and Town departments; citizens; and other stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the planning area, assessed the planning area's vulnerability to these hazards, and examined each participating jurisdiction's capabilities in place to mitigate them. The hazards profiled in this plan include:

- Coastal Hazards (Erosion & Rip Current)
- Dam & Levee Failure
- Drought
- Earthquake
- Extreme Heat
- Flood
- Hurricane & Tropical Storm
- Severe Weather (Thunderstorm Wind, Lightning, & Hail)
- Severe Winter Storm
- Tornado
- Wildfire

1.4 REFERENCES

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. June 1, 2010.
- FEMA. Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013.
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.

Additional sources used in the development of this plan, including data compiled for the Hazard Identification and Risk Assessment, are listed in Appendix D.

1.5 PLAN ORGANIZATION

The Pamlico Sound Regional Hazard Mitigation Plan is organized into the following sections:

- Section 2: Planning Process
- Section 3: Planning Area Profile
- Section 4: Hazard Identification & Risk Assessment
- Section 5: Capability Assessment
- Section 6: Mitigation Strategy
- Section 7: Mitigation Action Plans
- Section 8: Plan Implementation and Maintenance
- Section 9: Plan Adoption
- Appendix A: Local Plan Review Tool
- Appendix B: Planning Process Documentation
- Appendix C: Mitigation Alternatives
- Appendix D: References

2 Planning Process

Requirement §201.6(b): An open public involvement process is essential to the development of an effective plan. To develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
Requirement §201.6(c)(1): The plan shall include the following:
1) Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

This section provides a review of the planning process followed for the development of the Pamlico Sound Regional Hazard Mitigation Plan. It consists of the following sub-sections:

- 2.1 Purpose and Vision
- 2.2 What's Changed in the Plan
- 2.3 Preparing the Plan
- 2.4 Hazard Mitigation Planning Committee
- 2.5 Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Outreach Efforts
- 2.8 Involving the Stakeholders
- 2.9 Documentation of Plan Progress

2.1 PURPOSE AND VISION

As defined by FEMA, "hazard mitigation" means any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented.

The purpose of the Pamlico Sound Regional Hazard Mitigation Plan is to identify, assess, and mitigate hazard risk to better protect the people and property within the Region from the effects of natural and human-caused hazards. This plan documents progress on existing hazard mitigation planning efforts, updates the previous plan to reflect current conditions in the Region including relevant hazards and vulnerabilities, increases public education and awareness about the plan and planning process, maintains grant eligibility for participating jurisdictions, maintains compliance with state and federal requirements for local hazard mitigation plans, and identifies and outlines strategies the Region's participating jurisdictions will use to decrease vulnerability and increase resiliency.

The Pamlico Sound Region HMPC met to discuss their vision for the Region in terms of hazard mitigation planning. The committee was asked to consider what the successful implementation of the plan would achieve, what outcomes the plan would generate, and what the Region will look like in five years as a way to brainstorm a vision statement for the plan. The HMPC developed and discussed a list of ideas that were consolidated into the following statement to guide the Region's approach to hazard mitigation:

The vision of the Pamlico Sound Regional Hazard Mitigation Plan is to establish sound public policy to protect life, property, and the quality of the natural environment; to reduce risk and prevent loss from future hazard events.

2.2 WHAT'S CHANGED IN THE PLAN

This plan is an update to the 2015 Pamlico Sound Regional Hazard Mitigation Plan, which included participation from all jurisdictions involved in this plan update: Beaufort, Carteret, Craven, and Pamlico Counties. Hyde County was also involved in the 2015 plan but is now participating within a new Region for this plan update cycle. The previous plan was approved by FEMA on June 2, 2015.

This hazard mitigation plan update involved a comprehensive review and update of each section of the existing plan and an assessment of the success of the Counties and participating municipalities in evaluating, monitoring and implementing the mitigation strategy outlined in their existing plans. Only the information and data still valid from the existing plans was carried forward as applicable into this update. The following requirements were addressed during the development of this regional plan:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Section 4.2 provides a comparison of the hazards addressed in the 2018 State of North Carolina HMP and the existing Pamlico Sound Regional plan and provides the final decision made by the HMPC as to which hazards should be included in the updated 2020 Pamlico Sound Regional Plan.

In addition to the specific changes in hazard analyses identified in Section 4.2, the following items were also addressed in this 2020 plan update:

- GIS was used, to the extent data allowed, to analyze the priority hazards as part of the vulnerability assessment.
- Assets at risk to identified hazards were identified by property type and values of properties based on North Carolina Emergency Management's IRISK Database.
- A discussion on climate change and its projected effect on specific hazards was included in each hazard profile in the risk assessment.
- The discussion on growth and development trends was enhanced utilizing 2017 American Community Survey data.
- Enhanced public outreach and agency coordination efforts were conducted throughout the plan update process in order to meet the more rigorous requirements of the 2017 CRS Coordinator's Manual, in addition to DMA requirements.

2.3 PREPARING THE PLAN

The planning process for preparing the Pamlico Sound Regional Hazard Mitigation Plan was based on DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1) Planning Process;

2) Risk Assessment;
3) Mitigation Strategy; and
4) Plan Maintenance.

Into this process, the planning consultant integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program; Pre-Disaster Mitigation Program; Community Rating System; Flood Mitigation Assistance Program; Severe Repetitive Loss Program; and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 2.1 shows how the 10-step CRS planning process aligns with the four phases of hazard mitigation planning pursuant to the Disaster Mitigation Act of 2000.

Table 2.1 – Mitigation Planning and CRS 10-Step Process Reference Table

DMA Process	CRS Process
Phase I – Planning Process	
§201.6(c)(1)	Step 1. Organize to Prepare the Plan
§201.6(b)(1)	Step 2. Involve the Public
§201.6(b)(2) & (3)	Step 3. Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4. Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5. Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6. Set Goals
§201.6(c)(3)(ii)	Step 7. Review Possible Activities
§201.6(c)(3)(iii)	Step 8. Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9. Adopt the Plan
§201.6(c)(4)	Step 10. Implement, Evaluate and Revise the Plan

In addition to meeting DMA and CRS requirements, this plan also meets the recommended steps for developing a Community Wildfire Protection Plan (CWPP). Table 2.2 below outlines the recommended CWPP process and the CRS step and sections of this plan that meet each step.

Table 2.2 – Community Wildfire Protection Plan Process Reference

CWPP Process	CRS Step	Fulfilling Plan Section
Convene decision makers	Step 1	Section 2 – HMPC
Involve Federal agencies	Step 3	Section 2 – Involving Stakeholders
Engage interested parties (such as community representatives)	Step 1, 2, and 3	Section 2 – HMPC, Involving the Public, Involving Stakeholders
Establish a community base map		Section 4 – Wildfire
Develop a community risk assessment, including fuel hazards, risk of wildfire occurrence, homes, business and essential infrastructure at risk, other community values at risk, local preparedness, and firefighting capability	Step 4 and 5	Section 4 – Wildfire Section 6 – Capability
Establish community hazard reduction priorities and recommendations to reduce structural ignitability	Step 6, 7, and 8	Section 6 – Mitigation Strategy Section 7 – Mitigation Action Plans
Develop an action plan and assessment strategy	Step 8 and 10	Section 7 – Mitigation Action Plans Section 8 – Plan Maintenance
Finalize the CWPP	Step 9	Section 9 – Plan Adoption

The process followed for the preparation of this plan, as outlined in Table 2.1 above, is as follows:

2.3.1 Phase I – Planning Process

Planning Step 1: Organize to Prepare the Plan

With the Region's commitment to participate in the DMA planning process, community officials worked to establish the framework and organization for development of the plan. An initial meeting was held with key community representatives to discuss the organizational aspects of the plan development process. The County Emergency Managers led the Region's effort to reorganize and coordinate for the plan update. Consultants from Wood Environment and Infrastructure Solutions, Inc. and Holland Consulting Planners assisted by leading the Region through the planning process and preparing the plan document.

Planning Step 2: Involve the Public

Public involvement in the development of the plan was sought using various methods, as detailed in Section 2.6.

Planning Step 3: Coordinate

The HMPC formed to develop the 2015 Plan was reconvened for this plan update. More details on the HMPC are provided in Section 2.4. Stakeholder coordination was incorporated into the formation of the HMPC and was sought through additional outreach methods. These efforts are detailed in Section 2.8.

Coordination with Other Community Planning Efforts and Hazard Mitigation Activities

In addition to stakeholder involvement, coordination with other community planning efforts was also seen as paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. The Pamlico Sound Region participating jurisdictions use a variety of planning mechanisms, such as Comprehensive Plans, subdivision regulations, building codes, and ordinances to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. As detailed in Table 2.3, the development of this plan incorporated information from existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

These and other documents were reviewed and considered, as appropriate, during the collection of data to support the planning process and plan development, including the hazard identification, vulnerability assessment, and capability assessment. The Hazard Identification and Risk Assessment can be found in Section 4 and the Capability Assessment can be found in Section 5.

Table 2.3 – Summary of Existing Studies and Plans Reviewed

Resource Referenced	Use in this Plan
Local Comprehensive Plans	Where available, each community's comprehensive plan was referenced to develop the Planning Area Profile in Section 3, with future land use maps and descriptions incorporated into community annexes. Local land use and comprehensive plans were also used to develop Mitigation Action Plans in Section 7 and were referenced in the Capability Assessment in Section 5.
Local Ordinances (Flood Damage Prevention Ordinances, Subdivision Ordinances, Zoning Ordinances, etc)	Local ordinances were referenced in the Capability Assessment in Section 5 and where applicable for updates or enforcement in Mitigation Action Plans in Section 7.

Resource Referenced	Use in this Plan
Flood Insurance Study Reports for Beaufort, Carteret, Craven, and Pamlico Counties and Incorporated Areas	FIS reports were referenced in the preparation of the flood hazard profile in Section 4.
Pamlico Sound Regional Hazard Mitigation Plan, 2015	The previous plan was referenced in compiling the Hazard Identification and Risk Assessment in Section 4 and in reporting on implementation status and developing the Mitigation Action Plans in Section 2 and Section 7, respectively.
North Carolina State Hazard Mitigation Plan, 2018	The State plan was references in compiling the Hazard Identification and Risk Assessment in Section 4.

2.3.2 Phase II – Risk Assessment

Planning Steps 4 and 5: Identify/Assess the Hazard and Assess the Problem

The HMPC completed a comprehensive effort to identify, document, and profile all hazards that have, or could have, an impact on the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. A draft of the risk and vulnerability assessment was made available on the plan website for the HMPC, stakeholders, and the public to review and comment.

The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Section 4 Risk Assessment.

2.3.3 Phase III – Mitigation Strategy

Planning Steps 6 and 7: Set Goals and Review Possible Activities

Wood and HCP facilitated brainstorming and discussion sessions with the HMPC that described the purpose and process of developing a vision for the planning process and setting planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Section 6 Mitigation Strategy.

Planning Step 8: Draft an Action Plan

A complete first draft of the plan was prepared based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7. This draft was shared for HMPC, stakeholder, and public review and comment via the plan website. HMPC, public, and stakeholder comments were integrated into the final draft for NCEM and FEMA Region IV to review and approve, contingent upon final adoption by the Counties and their participating jurisdictions.

2.3.4 Phase IV – Plan Maintenance

Planning Step 9: Adopt the Plan

To secure buy-in and officially implement the plan, the plan will be reviewed and adopted by all participating jurisdictions. Resolutions will be provided in Section 9.

Planning Step 10: Implement, Evaluate and Revise the Plan

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. Up to this point in the planning process, the HMPC's efforts have been directed at researching

data, coordinating input from participating entities, and developing mitigation actions. Section 8 Plan Maintenance provides an overview of the strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The Section also discusses incorporating the plan into existing planning mechanisms and how to continue public involvement.

2.4 HAZARD MITIGATION PLANNING COMMITTEE

As with the previous plan, this Hazard Mitigation Plan was developed under the guidance of a HMPC. The Committee's members included representatives of County and jurisdiction departments, federal and state agencies, citizens and other stakeholders.

To reconvene the planning committee, a letter was sent via email to all County, City, and Town HMPC contacts from the previous planning effort. County Emergency Managers and County Planning Directors were asked to assist in identifying new representatives where necessary. Each community was asked to designate a primary and secondary contact for the HMPC. Communities were also asked to identify local stakeholder representatives to participate on the HMPC alongside the County, City, and Town officials in order to improve the integration of stakeholder input into the plan. Table 2.4 details the HMPC members and the agencies and jurisdictions they represented. The HMPC was supported by a Working Group comprised of additional community representatives, detailed in Table 2.5.

The formal HMPC meetings followed the 10 CRS Planning Steps. Agendas, minutes, and sign-in sheets for the HMPC meetings are included in Appendix B. The meeting dates and topics discussed are summarized in Section 2.5 Meetings and Workshops. All HMPC meetings were open to the public.

The DMA planning regulations and guidance stress that to satisfy multi-jurisdictional participation requirements, each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail where within the planning area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For the Pamlico Sound Region HMPC, "participation" meant the following:

- Providing facilities for meetings;
- Attending and participating in the HMPC meetings;
- Collecting and providing requested data (as available);
- Completing the Local Capability Self-Assessment;
- Providing an update on previously adopted mitigation actions;
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan;
- Coordinating and participating in the public input process; and
- Coordinating the formal adoption of the plan by local governing bodies.

Detailed summaries of HMPC meetings are provided under Meetings and Workshops, including meeting dates, locations, and topics discussed. During the planning process, the HMPC members communicated through face-to-face meetings, email, and telephone conversations. This continued communication

ensured that coordination was ongoing throughout the entire planning process despite the fact that not all HMPC members could be present at every meeting. The Towns of Arapahoe, Bath, Bridgeton, Cove City, Dover, Indian Beach, and Trent Woods were represented by their respective County leads due to a limited local administrative capability. These jurisdictions still had representatives on the HMPC who received emails and updates about the planning process even if they were unable to attend meetings in person. Draft documents were distributed via the plan website so that HMPC members could easily access them and provide comments.

Table 2.4 – HMPC Members

Jurisdiction	Representative	Agency	Position or Title
Beaufort County			
Beaufort County	Brian Alligood	Beaufort County	County Manager
Aurora	Clif Williams	Town of Aurora	Mayor
Bath	Bubs Carson	Town of Bath	Town Admin
Belhaven	Gloria Rogers	Town of Belhaven	Town Clerk
Belhaven	Myers Williams	N/A	Citizen/Stakeholder
Belhaven	Nelson Guy	N/A	Citizen/Stakeholder
Chocowinity	Joy McRoy	Town of Chocowinity	Town Clerk/Finance Officer
Pantego	Chad Keech	Town of Pantego	Commissioner
Washington	Allen Pittman	City of Washington	Senior Building Official
Washington	Steve Fuchs	N/A	Resident
Washington	Donna Pittman	N/A	Resident
Washington Park	Denise D. Dale	Town of Washington Park	Town Clerk
Washington Park	Seth Laughlin	N/A	Resident
Washington Park	Dylan Bowen	N/A	Resident
Carteret County			
Carteret County	Gene Foxworth	Carteret County Planning	Planning Director
Carteret County	Bruce Rodgers	N/A	Planning Commission Member
Carteret County	David Heath	N/A	Planning Commission Member
Atlantic Beach	Nick Krebs	Town of Atlantic Beach	Town Planner
Atlantic Beach	Richard Porter	N/A	Resident
Atlantic Beach	Austin Waters	N/A	Resident
Beaufort	Kate Allen, CFM, CZO	Town of Beaufort	Town Planner
Beaufort	John Carter	N/A	Planning Board Member
Beaufort	Doug Doubleday	N/A	Resident
Bogue	Elizabeth Sweeney	Town of Bogue	Town Clerk/Planner
Bogue	Gregg Hartman	Carteret County Planning	Resident
Cape Carteret	Zachary Steffey	Town of Cape Carteret	Town Manager
Cape Carteret	John Ritchie	N/A	Citizen/Stakeholder
Cape Carteret	David Figowy	N/A	Citizen/Stakeholder
Cedar Point	Christopher Seaberg	Town of Cedar Point	Town Manager
Cedar Point	Josh Reilly	N/A	Resident
Cedar Point	Neil Foose	N/A	Resident
Emerald Isle	Josh Edmondson	Town of Emerald Isle	Town Planner
Emerald Isle	Chad MacAvery	N/A	Resident
Emerald Isle	Malcolm Boartfield	N/A	Resident
Indian Beach	Stewart Pickett	Town of Indian Beach	Mayor
Morehead City	Sandi Watkins	Town of Morehead City	Planning & Inspections Director

Jurisdiction	Representative	Agency	Position or Title
Morehead City	Lucine Beauchard	N/A	Planning Board Member
Morehead City	Tom Outlaw	N/A	Planning Board Chair
Newport	Robert Will	Town of Newport	Planning & Zoning Administrator
Newport	Cathy Tomon	N/A	Planning Board Chair
Newport	Dominick Spadaro	N/A	Planning Board Vice Chair
Newport	Rhonda Shinn	N/A	Planning Board Member
Peletier	Bill Norris	Town of Peletier BOC	Commissioner
Pine Knoll Shores	Kevin Reed	Town of Pine Knoll Shores	Town Planner
Craven County			
Craven County	Don Baumgardner	Craven County Planning	Planning Director
Craven County	Daniel Hill, Jr.	N/A	Planning Board Member
Craven County	Bruce Hice	N/A	Planning Board Member
Bridgeton	Rodman Williams	Town of Bridgeton	Mayor
Cove City	Dred C. Mitchell, Jr.	Town of Cove City	Mayor
Dover	John Wetherington Sr	Town of Dover	Mayor
Havelock	Katrina Marshall	City of Havelock	Planning Director
Havelock	Iris Wooliever	N/A	Resident
Havelock	Mason Morgan	N/A	Resident
New Bern	Mark Stephens	City of New Bern	City Manager
River Bend	John Kirkland	Town of River Bend	Mayor
River Bend	Bob Edwards	N/A	Resident
River Bend	Egon Lippert	N/A	Resident
Trent Woods	Mike Haber	Town of Trent Woods	Maintenance Director
Vanceboro	Beverly Drake	Town of Vanceboro	Town Clerk
Pamlico County			
Pamlico County	Tim Buck	Pamlico County Admin	County Manager
Pamlico County	Marvella Jones	N/A	Resident
Pamlico County	Paul Slobodian	N/A	Resident
Alliance	Linda Marshall	Town of Alliance	Town Clerk
Alliance	Kenny Riggs	N/A	Citizen/Stakeholder
Alliance	Sherry Riggs	N/A	Citizen/Stakeholder
Arapahoe	David Peterson	Town of Arapahoe	Town Clerk
Bayboro	Joan S. Leary	Town of Bayboro	Town Clerk/Finance Officer
Bayboro	Joan Arnette	N/A	Resident
Bayboro	Rebecca H. Ackiss	Hollowell & Hollowell	Office Manager/Legal Asst.
Grantsboro	Ray Lewis	Town of Grantsboro	Town Clerk
Mesic	Booker T. Jones	Town of Mesic	Mayor
Minnesott Beach	Carolyn Braly	Town of Minnesott Beach	Town Manager
Oriental	Diane H. Miller, MPA, ICMA-CM	Town of Oriental	Town Manager
Oriental	Dan Allen	N/A	Resident
Oriental	Martin Barrow	N/A	Resident
Stonewall	Marie Spain	Town of Stonewall	Town Clerk
Stonewall	Jim Spain	N/A	Citizen/Stakeholder
Stonewall	Irene Wright	N/A	Citizen/Stakeholder
Vandemere	Chris Venters	Town of Vandemere	Town Manager
Vandemere	James Britt	N/A	Resident
Vandemere	Danny Wooten	N/A	Resident

Table 2.5 – Working Group Members

Jurisdiction	Representative	Agency	Position or Title
Beaufort County			
Beaufort County	Carnie Hedgepeth	Beaufort County	Emergency Services Director
Beaufort County	Chris Newkirk	Beaufort Co Emergency Svcs	Operations Chief of Fire/EM
Aurora	Jeff Peed	Town of Aurora	Commissioner
Bath	James Latham	Town of Bath	Mayor
Belhaven	Lynn Davis	Town of Belhaven	Town Manager
Chocowinity	Kevin Brickhouse	Town of Chocowinity	Public Works Director
Pantego	Bobbi Jo Ricks	Town of Pantego	Town Clerk
Washington	Mike Dail	City of Washington	
Washington	Mike Weldin	City of Washington	
Washington Park	Thomas B. Richter	Town of Washington Park	Mayor
Washington Park	Wade Dale	Town of Washington Park	Commissioner
Carteret County			
Carteret County	Gregg Hartman	Carteret County Planning	
Atlantic Beach	Michelle Eitner	Town of Atlantic Beach	Planning Director
Beaufort	Kyle Garner	Town of Beaufort	Planning & Inspections Director
Cape Carteret	William McKinney	Town of Cape Carteret	Police Chief
Cedar Point	Jayne Calhoun	Town of Cedar Point	Town Clerk
Emerald Isle	Randy Martin	Town of Emerald Isle	Interim Town Manager
Indian Beach	Stewart Pickett	Town of Indian Beach	Mayor
Morehead City	Mackenzie Todd	Town of Morehead City	Planner
Newport	Angela Christian	Town of Newport	Town Manager
Peletier	Bea Cunningham	Town of Peletier	Town Clerk
Pine Knoll Shores	Brian Kramer	Town of Pine Knoll Shores	Town Manager
Craven County			
Craven County	Chad Strawn	Craven County Planning	Asst. Planning Director
Bridgeton	David Cuthrell	Town of Bridgeton	
Cove City	Sonja H Gaskins-Hill	Town of Cove City	Town Clerk
Dover	John Wetherington Sr	Town of Dover	Mayor
River Bend	Delane Jackson	Town of River Bend	Town Manager
Trent Woods	Holly Willis	Town of Trent Woods	Town Clerk
Vanceboro	Brittany Mumford	Town of Vanceboro	Asst. Town Clerk
Pamlico County			
Pamlico County	Autumn Hardison	Pamlico County EM	Operations Assistant
Alliance	Franklin Willis	Town of Alliance	Mayor
Arapahoe	David Peterson	Town of Arapahoe	Town Clerk
Bayboro	Heidi Artley	Town of Bayboro	Town Clerk Assistant
Grantsboro	Ray Poole	Town of Grantsboro	Town Council Member
Mesic	Lois M. Credle	Town of Mesic	Mayor Pro Tem
Minnesott Beach	Donna Scott	Town of Minnesott Beach	Town Clerk
Oriental	Tammy L. Cox	Town of Oriental	Deputy Finance Officer
Stonewall	Charles Alexander	Town of Stonewall	Mayor
Vandemere	Sue Britt	Town of Vandemere	Town Clerk

2.5 MEETINGS AND WORKSHOPS

The preparation of this plan required a series of meetings and workshops for facilitating discussion, gaining consensus, and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan.

Table 2.6 summarizes the key meetings and workshops held by the HMPC during the development of the plan. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency. For example, completing the Local Capability Self-Assessment or seeking approval of specific mitigation actions for their department or agency to undertake and include in their Mitigation Action Plan. These meetings were informal and are not documented here.

Public meetings are summarized in subsection 2.6.

Table 2.6 – Summary of HMPC Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kickoff	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	February 12, 2019	Craven County Cooperative Extension, 300 Industrial Drive, New Bern, NC
HMPC Mtg. #2	1) Review and update plan goals 2) Brainstorm a vision statement 3) Report on status of actions from the 2015 plan 4) Complete the capability assessment	February 28, 2019	Emerald Isle Commissioners Board, Room 7500, Emerald Drive, Emerald Isle, NC
HMPC Mtg. #3	1) Review draft Hazard Identification & Risk Assessment (HIRA) 2) Review draft goals and objectives 3) Draft Mitigation Strategies	June 20, 2019	Beaufort County Community College 5337 US Highway 264 East, Washington, NC
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	December 4, 2019	Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC

2.6 INVOLVING THE PUBLIC

An important component of any mitigation planning process is public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business, or entire planning area safer from the potential effects of hazards.

Public involvement in the development of the plan was sought using various methods including open public meetings, an interactive plan website, a public participation survey, and by making copies of draft plan documents available for public review online and at government offices. Additionally, all HMPC meetings were made open to the public. All public meetings were advertised on the plan website, which was shared on local community websites, and on local community websites, where possible. Copies of

meeting announcements are provided in Appendix B. The public meetings held during the planning process are summarized in Table 2.7.

Table 2.7 – Summary of Public Meetings

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	February 28, 2019	Emerald Isle Commissioners Board, Room 7500, Emerald Drive, Emerald Isle, NC
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	December 4, 2019	Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC

2.7 OUTREACH EFFORTS

The HMPC agreed to employ a variety of public outreach methods including established public information mechanisms and resources within the community. The table below details public outreach efforts employed during the preparation of this plan.

Table 2.8 – Public Outreach Efforts

Location	Date	Event/Message
Plan website	Ongoing	Meeting announcements, meeting materials, and description of hazards; contact information provided to request additional information and/or provide comments
Local community websites	Feb. 2019	Public Meeting #1 announcements posted
Local community websites	Feb. 2019	Link to the plan website and survey shared to expand reach
Public survey	Ongoing	Survey hosted online and made available via shareable link
Plan website - HIRA draft	6/20/2019	Draft HIRA made available for review and comment online
Plan website - Draft Plan	11/21/2019	Full draft plan made available for review and comment online
Mitigation Flyer	Ongoing	An informational flyer was made available online and at meetings

Public involvement activities for this plan update included press releases, creation of a website for the plan, a public survey, and the collection of public and stakeholder comments on the draft plan.

A public outreach survey was made available on February 12, 2019 and remained open for response until June 11, 2019. The public survey requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities to lessen the risk and impact of future hazard events. The survey is shown in Appendix B. The survey was available in hard copy at the first public meeting and online on the plan website. In total, 365 survey responses were received. The following is a list of high-level summary results and analysis derived from survey responses:

- 71% of responses were from Carteret County, 16% were from Pamlico County, 3% were from Beaufort County, and 3% were from Craven County.
- Only 5.8% of respondents say they feel not at all prepared for a hazard event; 62.9% feel somewhat prepared and 31.3% feel very prepared.
- 44% of respondents do not know where evacuation centers or storm shelters are located; however, 98.6% of respondents say they are able to evacuate or take shelter if necessary, which indicates that most people manage evacuating or taking shelter through their own resources. It is

possible that these results skew toward those with more awareness of hazard risk and resources to respond.

- 27% of respondents do not know where to get more information on hazard risk and preparedness.
- Hurricane was by far rated the most significant hazard, followed by flood, severe weather, rip current, tornado and erosion. Dam failure was rated the least significant hazard, followed by earthquake, and drought.
- Many respondents reported having taken steps to mitigate risk at home; these efforts include prevention, property protection, and preparedness measures.
- Respondents largely favored structural projects, prevention, and natural resource protection options for mitigation.

Detailed survey results are provided in Appendix B.

2.8 INVOLVING THE STAKEHOLDERS

In addition to representatives of each participating jurisdiction, the HMPC included a variety of stakeholders. Stakeholders on the HMPC included residents, planning board members, among others. Representatives from North Carolina Emergency Management also attended HMPC meetings. Input from additional stakeholders, including neighboring communities, was solicited through invitation to the public meetings and distribution of the public survey. However, if any additional stakeholders representing other agencies and organizations participated through the public survey, that information is unknown due to the anonymous nature of the survey.

2.9 DOCUMENTATION OF PLAN PROGRESS

Progress on the mitigation strategy developed in the previous plan is documented in this plan update. Table 2.9 below details the status of mitigation actions from the previous plan. More detail on actions being carried forward is provided in Section 7: Mitigation Action Plans.

Table 2.9 – Status of Previous Mitigation Actions

Jurisdiction	Completed	Deleted	Carried Forward
Beaufort County	**7**	**7**	**24**
Town of Aurora	6	7	24
Town of Bath	6	7	24
Town of Belhaven	7	7	23
Town of Chocowinity	6	7	24
Town of Pantego	6	7	24
City of Washington	7	7	23
Town of Washington Park	7	7	23
Carteret County	**8**	**3**	**21**
Town of Atlantic Beach	8	3	20
Town of Beaufort	8	3	20
Town of Bogue	8	3	20
Town of Cape Carteret	8	3	20
Town of Cedar Point	8	3	20
Town of Emerald Isle	8	3	20
Town of Indian Beach	8	3	20
Town of Morehead City	8	3	21
Town of Newport	8	3	20
Town of Peletier	8	3	17
Town of Pine Knoll Shores	8	3	20

Jurisdiction	Completed	Deleted	Carried Forward
Craven County	**6**	**1**	**17**
Town of Bridgeton	3	0	13
Town of Cove City	3	0	13
Town of Dover	2	0	12
City of Havelock	6	1	17
City of New Bern	6	1	17
Town of River Bend	6	1	17
Town of Trent Woods	4	0	14
Town of Vanceboro	3	0	13
Pamlico County	**1**	**1**	**11**
Town of Alliance	1	0	**11**
Town of Arapahoe	1	0	**11**
Town of Bayboro	1	0	**11**
Town of Grantsboro	1	0	**11**
Town of Mesic	1	0	**11**
Town of Minnesott Beach	1	0	**11**
Town of Oriental	1	0	**11**
Town of Stonewall	1	0	**11**
Town of Vandemere	1	0	**11**
Counties Total	**22**	**12**	**73**

Table 2.10 on the following pages details all completed and deleted actions from the 2015 plan.

Community capability continues to improve with the implementation of new plans, policies, and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 5: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and have proven this by reconvening the HMPC to update this multi-jurisdictional plan and by continuing to involve the public in the hazard mitigation planning process.

Moving forward, information in this plan will be used to help guide and coordinate mitigation activities and decisions for local plans and policies in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce safety hazards, health hazards, and property damage.

Table 2.10 – Completed and Deleted Actions from the 2015 Pamlico Sound Regional Hazard Mitigation Plan

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
Beaufort County				
B1	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Continue to include hazard mitigation policies in all CAMA Land Use Plan updates.	Deleted	Strategy addressed by B1.
B7	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Maintain information on county and local websites concerning location of approved shelter facilities and to ensure citizens that shelter facilities are the safest option in a major disaster event.	Completed	Strategy completed and is now in maintenance phase.
B9	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Continue to ensure adequate evacuation warning in case of major hazard event.	Deleted	Strategy addressed by B3.
B15	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Work on the five-year implementation of the plan. At the end of this five-year period, the County will undertake efforts to update this plan including the following ten (10) planning steps: 1) Organize to prepare the plan, 2) Involve the public, 3) Coordinate with other agencies, 4) Assess the hazard, 5) Assess the problem, 6) Set goals, 7) Review possible activities, 8) Draft an action plan, 9) Adopt the plan, and 10) Implement, evaluate, and revise.	Completed	Strategy completed and now required through plan implementation.
B21	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Maintain and improve the capabilities of local Geographic Information System (GIS) with respect to risk mapping and the availability of flood hazard data and other hazard information to the public.	Completed	Strategy completed and now addressed through planning process.
B22	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Continue to require a finished floor elevation certificate for all development within the Special Flood Hazard Area (SFHA) in both incorporated and unincorporated portions of the county. All elevation certificates should be submitted on an official FEMA elevation certificate. No certificate of occupancy shall be issued for any development within a defined SFHA without the submittal of the required elevation certificate. All elevation certificates shall be kept on file by the county or municipality.	Completed	Strategy completed and is now a day to day capability.

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
B25	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Maintain a map information service involving the following: 1) Provide information relating to Flood Insurance Rate Maps (FIRM) to all inquirers, including a provision of information on whether a given property is located within a flood hazard area, 2) Provide information regarding the flood insurance purchase requirement, 3) Maintain historical and current FIRMs, 4) Advertise once annually in the local newspaper the availability of FIRMs, and 5) Provide information to inquirers about local floodplain management requirements.	Completed	Strategy completed and is now a day to day capability.
B26	Beaufort County, Belhaven, Washington, Washington Park	Provide information on county/city/town websites informing the public where they can obtain information about their property's location with respect to the special flood hazard area, and where they can obtain information about the incidence of flood events and losses incurred during historic flood events.	Completed	Strategy completed; information is now provided by link on the county website to ncfloodmaps.com.
B32	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Continue to support the NC Office of Dam Safety's efforts to monitor and inspect all dams throughout the state. The county will rely on this agency to ensure that all upstream dam facilities, both public and private, are properly maintained and stable.	Completed	All dam facilities within Beaufort County are inspected and maintained in line with the NC Office of Dam Safety's maintenance schedule.
B33	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Continue to inventory and map Beaufort County's significant man-made hazards and coordinate reporting requirements, monitoring, and emergency response in accordance with the county's Emergency Operations Plan.	Deleted	Strategy addressed by B23
B34	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Provide manufactured home vendors, lenders, and buyers with information on proper construction, installation, and foundation specifications in accordance with appropriate HUD/FHA/FEMA and NC Department of Insurance requirements; provide information to the public related to wind-resistant construction methods.	Deleted	Strategy addressed by B19.
B36	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Improve monitoring of hazardous material transport at Norfolk Southern Railroad railyard facility near Chocowinity; improve communication with railroad officials and public information efforts related to this activity.	Deleted	Strategy addressed by B23.
B37	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Improve monitoring of hazardous material manufacturing, storage, and transport at PotashCorp facility and associated Norfolk Southern Railroad operations near Aurora; improve communication with corporate and railroad officials and public information efforts related to this activity.	Deleted	Strategy addressed by B23.

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
B38	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Work with citizen representatives and PotashCorp personnel to assess and improve emergency response procedures and specific mitigation actions related to the possible release of hazardous materials at the PotashCorp facility near Aurora.	Deleted	Strategy addressed by B23.
Carteret County				
CA8	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Maintain County representatives on the Hazard Mitigation Planning Committee (HMPC) to coordinate implementation and update of the Pamlico Sound Regional Hazard Mitigation Plan.	Completed	Strategy completed and is now a function of the planning process.
CA9	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Continue to work on the five-year implementation of the HMP. At the end of this five-year period, the County will undertake efforts to update the plan including the following ten (10) steps: (1) Organize to prepare the plan, (2) Involve the public, (3) Coordinate with other agencies, (4) Assess the hazard, (5) Assess the problem, (6) Set goals, (7) Review possible activities, (8) Draft an action plan, (9) Adopt the plan, and (10) Implement, evaluate, and revise.	Completed	Strategy completed and is now a function of the planning process.
CA16	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Maintain and map GIS-based data related to floodplain management and mitigation. These efforts will involve maintaining the most recent Flood Insurance Rate Maps (FIRMs), as well as GIS locations for each property either acquired or mitigated under current or prior year mitigation grant projects. Repetitive loss areas will also be mapped through this process.	Completed	Strategy completed; information is provided by link on the county website to ncfloodmaps.com.
CA17	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Continue to require a finished floor elevation certificate for all development within the Special Flood Hazard Area (SFHA) in both incorporated and unincorporated portions of the County. All elevation certificates will be submitted on an official FEMA elevation certificate. All elevation certificates shall be kept on file by the County or municipalities.	Completed	Completed; the County requires and maintains all under construction and finished construction elevation certificates in perpetuity. A digital copy of each EC is also created.

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
CA18	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Establish and/or maintain reconstruction policies that include procedures for issuance of building permits after a natural disaster.	Completed	Completed; the County has provisions in place for the issuance of building permits after a natural disaster including mobile permit offices if necessary.
CA22	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Continue to work with local real estate agencies to ensure that agents are informing clients when property for sale is located within a SFHA. The County will provide these agencies with brochures documenting the concerns relating to development located with the floodprone areas and ways that homeowners may make their home more disaster resistant to strong winds, lightning, and heavy rains.	Deleted	Strategy addressed by CA17.
CA25	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Continue to support the NC Office of Dam Safety in its efforts to monitor and inspect all dams throughout the state. The County will rely on this agency to ensure that all dam facilities, both public and private, are properly maintained and stable.	Completed	Completed; the County works with the Office of Dam Safety to carry this strategy out (day to day capability).
CA27	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	In the event of a substantial flooding event or other natural hazard occurrence, perform damage assessments in coordination with NCEM. These assessments will assist the county in determining the extent of the damage caused by the respective disaster event. This data, in conjunction with the information outlined in this plan, will be utilized as a tool for land use planning and future hazard mitigation plan updates.	Completed	Completed; general function of the County Emergency Operations Plan.
CA28	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Review all land use planning and regulatory documents pertinent to hazard mitigation in an effort to: (1) Reduce exposure to natural hazards (2) Promote resource protection (3) Encourage the use of best management practices	Deleted	This strategy is adequately addressed through other strategies included in the updated plan.
CA29	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Consider developing a hazardous materials actions plan focused on addressing the potential impacts of hazardous materials spills. Specifically, the plan will identify and address risk associated with known hazardous materials risk areas.	Deleted	Strategy addressed by CA18.

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
CA30	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Continue to enforce the NC State Building Code. Local government inspections staff will re-certify the NC State Building Code as the adopted local regulation applying to all construction activities on an annual basis. Through enforcement of the NC State Building Code, jurisdictions will work to ensure that all structures, including manufactured homes, are properly anchored to minimize potential impacts stemming from a disaster event.	Completed	Completed; the County continues to enforce the NC State Building Code with its 5 building inspectors on staff all licensed by the State of NC to perform building inspections.
Craven County				
CR3	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Continue to enforce the NC State Building Code. Local Government Inspections Staff will recertify the NC State Building Code as the adopted local regulation applying to all construction activities on an annual basis. Through enforcement of the NC State Building Code, jurisdictions will work to ensure that all structures, including manufactured homes, are properly anchored to minimize potential impacts stemming from a disaster event.	Completed	Completed; the County, as well as municipal jurisdictions providing their own building inspection services, continues to enforce the NC State Building Code. The building code will be updated as necessary to remain in line with the International Building Code.
CR4	Craven County, Bridgeton, Cove City, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Maintain and update local Flood Insurance Rate Maps (FIRMs). These maps will be reviewed and formally updated as revisions become available through the North Carolina Floodplain Mapping Program.	Completed	Strategy completed; information is provided by link on the county website to ncfloodmaps.com.
CR5	Craven County, Havelock, New Bern, River Bend	Continue to impose a two-foot freeboard requirement for all development located within a defined flood hazard area. Individual municipal jurisdictions are responsible for maintaining and enforcing their respective freeboard requirements (the County provides inspections services for some municipalities).	Completed	Completed; Craven County communities with a freeboard requirement continue to enforce this standard as follows: Havelock - 1 foot New Bern - 2 feet River Bend - 2 feet Vanceboro - 2 feet Craven County (Unincorporated) – 2 feet
CR6	Craven County, Havelock, New Bern, River Bend	Maintain all FEMA Elevation Certificates and FEMA Floodproofing Certificates for residential and non-residential structures.	Completed	Strategy completed and is now a day to day capability.
CR7	Craven County, Havelock, New Bern, River Bend, Trent Woods	Coordinate with NCDENR to enforce all NC State Erosion and Sediment Control Regulations.	Completed	Strategy completed and is now a day to day capability.
CR22	Craven County, Havelock, New Bern, River Bend	Continue to work closely with real estate agents to ensure that prospective buyers are educated about development within a flood hazard area. The County will prepare materials for dissemination to local real estate agents to assist in this education process.	Deleted	Strategy addressed by CR17.
CR23	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Continue to support the NC Office of Dam Safety in its efforts to monitor and inspect all dams throughout the state. The County will rely on this agency to ensure that all dam facilities, both public and private, are properly maintained and stable.	Completed	Completed; the County works with the Office of Dam Safety to carry this strategy out (day to day capability).

2015 Action #	Jurisdictions	Description	2019 Status	Status Comments/Explanation
Pamlico County				
P4	Pamlico County	Continue to utilize the NC Department of Corrections Community Service Program to assist and leverage efforts to snag and clear ditches and canals located throughout the County.	Deleted	This service is no longer available to the County.
P11	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Maintain and update local Flood Insurance Rate Maps (FIRMs). These maps will be reviewed and formally updated as revisions become available through North Carolina Floodplain Mapping Program. The FIRMs will be maintained in the County offices, as well as on the County website.	Completed	Strategy completed; information is provided by link on the county website to ncfloodmaps.com.

3 Planning Area Profile

This section provides an overview of the current conditions and characteristics of the Pamlico Sound Region. As Beaufort, Carteret, Craven, and Pamlico Counties collectively comprise the Pamlico Sound Region, general information for the entire region such as location, topography/geology, and climate have been combined, while more detailed information regarding history, natural functions, demographics such as population, housing, and economic characteristics, and land development trends is provided for each county and participating municipal jurisdiction. The section is organized into the following sub-sections:

- 3.1 Regional Characteristics

This regional section discusses the Region's overall location within North Carolina, as well as significant geographic, transportation, and geologic features. It also provides an overview of average annual climactic conditions, documents the presence of mapped wetlands located throughout each of the participating County jurisdictions, and outlines the presence of threatened and endangered species.

- 3.2 Beaufort County Characteristics
- 3.3 Carteret County Characteristics
- 3.4 Craven County Characteristics
- 3.5 Pamlico County Characteristics

Each of the county profiles contains the following information: an overview of each county's hydrology, a discussion of parks/open space; demographic data for all participating jurisdictions including total population counts, racial composition, housing characteristics, and employment and industry statistics; a listing of all properties within each participating County jurisdiction that have been listed on the National Register of Historic Places; and a brief overview of development trends throughout each participating jurisdiction with information on parcel development and pre-FIRM property counts where available.

3.1 REGIONAL CHARACTERISTICS

The Pamlico Sound Region is located in eastern North Carolina's Coastal Plain, as shown in Figure 3.1. The Coastal Plain forms the eastern edge of North Carolina, making up about 45% of the state's total land area. It is bounded on the east by the Atlantic Ocean and on the west by the Fall Line, a broad zone where the soft rocks of the Coastal Plain meet the hard crystalline rocks of the Piedmont. The Coastal Plain varies in width from 100 to 140 miles. It rises gently in elevation to the west, from about sea level at the coast to as much as 500 feet in the Sand Hills district.

An abundance of water courses surround the area, with the Pamlico and Pungo Rivers in Beaufort County and the Neuse River between Craven and Pamlico counties. Additionally, there are abundant fishing grounds located within the Atlantic Ocean adjacent to Carteret County. The area is also rich in wildlife refuges, with the Cedar Island National Wildlife Refuge located in Carteret County. The area's countryside is enhanced by streams and brooks, natural lakes and ponds, and swampy woodlands.

The North Carolina Railroad, Norfolk-Southern, and Carolina Coastal Railways run through Beaufort, Carteret, and Craven Counties. Roadway transportation for the area is provided by US Route 17 (running in a north-south direction), 70 and 264 (east-west), and State Highways 24, 32, 33, 43, 45, 55, 58, 92, 94, 99, 304, and 306. General aviation airports in the area include Warren Field in Washington, NC, and the Michael J. Smith Field in Beaufort, NC. Air carrier service is provided by Coastal Carolina Regional Airport in New Bern. The region is also home to two military air fields: Marine Corps Air Station Cherry Point in Havelock and Marine Corps Auxiliary Landing Field Bogue on Bogue Sound.

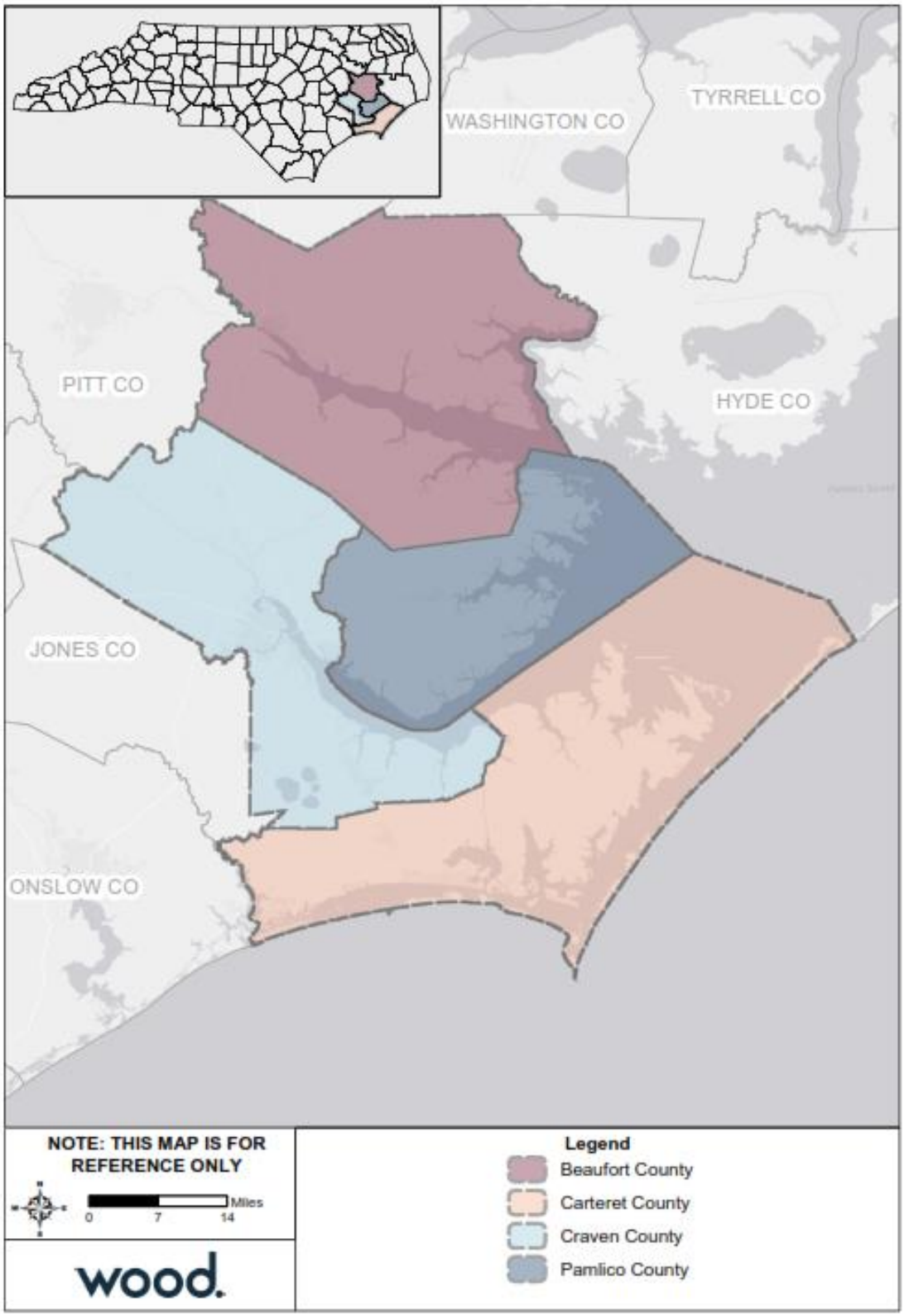
The Pamlico Sound Region comprises 3,640 square miles of land area, as detailed by participating jurisdiction in Table 3.1.

Table 3.1 – Pamlico Sound Region Total Land Area

Jurisdiction	Total Land Area (Square Miles)
Beaufort County	**958.0**
Aurora	1.0
Bath	0.9
Belhaven	2.1
Chocowinity	1.0
Pantego	0.8
Washington	9.0
Washington Park	0.3
Unincorporated Area	942.9
Carteret County	**1,341.0**
Atlantic Beach	2.7
Beaufort	5.6
Bogue	3.0
Cape Carteret	2.7
Cedar Point	2.2
Emerald Isle	5.1
Indian Beach	1.5
Morehead City	8.5
Newport	7.7
Peletier	3.7
Pine Knoll Shores	2.5
Unincorporated Area	1,295.80
Craven County	**774.0**
Bridgeton	1.5
Cove City	0.6
Dover	0.9
Havelock	17.6
New Bern	29.7
River Bend	2.7
Trent Woods	3.4
Vanceboro	1.7
Unincorporated Area	715.9
Pamlico County	**567.0**
Alliance	2.0
Arapahoe	2.2
Bayboro	1.5
Grantsboro	0.7
Mesic	1.2
Minnesott Beach	1.5
Oriental	1.4
Stonewall	2.0
Vandemere	1.6
Unincorporated Area	552.9

Source: County Profiles - Wikipedia.

Figure 3.1 – Pamlico Sound Region Location Map



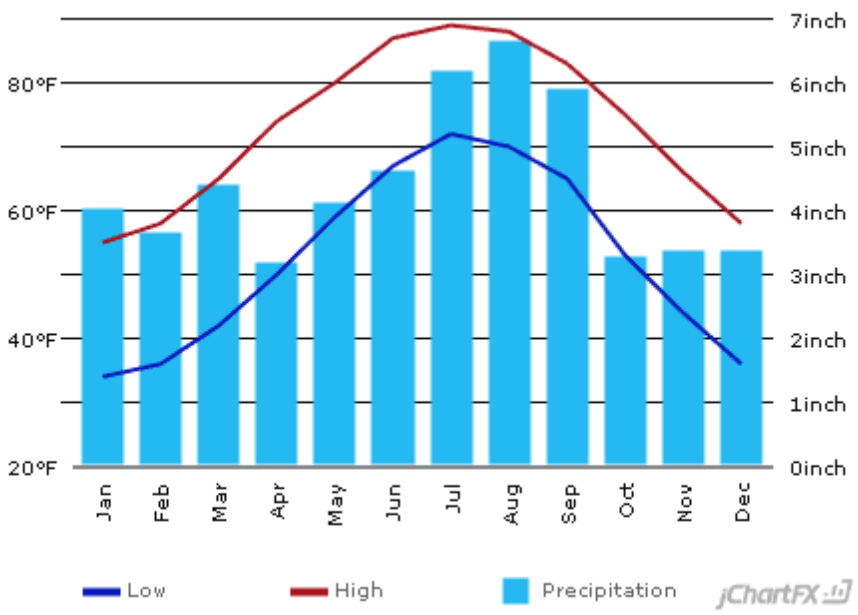
Source: U.S. Census Bureau

The Pamlico Sound Region is hot and humid in summer, but the coast is frequently cooled by sea breezes. Winter is cool with occasional brief cold spells. Afternoon thunderstorms are the main form of precipitation during the summer, with most summer precipitation occurring in July and August. Precipitation is generally adequate for all crops, and the region benefits by a lengthy growing season.

The average annual maximum temperature is 72.3 degrees F., and the average minimum temperature is 52 degrees F. In winter, the average daily minimum temperature is 35.2 degrees F. In summer, the average daily maximum temperature is 86.8 degrees F. Rainfall is usually well distributed throughout the year, with a peak in July through September and an average annual precipitation of 52.64 inches. The average seasonal snowfall is about 2.6 inches.

Figure 3.2 shows the average monthly temperature and precipitation for a New Bern weather station, which approximates temperature and precipitation of the Region.

Figure 3.2 – Average Monthly Precipitation



Source: NOAA

Wetlands

According to data from the U.S. Fish and Wildlife Service's National Wetlands Inventory, there are approximately 520,551 acres of wetlands in the Region. Wetlands areas are shown by type in each county's annex. Table 3.2 provides a summary of wetland coverage within each County.

Table 3.2 – Pamlico Sound Region Wetlands Acreage

County	Wetland Acreage	% of Total County Acreage
Beaufort County	100,485	18.0%
Craven County	175,629	35.5%
Carteret County	143,952	16.8%
Pamlico County	100,485	27.7%
Total	**520,551**	--

Source: U.S. Fish & Wildlife Service, National Wetlands Inventory

Natural and Beneficial Wetland Functions: The benefits of wetlands are hard to overestimate. They provide critical habitat for many plant and animal species that could not survive in other habitats. They are also critical for water management as they absorb and store vast quantities of storm water, helping reduce floods and recharge aquifers. Not only do wetlands store water like sponges, they also filter and clean water as well, absorbing toxins and other pollutants.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. The Pamlico Region has 21 species that are listed with the U.S. Fish and Wildlife Services. Table 3.3 below lists the species identified as threatened, endangered, or other classification.

Table 3.3 – Pamlico Sound Region Threatened and Endangered Species

Group	Common Name	Scientific Name	Federal Status	Counties Identified
Amphibians	Neuse River waterdog	Necturus lewisi	Under Review	B, Cr
Birds	Red-cockaded woodpecker	Picoides borealis	Endangered	B, Ca, Cr, P
Birds	Red knot	Calidris canutus rufa	Threatened	B, Ca, Cr, P
Birds	Piping Plover	Charadrius melodus	Threatened	Ca
Birds	Roseate tern	Sterna dougallii dougallii	Endangered	Ca
Clams	Tar River spinymussel	Elliptio steinstansana	Endangered	B
Clams	Dwarf wedgemussel	Alasmidonta heterodon	Endangered	B
Clams	Atlantic pigtoe	Fusconaia masoni	Proposed Threatened	B
Fishes	Carolina madtom	Noturus furiosus	Under Review	Cr
Flowering Plants	Sensitive joint-vetch	Aeschynomene virginica	Threatened	B, Cr
Flowering Plants	Seabeach amaranth	Amaranthus pumilus	Threatened	Ca
Flowering Plants	Rough-leaved loosestrife	Lysimachia asperulaefolia	Endangered	B, Ca, Cr, P
Mammals	West Indian Manatee	Trichechus manatus	Threatened	B, Ca, Cr, P
Mammals	Red wolf	Canis rufus	Experimental Population, Non-Essential	B
Mammals	Northern Long-Eared Bat	Myotis septentrionalis	Threatened	B, Ca, Cr
Reptiles	American alligator	Alligator mississippiensis	Similarity of Appearance (Threatened)	Ca, Cr, P
Reptiles	Hawksbill sea turtle	Eretmochelys imbricata	Endangered	B, Ca, P
Reptiles	Leatherback sea turtle	Dermochelys coriacea	Endangered	B, Ca, Cr, P
Reptiles	Loggerhead sea turtle	Caretta caretta	Threatened	Ca
Reptiles	Kemp's ridley sea turtle	Lepidochelys kempii	Endangered	B, Ca, P
Reptiles	Green sea turtle	Chelonia mydas	Threatened	B, Ca, Cr, P

Source: U.S. Fish & Wildlife Service
Note: B = Beaufort, Ca = Carteret, Cr = Craven, P = Pamlico

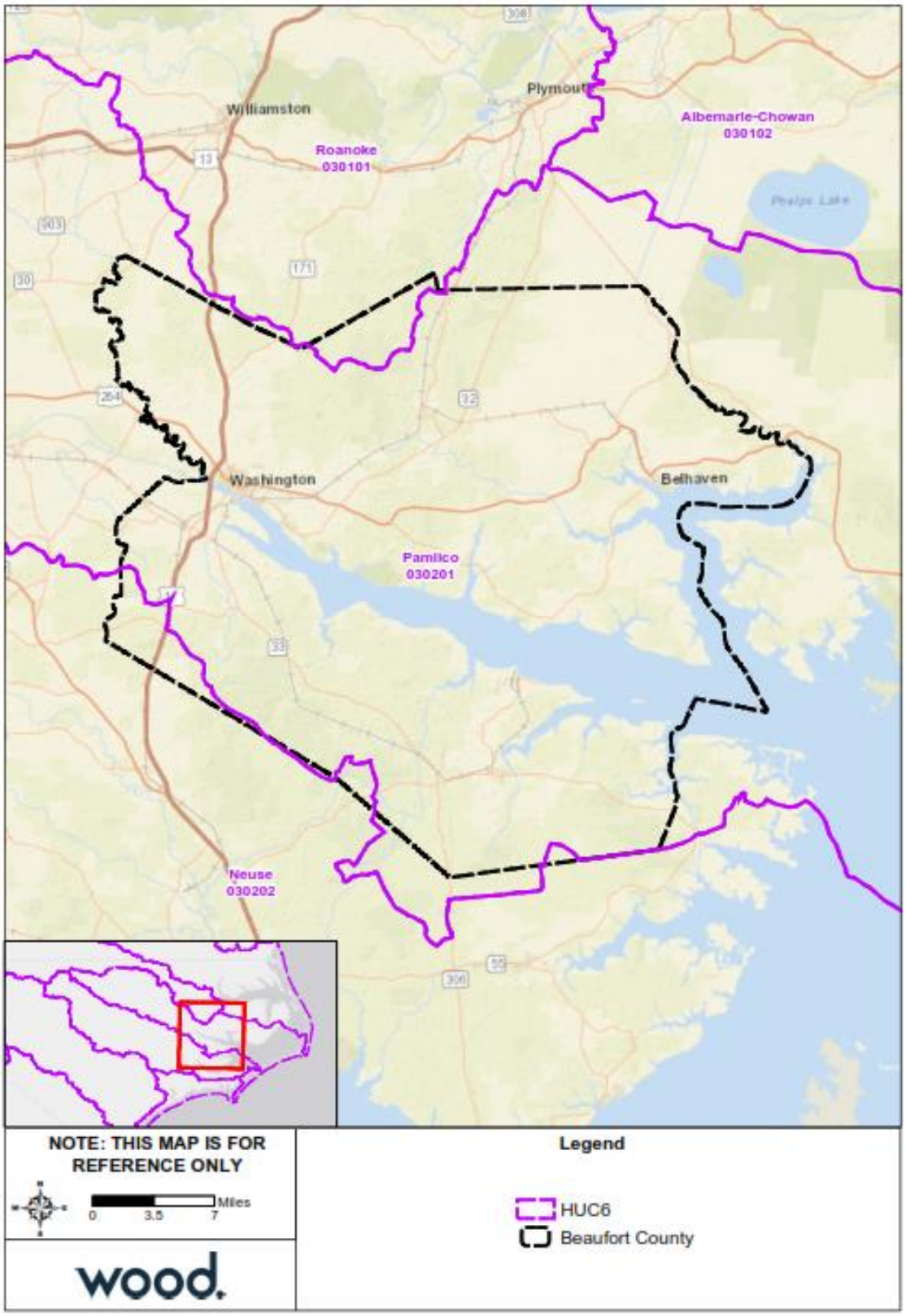
3.2 BEAUFORT COUNTY

3.2.1 Hydrology

Nearly all of Beaufort County falls within the Pamlico River Basin. Roughly two percent of the County's northern extent falls within the Roanoke River Basin and a little less than four percent of the County's southwestern extent falls within the Neuse River Basin. A detailed overview of the Region's River Basin and boundaries is provided in Figure 3.3. The following provides a summary of each River Basin relevant to Beaufort County's jurisdiction:

- **Pamlico River Basin:** The Pamlico River Basin is the fourth largest river basin in North Carolina and is one of only four river basins whose boundaries are located entirely within the state. The Tar River originates in north central North Carolina in Person, Granville and Vance counties and flows southeasterly until it reaches tidal waters near Washington and becomes the Pamlico River and empties into the Pamlico Sound. The entire basin is classified as Nutrient Sensitive Waters (NSW).
- **Roanoke River Basin**: The Roanoke River basin extends from its source in the Blue Ridge Mountains of Virginia to the Albemarle Sound in North Carolina, encompassing mountainous, piedmont, and coastal topography as it flows generally east-southeastward. Its five subbasins constitute approximately 3,500 square miles of drainage area and approximately 2,400 miles of streams and rivers in North Carolina, and contains diversity with classified trout streams in the western portion and swamp classified waters in the eastern portion. Seventeen counties and 42 municipalities are within the NC portion of the basin.
- **Neuse River Basin:** The Neuse River Basin is one of 17 basins designated for planning purposes in North Carolina. It lies entirely within the state. With a drainage area of 6,235 square miles, it is the third largest river basin in North Carolina. The headwater streams merge in Falls Lake Reservoir to form the Neuse River. Below Falls Lake Reservoir the river and its tributary streams flow through the broad flat terrain of the Coastal Plain. The low gradients of the Coastal Plain slow the river as it continues to flow southeasterly toward New Bern, where it changes character. The freshwater flowing downstream becomes brackish as it merges with the tidally influenced saltwater of the estuary and flows into Pamlico Sound.

Figure 3.3 – Beaufort County, HUC6 River Basins



Source: National Hydrology Dataset

3.2.2 Parks and Open Space

There are several parks located throughout Beaufort County, both within unincorporated portions of the County as well as participating municipalities. Additionally, Goose Creek State Park is located within the County.

Goose Creek State Park is a North Carolina State Park near Washington, North Carolina. It covers 1,672 acres just off of the Pamlico Sound. Goose Creek State Park is home to a wide variety of wildlife that make their homes in the extensive salt water marshes, inlets and creeks on the northern side of the sound. Goose Creek State Park is open for year-round passive and active recreation.

The following provides a listing of parks located in Beaufort County:

- Havens Gardens – 1001 Park Drive, Washington, NC
- Off Leash Dog Park – Corner of 4th and Brown Streets, Washington, NC
- Festival Park – 119 East Water Street, Washington, NC
- Belhaven Waterfront – East Water Street, Belhaven, NC
- Bonner's Point – Front and Main Streets, Bath, NC
- Beebe Memorial Park – 1101 North Bridge Street, Washington, NC
- Veterans Park – 404 East Third Street, Washington, NC

3.2.3 Demographics

Population Total

Beaufort County, as well as each participating jurisdiction, have experienced periods of population growth since the 2000 census. Growth within the Unincorporated Areas of the County has occurred at a rate of 5.9% since the year 2000, while municipalities experienced overall growth of 3.8% over the same period. Growth has been steady countywide with the exception of several municipalities which have experienced substantial population increases including Chocowinity (18.3%), Pantego (82.9%), and Washington Park (29.1%). The only communities that experienced a decline in population between the years of 2000 and 2017 are the Town of Bath and the Town of Washington Park. Figure 3.4 provides an overview of region-wide population density as of 2017 as reported by the American Community Survey.

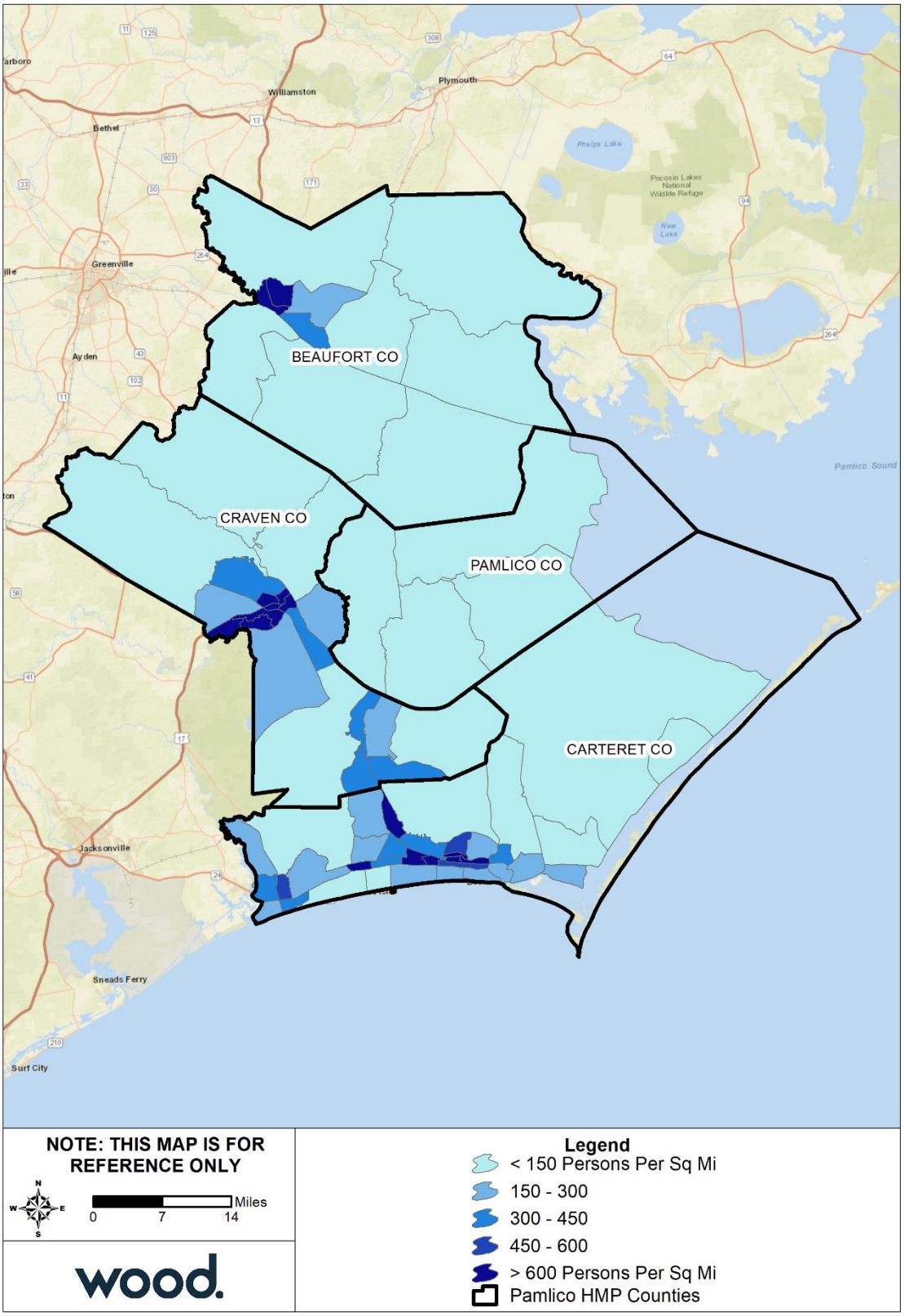
Table 3.4 provides a breakdown of total population for Beaufort County and the participating municipalities for the years 2000, 2010, and 2017.

Table 3.4 – Beaufort County Total Population

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Aurora	583	520	591	-10.8%	13.7%	1.4%
Bath	275	249	251	-9.5%	0.8%	-8.7%
Belhaven	1,968	1,688	1,997	-14.2%	18.3%	1.5%
Chocowinity	733	820	867	11.9%	5.7%	18.3%
Pantego	170	179	311	5.3%	73.7%	82.9%
Washington	9,619	9,477	9,721	-1.5%	2.6%	1.1%
Washington Park	440	451	432	2.5%	-4.2%	-1.8%
Municipalities	**13,788**	**13,384**	**14,170**	**-2.9%**	**6.9%**	**2.8%**
Unincorporated Areas	31,170	34,375	33,146	10.3%	-3.6%	6.3%
Total	**44,958**	**47,759**	**47,316**	**6.2%**	**-0.9%**	**5.2%**

Source: US Census Bureau American Community Survey; NC State Demographer

Figure 3.4 – Pamlico Sound Region Population Density



Source: American Community Survey 2013-2017 5-Year Estimates

Growth Trends

Table 3.5 provides population forecast through the year 2050 for Beaufort County, as well as all participating municipal jurisdictions. These forecasts are based on established tends between the years 2000 and 2017. According to these estimates, Beaufort County overall is expected to increase in population at a rate of 10.2% through 2050 (a total of 1,459 individuals). The most substantial increase for the County's municipalities is expected to be the Town of Pantego at a rate of 161% (152 individuals) over the same period.

Table 3.5 – Beaufort County Population Projections, 2017-2050

Jurisdiction	2017	2020	2030	2040	2050	% Change 2017-2050
Aurora	591	592	597	602	607	2.7%
Bath	251	247	234	221	208	-16.9%
Belhaven	1,997	2,002	2,020	2,037	2,054	2.9%
Chocowinity	867	895	988	1,081	1,175	35.5%
Pantego	311	357	508	660	812	161%
Washington	9,721	9,739	9,800	9,860	9,921	2.1%
Washington Park	432	431	426	421	417	-3.5%
Municipalities	**14,170**	**14,239**	**14,470**	**14,701**	**14,932**	**5.4%**
Unincorporated Areas	33,146	33,517	34,753	35,989	37,225	12.3%
Total	**47,316**	**47,754**	**49,214**	**50,674**	**52,133**	**10.2%**

Source: US Census Bureau American Community Survey and HCP, Inc.

Racial Demographics

The overall Beaufort County population is predominantly Caucasian comprising 71.2% of citizens, while most of the remaining population is African-American (26.5%). Overall, Beaufort County has a Hispanic/Latino population of 7.6%. Municipalities boasting the largest Hispanic population throughout the County include the City of Washington (12.0%) and the Town of Pantego (11.9%).

According to the American Community Survey, the 2017 median age within Beaufort County was 45.4 years. Approximately 76% of the County's population is over the age of eighteen, while 47% is male and 53% is female. Table 3.6 provides a summary of racial composition for Beaufort County, as well as all participating municipal jurisdictions.

Table 3.6 – Beaufort County Racial Composition

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Aurora	40.6%	56.7%	0.0%	0.0%	2.7%	0.5%
Bath	99.2%	0.0%	0.0%	0.0%	0.8%	0.0%
Belhaven	52.5%	46.5%	0.0%	0.0%	0.1%	9.6%
Chocowinity	62.3%	29.5%	0.0%	2.0%	6.2%	7.6%
Pantego	79.7%	18.6%	0.0%	1.0%	0.6%	11.9%
Washington	53.0%	43.3%	0.4%	1.6%	1.7%	12.0%
Washington Park	97.4%	0.2%	0.4%	2.1%	0.0%	9.3%
Beaufort County	**71.2%**	**26.5%**	**0.2%**	**0.7%**	**1.4%**	**7.6%**

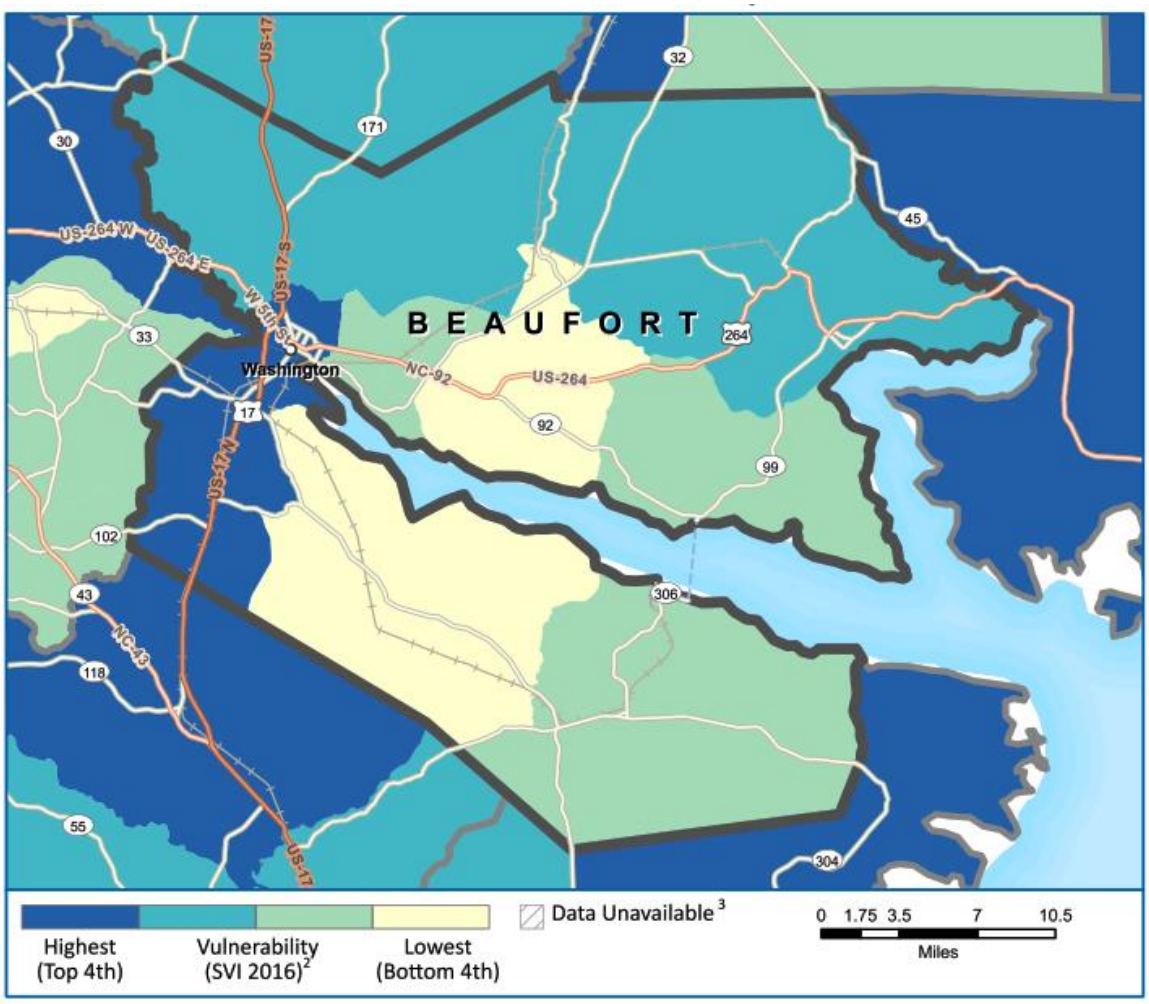
*Other races includes American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Social Vulnerability

Figure 3.5 below displays social vulnerability information for Beaufort County by census tract according to 2016 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the County and municipal jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Overall, Beaufort County has a fairly low SVI index. Central portions of the County have the lowest SVI, while portions of the County within and adjacent to the City of Washington have a much higher SVI than the County overall. The areas around the City of Washington have a much higher development density, higher dollar value per acre and access to services than other portions of Beaufort County.

Figure 3.5 – Beaufort County Social Vulnerability Index



3.2.4 Housing Characteristics

According to the American Community Survey, there were approximately 25,773 housing units in Beaufort County as of 2017. This figure marks a 4.4%, or 1,085 unit, increase since 2010 for unincorporated portions of Beaufort County. Although the County's housing unit growth has been somewhat modest,

several County municipalities have experienced a much more rapid increase in their housing stock. Projected housing unit counts have increased by roughly 33% in Aurora, 44% in Belhaven, 47% in Chocowinity, and 53% in Washington over the same period.

Throughout Beaufort County, the housing is predominantly comprised of owner occupants (70.8%). This percentage is generally characteristic of all municipal jurisdictions as well, with the exception of Washington, Belhaven, and Chocowinity which maintain an owner occupancy rate closer to 50%. This factor is important in regards to mitigation and post disaster recovery because homeownership directly correlates to the long term maintenance and flood proofing of property, as well as the eligibility for funding of impacted units following a flooding event associated with nor'easters and tropical storms/hurricanes.

In terms of vulnerability associated with natural hazard events such as tropical storms, hurricanes, and tornadoes, roughly 26% of the Beaufort County housing stock is comprised of manufactured homes, which is much higher than the state overall (13%). The prevalence of manufactured housing poses a unique threat regarding both sustainability, as well as emergency response with defined flood hazard areas.

Table 3.7 below provides a summary of housing characteristics for Beaufort County, as well as participating municipal jurisdictions.

Table 3.7 – Beaufort County Housing Characteristics

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Aurora	315	354	12.4%	67.2%	32.8%
Bath	176	190	7.9%	90.4%	9.6%
Belhaven	940	1,134	20.6%	56.2%	43.8%
Chocowinity	393	482	22.6%	52.8%	47.2%
Pantego	88	141	60.3%	77.5%	22.5%
Washington	4,754	4,811	1.2%	47.2%	52.8%
Washington Park	220	279	26.8%	84.2%	15.8%
Beaufort County	**24,688**	**25,773**	**4.4%**	**70.8%**	**29.2%**

Source: US Census Bureau American Community Survey.

3.2.5 Wages, Employment and Industry

The 2017 American Community Survey indicates that the median household income for Beaufort County was $41,101, which is over 22% lower than the state's median household income ($50,320). Approximately 14.3% of the population is considered to be living below the poverty level. Moreover, 24.2% of people under 18 years of age are living below the poverty level.

Within Beaufort County, approximately 49.3% of the population is considered to be in the labor force. This is generally characteristic of all participating municipal jurisdictions as well. Throughout Beaufort County, including all municipal jurisdictions, the percentage of the population currently employed is at or above 50% with the exception of Aurora (32.5%), Bath (41.6%), and Belhaven (43.0%). According to the American Community Survey, the unemployment rate for Beaufort County overall was 9.0%. Additionally, as of 2017 approximately 13% of households throughout Beaufort County relied on food stamps/SNAP benefits.

The following tables provides a summary of key economic indicators and population employed by industry for both incorporated and unincorporated portions of Beaufort County.

Table 3.8 – Beaufort County Key Economic Indicators

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Aurora	196	32.5%	7.1%	60.5%	17.9%
Bath	99	41.6%	0.0%	58.4%	0.0%
Belhaven	799	43.0%	5.3%	51.7%	11.0%
Chocowinity	396	52.6%	2.9%	44.5%	5.3%
Pantego	153	62.8%	3.5%	33.8%	5.2%
Washington	4,095	45.9%	8.5%	45.6%	15.6%
Washington Park	311	62.2%	1.6%	36.1%	2.6%
Beaufort County	**20,945**	**49.3%**	**4.9%**	**45.8%**	**9.0%**

Source: US Census Bureau American Community Survey.

Table 3.9 – Beaufort County Employment by Industry

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Aurora	22.4%	18.6%	29.2%	19.3%	10.6%
Bath	42.4%	17.2%	29.3%	2.0%	9.1%
Belhaven	24.9%	17.0%	23.3%	13.8%	21.0%
Chocowinity	20.8%	18.9%	34.4%	8.5%	50.0%
Pantego	39.3%	10.3%	16.6%	20.0%	13.8%
Washington	33.9%	25.9%	18.0%	8.4%	13.9%
Washington Park	44.2%	11.2%	28.1%	9.9%	6.6%
Beaufort County	31.5%	17.4%	20.8%	14.1%	16.1%

Source: US Census Bureau American Community Survey.

The top industries in Beaufort County are management, business, science and arts; sales and office industries; and service. Top employers across the County include:

- Beaufort County Schools
- PCS Phosphate Company, Inc.
- Vidant Medical Center
- Walmart Associates, Inc.
- Flanders Airpure, NC Division
- County of Beaufort
- Austin Maintenance and Construction
- City of Washington
- Beaufort County Community College
- Food Lion

3.2.6 Historic Properties

As of May 2019, Beaufort County had 19 listings on the National Register of Historic Places. This list includes 15 Historic Structures and 4 Historic Districts. Presence on the National Register signifies that these structures have been determined to be worthy of preservation for their historical or cultural values. The following provides a listing of all Nationally Registered Properties in Beaufort County:

- Bath Historic District (Bath) – 2/26/1970

- Bath School (Bath) – 1/30/2008
- Bonner House (Bath) – 2/26/1970
- Palmer-Marsh House (Bath) – 2/26/1970
- St. Thomas Episcopal Church (Bath) – 11/20/1970
- Belhaven City Hall (Belhaven) – 1/27/1981
- Belhaven Commercial Historic District (Belhaven) – 4/24/2015
- Ware Creek School (Blounts Creek) – 12/6/1996
- Trinity Cemetery (Chocowinity) – 8/19/2011
- Belfont Plantation House (Latham) – 12/12/1976
- Pantego Academy (Pantego) – 10/25/1984
- Bank of Washington, West End Branch (Washington) – 2/18/1971
- Beaufort County Courthouse (Washington) – 3/31/1971
- Bowers-Trip House (Washington) – 4/1/1999
- North Market Street Historic District (Washington) – 10/25/2011
- Rosedale (Washington) – 4/29/1982
- US Army Gunboat Picket (Screw Steamer) (Washington) – 8/24/2018
- Washington Historic District (Washington) – 2/9/1979
- Zion Episcopal Church (Washington) – 8/16/2000

3.2.7 Land Development Trends

Throughout Beaufort County, approximately 53% of parcels are currently developed. Of this 53%, roughly 30% were developed prior to July 8, 1977, Beaufort County's initial FIRM date. This percentage approximates the number of structures that were built prior to the establishment of required minimum standards aimed at protecting property from damages associated with flooding events.

Table 3.10 provides an overview of developed and undeveloped properties located throughout Beaufort County. A majority of development is focused within the County's municipal areas; however, the County is also home to a burgeoning agricultural industry. Aside from agricultural uses and urbanized growth, development is centralized along key highway corridors.

Table 3.10 – Beaufort County Developed and Undeveloped Parcel Counts

Jurisdiction	Developed Parcels	Undeveloped Parcels	Pre-Firm Buildings	% Developed Pre-Firm
Aurora	298	155	177	59.4%
Bath	231	73	139	60.2%
Belhaven	1,018	587	489	48.0%
Chocowinity	339	119	221	65.2%
Pantego	111	59	66	59.5%
Washington	4,125	945	2,592	62.8%
Washington Park	220	59	181	82.3%
Beaufort County	**19,759**	**17,316**	**5,985**	**30.3%**

Source: HCP, Inc., Beaufort County Tax Office.
Note: A more detailed methodology for identifying pre-FIRM structures was employed for the IRISK database and is described in Section 4.

Detailed summaries of future land development trends, including Future Land Use Maps, are provided in the community annexes.

3.3 CARTERET COUNTY

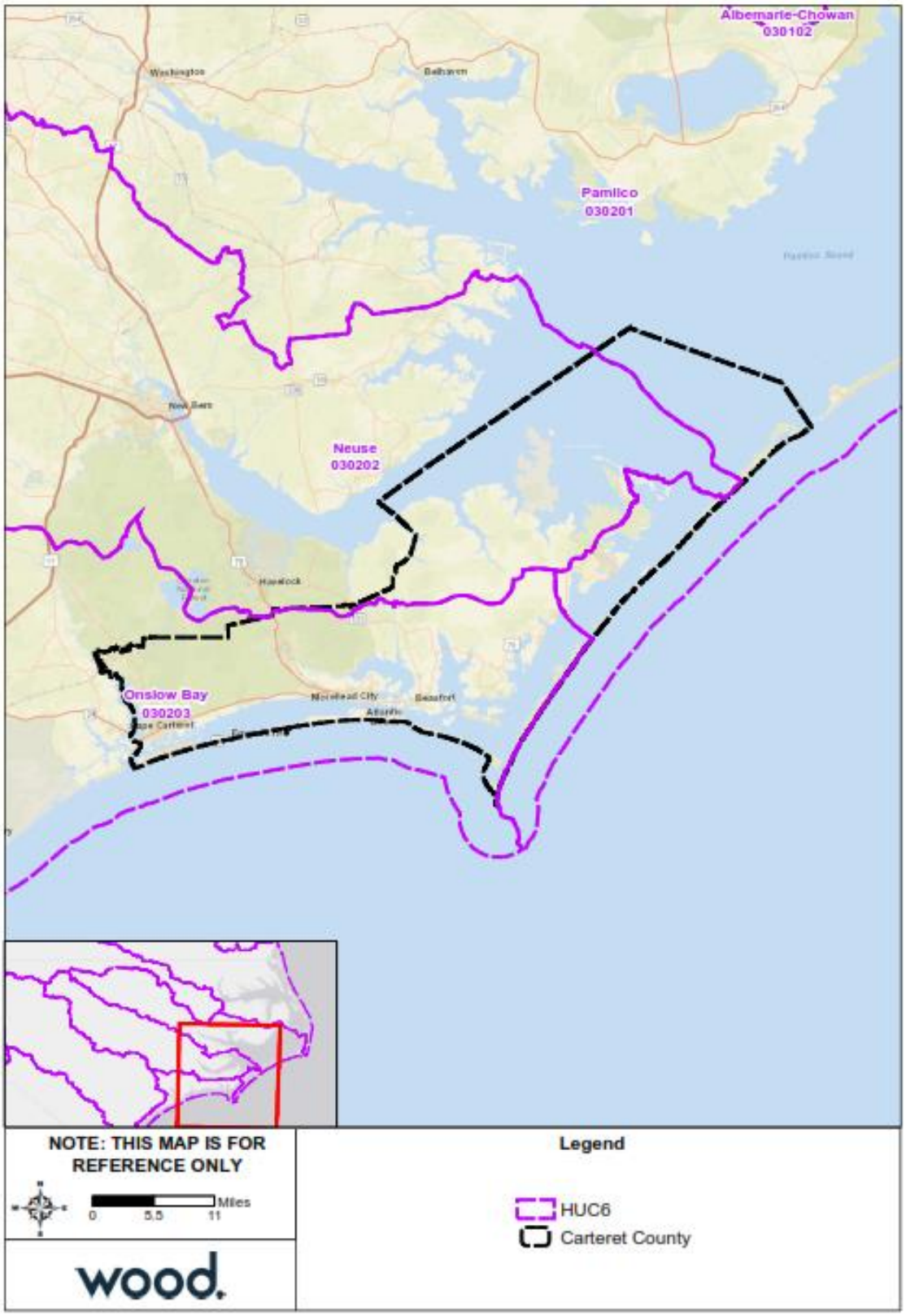
3.3.1 Hydrology

Parts of three river basins are found in Carteret County: the Onslow Bay River Basin, the Neuse River Basin, and the Pamlico River Basin, as shown in Figure 3.6. The Onslow Bay Basin encompasses most of the populated land area whereas the Neuse Basin encompasses undeveloped, agricultural, and sparsely populated land. A small area of the Pamlico Sound is part of the Pamlico River Basin portion of the County.

The following provides a summary of each river basin:

- **Onslow Bay River Basin:** The Onslow Bay Basin drains 910 square miles of the North Carolina Coastal Plain and includes the barrier islands from Browns Inlet to Ocracoke Inlet. The basin encompasses the drainage areas of three separate rivers, the White Oak River, the Newport River, and the North River. The basin also includes the waters of Bogue Sound and Core Sound. About 45% of the area of the basin is classified as water by the 1997 Natural Resource Inventory. An additional 40% of the basin is forested, with much of it being in the Croatan National Forest.
- **Neuse River Basin:** The Neuse River originates in north central North Carolina in Person and Orange counties and flows southeasterly until it reaches tidal waters near Streets Ferry upstream of New Bern. At New Bern, the river broadens dramatically and changes from a free-flowing river to a tidal estuary that eventually flows into the Pamlico Sound. The Neuse River basin is the third largest river basin in North Carolina (6,235 square miles) and is one of only four major river basins whose boundaries are located entirely within the state. There are 3,389 freshwater stream miles, 17,902 acres of freshwater reservoirs and lakes, 143 saltwater stream miles, and 370,779 estuarine/saltwater acres in the Neuse River basin. There are also numerous miles of unmapped small perennial, intermittent and ephemeral streams. Extensive wetland communities are also found in the lower Neuse River basin. The Neuse River basin encompasses all or portions of 18 counties and 77 municipalities.
- **Pamlico River Basin:** The Tar-Pamlico River Basin is the fourth largest river basin in North Carolina and is one of only four river basins whose boundaries are located entirely within the state. The Tar River originates in north central North Carolina in Person, Granville and Vance counties and flows southeasterly until it reaches tidal waters near Washington and becomes the Pamlico River and empties into the Pamlico Sound. The entire basin is classified as Nutrient Sensitive Waters (NSW).

Figure 3.6 – Carteret County, HUC6 River Basins



Source: National Hydrology Dataset

3.3.2 Parks and Open Space

There are several parks located throughout Carteret County, both within unincorporated portions of the County, as well as within participating municipalities. Additionally, the Croatan National Forest is located within the County.

The Croatan National Forest is one of four National Forests in North Carolina and the only true coastal forest in the East. The Croatan National Forest's 160,000 acres have pine forests, saltwater estuaries, bogs and raised swamps called pocosins. Bordered on three sides by tidal rivers and the Bogue Sound, the forest is defined by water.

All this water provides a variety of recreation and diversity of wildlife- from deer, black bears and turkeys to wading birds, ospreys and alligators. Canoeing and fishing are popular on blackwater creeks and saltwater marshes. The Croatan is also home to the carnivorous Venus fly-trap, sunder and pitcherplant.

The following provides a listing of parks and facilities located throughout Carteret County:

- Western Park Community Center (Cedar Point)
- Fort Benjamin Recreation Center (Newport)
- Western Park (Cedar Point)
- Salter Path Park (Salter Path)
- Salter Path Beach Access (Pine Knoll Shores)
- Fort Benjamin Park (Newport)
- Swinson Park (Morehead City)
- Radio Island Beach Access (Morehead City)
- West Beaufort Beach Access (Beaufort)
- Harkers Island Beach Access (Harkers Island)
- Freedom Park (Beaufort)
- Marshallburg Picnic Area (Marshallburg)
- Eastern Smyrna Park (Smyrna)
- Straits Fishing Pier (Beaufort)
- Mariners Park (Sea Level)
- South River Park (Beaufort)

3.3.3 Demographics

Population Total

The total population of Carteret County according to the 2017 American Community Survey was 68,699 persons. Overall, County population growth has been slow dating back to census year 2000. Over roughly the last two decades, unincorporated portions of the County have increased in population by roughly 10.7%. Although this growth has been slow but steady, municipal population growth has been rapid, especially in relation to barrier-island and coastal communities. From the years 2000 to 2017, Cape Carteret (82.6%), Cedar Point (86.8%), Indian Beach (145.3%), Newport (38.3%), and Peletier (69.0%) have all experienced drastic increases in population. The only communities showing negative growth over this same period were Atlantic Beach (-1%) and Pine Knoll Shores (-7.5%). It should be noted; however, that growth in Atlantic Beach has generally been flat over this 17-year period. Figure 3.4 in Section 3.2 provides an overview of region-wide population density as of 2017 as reported by the American Community Survey.

Table 3.11 provides a breakdown of total population for Carteret County and the participating municipalities for the years 2000, 2010, and 2017.

Table 3.11 – Carteret County Total Population

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Atlantic Beach	1,781	1,495	1,763	-16.1%	17.9%	-1.0%
Beaufort	3,771	4,039	4,170	7.1%	3.2%	10.6%
Bogue	590	684	668	15.9%	-2.3%	13.2%
Cape Carteret	1,214	1,917	2,217	57.9%	15.6%	82.6%
Cedar Point	929	1,279	1,735	37.7%	35.7%	86.8%
Emerald Isle	3,488	3,655	3,705	4.8%	1.4%	6.2%
Indian Beach	95	112	233	17.9%	108.0%	145.3%
Morehead City	7,691	8,661	9,200	12.6%	6.2%	19.6%
Newport	3,349	4,150	4,631	23.9%	11.6%	38.3%
Peletier	487	644	823	32.2%	27.8%	69.0%
Pine Knoll Shores	1,524	1,339	1,409	-12.1%	5.2%	-7.5%
Municipalities	**24,919**	**27,975**	**30,554**	12.3%	9.2%	22.6%
Unincorporated Areas	34,464	38,494	38,145	11.7%	-0.9%	10.7%
Total	**59,383**	**66,469**	**68,699**	11.9%	3.4%	15.7%

Source: US Census Bureau American Community Survey.

Growth Trends

Table 3.12 provides population forecast through the year 2050 for Carteret County, as well as all participating municipal jurisdictions. These forecasts are based on established trends between the years 2000 and 2017. According to these estimates, Carteret County overall is expected to increase in population at a rate of 30.5% through 2050 (a total of 6,340 individuals). The most substantial increase for the County's municipalities is expected to be in the Towns of Cedar Point and Cape Carteret at a rate of roughly 168% and 160%, respectively. Indian Beach shows the most robust growth; however, this figure is considered a bit of an outlier.

Table 3.12 – Carteret County Population Projections, 2017-2050

Jurisdiction	2017	2020	2030	2040	2050	% Change 2017-2050
Atlantic Beach	1,763	1,760	1,749	1,739	1,728	-2.0%
Beaufort	4,170	4,248	4,507	4,767	5,026	20.5%
Bogue	668	684	736	787	839	25.7%
Cape Carteret	2,217	2,540	3,618	4,695	5,773	160.4%
Cedar Point	1,735	2,001	2,886	3,772	4,657	168.4%
Emerald Isle	3,705	3,746	3,881	4,017	4,152	12.1%
Indian Beach	233	293	492	691	890	282.0%
Morehead City	9,200	9,519	10,580	11,642	12,704	38.1%
Newport	4,631	4,944	5,987	7,029	8,072	74.3%
Peletier	823	923	1,257	1,591	1,925	133.9%
Pine Knoll Shores	1,409	1,390	1,328	1,265	1,203	-14.6%
Municipalities	**30,554**	**31,773**	**35,838**	**39,902**	**43,966**	**43.9%**
Unincorporated Areas	38,145	38,864	41,261	43,657	46,054	20.7%
Total	**68,699**	**70,601**	**76,941**	**83,280**	**89,620**	**30.5%**

Source: US Census Bureau American Community Survey and HCP, Inc.

Racial Demographics

The overall Carteret County population is predominantly Caucasian comprising 89.3% of citizens, while most of the remaining population is African-American (5.7%). The racial composition of the County's municipal jurisdictions is similar to the County makeup with the exception of the Town of Beaufort and Morehead City, which each have a slightly higher African-American population (12.2% and 10.7%, respectively). Overall Carteret County has a Hispanic/Latino population of 4.2%. Municipalities with the largest Hispanic population throughout the County include Morehead City (8.3%), Cape Carteret (5.2%), and Newport (5.3%).

According to the American Community Survey, the 2017 median age in Carteret County was 47.4 years. Approximately 82% of the County's population is over the age of eighteen, while 48% is male and 52% is female. Table 3.13 provides a summary of racial composition for Carteret County, as well as all participating municipal jurisdictions.

Table 3.13 – Carteret County Racial Composition

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Atlantic Beach	96.9%	0.5%	0.5%	1.2%	1.0%	1.4%
Beaufort	83.1%	12.2%	0.5%	0.4%	3.8%	2.1%
Bogue	98.2%	0.9%	0.3%	0.0%	0.6%	4.8%
Cape Carteret	97.1%	0.9%	0.3%	0.8%	0.8%	5.2%
Cedar Point	84.8%	2.6%	1.8%	1.0%	9.7%	1.5%
Emerald Isle	95.1%	0.3%	0.2%	1.6%	2.8%	2.0%
Indian Beach	98.7%	1.3%	0.0%	0.0%	0.0%	0.0%
Morehead City	83.0%	10.7%	2.3%	1.1%	2.9%	8.3%
Newport	85.0%	8.2%	2.5%	0.8%	3.5%	5.3%
Peletier	95.4%	1.3%	0.0%	0.9%	2.4%	6.0%
Pine Knoll Shores	97.9%	0.9%	0.0%	0.0%	1.3%	0.9%
Carteret County	**89.3%**	**5.7%**	**1.1%**	**1.3%**	**2.6%**	**4.2%**

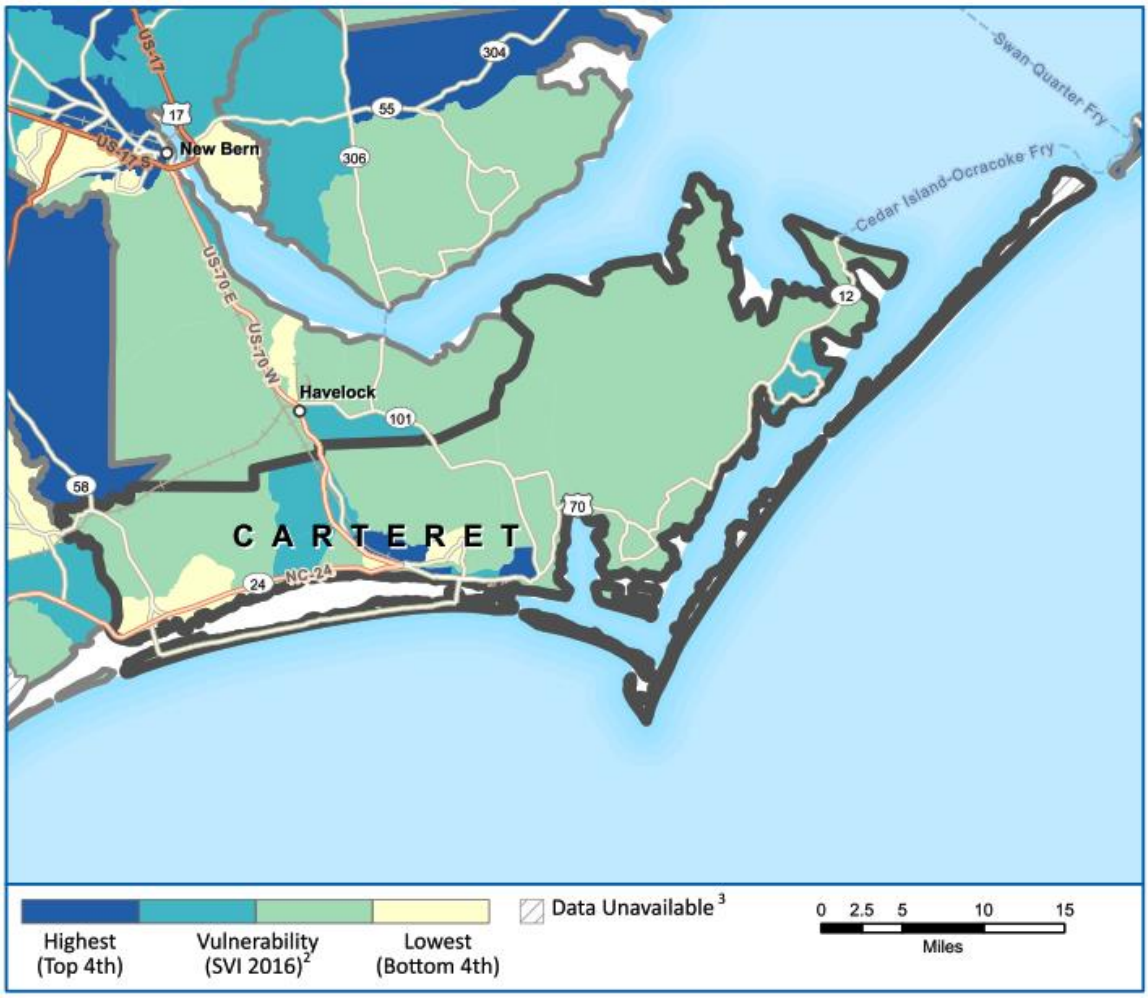
*Other races includes American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Social Vulnerability

Figure 3.7 below displays social vulnerability information for Carteret County by census tract according to 2016 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the County and municipal jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Nearly all of Carteret County has a moderate SVI index. Aside from portions of the County in an around Morehead City and the Town of Newport, Carteret County is rural in nature and the availability of municipal/county infrastructure is available yet limited. Additionally, incomes throughout a majority of the County are lower than the NC State median.

Figure 3.7 – Carteret County Social Vulnerability Index



3.3.4 Housing Characteristics

According to the American Community Survey, there were approximately 49,580 housing units in Carteret County as of 2017. This figure marks a 4.5%, or 2,121 unit, increase since 2010 for unincorporated portions of Carteret County. Although the County's housing unit growth has been somewhat modest, several County municipalities have experienced a much more rapid increase in their housing stock. Projected housing unit counts have increased by roughly 31.5% in Newport, 18.3% in Peletier, and 13.3% in Cedar Point over the same period. Residential housing starts have been fairly modest within the Bogue Banks beach communities, with Atlantic Beach, Pine Knoll Shores, and Emerald Isle all falling under 5%. The one exception to this growth was Indian Beach which experienced a slightly higher residential growth rate of 7.5%.

Throughout Carteret County, the housing is predominantly comprised of owner occupants (72.7%). This percentage is generally characteristic of all municipal jurisdictions as well with the exception of Atlantic Beach, Newport, and Beaufort which maintain an owner occupancy rate below 60%. One unusual factor relating to home occupancy is that a majority of the County's barrier island beach communities maintain high rates of owner occupancy. This factor is important in regards to mitigation and post disaster recovery due to the fact that homeownership directly correlates to the long-term maintenance and flood proofing

of property, as well as the eligibility for funding of impacted units following a flooding event associated with nor'easters and tropical storm/hurricanes.

In terms of vulnerability associated with natural hazard events such as tropical storms, hurricanes, and tornadoes, roughly 18.3% of the Carteret County housing stock is comprised of manufactured homes, which is much higher than the state overall (13%). The prevalence of manufactured housing poses a unique threat regarding both sustainability, as well as emergency response within defined flood hazard areas.

Table 3.14 below provides a summary of housing characteristics for Carteret County, as well as participating municipal jurisdictions.

Table 3.14 – Carteret County Housing Characteristics

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Atlantic Beach	4,935	5,041	2.1%	59.8%	81.4%
Beaufort	2,745	2,849	3.8%	52.5%	24.8%
Bogue	296	307	3.7%	78.9%	10.4%
Cape Carteret	1,027	1,119	9.0%	84.7%	19.7%
Cedar Point	955	1,082	13.3%	78.3%	36.4%
Emerald Isle	6,735	6,804	1.0%	73.0%	73.1%
Indian Beach	1,565	1,682	7.5%	85.6%	92.8%
Morehead City	5,383	5,546	3.0%	49.7%	21.4%
Newport	1,697	2,231	31.5%	73.8%	10.8%
Peletier	393	465	18.3%	69.7%	28.4%
Pine Knoll Shores	2,049	2,096	2.3%	88.7%	68.0%
Carteret County	**47,459**	**49,580**	**4.5%**	**72.7%**	**39.5%**

Source: US Census Bureau American Community Survey.

3.3.5 Wages, Employment and Industry

The 2017 American Community Survey reports that the median household income for Carteret County was $51,584, which is over 2.5% higher than the state's median household income ($50,320). However, approximately 9.4% of the population is considered to be living below the poverty level. Moreover, 18% percent of people under 18 years of age are living below the poverty level.

Within Carteret County, approximately 58.2% of the population is considered to be in the labor force. This is generally characteristic of all participating municipal jurisdictions as well, with the exception of Pine Knoll Shores and Indian Beach. Throughout Carteret County, including all municipal jurisdictions, the percentage of the population currently employed is at or above 50% with the exception of Cape Carteret (48.5%), Emerald Isle (47.0%), Indian Beach (39.1%), and Pine Knoll Shores (41.5%). According to the American Community Survey, the unemployment rate for Carteret County overall was 8.0%. Additionally, as of 2017, approximately 11.7% of households in Carteret County relied on food stamps/SNAP benefits.

The following tables provides a summary of key economic indicators and population employed by industry for both incorporated and unincorporated portions of Carteret County.

Table 3.15 – Carteret County Key Economic Indicators

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Atlantic Beach	62.7%	53.7%	7.8%	37.3%	12.7%

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Beaufort	56.0%	49.6%	5.4%	44.0%	9.8%
Bogue	66.9%	60.1%	3.3%	33.1%	5.2%
Cape Carteret	56.6%	48.5%	4.1%	43.4%	7.8%
Cedar Point	64.2%	54.2%	1.3%	35.8%	2.3%
Emerald Isle	51.3%	47.0%	3.3%	48.7%	6.5%
Indian Beach	40.5%	39.1%	1.4%	59.5%	3.4%
Morehead City	61.8%	56.0%	4.2%	38.2%	6.9%
Newport	57.1%	51.3%	4.3%	42.9%	7.8%
Peletier	65.9%	50.7%	14.0%	34.1%	21.6%
Pine Knoll Shores	43.5%	41.5%	1.6%	56.5%	3.8%
Carteret County	**58.2%**	**52.2%**	**4.5%**	**41.8%**	**8.0%**

Source: US Census Bureau American Community Survey.

Table 3.16 – Carteret County Employment by Industry

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Atlantic Beach	53.3%	10.7%	20.6%	9.0%	6.3%
Beaufort	33.2%	27.8%	19.9%	10.9%	8.2%
Bogue	30.4%	28.0%	17.9%	16.4%	7.3%
Cape Carteret	41.6%	15.2%	24.3%	13.7%	5.2%
Cedar Point	46.7%	17.4%	18.2%	10.5%	7.2%
Emerald Isle	50.9%	16.5%	24.2%	5.9%	2.5%
Indian Beach	66.7%	9.5%	21.4%	0.0%	2.4%
Morehead City	34.2%	20.7%	23.2%	9.8%	12.1%
Newport	33.1%	23.3%	23.9%	11.5%	8.3%
Peletier	17.5%	23.6%	24.2%	28.8%	5.8%
Pine Knoll Shores	57.3%	7.7%	26.1%	3.6%	5.3%
Carteret County	35.1%	20.3%	22.7%	12.9%	9.0%

Source: US Census Bureau American Community Survey.

The top employers in Carteret County represent the sales and office; service; management, business, science and arts industries. These employers include:

- Carteret County Board of Education
- Carteret County General
- County of Carteret
- Walmart Associates, Inc.
- Big Rock Sports LLC
- Food Lion
- Lowes Home Improvements Centers
- Carteret Community College
- Lowes Food Stores
- Refrigerated Boxes Inc.

3.3.6 Historic Properties

As of May 2019, Carteret County had 16 listings on the National Register of Historic Places. This list includes 13 Historic Structures and 3 Historic Districts. Presence on the National Register signifies that these structures have been determined to be worthy of preservation for their historical or cultural values. The following provides a comprehensive listing of all Nationally Registered Properties in Carteret County.

- Fort Macon (Atlantic Beach) – 2/26/1970
- Queen Anne's Revenge (Atlantic Beach) – 3/9/2004
- Beaufort Historic District (Beaufort) – 5/6/1974
- Cape Lookout Coast Guard Station (Beaufort) – 2/1/1989
- Carteret County Home (Beaufort) – 12/20/1984
- Gibbs House (Beaufort) – 3/14/1973
- Henry, Jacob House (Beaufort) – 5/7/1973
- HMT Bedfordshire (shipwreck and remains) (Beaufort) – 7/31/2015
- Old Burying Ground (Beaufort) – 4/8/1974
- U-352 (Submarine) Shipwreck and Remains (Beaufort) – 11/12/2015
- Cape Lookout Light Station (Core Banks) – 10/18/1972
- Cape Lookout Village Historic District (Harkers Island) – 6/3/2000
- Morehead City Historic District (Morehead City) – 4/18/2003
- Morehead City Municipal Building (Morehead City) – 8/11/2004
- Salter-Battle Hunting and Fishing Lodge (Ocracoke) – 5/5/2005
- Portsmouth Village (Portsmouth) – 11/29/1978

3.3.7 Land Development Trends

Throughout Carteret County, approximately 59% of parcels are currently developed. Of this 59%, nearly 24% were developed prior to February 14, 1975, Carteret County's initial FIRM date. This percentage approximates the number of structures that were built prior to the establishment of required minimum standards aimed at protecting property from damages associated with flooding events.

Table 3.17 provides an overview of developed and undeveloped properties located throughout Carteret County. Most of the development is focused along coastal areas, in particular the Towns of Beaufort and Morehead City, as well as communities located along Bogue Banks. However, the County is also home to a burgeoning agricultural industry. Additional development is centralized along key highway corridors.

Table 3.17 – Carteret County Developed and Undeveloped Parcel Counts

Jurisdiction	Developed Parcels	Undeveloped Parcels	Pre-Firm Buildings	% Developed Pre-Firm
Atlantic Beach	4,242	773	1,087	25.6%
Beaufort	2,425	767	1,183	48.8%
Bogue	264	130	46	17.4%
Cape Carteret	945	403	224	23.7%
Cedar Point	773	250	132	17.1%
Emerald Isle	6,371	1,357	498	7.8%
Indian Beach	143	62	0	0.0%
Morehead City	4,670	1,299	1,903	40.7%
Newport	1,225	166	431	35.2%
Peletier	259	215	43	16.6%
Pine Knoll Shores	1,900	307	292	15.4%
Carteret County	**17,820**	**12,485**	**4,203**	**23.6%**

Source: HCP, Inc., Carteret County Tax Office.

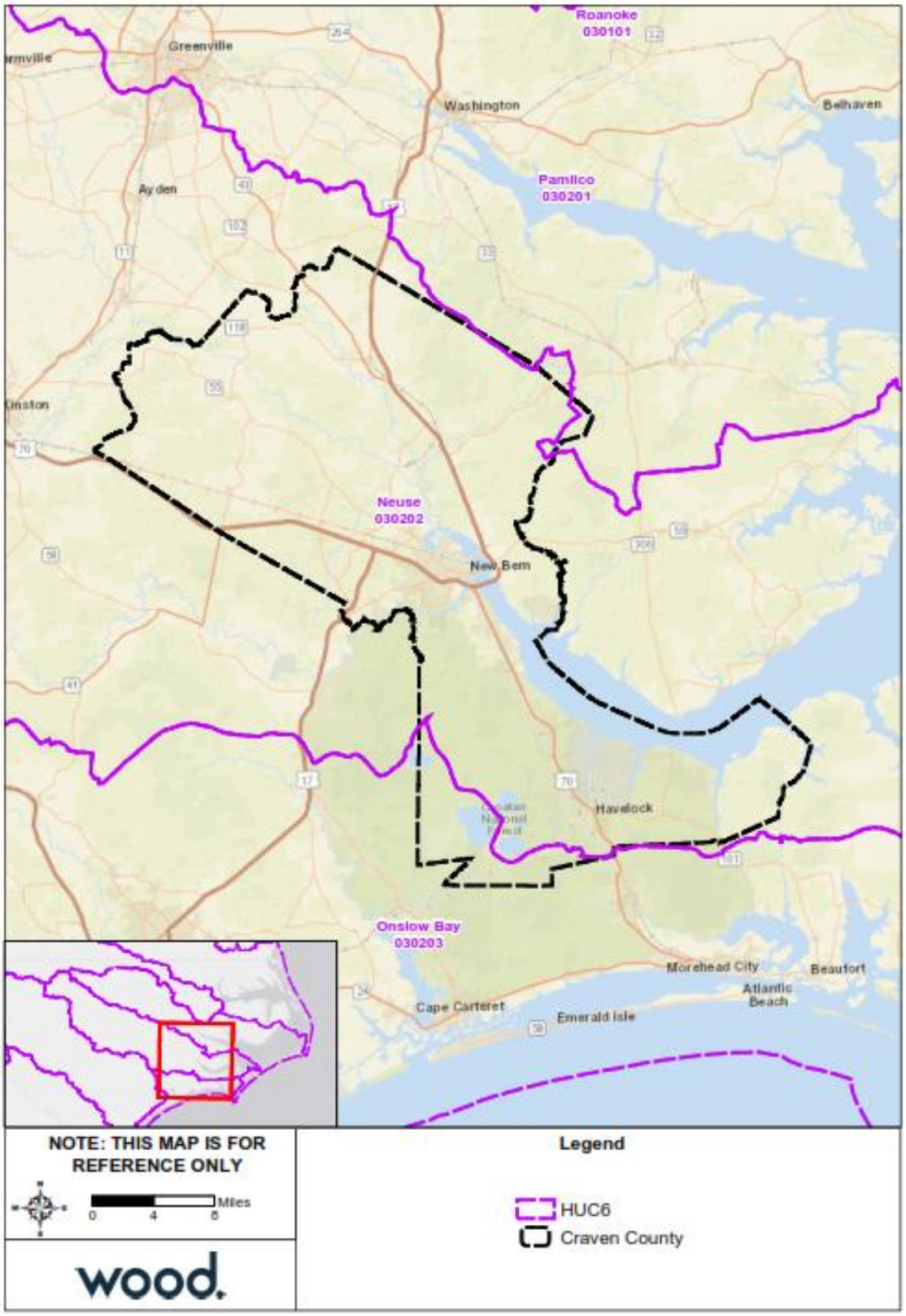
Detailed summaries of future land development trends, including Future Land Use Maps, are provided in the community annexes.

3.4 CRAVEN COUNTY

3.4.1 Hydrology

As with Carteret County, Craven County has three separate river basins traversing through its boundaries. These basins include the Onslow Bay, Neuse, and Pamlico, as shown in Figure 3.6. Descriptions of these river basins can be found in Section 3.3.2.

Figure 3.8 – Craven County, HUC6 River Basins



Source: National Hydrology Dataset

3.4.2 Parks and Open Space

There are several parks located throughout Craven County, both within unincorporated portions of the County, as well as within participating municipalities. Additionally, a portion of the Croatan National Forest is located within Craven County. The Croatan National Forest is one of four National Forests in North Carolina and the only true coastal forest in the East. Refer to the Carteret County Parks and Open Space discussion for more details regarding the Croatan National Forest.

The following provides a listing of parks and recreational facilities located in Craven County:

- Creekside Park (New Bern)
- West Craven Park (Vanceboro)
- Latham-Whitehurst Nature Park (New Bern)
- Rocky Run Park (New Bern)

3.4.3 Demographics

Population Total

The total population of Craven County according to the 2017 American Community Survey was 103,374 persons. Population growth throughout unincorporated portions of Craven County has been fairly rapid since Census year 2000 at a rate of 19.5%. Although growth within unincorporated portions of the County has been steady, municipal growth rates have been somewhat stagnant. From the years 2000 to 2017, Bridgeton (-22.3%), Cove City (-4.2%), Dover (-42.0%), and Havelock (-9.1%) have all experienced declining populations. In comparison, the communities of New Bern (28.4%) and Vanceboro (36.3%) experienced fairly rapid population increases over the same period.

Table 3.18 provides a breakdown of total population for Craven County and the participating municipalities for the years 2000, 2010, and 2017.

Table 3.18 – Craven County Total Population

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Bridgeton	328	454	255	38.4%	-43.8%	-22.3%
Cove City	433	399	415	-7.9%	4.0%	-4.2%
Dover	443	401	257	-9.5%	-35.9%	-42.0%
Havelock	22,442	20,735	20,404	-7.6%	-1.6%	-9.1%
New Bern	23,111	29,524	29,664	27.7%	0.5%	28.4%
River Bend	2,923	3,119	3,095	6.7%	-0.8%	5.9%
Trent Woods	4,224	4,155	4,117	-1.6%	-0.9%	-2.5%
Vanceboro	898	1,055	1,224	17.5%	16.0%	36.3%
Municipalities	**54,802**	**59,842**	**59,431**	**9.2%**	**-0.7%**	**8.4%**
Unincorporated Areas	36,784	36,721	43,943	-0.2%	19.7%	19.5%
Total	**91,586**	**96,563**	**103,374**	**5.4%**	**7.1%**	**12.9%**

Source: US Census Bureau American Community Survey.

Growth Trends

Table 3.12 provides population forecast through the year 2050 for Craven County, as well as all participating municipal jurisdictions. These forecasts are based on established trends between the years 2000 and 2017. According to these estimates, Craven County overall is expected to increase in population at a rate of 25% through 2050 by a total of 15,653 individuals. The most substantial increase regarding

the County's municipalities is expected to be the Town of Vanceboro at a rate of 70.5% (262 individuals) over the same period.

Table 3.19 – Craven County Population Projections, 2017-2050

Jurisdiction	2017	2020	2030	2040	2050	% Change 2017-2050
Bridgeton	255	245	212	178	145	-43.2%
Cove City	415	412	402	392	382	-8.1%
Dover	257	238	174	111	48	-81.5%
Havelock	20,404	20,077	18,987	17,897	16,807	-17.6%
New Bern	29,664	31,148	36,096	41,044	45,991	55.0%
River Bend	3,095	3,127	3,234	3,341	3,449	11.4%
Trent Woods	4,117	4,099	4,037	3,976	3,915	-4.9%
Vanceboro	1,224	1,302	1,564	1,825	2,087	70.5%
Municipalities	**59,431**	**60,317**	**63,270**	**66,223**	**69,176**	**16.4%**
Unincorporated Areas	43,943	45,452	50,483	55,514	60,545	37.8%
Total	**103,374**	**105,722**	**113,549**	**121,375**	**129,202**	**25.0%**

Source: US Census Bureau American Community Survey and HCP, Inc.

Racial Demographics

The overall Craven County population is predominantly Caucasian comprising 70.2% of citizens, while most of the remaining population is African-American (21.4%). The racial composition of the County's municipal jurisdictions varies substantially. The Town of Dover is predominantly African-American (65.4%), while Cove City and Vanceboro have an African-American population over 40%. One other unique characteristic is that the City of New Bern and Town of Vanceboro maintain an Asian population of over 6.5%. Overall, Craven County has a Hispanic/Latino population of 7.1%. Municipalities with the largest Hispanic population in the County include Havelock (11.7%), New Bern (6.7%), and Vanceboro (4.3%).

According to the American Community Survey, the 2017 median age in Craven County was 36.2 years. Approximately 78% of the County's population is over the age of eighteen, while 51% is male and 49% is female. Table 3.20 provides a summary of racial composition for Craven County, as well as all participating municipal jurisdictions.

Table 3.20 – Craven County Racial Composition

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Bridgeton	86.7%	13.3%	0.0%	0.0%	0.0%	0.4%
Cove City	52.0%	47.7%	0.0%	0.2%	0.0%	2.7%
Dover	33.9%	65.4%	0.0%	0.0%	0.8%	1.2%
Havelock	68.8%	19.7%	1.8%	3.6%	6.1%	11.7%
New Bern	56.6%	31.7%	6.5%	2.3%	2.4%	6.7%
River Bend	84.4%	5.4%	8.3%	0.0%	2.0%	1.3%
Trent Woods	97.2%	0.9%	0.0%	1.0%	0.9%	3.3%
Vanceboro	52.2%	45.1%	0.0%	0.5%	2.2%	4.3%
Craven County	**70.2%**	**21.4%**	**2.8%**	**2.8%**	**2.7%**	**7.1%**

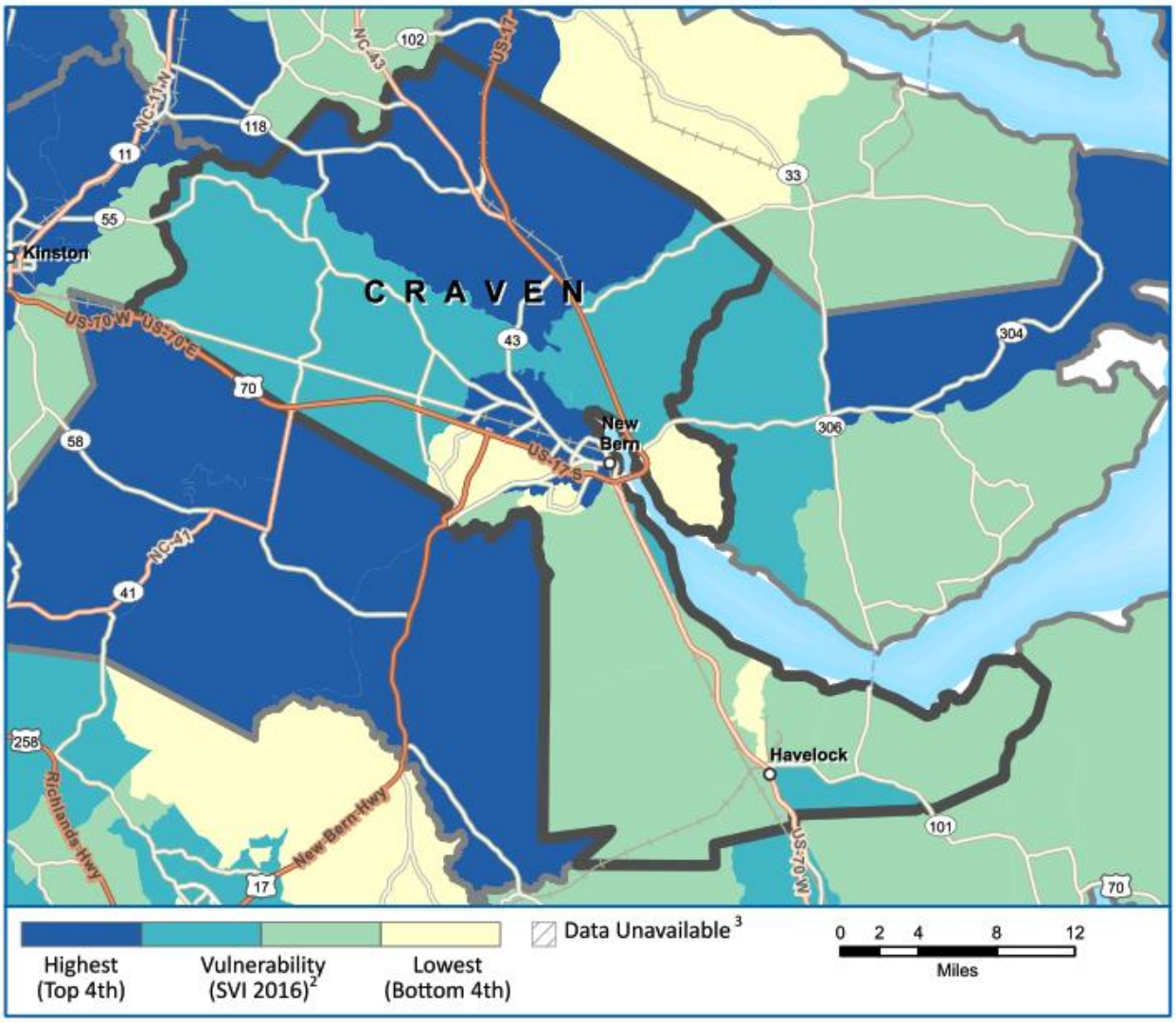
*Other races includes American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Social Vulnerability

Figure 3.9 below displays social vulnerability information for Craven County by census tract according to 2016 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the County and municipal jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

The SVI throughout Craven County is generally split between the northern and southern portions of the County. Northern portions of Craven County, including those areas surrounding the City of New Bern have a high SVI index, while portions of the County to the South including those in an around the City of Havelock have a much lower SVI score. Within Craven County development is distributed more evenly throughout the County than other portions of Pamlico Region; however, developed density is higher throughout northern Craven County.

Figure 3.9 – Craven County Social Vulnerability Index



3.4.4 Housing Characteristics

According to the American Community Survey, there were approximately 46,453 housing units in Craven County as of 2017. This figure marks a 4.9%, or 2,151 unit, increase since 2010 for unincorporated portions of Craven County. Although the County's housing unit growth has been somewhat modest, several County municipalities have experienced a much more rapid increase in their housing stock. Housing unit counts have increased by roughly 11.9% in Bridgeton and 53.5% in Vanceboro over the same period. With the exception of these two municipalities, housing starts have been slow throughout Craven County.

Housing in Craven County is predominantly comprised of owner occupants (63.3%). Overall, the County and its municipalities maintain a fairly high owner occupancy rate. Of the eight municipal jurisdictions, six have an owner occupancy rate above 50%. This factor is important in regards to mitigation and post disaster recovery due to the fact that homeownership directly correlates to the long term maintenance and flood proofing of property, as well as the eligibility for funding of impacted units following a flooding event associated with nor'easters and tropical storm/hurricanes.

In terms of vulnerability associated with natural hazard events such as tropical storms, hurricanes, and tornadoes, roughly 13.4% of the Craven County housing stock is comprised of manufactured homes, which is in line with the state average of 13%. The prevalence of manufactured housing poses a unique threat regarding both sustainability, as well as emergency response within defined flood hazard areas.

Table 3.21 below provides a summary of housing characteristics for Craven County, as well as participating municipal jurisdictions.

Table 3.21 – Craven County Housing Characteristics

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Bridgeton	194	217	11.9%	79.0%	36.4%
Cove City	230	248	7.8%	75.0%	14.1%
Dover	258	260	0.8%	67.8%	9.0%
Havelock	6,844	7,289	6.5%	39.9%	11.2%
New Bern	14,504	15,051	3.8%	50.6%	13.7%
River Bend	1,618	1,640	1.4%	81.3%	11.4%
Trent Woods	1,805	1,887	4.5%	86.1%	7.1%
Vanceboro	359	551	53.5%	44.3%	13.1%
Craven County	**44,302**	**46,453**	**4.9%**	**63.3%**	**12.7%**

Source: US Census Bureau American Community Survey.

3.4.5 Wages, Employment and Industry

The 2017 American Community Survey reports that the median household income for the Craven County was $49,931, which is slightly lower than the state's median household income of ($50,320). However, approximately 10.3% of the population is considered to be living below the poverty level. Moreover, 25.7% percent of people under 18 years of age are living below the poverty level.

Within Craven County, approximately 61.8% of the population is considered to be in the labor force. This is generally characteristic of all participating municipal jurisdictions as well, with the exception of River Bend and Dover which fall under 50%. Throughout Craven County, including all municipal jurisdictions, the percentage of the population currently employed falls below 50% with the exception of Bridgeton (59.0%), New Bern (52.5%), and Trent Woods (53.6%) Although the remaining municipalities fall below 50% in terms of employment, these employment rates vary from 40-49%. According to the American

Community Survey, the unemployment rate for Craven County overall was 8.1%. Additionally, as of 2017, approximately 13.9% of households throughout Craven County relied on food stamps/SNAP benefits.

The following tables provides a summary of key economic indicators and population employed by industry for both incorporated and unincorporated portions of Craven County.

Table 3.22 – Craven County Key Economic Indicators

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Bridgeton	65.2%	59.0%	0.0%	34.8%	0.0%
Cove City	50.0%	45.1%	4.9%	50.0%	9.9%
Dover	49.0%	48.5%	0.5%	51.0%	1.0%
Havelock	81.0%	40.5%	4.1%	19.0%	9.1%
New Bern	60.9%	52.5%	5.6%	39.1%	9.6%
River Bend	48.7%	45.5%	2.7%	51.3%	5.7%
Trent Woods	55.9%	53.6%	0.8%	44.1%	1.5%
Vanceboro	55.8%	49.2%	6.6%	44.2%	11.8%
Craven County	**61.8%**	**48.8%**	**4.3%**	**38.2%**	**8.1%**

Source: US Census Bureau American Community Survey.

Table 3.23 – Craven County Employment by Industry

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Bridgeton	48.5%	10.4%	22.4%	13.4%	5.2%
Cove City	17.8%	9.6%	14.4%	24.7%	33.6%
Dover	13.3%	8.2%	19.4%	14.3%	44.9%
Havelock	24.5%	29.8%	24.0%	11.9%	9.8%
New Bern	34.9%	22.6%	21.1%	8.1%	13.3%
River Bend	29.6%	18.9%	32.0%	9.8%	9.8%
Trent Woods	52.1%	12.3%	24.5%	5.0%	6.2%
Vanceboro	28.2%	22.6%	24.6%	13.1%	11.5%
Craven County	**33.1%**	**20.4%**	**22.0%**	**12.1%**	**12.5%**

Source: US Census Bureau American Community Survey.

The top employers in Craven County represent the production, transportation, and material moving; service; and sales and office industries. These employers include:

- Department of Defense
- Craven Regional Medical Center
- Craven County Schools
- BSH Home Appliances Corporation
- Moen Incorporated
- Walmart Associates, LLC
- Craven County
- Marine Corps Community Services
- Holden Temporaries, Inc.
- Craven Community College

3.4.6 Historic Properties

As of May 2019, Craven County had 56 listings on the National Register of Historic Places. This list includes 51 Historic Structures and 5 Historic Districts. Presence on the National Register signifies that these structures have been determined to be worthy of preservation for their historical or cultural values. The following provides a comprehensive listing of all Nationally Registered Properties in Craven County.

- Attmore-Oliver House (New Bern) – 1/20/1972
- Barber, J.T., School (New Bern) – 12/20/2006
- Baxter Clock (New Bern) – 7/2/1973
- Bellair (New Bern) – 8/25/1972
- Blades House (New Bern) – 1/14/1972
- Bryan House and Office (New Bern) – 3/24/1972
- Cedar Grove Cemetery (New Bern) – 12/5/1972
- Cedar Street Recreation Center (New Bern) – 8/21/2003
- Centenary Methodist Church (New Bern) – 9/11/1972
- Central Elementary School (New Bern) – 1/20/1972
- Christ Episcopal Church and Parish House (New Bern) – 4/13/1973
- Clear Springs Plantation (Jasper) – 3/14/1973
- Coor-Bishop House (New Bern) – 11/9/1972
- Coor-Gaston House (New Bern) – 2/1/1972
- Craven Terrace (New Bern) – 8/19/2014
- DeGraffenried Park Historic District (New Bern) – 8/9/2006
- Ebenezer Presbyterian Church (New Bern) – 6/30/1997
- First Baptist Church (New Bern) – 3/24/1972
- First Church of Christ, Scientist (New Bern) – 10/2/1973
- First Missionary Baptist Church (New Bern) – 6/30/1997
- First Presbyterian Church and Churchyard (New Bern) – 2/1/1972
- Ghent Historic District (New Bern) – 3/17/1988
- Gull Harbor (New Bern) – 8/14/1973
- Harvey Mansion (New Bern) – 11/12/1971
- Hawks House (New Bern) – 3/16/1972
- Hollister, William, House (New Bern) – 6/30/1972
- Jerkins, Thomas, House (New Bern) – 10/18/1972
- Jerkins--Duffy House (New Bern) – 3/17/1988
- Jones-Jarvis House (New Bern) – 4/11/1973
- Mace, Ulysses S., House (New Bern) – 6/4/1973
- Masonic Temple and Theater (New Bern) – 3/16/1972
- Mount Shiloh Missionary Baptist Church (New Bern) – 3/1/2007
- New Bern Battlefield Site (New Bern) – 10/19/2001
- New Bern Historic District (New Bern) – 6/19/1973
- New Bern Historic District (Boundary Increase) (New Bern) – 9/25/2003
- New Bern Municipal Building (New Bern) – 6/4/1973
- New Bern National Cemetery (New Bern) – 1/31/1997
- Rhem-Waldrop House (New Bern) – 10/18/1972
- Riverside Historic District (New Bern) – 2/9/1988
- Rue Chapel AME Church (New Bern) – 6/30/1997
- Sloan, Dr. Earl S., House (Trent Woods) – 8/14/1986
- Slover-Bradham House (New Bern) – 4/11/1973

- Smallwood, Eli, House (New Bern) – 12/15/1972
- Smith Jr., Isaac H., House (New Bern) – 9/14/2002
- Smith, Benjamin, House (New Bern) – 4/13/1972
- Smith-Whitford House (New Bern) – 4/13/1972
- St. John's Missionary Baptist Church (New Bern) – 6/30/1997
- St. Paul's Roman Catholic Church (New Bern) – 3/24/1972
- St. Peter's AME Zion Church (New Bern) – 6/30/1997
- Stanly, Edward R., House (New Bern) – 3/24/1972
- Stanly, John Wright, House (New Bern) – 2/26/1970
- Stevenson House (New Bern) – 8/26/1971
- Taylor, Isaac, House (New Bern) – 12/27/1972
- Tisdale-Jones House (New Bern) – 4/25/1972
- U.S. Post Office, Court House, and Custom House (New Bern) – 8/7/2018
- York-Gordon House (New Bern) – 6/18/1973

3.4.7 Land Development Trends

Throughout Craven County, approximately 75% of parcels are currently developed. Of this 75%, roughly 23% were developed prior to December 20, 1974, Craven County's initial FIRM date. This percentage approximates the number of structures that were built prior to the establishment of required minimum standards aimed at protecting property from damages associated with flooding events.

Table 3.24 provides an overview of developed and undeveloped properties located throughout Craven County. A majority of development is focused within the urban communities of New Bern and Havelock. Additionally, increased growth has begun to occur within communities adjacent to New Bern including Trent Woods, River Bend, and Vanceboro. Development is also centralized along key highway corridors, especially throughout portions of the County adjacent to Havelock between New Bern and the Carteret County line. It should also be noted that agriculture and associated land uses are a critical component of the County's economy.

Table 3.24 – Craven County Developed and Undeveloped Parcel Counts

Jurisdiction	Developed Parcels	Undeveloped Parcels	Pre-Firm Buildings	% Developed Pre-Firm
Bridgeton	571	140	220	38.5%
Cove City	403	139	216	53.6%
Dover	381	168	204	53.5%
Havelock	7,649	407	1,501	19.6%
New Bern	19,142	4,159	6,283	32.8%
River Bend	2,404	210	153	6.4%
Trent Woods	3,603	286	1,047	29.1%
Vanceboro	815	261	388	47.6%
Craven County	**37,207**	**12,169**	**8,359**	**22.5%**

Source: HCP, Inc., Craven County Tax Office.

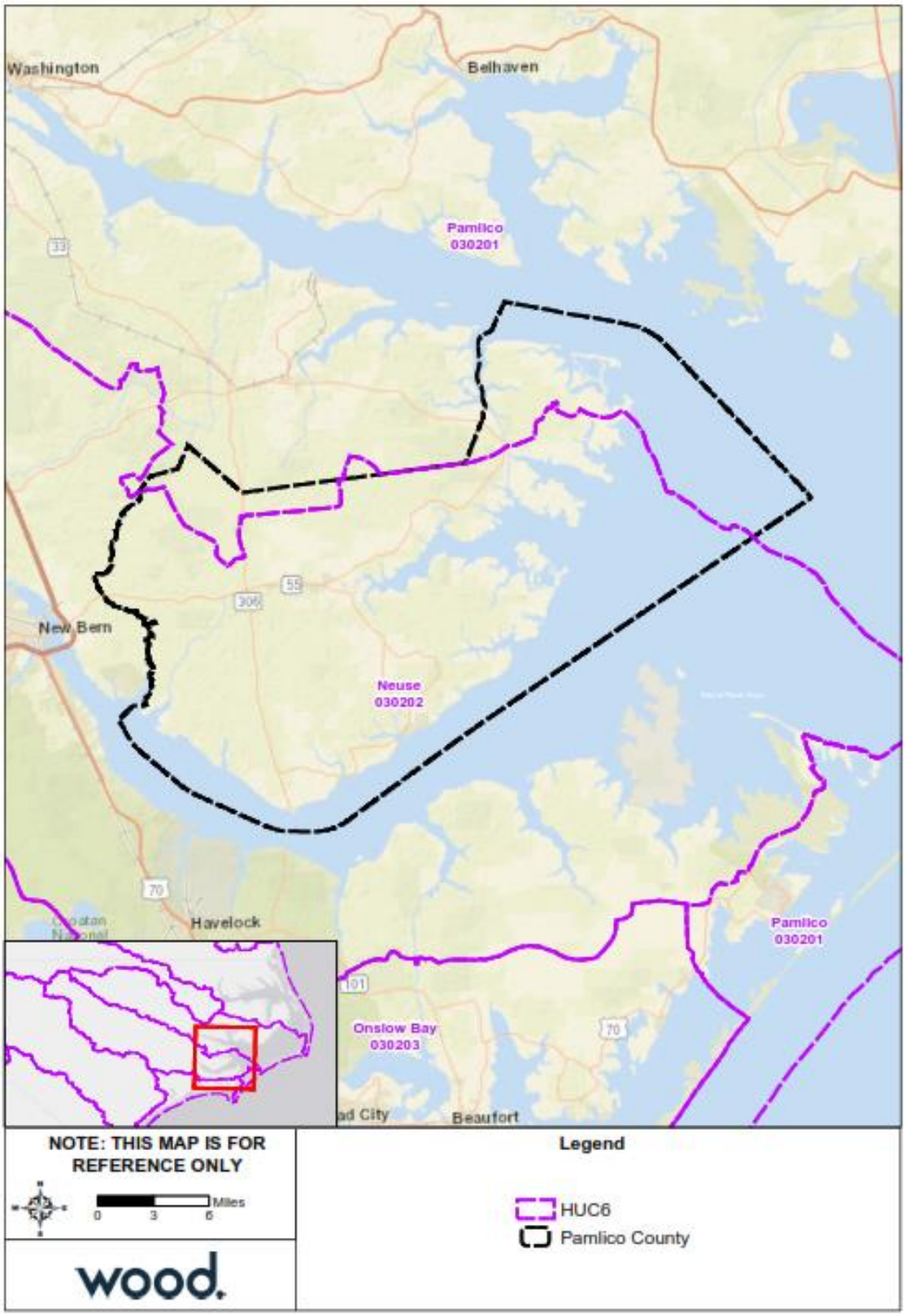
Detailed summaries of future land development trends, including Future Land Use Maps, are provided in the community annexes.

3.5 PAMLICO COUNTY

3.5.1 Hydrology

Pamlico County's waters are situated in two river basins: the northern portion of Goose Creek Island adjacent to the Pamlico River is in the Pamlico River Basin and the remainder of the County's estuarine waters are located in the Neuse River Basin, as shown in Figure 3.6. Descriptions of these river basins can be found in Section 3.3.2.

Figure 3.10 – Pamlico County, HUC6 River Basins



Source: National Hydrology Dataset

3.5.2 Parks and Open Space

There are several parks located throughout Pamlico County, both within unincorporated portions of the County, as well as within participating municipalities. The following provides a listing of those parks and recreational facilities:

- Alliance Recreation Park (Bayboro)
- Newton Creek Park (Bayboro)
- Bayboro Community Park (Bayboro)
- Raccoon Creek Park (Bayboro)
- Dawson's Creek Beach access (3886 Janicro Road)
- Styron Beach Access (681 Styrontown Beach Road)
- Lupton Park (Oriental)
- Lou Mac Park (Oriental)
- Oriental Recreation Park (Oriental)

3.5.3 Demographics

Population Total

The total population of Pamlico County according to the 2017 American Community Survey was 12,803 persons. Population throughout unincorporated portions of Pamlico County has been in decline since the 2000 Census at a rate of -11.8%. This negative growth has also been experienced by several of the County's municipalities, including the Towns of Alliance, Mesic, Stonewall, and Vandemere. There are several municipalities that have experienced quite rapid population increase over this same period, including Bayboro (86.0%), Arapahoe (31.9%), Minnesott Beach (25.1%), and Oriental (14.6%). It should be noted that a majority of this growth occurred between the years of 2000 and 2010.

Table 3.25 provides a breakdown of total population for Pamlico County and the participating municipalities for the years 2000, 2010, and 2017.

Table 3.25 – Pamlico County Total Population

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Alliance	785	776	732	-1.1%	-5.7%	-6.8%
Arapahoe	436	556	575	27.5%	3.4%	31.9%
Bayboro	741	1,263	1,378	70.4%	9.1%	86.0%
Grantsboro	754	688	809	-8.8%	17.6%	7.3%
Mesic	257	220	195	-14.4%	-11.4%	-24.1%
Minnesott Beach	311	440	389	41.5%	-11.6%	25.1%
Oriental	875	900	1,003	2.9%	11.4%	14.6%
Stonewall	285	281	255	-1.4%	-9.3%	-10.5%
Vandemere	289	245	233	-15.2%	-4.9%	-19.4%
Municipalities	**4,733**	**5,369**	**5,569**	**13.4%**	**3.7%**	**17.7%**
Unincorporated Areas	**8,201**	**7,775**	**7,234**	-5.2%	-7.0%	-11.8%
Total	**12,934**	**13,144**	**12,803**	**1.6%**	**-2.6%**	**-1.0%**

Source: US Census Bureau American Community Survey.

Growth Trends

Table 3.26 provides population forecast through the year 2050 for Pamlico County, as well as all participating municipal jurisdictions. These forecasts are based on established trends between the years 2000 and 2017. According to these estimates Pamlico County overall is expected to decrease in population at a rate of -2.0% through 2050 with a reduction of 77 individuals. The most substantial increase regarding the County's municipalities is expected to be the Town of Bayboro at a rate of 167% (697 individuals) over the same period.

Table 3.26 – Pamlico County Population Projections, 2017-2050

Jurisdiction	2017	2020	2030	2040	2050	% Change 2017-2050
Alliance	732	723	694	665	636	-13.1%
Arapahoe	575	607	715	823	931	61.9%
Bayboro	1,378	1,587	2,284	2,981	3,678	166.9%
Grantsboro	809	819	854	889	924	14.2%
Mesic	195	187	159	131	104	-46.8%
Minnesott Beach	389	406	464	521	578	48.7%
Oriental	1,003	1,029	1,115	1,202	1,288	28.4%
Stonewall	255	250	234	219	203	-20.4%
Vandemere	233	225	198	172	145	-37.6%
Municipalities	**5,569**	**5,743**	**6,321**	**6,900**	**7,478**	**34.3%**
Unincorporated Areas	7,234	7,083	6,582	6,080	5,578	-22.9%
Total	**12,803**	**12,780**	**12,704**	**12,628**	**12,551**	**-2.0%**

Source: US Census Bureau American Community Survey and HCP, Inc.

Racial Demographics

The overall Pamlico County population is predominantly Caucasian comprising 75.6% of citizens, while most of the remaining population is African-American (18.6%). The racial composition of the County's municipal jurisdictions varies slightly. The Towns of Bayboro, Mesic, and Vandemere are predominantly African-American. Overall, Pamlico County has a fairly low Hispanic/Latino population of 3.6%. Municipalities with the largest Hispanic population throughout the County include Grantsboro and Stonewall at 9%, as well as Alliance (7.7%) and Bayboro (6.3%).

According to the American Community Survey, the 2017 median age within Pamlico County was 51.0 years. Approximately 84% of the County's population is over the age of eighteen, while 51% is male and 49% is female. Table 3.20 provides a summary of racial composition for Pamlico County, as well as all participating municipal jurisdictions.

Table 3.27 – Pamlico County Racial Composition

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Alliance	85.7%	14.2%	0.0%	0.0%	0.1%	7.7%
Arapahoe	87.1%	11.7%	0.0%	0.0%	1.2%	1.0%
Bayboro	40.6%	53.1%	0.8%	2.5%	3.0%	6.3%
Grantsboro	63.5%	13.8%	0.0%	15.8%	6.9%	9.0%
Mesic	44.6%	55.4%	0.0%	0.0%	0.0%	0.0%
Minnesott Beach	95.4%	3.3%	1.3%	0.0%	0.0%	2.3%
Oriental	90.4%	8.3%	0.0%	0.0%	1.3%	0.0%
Stonewall	62.7%	29.8%	0.8%	0.0%	6.7%	9.0%
Vandemere	38.2%	60.5%	0.0%	0.0%	1.3%	0.0%
Pamlico County	**75.6%**	**18.6%**	**0.2%**	**3.1%**	**2.5%**	**3.6%**

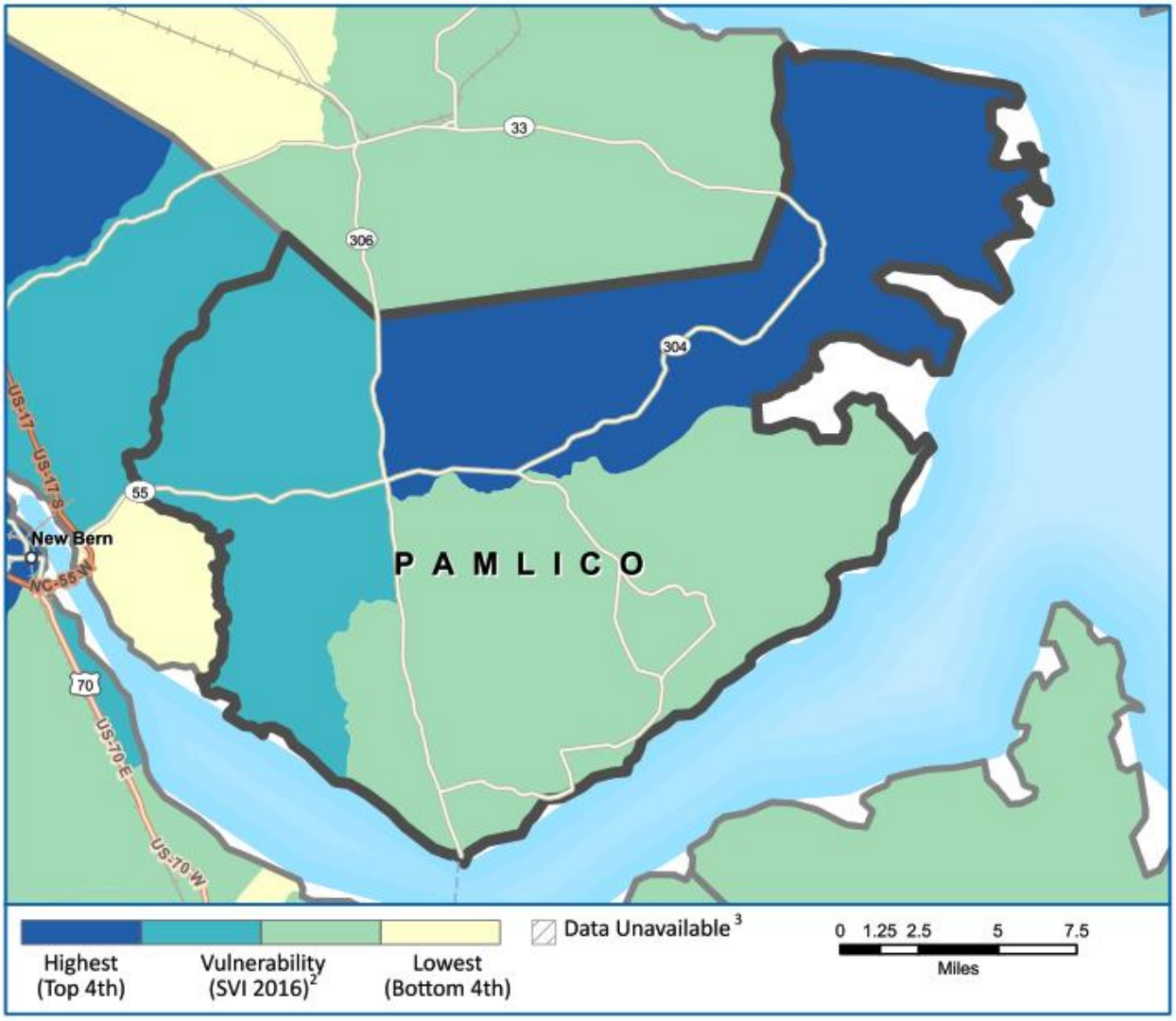
*Other races includes American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Social Vulnerability

Figure 3.11 below displays social vulnerability information for Pamlico County by census tract according to 2016 data and analysis by the Centers for Disease Control and Prevention (CDC). The CDC's Social Vulnerability Index (SVI) indicates the relative vulnerability within census tracts based on 15 social factors: poverty, unemployment, income, education, age, disability, household composition, minority status, language, housing type, and transportation access. Higher social vulnerability is an indicator that a community may be limited in its ability to respond to and recover from hazard events. Therefore, using this SVI information can help the County and municipal jurisdictions to prioritize pre-disaster aid, allocate emergency preparedness and response resources, and plan for the provision of recovery support.

Overall Pamlico County is into three areas regarding the SVI Index. North eastern Pamlico has a high a high SVI score, while western and south central Pamlico County have a low to moderate index. Pamlico County is the most rurally developed County within the Pamlico Region. This is reflected through the delineation of the SVI index areas where individual factors impacted large portions of the County. Northeastern Pamlico County has a higher SVI score principally due to the fact that the County's administration and management infrastructure are located within this census tract.

Figure 3.11 – Pamlico County Social Vulnerability Index



3.5.4 Housing Characteristics

According to the American Community Survey, there were approximately 7,687 housing units in Pamlico County as of 2017. This figure marks a 3.2%, or 238 unit, increase since 2010 for unincorporated portions of Pamlico County. Although the County's housing unit growth has been somewhat modest, several County municipalities have experienced a much more rapid increase in their housing stock. Housing unit increases have been much more substantial in Grantsboro (13.9%), Mesic (13.8%), Minnesott Beach (13.6%), and Oriental (15.5%).

Throughout Pamlico County, the housing is predominantly comprised of owner occupants (74.9%). Overall, the County and its municipalities maintain a fairly high owner occupancy rate. Of the nine municipal jurisdictions all but one (Bayboro) maintain an owner occupancy rate above 65%. This factor is important in regards to mitigation and post disaster recovery due to the fact that homeownership directly correlates to the long term maintenance and flood proofing of property, as well as the eligibility for funding of impacted units following a flooding event associated with nor'easters and tropical storm/hurricanes.

In terms of vulnerability associated with natural hazard events such as tropical storms, hurricanes, and tornadoes, roughly 27.6% of the Pamlico County housing stock is comprised of manufactured homes, which is much higher than the state average of 13%. The prevalence of manufactured housing poses a unique threat regarding both sustainability, as well as emergency response within defined flood hazard areas.

Table 3.28 below provides a summary of housing characteristics for Pamlico County, as well as participating municipal jurisdictions.

Table 3.28 – Pamlico County Housing Characteristics

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Alliance	360	374	3.9%	68.8%	8.0%
Arapahoe	281	313	11.4%	78.2%	24.0%
Bayboro	406	441	8.6%	56.3%	17.5%
Grantsboro	323	368	13.9%	68.1%	11.4%
Mesic	189	215	13.8%	81.3%	19.3%
Minnesott Beach	296	351	18.6%	89.0%	37.6%
Oriental	620	716	15.5%	74.3%	31.0%
Stonewall	130	142	9.2%	79.0%	18.7%
Vandemere	159	174	9.4%	78.4%	41.4%
Pamlico County	**7,449**	**7,687**	3.2%	**74.9%**	**29.8%**

Source: US Census Bureau American Community Survey.

3.5.5 Wages, Employment and Industry

The 2017 American Community Survey reports that the median household income for Pamlico County was $45,211, which is slightly lower than the state's median household income of ($50,320). However, approximately 9.0% of the population is considered to be living below the poverty level. Moreover, 15.1% percent of people under 18 years of age are living below the poverty level.

Within Pamlico County, approximately 49.6% of the population is considered to be in the labor force. This is generally characteristic of all participating municipal jurisdictions as well, with the exception of Bayboro and Mesic which fall under 35%. Throughout Pamlico County, including all municipal jurisdictions, the percentage of the labor force currently employed falls below 50%, with the exception of Grantsboro

(54.0%). According to the American Community Survey, the unemployment rate for Pamlico County overall was 8.1%. Additionally, as of 2017, approximately 13.5% of households throughout Pamlico County relied on food stamps/SNAP benefits.

The following tables provide a summary of key economic indicators and population employed by industry for both incorporated and unincorporated portions of Pamlico County.

Table 3.29 – Pamlico County Key Economic Indicators

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Alliance	44.6%	41.9%	2.7%	55.4%	6.2%
Arapahoe	52.9%	52.7%	0.2%	47.1%	0.4%
Bayboro	28.9%	25.9%	2.9%	71.1%	10.1%
Grantsboro	57.6%	54.0%	3.7%	42.4%	6.3%
Mesic	32.4%	29.5%	2.8%	67.6%	8.8%
Minnesott Beach	44.5%	41.0%	3.5%	55.5%	7.8%
Oriental	40.0%	38.7%	1.3%	60.0%	3.4%
Stonewall	48.0%	45.6%	2.5%	52.0%	5.1%
Vandemere	51.7%	47.4%	4.3%	48.3%	8.3%
Pamlico County	**49.6%**	**45.5%**	**4.0%**	**50.4%**	**8.1%**

Source: US Census Bureau American Community Survey.

Table 3.30 – Pamlico County Employment by Industry

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Alliance	35.7%	7.0%	24.2%	22.5%	10.7%
Arapahoe	21.2%	29.8%	23.1%	8.2%	17.6%
Bayboro	27.2%	26.6%	15.0%	7.0%	24.3%
Grantsboro	23.2%	27.4%	18.6%	21.5%	9.3%
Mesic	30.8%	23.1%	23.1%	21.2%	1.9%
Minnesott Beach	36.6%	14.4%	38.6%	8.5%	2.0%
Oriental	40.5%	13.0%	39.6%	5.2%	1.7%
Stonewall	34.4%	40.9%	12.9%	6.5%	5.4%
Vandemere	15.0%	35.0%	10.0%	15.0%	25.0%
Pamlico County	**29.3%**	**17.6%**	**24.8%**	**16.0%**	**12.3%**

Source: US Census Bureau American Community Survey.

The top employers in Pamlico County represent the sales and office industry and the service industry. These employers include:

- YMCA
- Pamlico County Board of Education
- NC Department of Public Safety
- County of Pamlico
- Walmart Associates LLC
- Food Lion
- Pamlico Community College
- Home Life Care Inc.
- Arapahoe Charter School
- Principle Long Term Care Inc.

3.5.6 Historic Properties

As of May 2019, Pamlico County had 1 listing on the National Register of Historic Places: China Grove (Oriental) – 2/6/1973. Presence on the National Register signifies that this structure has been determined to be worthy of preservation for its historical or cultural values.

3.5.7 Land Development Trends

Throughout Pamlico County approximately 52.5% of parcels are currently developed.

Table 3.31 – Pamlico County Developed and Undeveloped Parcel Counts

Jurisdiction	Developed Parcels	Undeveloped Parcels	% Developed
Alliance	295	101	74.5%
Arapahoe	110	30	78.5%
Bayboro	342	191	64.2%
Grantsboro	291	147	66.4%
Mesic	108	83	56.5%
Minnesott Beach	370	685	35.1%
Oriental	1,200	352	77.3%
Stonewall	147	965	13.2%
Vandemere	177	217	44.9%
Pamlico County	**6,258**	**5,669**	**52.5%**

*NOTE: Data necessary to determine Pre-FIRM developed properties was not available for Pamlico County.
Source: HCP, Inc., Pamlico County Tax Office.

Detailed summaries of future land development trends, including Future Land Use Maps, are provided in the community annexes.

4 Risk Assessment

4.1 OVERVIEW

This section describes the Hazard Identification and Risk Assessment process for the development of the Pamlico Sound Regional Hazard Mitigation Plan. It describes how the Region met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

This hazard risk assessment covers all of the Pamlico Sound Region, including the unincorporated counties and all incorporated jurisdictions participating in this plan.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of the potential risk to natural hazards in the county and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

Data collected through this process has been incorporated into the following sections of this plan:

- **Section 4.2**: **Hazard Identification** identifies the natural and human-caused hazards that threaten the planning area.
- **Section 4.3: Risk Assessment Methodology and Assumptions**
- **Section 4.4: Asset Inventory** details the population, buildings, and critical facilities at risk within the planning area.
- **Section 4.5**: **Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the planning area, describes previous occurrences of hazard events and the likelihood of future occurrences, and assesses the planning area's exposure to each hazard profiled; considering assets at risk, critical facilities, and future development trends.
- **Section 4.6: Conclusions on Hazard Risk** summarizes the results of the Priority Risk Index and defines each hazard as a Low, Moderate, or High Risk hazard.

4.2 HAZARD IDENTIFICATION

To identify hazards relevant to the planning area, the HMPC began with a review of the list of hazards identified in the 2018 State Hazard Mitigation Plan and the 2015 Pamlico Sound Regional Hazard Mitigation Plan. This review of hazards is summarized in Table 4.1. The HMPC used these lists to identify a full range of hazards for potential inclusion in this plan update and to ensure consistency across these planning efforts. All hazards on the below list were evaluated for inclusion in this plan update.

Table 4.1 – Full Range of Hazards Evaluated

Hazard	Included in 2018 State HMP?	Included in 2015 Pamlico Sound Regional HMP?
Flooding	Yes	Yes
Hurricanes and Coastal Hazards	Yes	Yes
Severe Winter Weather (Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold)	Yes	Yes
Extreme Heat	Yes	Yes
Earthquake	Yes	Yes
Wildfire	Yes	Yes
Dam Failure	Yes	Yes
Levee Failure	No	Yes
Drought	Yes	Yes
Severe Thunderstorm (Tornado, Hailstorm, Torrential Rain, Thunderstorm Wind, High Wind, Lightning)	Yes	Yes (Tornadoes evaluated as a separate hazard)
Landslide	Yes	No
Sinkholes	Yes	No
Coastal Erosion	Yes	Yes
Nor'easters	No	Yes
Tsunamis	No	Yes
Rip Currents	No	Yes
Hazardous Materials Incident	Yes	No
Radiological Emergency	Yes	No
Terrorism	Yes	No
Infectious Disease	Yes	No
Cyber Threat	Yes	No
Electromagnetic Pulse	Yes	No

The HMPC evaluated the above list of hazards using existing hazard data, past disaster declarations, local knowledge, and information from the 2018 State Plan and the 2015 Pamlico Sound Regional Plan to determine the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

One significant resource in this effort was the National Oceanic and Atmospheric Administration's National Center for Environmental Information (NCEI), which has been tracking various types of severe weather since 1950. Their Storm Events Database contains an archive by county of destructive storm or weather data and information which includes local, intense and damaging events. NCEI receives storm data from the National Weather Service (NWS). The NWS receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public, among others. The NCEI database contains 1,084 records of severe weather events that occurred in Beaufort, Carteret, Craven, and Pamlico Counties in the 20-year period from November 1998 through October 2018. Table 4.2 summarizes these events.

Table 4.2 – NCEI Severe Weather Reports for the Pamlico Sound Region Counties, Nov 1998 – Oct 2018

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Blizzard	0	$0	$0	0	0
Coastal Flood	19	$2,000	$0	0	0
Cold/Wind Chill	0	$0	$0	0	0
Drought	12	$0	$0	0	0
Excessive Heat	0	$0	$0	0	0
Extreme Cold/Wind Chill	0	$0	$0	0	0
Flash Flood	63	$1,145,000	$55,500,000	0	0
Flood	33	$106,000	$0	1	0
Frost/Freeze	4	$0	$0	0	0
Hail	318	$920,000	$0	0	0
Heat	0	$0	$0	0	0
Heavy Rain	0	$0	$0	0	0
Heavy Snow	17	$0	$0	0	0
High Wind	38	$9,000	$0	0	0
Hurricane	33	$185,970,000	$74,850,000	3	5
Ice Storm	4	$0	$0	0	0
Lightning	7	$6,107,000	$0	2	1
Storm Surge	15	$127,240,000	$0	0	0
Strong Wind	4	$2,000	$0	0	0
Thunderstorm Wind	336	$687,000	$3,000	2	41
Tornado	92	$34,102,000	$0	0	35
Tropical Storm	39	$43,467,000	$16,900,000	0	0
Wildfire	0	$0	$0	0	0
Winter Storm	38	$0	$0	0	0
Winter Weather	12	$0	$0	0	0
Total:	**1,084**	**$399,757,000**	**$147,253,000**	**8**	**82**

Source: National Center for Environmental Information Events Database, accessed February 2019
Note: Losses reflect totals for all impacted areas for each event.

The HMPC also researched past events that resulted in a federal and/or state emergency or disaster declaration for Beaufort, Carteret, Craven, and Pamlico Counties to identify significant hazards. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded and the Governor certifies the situation is beyond their recovery capabilities, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Records of designated counties for FEMA major disaster declarations start in 1964. Since then, Beaufort, Carteret, Craven, and Pamlico Counties have been designated in 14 different major disaster declarations. Table 4.3 summarizes the declarations per county, and Table 4.4 provides details for these declarations.

Table 4.3 – Summary of Disaster Declarations by County

County	Major Declarations Received
Beaufort	12
Carteret	10
Craven	13
Pamlico	11

Source: FEMA Disaster Declarations Summary, updated December 20, 2018

Table 4.4 – FEMA Major Disaster Declarations for Pamlico Sound Region Counties

County*	Disaster #	Dec. Date	Incident Type	Event Title
B, Ca, Cr, P	4393	9/14/2018	Hurricane	Hurricane Florence
B, Ca, Cr, P	4285	10/10/2016	Hurricane	Hurricane Matthew
B, Ca, Cr, P	4019	8/31/2011	Hurricane	Hurricane Irene
Cr	1969	4/19/2011	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
B, Cr	1942	10/14/2010	Severe Storm(s)	Severe Storms, Flooding, And Straight-Line Winds
Ca, Cr, P	1608	10/7/2005	Hurricane	Hurricane Ophelia
B, Ca, Cr, P	1490	9/18/2003	Hurricane	Hurricane Isabel
B, Ca, Cr, P	1292	9/16/1999	Hurricane	Hurricane Floyd Major Disaster Declarations
B, Ca, Cr, P	1291	9/9/1999	Hurricane	Hurricane Dennis
B, Ca, Cr, P	1240	8/27/1998	Hurricane	Hurricane Bonnie
B, Ca, Cr, P	1134	9/6/1996	Hurricane	Hurricane Fran
B, Ca, Cr, P	1127	7/18/1996	Hurricane	Hurricane Bertha
P	818	12/2/1988	Tornado	Severe Storms & Tornadoes
B, Cr	234	2/10/1968	Severe Ice Storm	Severe Ice Storm

Source: FEMA Disaster Declarations Summary, updated December 20, 2018
*County code: B = Beaufort, Ca = Carteret, Cr = Craven, P = Pamlico

Using the above information and additional discussion, the HMPC evaluated each hazard's significance to the planning area in order to decide which hazards to include in this plan update. Some hazard titles have been updated either to better encompass the full scope of a hazard or to assess closely related hazards together. Table 4.5 summarizes the determination made for each hazard.

Table 4.5 – Hazard Evaluation Results

Hazard	Included in this plan update?	Explanation for Decision
Flood	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. Multiple disaster declarations for the region are related to flooding. NCEI reports 130 flood-related events.
Hurricane and Tropical Storm	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. Past disaster declarations and NCEI storm reports indicate hurricanes are a significant hazard for the region.
Nor'easters	No	Nor'easters cause damage through high winds, erosion, and heavy rains. These hazards will be addressed under the following hazards: hurricane and tropical storm; severe thunderstorm, lighting, and hail; and erosion.
Severe Winter Weather (Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold)	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. The region has received several past disaster declarations related to this hazard. NCEI reports 75 severe winter weather related events.
Extreme Heat	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. Despite no NCEI records for heat, it may pose a significant risk to the planning area.
Earthquake	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. The region could potentially be impacted by the New Madrid fault and the Charleston fault.
Wildfire	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard.

Hazard	Included in this plan update?	Explanation for Decision
Dam & Levee Failure	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed dam failure. The 2015 Pamlico Sound plan addressed levees in conjunction with dam failure. The USACE's National Levee Database identifies three USACE levee systems in the region.
Drought	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. There have been multiple past instances of severe drought.
Severe Thunderstorm, Lightning, and Hail	Yes	The 2015 Pamlico Sound plan and the 2018 State plan addressed this hazard. The region has received multiple disaster declarations for this hazard. NCEI reports 703 severe weather related events in the past 20 years. Given this frequency, analysis is warranted.
Tornado	Yes	The 2015 Pamlico Sound plan and the 2018 State plan addressed this hazard. Multiple disaster declarations have been received for this hazard. NCEI reports 92 tornado segments passing through the region.
Landslide	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. There is no history of landslide in the region.
Sinkholes	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. There is no history of landslide in the region.
Erosion	Yes	The 2015 Pamlico Sound plan and 2018 State plan addressed this hazard. Past hurricane activity and the region's coastal location indicate this is a significant hazard for the region. Erosion will be addressed within a grouping of Coastal Hazards.
Rip Currents	Yes	The State plan does not address this hazard, but the 2015 Pamlico Sound plan found it a significant hazard. Vulnerability to rip currents given the region's coastal location and prominence as a tourist destination warrant inclusion in this plan. Rip Currents will be addressed within a grouping of Coastal Hazards.
Tsunami	No	The 2015 Pamlico Sound plan addressed this hazard but found it unlikely. The 2018 State plan does not address this hazard. There were no past events in or near the planning area.
Hazardous Materials Incident	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. The region considers this hazard more appropriately addressed through emergency operations planning and local staff training.
Radiological Emergency	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. No part of the region falls within the EPZ or IPZ of a nuclear facility.
Terrorism	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. The region considers this hazard more appropriately addressed at the State level.
Infectious Disease	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. The State HMP reports the entire State is equally at risk, but vulnerability is low across all but one impact category.
Cyber Threat	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. The region considers this hazard more appropriately addressed through emergency operations planning and local staff training.
Electromagnetic Pulse	No	The 2018 State plan addressed this hazard, but the 2015 Pamlico Sound plan did not. The region considers this hazard more appropriately addressed at the State level.

The final list of hazards included in this plan are as follows:

- Coastal Hazards (Erosion & Rip Current)
- Dam & Levee Failure
- Drought
- Earthquake
- Extreme Heat
- Flood
- Hurricane & Tropical Storm
- Severe Weather (Thunderstorm Wind, Lightning, & Hail)
- Severe Winter Storm
- Tornado
- Wildfire

4.3 RISK ASSESSMENT METHODOLOGY AND ASSUMPTIONS

The Disaster Mitigation Act of 2000 requires that the HMPC evaluate the risks associated with each of the hazards identified in the planning process. Each hazard was evaluated to determine its probability of future occurrence and potential impact. A vulnerability assessment was conducted for each hazard using either quantitative or qualitative methods depending on the available data, to determine its potential to cause significant human and/or monetary losses. A consequence analysis was also completed for each hazard.

Each hazard is profiled in the following format:

Hazard Description

This section provides a description of the hazard, including discussion of its speed of onset and duration, as well as any secondary effects followed by details specific to the Pamlico Sound Region.

Location

This section includes information on the hazard's physical extent, with mapped boundaries where applicable.

Extent

This section includes information on the hazard extent in terms of magnitude and describes how the severity of the hazard can be measured. Where available, the most severe event on record is used as a frame of reference.

Past Occurrences

This section contains information on historical events, including the location and consequences of all past events on record within or near the Pamlico Sound Region.

Probability of Future Occurrence

This section gauges the likelihood of future occurrences based on past events and existing data. The frequency is generally determined by dividing the number of events observed by the number of years on record. This provides the percent chance of the event happening in any given year according to historical occurrence (e.g. 10 winter storm events over a 30-year period equates to a 33 percent chance of experiencing a severe winter storm in any given year). The likelihood of future occurrences is categorized into one of the classifications as follows:

- ***Highly Likely*** – Near or more than 100 percent chance of occurrence within the next year
- ***Likely*** – Between 10 and 100 percent chance of occurrence within the next year (recurrence interval of 10 years or less)
- ***Possible*** – Between 1 and 10 percent chance of occurrence within the next year (recurrence interval of 11 to 100 years)
- ***Unlikely*** – Less than 1 percent chance or occurrence within the next 100 years (recurrence interval of greater than every 100 years)

Climate Change

Where applicable, this section discusses how climate change may or may not influence the risk posed by the hazard on the planning area in the future.

Vulnerability Assessment

This section quantifies, to the extent feasible using best available data, assets at risk to natural hazards and potential loss estimates. People, properties and critical facilities, and environmental assets that are vulnerable to the hazard are identified. Future development is also discussed in this section, including how exposure to the hazard may change in the future or how development may affect hazard risk.

The vulnerability assessments followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (August 2001). The vulnerability assessment first describes the total vulnerability and values at risk and then discusses vulnerability by hazard. Data used to support this assessment included the following:

- Geographic Information System (GIS) datasets, including building footprints, topography, aerial photography, and transportation layers;
- Hazard layer GIS datasets from state and federal agencies;
- Written descriptions of inventory and risks provided by the State Hazard Mitigation Plan;
- Written descriptions of inventory and risks provided by the previous Pamlico Sound Regional Hazard Mitigation Plan;
- Exposure and vulnerability estimates provided by the North Carolina Emergency Management IRISK database; and
- Crop insurance claims by cause from USDA's Risk Management Agency.

NCEM's IRISK database incorporates county building footprint and parcel data. Footprints with an area less than 500 square feet were excluded from the analysis. To determine if a building is in a hazard area, the building footprints were intersected with each of the mapped hazard areas. If a building intersects two or more hazard areas (such as the 1-percent-annual-chance flood zone and the 0.2-percent-annual-chance flood zone), it is counted as being in the hazard area of highest risk. The parcel data provided building value and year built. Building value was used to determine the value of buildings at risk. Year built was used to determine if the building was constructed prior to or after the community had joined the NFIP and had an effective FIRM and building codes enforced.

Census blocks and Summary File 1 from the 2010 Census were used to determine population at risk. This included the total population, as well as the vulnerable elderly and children age groups. To determine population at risk, the census blocks were intersected with the hazard area. To better determine the actual number of people at risk, the intersecting area of the census block was calculated and divided by the total area of the census block to determine a ratio of area at risk. This ratio was applied to the population of the census block. For example, a census block has a population of 400 people. Five percent of the census block intersects the 1-percent-annual-chance flood hazard area. The ratio estimates that 20

people are then at risk within the 1-percent-annual-chance flood hazard area (5% of the total population for that census block).

Two distinct risk assessment methodologies were used in the formation of the vulnerability assessment. The first consists of a ***quantitative*** analysis that relies upon best available data and technology, while the second approach consists of a ***qualitative*** analysis that relies on local knowledge and rational decision making. The quantitative analysis involved the use of NCEM's IRISK database, which provides modeled damage estimates for earthquake, flood, wind, and wildfire hazards.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Where hazard risk cannot be distinctly quantified and modeled, other information can be collected in regard to the hazard area, such as the location of critical facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the vulnerability of that area to that hazard.

Certain assumptions are inherent in any risk assessment. For the Pamlico Sound Regional HMP, three primary assumptions were discussed by the HMPC from the beginning of the risk assessment process: (1) that the best readily available data would be used, (2) that the hazard data selected for use is reasonably accurate for mitigation planning purposes, and (3) that the risk assessment will be regional in nature with local, municipal-level data provided where appropriate and practical.

Key methodologies and assumptions made for specific hazards analysis are described in their respective profiles.

Priority Risk Index

The conclusions drawn from the hazard profiling and vulnerability assessment process can be used to prioritize all potential hazards to the Pamlico Sound Region. The Priority Risk Index (PRI) was applied for this purpose because it provides a standardized numerical value so that hazards can be compared against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk was assigned a value (1 to 4) and a weighting factor as summarized in Table 4.6.

The results of the risk assessment and PRI scoring are provided in Section 4.6 Conclusions on Hazard Risk.

Table 4.6 – Priority Risk Index

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK CRITERIA	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 DAY	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES > 30 DAYS.	4	
SPATIAL EXTENT How large of an area could be impacted by a hazard event? Are impacts localized or regional?	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME Is there usually some lead time associated with the hazard event? Have warning measures been implemented?	**MORE THAN 24 HRS**	SELF DEFINED	1	10%
	12 TO 24 HRS	SELF DEFINED	2	
	6 TO 12 HRS	SELF DEFINED	3	
	LESS THAN 6 HRS	SELF DEFINED	4	
DURATION How long does the hazard event usually last?	**LESS THAN 6 HRS**	SELF DEFINED	1	10%
	LESS THAN 24 HRS	SELF DEFINED	2	
	LESS THAN 1 WEEK	SELF DEFINED	3	
	MORE THAN 1 WEEK	SELF DEFINED	4	

The sum of all five risk assessment categories equals the final PRI value, demonstrated in the equation below (the highest possible PRI value is 4.0).

PRI = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

The purpose of the PRI is to categorize and prioritize all potential hazards for the Pamlico Sound Region as high, moderate, or low risk. The summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes. Mitigation actions are not developed for hazards identified as low risk through this process.

4.4 ASSET INVENTORY

4.4.1 Population

North Carolina Emergency Management's (NCEM) IRISK database provided the asset inventory used for this vulnerability assessment. Population data in IRISK is pulled from the 2010 Census and includes a breakdown of population into two subpopulations considered to be a greater risk than the general population, the elderly and children. Table 4.7 details the population counts by jurisdiction used for the vulnerability assessment.

Table 4.7 – Population Counts by Jurisdiction, 2010

Jurisdiction	2010 Census Population	Elderly (Age 65 and Over)	Children (Age 5 and Under)
Beaufort			
Beaufort County (Unincorporated Area)	31,461	5,785	1,832
City of Washington	11,838	2,177	689
Town of Aurora	690	127	40
Town of Bath	558	103	33
Town of Belhaven	1,795	330	105
Town of Chocowinity	808	149	47
Town of Pantego	161	30	9
Town of Washington Park	446	82	26
Subtotal Beaufort	**47,757**	**8,783**	**2,781**
Carteret			
Carteret County (Unincorporated Area)	25,146	4,791	1,234
Town of Atlantic Beach	1,467	279	72
Town of Beaufort	5,345	1,018	262
Town of Bogue	670	128	33
Town of Cape Carteret	1,947	371	96
Town of Cedar Point	1,617	308	79
Town of Emerald Isle	3,642	694	179
Town of Indian Beach	120	23	6
Town of Morehead City	15,422	2,938	757
Town of Newport	8,929	1,701	438
Town of Peletier	808	154	40
Town of Pine Knoll Shores	1,335	254	65
Subtotal Carteret	**66,448**	**12,659**	**3,261**
Craven			
Craven County (Unincorporated Area)	42,854	6,546	3,180
City of Havelock	21,490	3,282	1,595
City of New Bern	29,720	4,539	2,205
Town of Bridgeton	455	69	34
Town of Cove City	392	60	29

Jurisdiction	2010 Census Population	Elderly (Age 65 and Over)	Children (Age 5 and Under)
Town of Dover	400	61	30
Town of River Bend	3,052	466	226
Town of Trent Woods	4,156	635	308
Town of Vanceboro	989	151	73
Subtotal Craven	**103,508**	**15,809**	**7,680**
Pamlico			
Pamlico County (Unincorporated Area)	7,546	1,641	344
Town of Alliance	732	159	33
Town of Arapahoe	552	120	25
Town of Bayboro	1,037	226	47
Town of Grantsboro	633	138	29
Town of Mesic	216	47	10
Town of Minnesott Beach	435	95	20
Town of Oriental	1,459	317	67
Town of Stonewall	274	60	12
Town of Vandemere	254	55	12
Subtotal Pamlico	**13,138**	**2,858**	**599**
Total Region	**230,851**	**40,109**	**14,321**

Source: NCEM IRISK Database; 2010 Decennial Census

4.4.2 Property

Building counts were also provided by the IRISK database and are detailed in Table 4.8. These values were generated using locally-provided building footprint and parcel data. The methodology for generating the building asset inventory is described in greater detail in Section 4.3. Note that these building counts were provided in 2010, and thus do not account for recent changes in development. Therefore, the exposure reflected in the following tables is likely an underestimate of actual present-day exposure. Chapter 2 Planning Area Profile describes the growth that has occurred since 2010 and provides a means of estimating the degree to which exposure and vulnerability may have increased.

Table 4.8 – Building Counts and Values by Jurisdiction

Jurisdiction	Building Count	Building Value
Beaufort		
Beaufort County (Unincorporated Area)	19,321	$1,549,327,941
City of Washington	5,559	$729,169,454
Town of Aurora	559	$35,367,571
Town of Bath	553	$79,203,926
Town of Belhaven	1,062	$85,390,855
Town of Chocowinity	392	$45,213,094
Town of Pantego	126	$7,357,109
Town of Washington Park	229	$29,533,488
Subtotal Beaufort	**27,801**	**$2,560,563,438**

Jurisdiction	Building Count	Building Value
Carteret		
Carteret County (Unincorporated Area)	15,309	$1,573,316,193
Town of Atlantic Beach	3,412	$880,457,593
Town of Beaufort	3,277	$548,967,817
Town of Bogue	363	$34,761,550
Town of Cape Carteret	989	$135,555,394
Town of Cedar Point	1,367	$131,494,292
Town of Emerald Isle	5,712	$1,446,750,580
Town of Indian Beach	899	$268,001,315
Town of Morehead City	7,827	$1,442,840,691
Town of Newport	4,085	$458,921,270
Town of Peletier	529	$34,194,198
Town of Pine Knoll Shores	1,757	$631,085,919
Subtotal Carteret	**45,526**	**$7,586,346,812**
Craven		
Craven County (Unincorporated Area)	23,133	$2,522,261,518
City of Havelock	5,366	$1,339,799,765
City of New Bern	12,738	$2,428,211,759
Town of Bridgeton	317	$30,257,749
Town of Cove City	274	$18,326,911
Town of Dover	281	$19,407,973
Town of River Bend	1,545	$207,913,029
Town of Trent Woods	1,910	$390,282,251
Town of Vanceboro	467	$51,127,916
Subtotal Craven	**46,031**	**$7,007,588,871**
Pamlico		
Pamlico County (Unincorporated Area)	6,385	$341,354,217
Town of Alliance	575	$28,822,154
Town of Arapahoe	428	$17,897,285
Town of Bayboro	514	$68,283,791
Town of Grantsboro	581	$35,161,133
Town of Mesic	185	$8,257,252
Town of Minnesott Beach	401	$41,676,493
Town of Oriental	1,377	$153,798,367
Town of Stonewall	226	$9,387,191
Town of Vandemere	190	$10,014,365
Subtotal Pamlico	**10,862**	**$714,652,248**
Total Region	**130,220**	**$17,869,151,369**

Source: NCEM IRISK Database

4.4.3 Critical Infrastructure & Key Resources and High Potential Loss Properties

The IRISK database also identifies Critical Infrastructure and Key Resources (CIKR) buildings as well as High Potential Loss Properties. These properties were also identified in 2010 and are likely an underestimate of the exposure of current CIKR and High Potential Loss Properties. These properties are detailed in Table 4.9 and Table 4.10, respectively. Details by jurisdiction can be found in county annexes.

Table 4.9 – Critical Infrastructure and Key Resources by Type and County

County	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	EM	Healthcare	Government Facilities	Defense Industrial Base	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Beaufort County	1,246	36	2	1,315	3	498	0	248	114	0	0	2	7	250	3	10	7	3,741
Carteret County	436	63	1	1,973	7	543	1	326	146	0	1	4	2	481	38	29	49	4,100
Craven County	1,031	55	0	2,173	16	389	6	408	203	0	0	0	1	333	25	45	29	4,714
Pamlico County	201	5	1	627	2	80	1	68	21	0	0	1	0	70	7	10	11	1,105
Total	**2,914**	**159**	**4**	**6,088**	**28**	**1,510**	**8**	**1,050**	**484**	**0**	**1**	**7**	**10**	**1,134**	**73**	**94**	**96**	**13,660**

Source: NCEM Risk Management Tool

Table 4.10 – High Potential Loss Properties by Use and County

County	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Beaufort County	4	55	17	44	0	22	5	147
Carteret County	64	69	1	62	0	28	48	272
Craven County	38	142	16	122	0	116	15	449
Pamlico County	0	3	0	11	0	0	3	17
Total	**106**	**269**	**34**	**239**	**0**	**166**	**71**	**885**

Source: NCEM Risk Management Tool

In addition to examining CIKR overall, the following critical facilities and assets were examined against known hazard areas, where possible, in this risk assessment. These facilities are those that could severely disrupt emergency operations or response and recovery efforts should they be damaged by a hazard event. Note that these facilities are a subset of the CIKR inventory; critical facility exposure and risk is accounted for in the exposure and vulnerability of CIKR.

Critical facilities are summarized by County in Table 4.11 through Table 4.14 and shown in Figure 4.1 through Figure 4.4. In total, there are 758 buildings in the region identified as critical facilities, worth an estimated $1,995,290,006

Table 4.11 – Critical Facilities, Beaufort County

Asset Type	Count of Buildings	Sum of Building Value
Community College	13	$25,155,111
Emergency Operations Center	1	$4,566,640
Fire Station	8	$4,851,870
Hog Farm	180	$11,698,267
Hospital	1	$8,344,502
Police Station	1	$661,489
School	48	$166,232,997
Substation	4	$24,000,000
Treatment Plant	6	$3,883,863
Total	**262**	**$249,394,739**

Source: NCEM IRISK Database; GIS analysis

Table 4.12 – Critical Facilities, Carteret County

Asset Type	Count of Buildings	Sum of Building Value
Community College	1	$2,334,488
Emergency Operations Center	1	$9,514,127
Fire Station	20	$3,532,677
Hospital	3	$12,079,184
Police Station	3	$7,898,888
School	75	$47,601,153
Substation	4	$34,208,124
Treatment Plant	74	$1,065,933,834
Grand Total	**181**	**$1,183,102,475**

Source: NCEM IRISK Database; GIS analysis

Table 4.13 – Critical Facilities, Craven County

Asset Type	Count of Buildings	Sum of Building Value
Community College	15	$26,210,148
Fire Station	40	$32,396,327
Hog Farm	79	$8,263,517
Police Station	4	$6,151,354
Power Plant	4	$14,765,013
School	102	$378,745,216
Substation	6	$60,000,000
Treatment Plant	28	$7,087,295
Total	**278**	**$533,618,870**

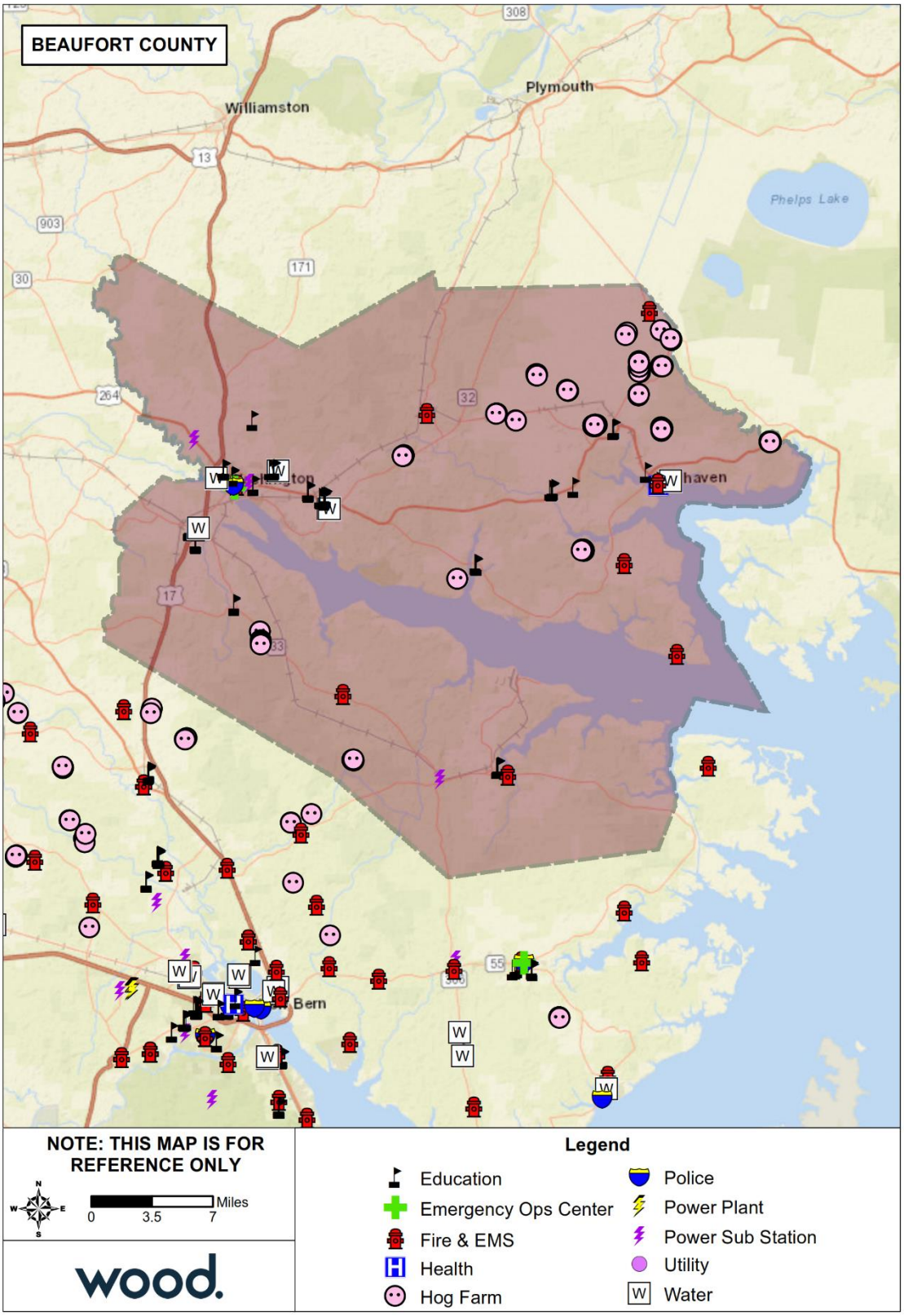
Source: NCEM IRISK Database; GIS analysis

Table 4.14 – Critical Facilities, Pamlico County

Asset Type	Count of Buildings	Sum of Building Value
Community College	5	$4,544,406
Emergency Operations Center	1	$940,580
Fire Station	9	$1,415,734
Hog Farm	7	$77,657
Police Station*	2	$1,311,237
School	9	$10,322,695
Substation	1	$10,000,000
Treatment Plant*	5	$561,613
Total	**39**	**$29,173,922**

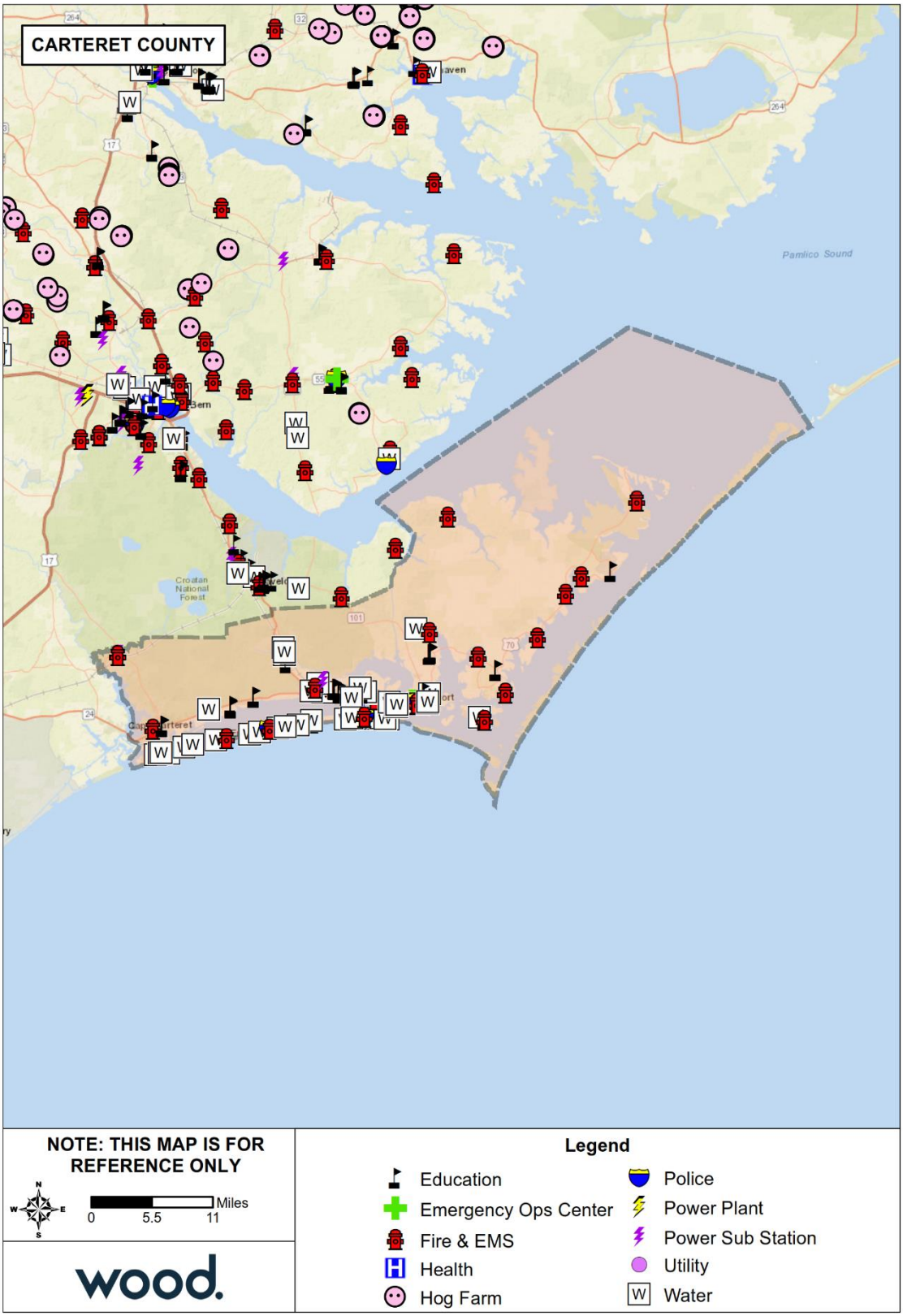
Source: NCEM IRISK Database; GIS analysis
*A water treatment plant and police station were added in the Town of Oriental based on HMPC input. These facilities are included in building counts and maps but are not included in the sum of building value because that information came from RMT.

Figure 4.1 – Beaufort County Critical Facilities



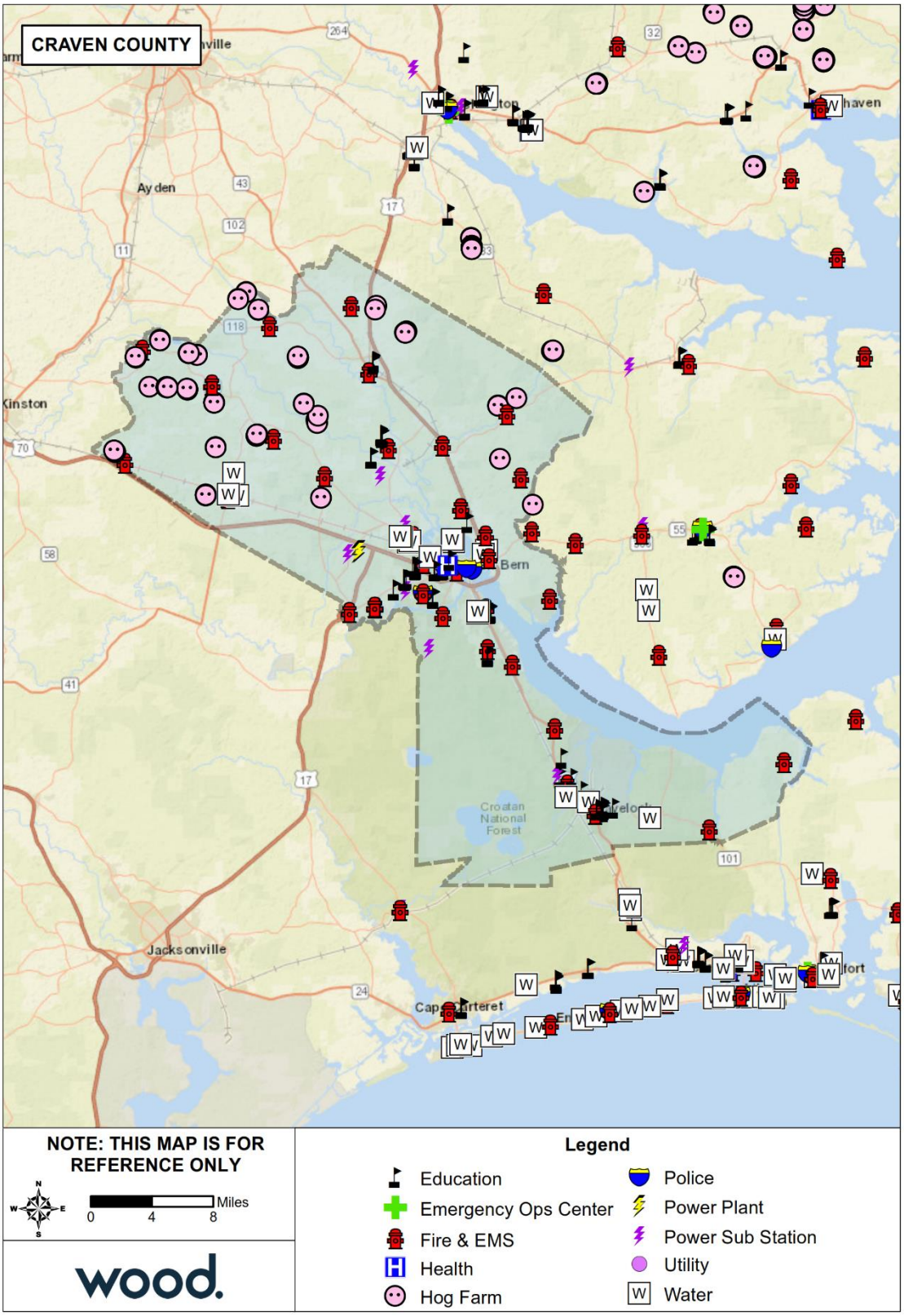
Source: NCEM IRISK Database, GIS Analysis

Figure 4.2 – Carteret County Critical Facilities



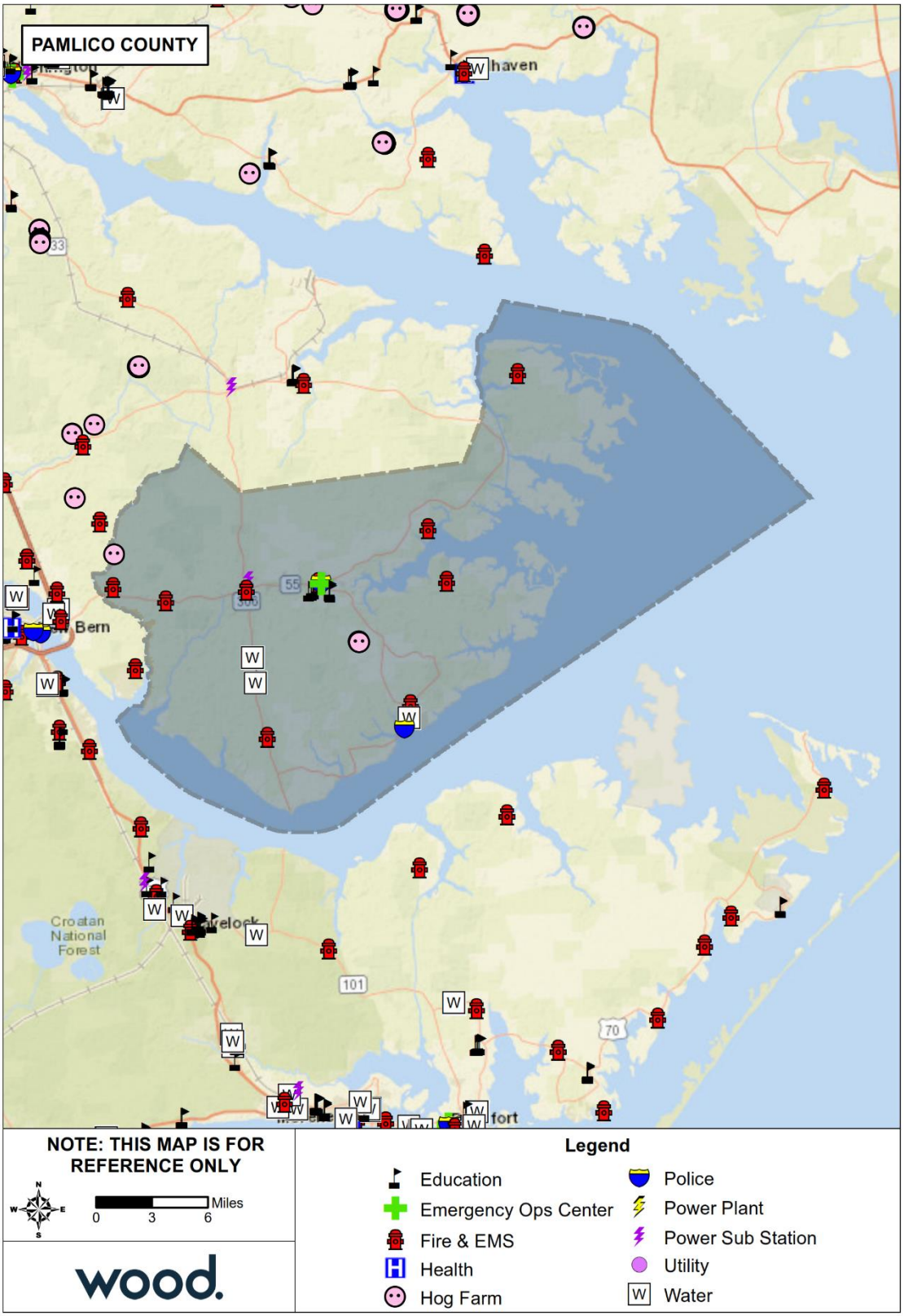
Source: NCEM IRISK Database, GIS Analysis

Figure 4.3 – Craven County Critical Facilities



Source: NCEM IRISK Database, GIS Analysis

Figure 4.4 – Pamlico County Critical Facilities



Source: NCEM IRISK Database, GIS Analysis; HMPC input

4.4.4 Agriculture

The agricultural industry is also highly vulnerable to natural hazards, which can cause both crop and livestock losses. The exposure of agriculture in the region was measured using the USDA's 2017 Census of Agriculture. Table 4.15 below summarizes the agricultural exposure in the Region by county.

Table 4.15 – Summary of Agriculture Exposure by County

County	Number of Farms	Acreage in Farms	Proportion of Total Land Area in Farms	Acreage with Crop Insurance	Estimated Market Value of Land & Buildings
Beaufort County	310	139,475	26.2%	103,426 (74.2%)	$477,022,000
Carteret County	158	62,764	19.3%	43,169 (68.8%)	$284,685,000
Craven County	245	81,360	18.0%	45,441 (55.9%)	$320,351,000
Pamlico County	100	43,262	20.1%	31,068 (71.8%)	$157,996,000

Source: USDA 2017 Census of Agriculture

4.5 HAZARD PROFILES, ANALYSIS, AND VULNERABILITY

4.5.1 Coastal Hazards (Erosion and Rip Current)

Hazard Background

Due to its location on estuarine and marine coastal areas, the Pamlico Sound Region is exposed to coastal hazards. The region identified coastal erosion and rip currents as significant hazards warranting assessment in this plan.

Coastal Erosion

Coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wear away the beaches and bluffs along the coast. Erosion undermines and often destroys homes, businesses, and public infrastructure and can have long-term economic and social consequences. According to NOAA, coastal erosion is responsible for approximately $500 million per year in coastal property loss in the United States, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of $150 million every year on beach nourishment and other shoreline erosion control measures.

Coastal erosion has both natural causes and causes related to human activities. Gradual coastal erosion/replenishment results naturally from the impacts of tidal longshore currents. Severe coastal erosion can occur over a very short period of time when the state is impacted by hurricanes, tropical storms and other weather systems. Sand is continually removed by longshore currents in some areas but it is also continually replaced by sand carried in by the same type of currents. Structures such as piers or sea walls, jetties, and navigational inlets may interrupt the movement of sand. Sand can become "trapped" in one place by these types of structures. The currents will, of course, continue to flow, though depleted of sand trapped elsewhere. With significant amounts of sand trapped in the system, the continuing motion of currents (now deficient in sand) results in erosion. In this way, human construction activities that result in the unnatural trapping of sand have the potential to result in significant coastal erosion.

Erosion rates and potential impacts are highly localized. Severe storms can remove wide beaches, along with substantial dunes, in a single event. In undeveloped areas, high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic (NOAA, 2014).

Warning Time: 1 – More than 24 hours

Duration: 4 – More than 1 week

Rip Currents

Rip currents are powerful, narrow channels of seaward flowing water along the coast, extending from the shoreline to outside the surf zone. Rip currents form when there are variations in wave breaking along the beach due to the flow of water from areas with more wave breaking and corresponding higher wave setup to areas with less wave breaking and corresponding lower wave setup.

The National Weather Service (NWS) describes three major types of rip currents:

- **Bathymetrically-controlled rip currents** are those that occur at relatively fixed locations due to sandbars, submarine canyons and ridges, reefs, or other offshore features. These rip currents can be referred to as channelized or focused. Channelized currents are the most documented and well understood and occur in deep channels through shallow sandbars. Channelized rip

currents are typically between 5 to 100 yards wide, 3 to 10 feet deep, and anywhere from 50 to 500 yards apart. Focused rip currents can occur along flat featureless beaches and appear as offshore directed plumes of turbulent water and sediment. These rip currents may last for days, weeks, or months.

- **Structurally-controlled rip currents** occur adjacent to man-made structures such as groins, jetties, and piers and natural features like rock outcrops.
- **Hydrodynamically-controlled rip currents** occur solely as a result of wave and current interactions, typically from waves originating from two different sources approaching the beach from different directions. These rip currents are transient and may only last for several minutes.

Warning Time: 4 – Less than 6 hours

Duration: 2 – Less than 24 hours

Location

Erosion

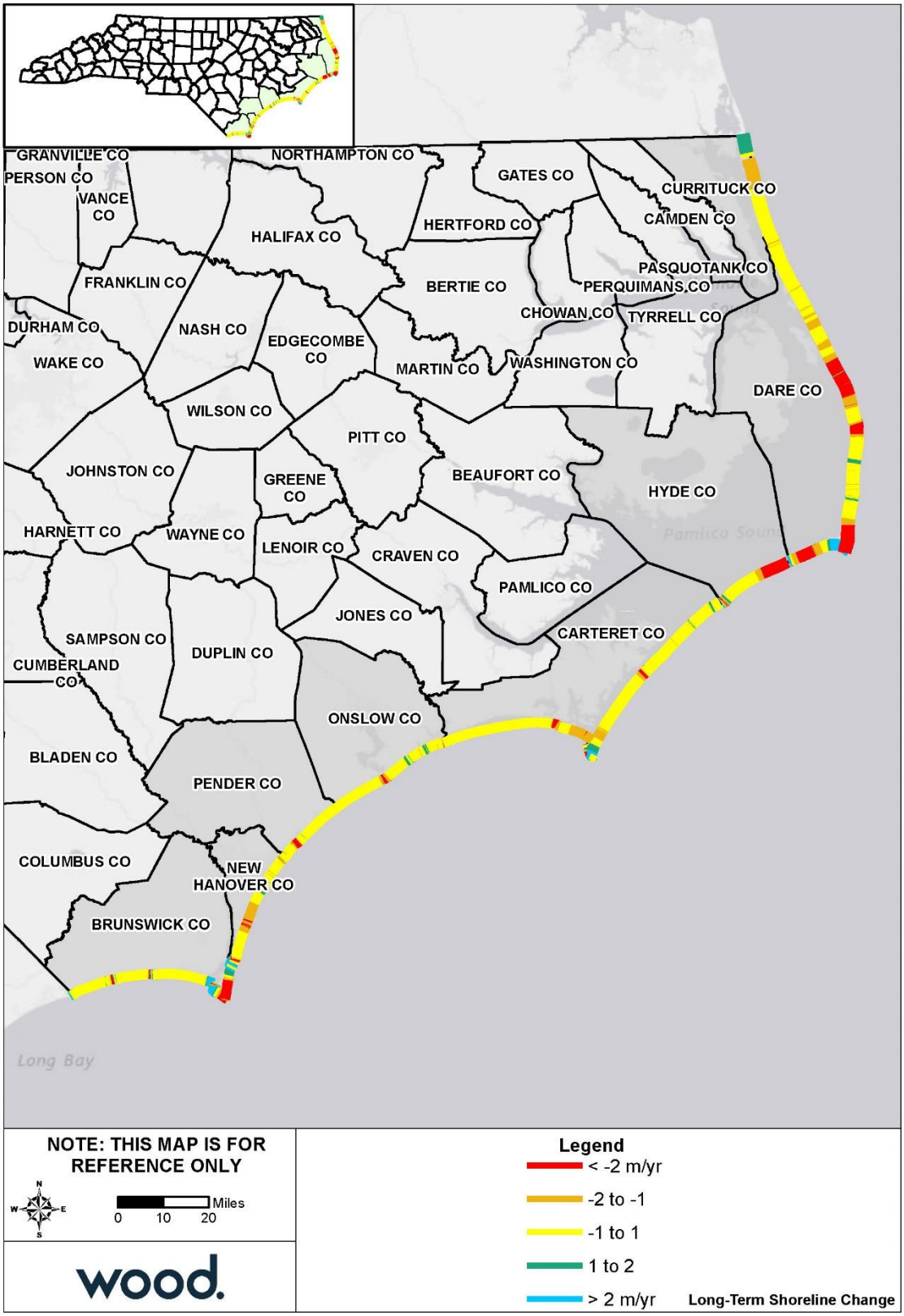
Erosion can occur along any shoreline in the region. While erosion is likely to be more frequent and severe along the Atlantic coast, erosion of estuarine shorelines can also occur. In the Pamlico Sound Region, Carteret County is the location facing the greatest exposure to erosion.

Figure 4.5 on the following page shows the locations where shoreline change data to measure erosion and accretion rates along the North Carolina coast has been compiled by the USGS.

Rip Currents

Rip currents can occur along any oceanfront or area that experiences breaking waves.

Figure 4.5 – Shoreline Change Along the North Carolina Coast



Source: USGS Coastal and Marine Geology Program

Extent

Overall, coastal hazards have a limited impact on the Region. Erosion events may cause property damage when severe but are unlikely to cause injury or death. Rip currents may result in injury or death in severe cases but rarely have reported property damages. Both types of events are limited to areas along the coastline and surf zone.

Impact: 2 – Limited

Spatial Extent: 1 – Negligible

Erosion

The magnitude of erosion can be measured as a rate of change from a measured previous condition. As part of their Digital Shoreline Analysis System version 4.3, USGS has developed short and long-term linear regression rate calculations as a metric for shoreline change, measured in meters per year.

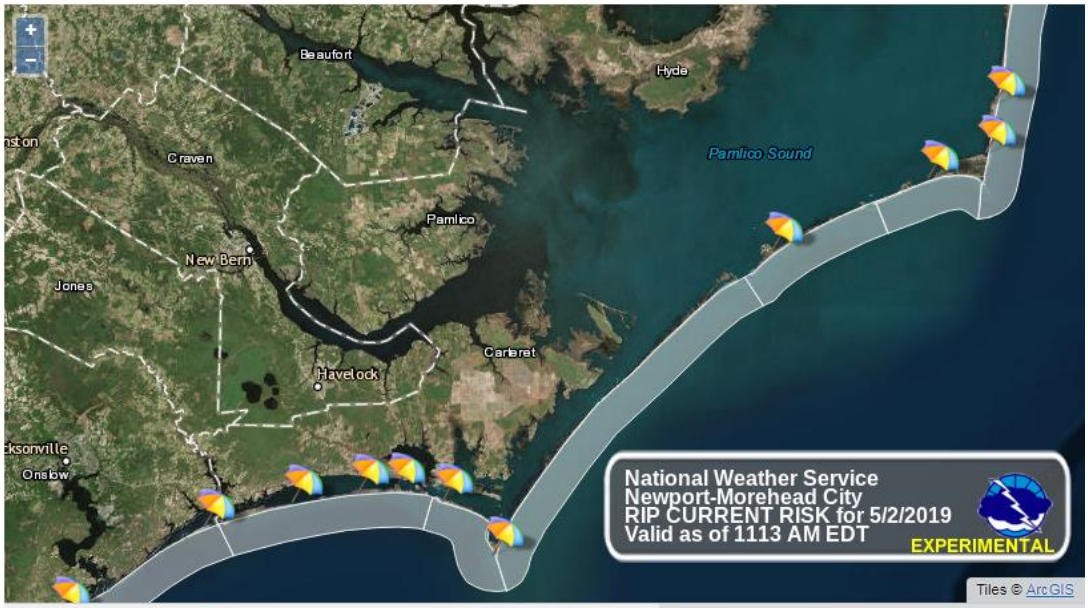
Rip Currents

One measure of rip currents is the flow speed of the current. Per NWS, channelized rip currents typically flow about 1-2 feet per second and can reach up to 8 feet per second. Rip currents do not have a steady flow but can experience rip pulses for short periods of time during which flows can suddenly accelerate to more than double their normal speed. Despite these measurable features, rip currents are not typically measured and recorded in these ways. Another way to consider the magnitude of a rip current is by its impacts. The HMPC is most concerned with rip currents causing deaths, injuries, or property damages.

The National Weather Service Newport-Morehead City, NC Forecast Office provides rip current risk level warnings on an Experimental Beach Forecast Webpage, shown in Figure 4.6. This tool indicates whether a section of the beach has low, moderate, or high rip current risk based on current surf conditions. The rip current risk levels carry the following descriptions, given as warnings to beach-goers:

- Low: Life threatening rip currents often occur in the vicinity of inlets, groins, jetties, and piers. Always supervise those who cannot swim and remember to heed the advice of the local beach patrol and flag warning systems.
- Moderate: Swim near a lifeguard. Remember to heed the advice of the local beach patrol and flag warning systems.
- High: The surf is dangerous for all levels of swimmers. Remember to heed the advice of the local beach patrol and flag warning systems.

Figure 4.6 – NWS Rip Current Risk Level Forecast



Risk Level	Description	Details
Low	Life threatening rip currents often occur in the vicinity of inlets, groins, jetties, and piers. Always supervise those who cannot swim and remember to heed the advice of the local beach patrol and flag warning systems.	Select a shaded area on the map to view details.
Moderate	Swim near a lifeguard. Remember to heed the advice of the local beach patrol and flag warning systems.	
High	The surf is dangerous for all levels of swimmers. Remember to heed the advice of the local beach patrol and flag warning systems.	

Source: National Weather Service Experimental Beach Forecast Webpage

Historical Occurrences

Erosion

The Carteret County Shore Protection Office conducts annual beach monitoring along Bogue Banks, Shackleford Banks, and Bear Island under the Bogue Banks Beach and Nearshore Mapping Program. Per the Program's 2018 Annual Report, the Bogue Banks oceanfront shoreline experienced an overall average landward recession at MHW of -6.9 ft over the prior year. However, much of the loss was expected equilibration of a 2017 beach renourishment project at Atlantic Beach. West of the renourishment project the average landward recession was only -2.7 ft.

The Program's 2019 Hurricane Florence Post-Storm Impact Evaluation reports that erosion caused by the storm resulted in an average landward recession at MHW of -21.4 ft. Average volumetric losses of up to 27.2 cy/ft were noted above -5 feet, -12 feet, and -20 feet NAVD88. Phase 1 of a planned Post-Florence beach renourishment project estimated base costs at over $20.1 million.

Rip Current

Rip currents are listed in NCEI's storm events database only when they cause a drowning, near-drowning, result in one or more rescues, or damage to watercraft. Table 4.16 lists all rip current events recorded by NCEI for the Pamlico Sound Region during the 20-year period between 1999-2018. Rip currents were only reported for Carteret County.

Table 4.16 – NCEI Records of Rip Currents, 1999-2018

Location	Date	Time	Deaths	Injuries	Reported Property Damage	Reported Crop Damage
Atlantic	5/31/2002	1400	1	0	$0	$0
Atlantic Beach	7/23/2002	1300	1	0	$0	$0
Atlantic Beach	7/18/2004	800	1	0	$0	$0
Carteret (Zone)	7/24/2006	930	1	0	$0	$0
Carteret (Zone)	5/5/2007	900	1	0	$0	$0
Carteret (Zone)	8/24/2010	1450	1	0	$0	$0
Carteret (Zone)	6/1/2013	1537	1	0	$0	$0
Carteret (Zone)	7/11/2013	800	1	0	$0	$0
Carteret (Zone)	6/10/2017	1730	1	0	$0	$0
Carteret (Zone)	6/10/2017	1730	1	0	$0	$0
Carteret (Zone)	6/17/2017	1000	1	0	$0	$0
Carteret (Zone)	6/18/2017	1000	1	0	$0	$0
Carteret (Zone)	7/11/2017	1404	1	0	$0	$0
Carteret (Zone)	6/15/2018	1813	1	0	$0	$0
Carteret (Zone)	7/25/2018	1330	1	0	$0	$0
		Total	**15**	**0**	**$0**	**$0**

The following narratives detail selected events reported in the table above:

July 18, 2004 – Rip Currents were prevalent along the south facing beaches in Eastern North Carolina with many rescues on this day. One young woman drowned during the afternoon hours.

May 5, 2007 – A 35-year old male was pulled out to sea in a rip current and drowned near Fort Macon in Atlantic Beach. The man entered the water to try and save two children who were in distress.

June 18, 2017 – A 21-year old gentleman was reportedly attempting to save others caught in a rip current off the Atlantic Beach on Sunday June 18 has died in the hospital on June 19. This gentleman was among five people who were in distress when Atlantic Beach Fire Department responded to the unprotected section of the beach near the Doubletree Inn.

July 25, 2018 – A man was pulled from the ocean in the 9000 block of Emerald Isle. Attempts to revive him were unsuccessful. There were several other water rescues around 2PM. Approximately 10 people were pulled out of the water. Lifeguards said there was a bad rip current and strong undertow that led to the rescues. A high rip current risk was in effect and red flags were flying.

Probability of Future Occurrence

Overall, the Pamlico Sound Region is highly likely to continue experiencing coastal hazard events. All counties in the region may experience erosion, but only Carteret County is exposed to rip currents. Risk and probability are therefore highest in Carteret County.

Erosion

Erosion and accretion are natural processes that are likely to continue to occur. Although data on historical erosion rates is only available for ocean shorelines, erosion is expected to continue affecting estuarine shorelines as well. The likelihood of significant instances of erosion will likely be tied to the occurrence of hurricane, tropical storm, and nor'easter events.

Probability: 4 – Highly Likely

Rip Current

Rip currents are ongoing phenomena that are always occurring along ocean surf zones. Rip currents are guaranteed to continue occurring, however, of concern to the HMPC is the probability of rip currents resulting in death, injury, or property damages. NCEI records indicate there have been 15 deaths due to rip currents over a 20-year period from 1999 through 2018. This equates to a 75 percent annual probability of significant rip current impacts.

Probability: 3 – Likely

Climate Change

As discussed under Climate Change in Section 4.5.6 and Section 4.5.7, climate change is expected to make heavy rain events and tropical storms and hurricanes more frequent and intense. As a result, the erosion typically caused by these storms can be expected to occur more frequently. Coastal erosion is also expected to increase as a result of rising seas. A 2018 study found that globally, between 1984 and 2015 erosion outweighed accretion. However, the study could not conclude the degree to which erosion during this period is attributed to climate changes or increased coastal development. Nonetheless, increases in erosion have been observed and are expected to continue.

Research on the impacts of climate change on rip currents are limited; however, the climate change factors that affect coastal erosion may also impact rip currents. Erosion and accretion result in changes to coastal bathymetry, which affects the location of rip currents. As large-scale erosion events occur more frequently, the location of rip currents may become more unpredictable.

Vulnerability Assessment

People

Erosion is unlikely to have any direct impact on the health or safety of individuals. However, it may cause indirect harm by weakening structures and by changing landscapes in ways that increase risk of other hazard impacts. For example, erosion of dune systems causes areas protected by those dunes to face higher levels of risk.

Rip currents pose a direct risk to human health and safety. Individuals who do not know how to recognize and avoid or escape rip currents are at risk of drowning. Since 1999, NCEI records reflect 15 fatalities attributed to rip currents in the Region.

Property

Property damage due to erosion typically only results in conjunction with large storm events which also bring wind and water damages. These events can cause scour and weaken foundations, which may undermine affected buildings' structural integrity.

Rip current is unlikely to result in any property damages, though it may result in indirect damages to watercrafts by pushing them into jetties or sandbars.

Environment

Erosion can change the shape and characteristics of coastal shorelines and riverine floodplains. Eroded material may clog waterways and decrease drainage capacity. Erosion can also negatively impact water quality by increasing sediment loads in waterways.

Consequence Analysis

Table 4.17 summarizes the potential negative consequences of erosion and rip currents.

Table 4.17 – Consequence Analysis – Coastal Hazards

Category	Consequences
Public	Rip currents may cause Injuries or fatalities. Erosion is unlikely to impact public health and safety.
Responders	If properly trained, responders are unlikely to suffer injuries or fatalities from rip currents. Erosion is unlikely to require immediate response or rescue operations.
Continuity of Operations (including Continued Delivery of Services)	Coastal hazards are unlikely to impact public continuity of operations.
Property, Facilities and Infrastructure	Rip current is unlikely to damage property but may result in indirect damages to watercrafts. Erosion can result in property damage if it is severe enough or if scour occurs that undermines the integrity of structural foundations.
Environment	Rip current will not have severe environmental consequences. Erosion can increase sediment loads in waterbodies and change riverine and coastal topography.
Economic Condition of the Jurisdiction	Rip current and severe erosion can negatively impact tourist economies. Beach renourishment projects to counter erosion are extremely costly.
Public Confidence in the Jurisdiction's Governance	Coastal hazards are unlikely to impact public confidence.

Hazard Summary by Jurisdiction

The following table summarizes coastal hazard risk by jurisdiction. Where priority ratings vary between erosion and rip current, these scores represent an average rating. Risk to coastal hazards varies based on the presence and type of coastal areas. For example, jurisdictions without oceanfront do not experience rip currents. Jurisdictions with more frequented beaches are likely to see a higher impact due to rip current or could currently be experiencing a slower rate of erosion.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	2	1	1	3	2.1	M
City of Washington	3	2	1	1	3	2.1	M
Town of Aurora	3	2	1	1	3	2.1	M
Town of Bath	3	2	1	1	3	2.1	M
Town of Belhaven	3	2	1	1	3	2.1	M
Town of Chocowinity	3	2	1	1	3	2.1	M

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Pantego	3	2	1	1	3	2.1	M
Town of Washington Park	3	2	1	1	3	2.1	M
Carteret County	4	2	1	2	3	2.5	H
Town of Atlantic Beach	4	2	1	2	3	2.5	H
Town of Beaufort	3	2	1	1	3	2.1	M
Town of Bogue	3	2	1	1	3	2.1	M
Town of Cape Carteret	3	2	1	1	3	2.1	M
Town of Cedar Point	3	2	1	1	3	2.1	M
Town of Emerald Isle	4	2	1	2	3	2.5	H
Town of Indian Beach	4	2	1	2	3	2.5	H
Town of Morehead City	3	2	1	1	3	2.1	M
Town of Newport	3	2	1	1	3	2.1	M
Town of Peletier	3	2	1	1	3	2.1	M
Town of Pine Knoll Shores	4	2	1	2	3	2.5	H
Craven County	3	2	1	1	3	2.1	M
City of Havelock	3	2	1	1	3	2.1	M
City of New Bern	3	2	1	1	3	2.1	M
Town of Bridgeton	3	2	1	1	3	2.1	M
Town of Cove City	1	1	1	1	3	1.5	L
Town of Dover	1	1	1	1	3	1.5	L
Town of River Bend	1	1	1	1	3	1.5	L
Town of Trent Woods	3	2	1	1	3	2.1	M
Town of Vanceboro	1	1	1	1	3	1.5	L
Pamlico County	3	2	1	1	3	2.1	M
Town of Alliance	1	1	1	1	3	1.5	L
Town of Arapahoe	1	1	1	1	3	1.5	L
Town of Bayboro	1	1	1	1	3	1.5	L
Town of Grantsboro	1	1	1	1	3	1.5	L
Town of Mesic	3	2	1	1	3	2.1	M
Town of Minnesott Beach	3	2	1	1	3	2.1	M
Town of Oriental	3	2	1	1	3	2.1	M
Town of Stonewall	3	2	1	1	3	2.1	M
Town of Vandemere	3	2	1	1	3	2.1	M

4.5.2 Dam & Levee Failure

Hazard Background

Dam Failure

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, concrete, or mine tailings. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farm land, provide recreation areas, generate electrical power, and help control erosion and flooding issues. A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, manmade events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as earthquakes or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding is the most common cause of dam failure.

Dam failures usually occur when the spillway capacity is inadequate and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping causes a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; or
- High winds, which can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. Dam failures are generally catastrophic if the structure is breached or significantly damaged. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects to roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Dam failure can occur with little warning. Intense storms may produce a flood in a few hours or even minutes for upstream locations. Flash floods occur within six hours of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching. Other failures and breaches can take much longer to occur, from days to weeks, as a result of debris jams or the accumulation of melting snow.

Dam failures are of particular concern because the failure of a large dam has the potential to cause more death and destruction than the failure of any other manmade structure. This is because of the destructive

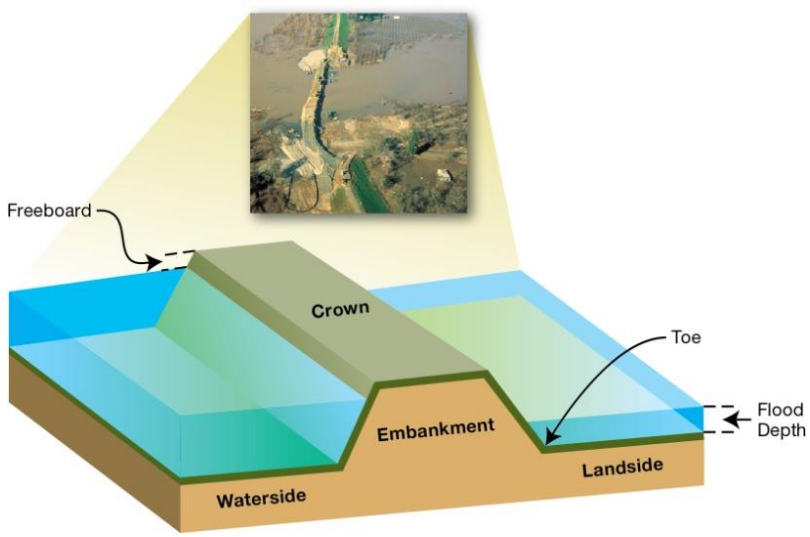
power of the flood wave that would be released by the sudden collapse of a large dam. Dams are innately hazardous structures. Failure or poor operation can result in the release of the reservoir contents—this can include water, mine wastes, or agricultural refuse–causing negative impacts upstream or downstream or at locations far from the dam. Negative impacts of primary concern are loss of human life, property damage, lifeline disruption, and environmental damage.

Levee Failure

FEMA defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce the risk from temporary flooding." Levee systems consist of levees, floodwalls, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. Levees often have "interior drainage" systems that work in conjunction with the levees to take water from the landward side to the water side. An interior drainage system may include culverts, canals, ditches, storm sewers, and/or pumps.

Levees and floodwalls are constructed from the earth, compacted soil or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. Levees and floodwalls are typically built parallel to a waterway, most often a river, in order to reduce the risk of flooding to the area behind it. Figure 4.7 shows the components of a typical levee.

Figure 4.7 – Components of a Typical Levee



Source: FEMA, What is a Levee Fact Sheet, August 2011

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events. Levees reduce, not eliminate, the risk to individuals and structures behind them. A levee system failure or overtopping can create severe flooding and high water velocities. It is important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

For both dam and levee failure events, there is generally very little warning time. A failure may result from heavy rains and flash flooding and occur within hours of the first signs of breaching. The duration of the flood will vary but may last as long as a week.

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

Location

Dam Failure

The North Carolina Dam Inventory, maintained by North Carolina Department of Environmental Quality, provides a detailed inventory of all dams in the state. As of July 2018, there are 28 dams in the Pamlico Sound Region, of which 20 are rated low hazard and 8 are rated high hazard. Of all 28 dams, 21 are located in Beaufort County, 1 in Carteret County, 4 in Craven County, and 2 in Pamlico County. Figure 4.8 through Figure 4.11 show the location of all dams in the Region by county. Table 4.18 lists all dams with high hazard potential in the Region by county. Dams located in or near specific jurisdictions are shown in their respective jurisdictional annexes.

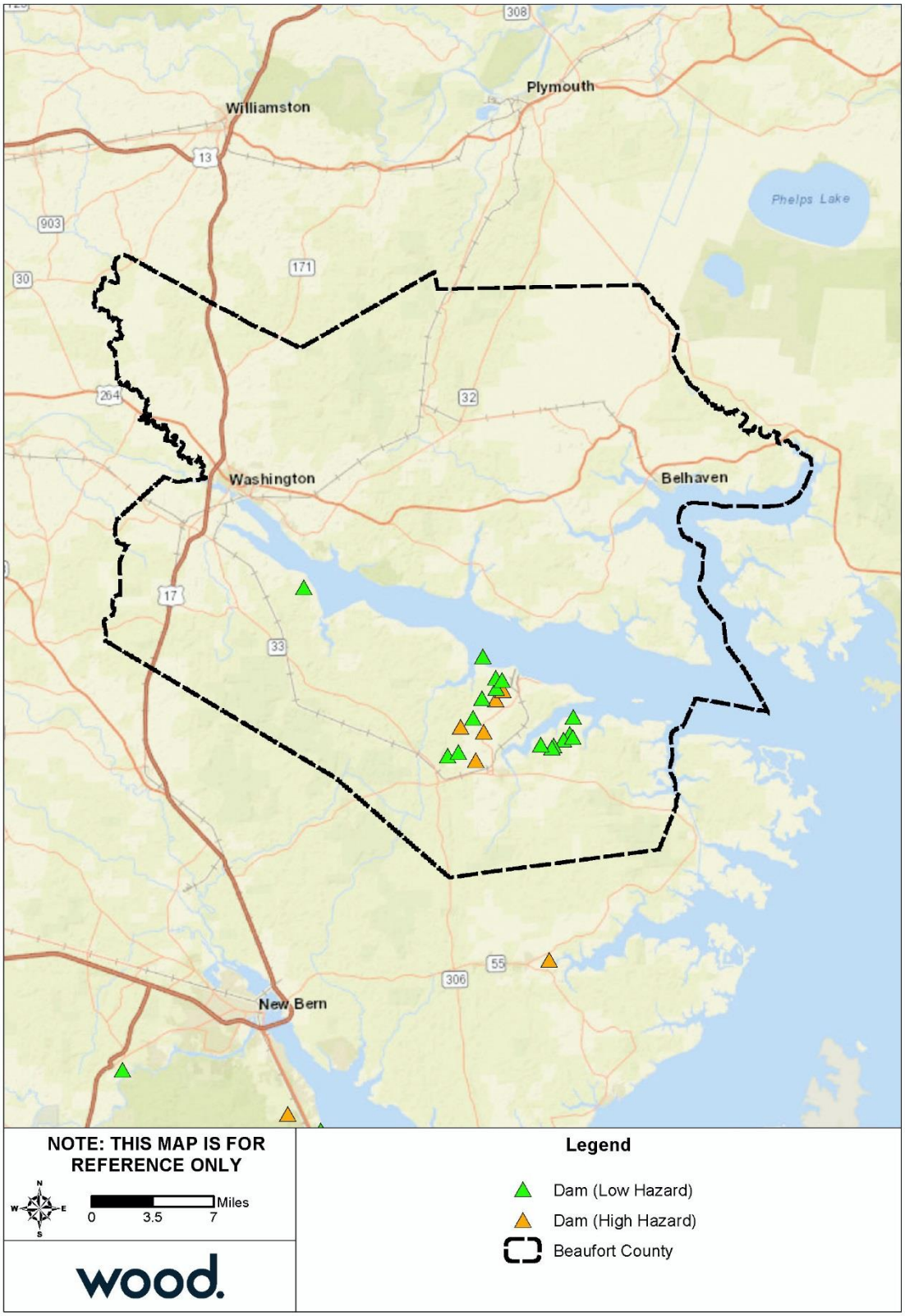
Table 4.18 – High Hazard Dams in the Pamlico Sound Region

Dam Name	NID ID	Condition as of Last Inspection	Max Capacity (Ac-Ft)	Nearest Downstream Location
Beaufort County				
PCS Phosphate R1 & R2 Blend Dike	NC01876	Satisfactory	16000	Pamlico
PCS Phosphate R7 Blend Dike	NC05642	Satisfactory	40875	
PCS Phosphate #1a Cooling Pond Dike	NC05885	Satisfactory		
PCS Phosphates R-5 Dike	NC06062	Satisfactory	4900	
PCS Phosphate R-9 Dike	NC06154	Satisfactory		
Carteret County				
Walker Millpond Dam	NC01106	Satisfactory	806	Morehead City
Craven County				
Carolina Commons Dam*	NC05962	Satisfactory		James City
Pamlico County				
Pamlico Regional Wastewater Dike	NC05367	Satisfactory	6	Bayboro

Source: North Carolina Dam Inventory

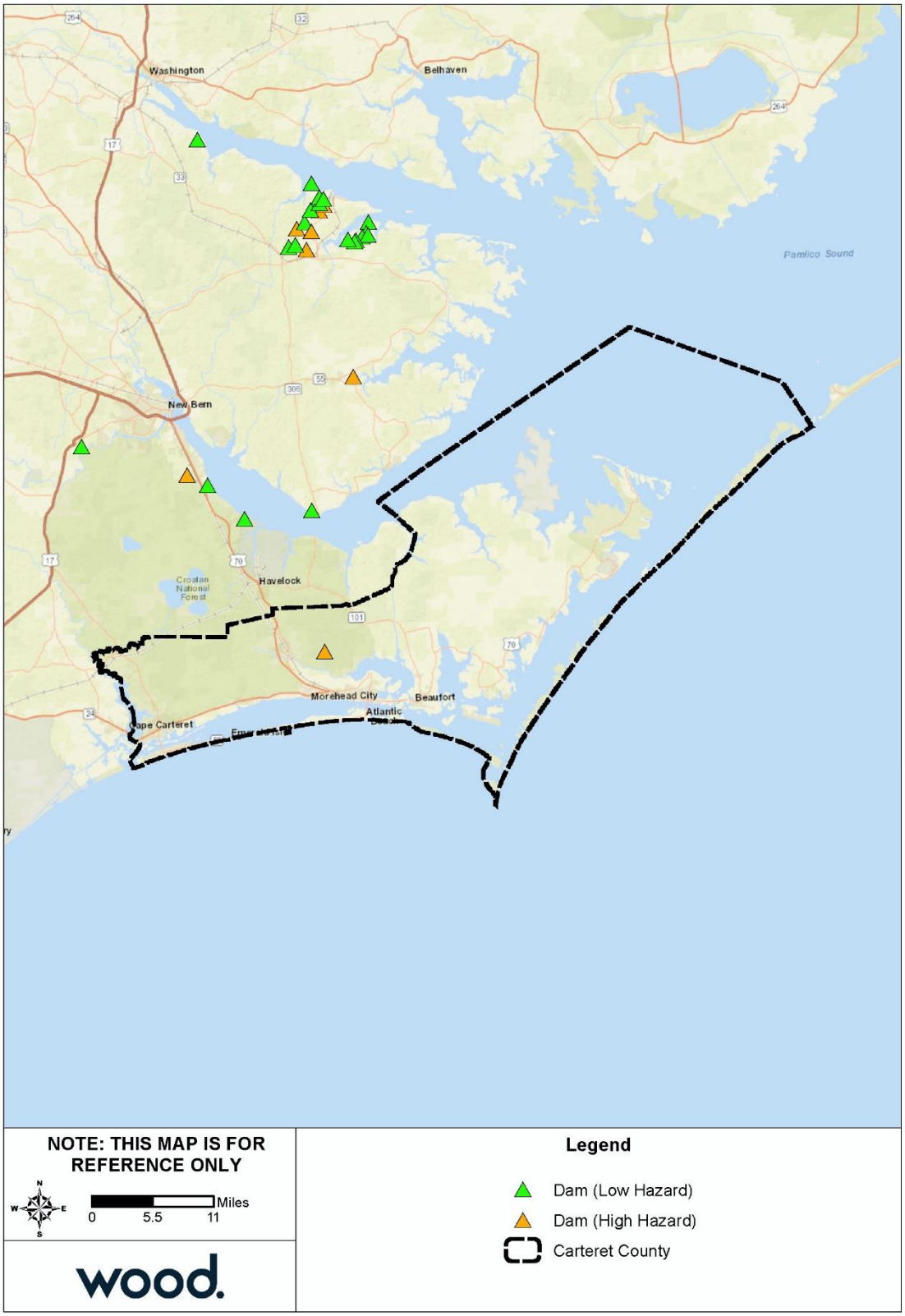
*The Carolina Commons Dam is located within the jurisdictional limits of New Bern City.

Figure 4.8 – Dam Locations in Beaufort County



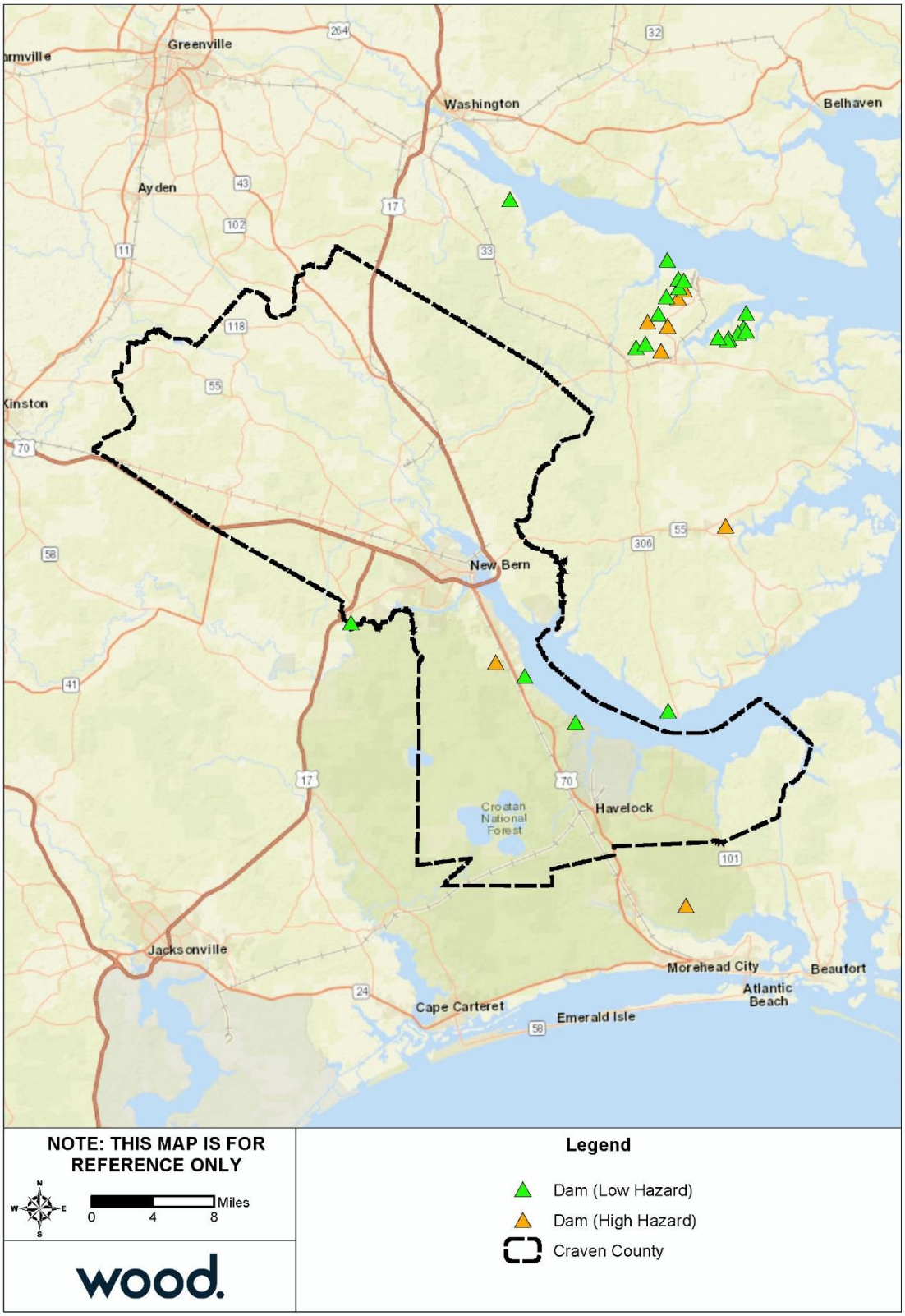
Source: North Carolina Dam Inventory, July 2018

Figure 4.9 – Dam Locations in Carteret County



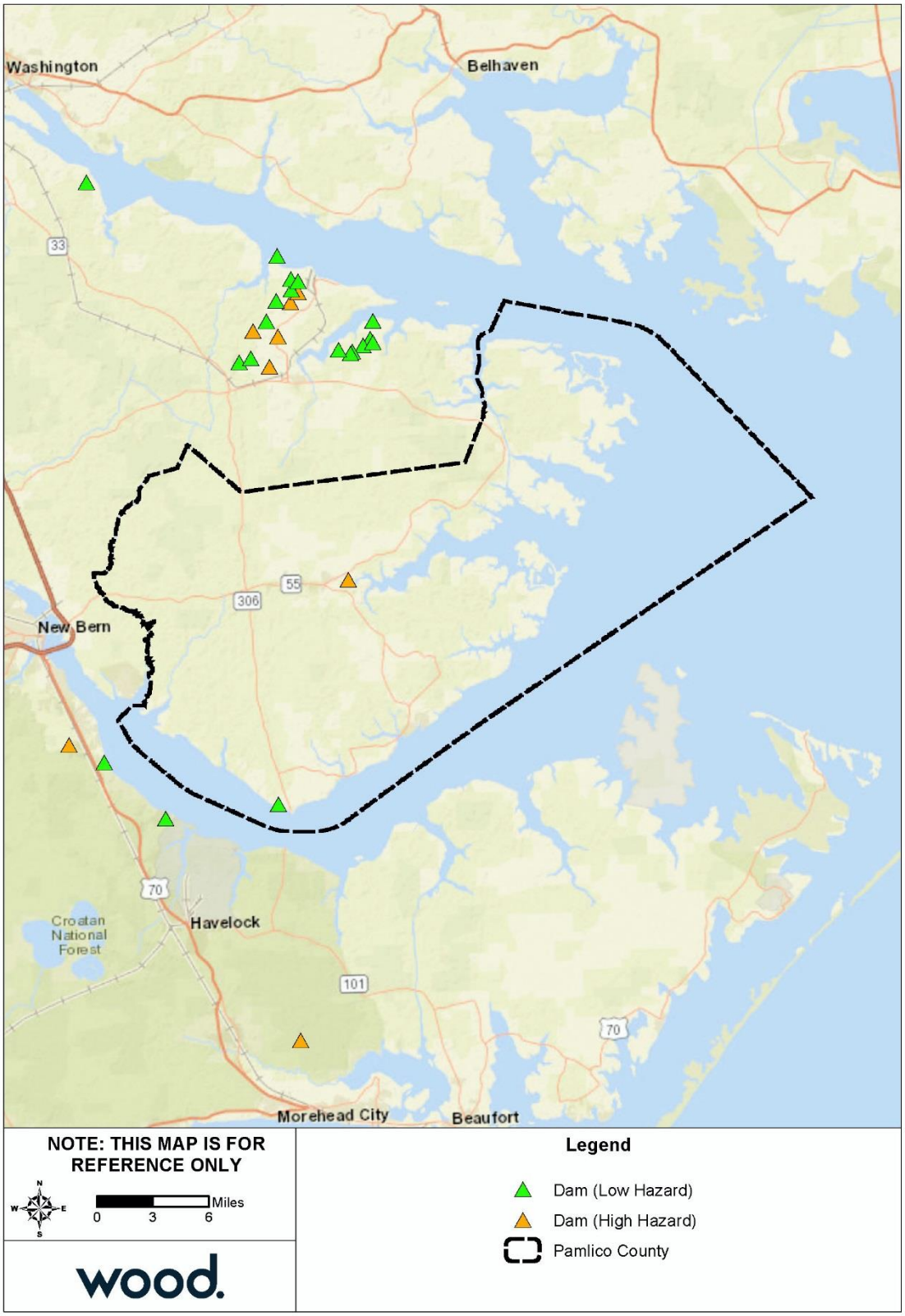
Source: North Carolina Dam Inventory, July 2018

Figure 4.10 – Dam Locations in Craven County



Source: North Carolina Dam Inventory, July 2018

Figure 4.11 – Dam Locations in Pamlico County



Source: North Carolina Dam Inventory, July 2018

Levee Failure

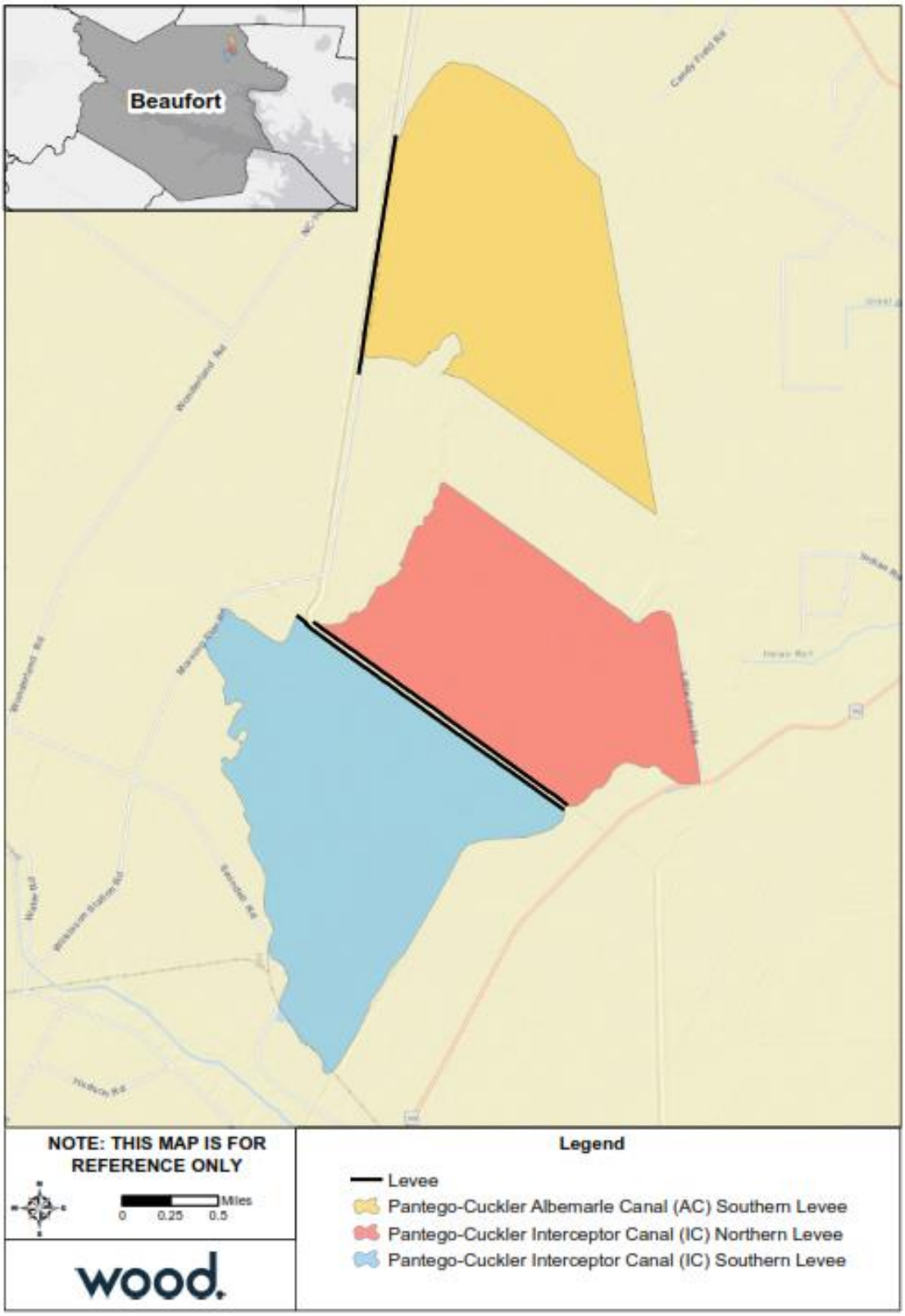
According to the US Army Corps of Engineers' (USACE) National Levee Database (NLD), there are three recognized levees in the Pamlico Sound Region. These levees are detailed in Table 4.19 and their locations are shown in Figure 4.12. All three levee segments are located in Beaufort County.

Table 4.19 – Levees in the Pamlico Sound Region

Levee Name	Year Constructed	Embankment Length (mi)	Levee Safety Action Classification	People at Risk	Structures at Risk	Property Value
Pantego-Cuckler Albemarle Canal (AC) Southern Levee	1962	1.26	Low	20	11	$4.19M
Pantego-Cuckler Interceptor Canal (IC) Northern Levee	1962	1.63	Low	15	11	$1.95M
Pantego-Cuckler Interceptor Canal (IC) Southern Levee	1962	1.73	Low	15	16	$1.66M

Source: National Levee Database

Figure 4.12 – Levee Locations in the Pamlico Sound Region



Source: National Levee Database

Extent

Each state has definitions and methods to determine the hazard potential of a dam. In North Carolina, dams are regulated by the state if they are 25 feet or more in height and impound 50 acre-feet or more. Dams and impoundments smaller than that may fall under state regulation if it is determined that failure of the dam could result in loss of human life or significant damage to property. The height of a dam is from the highest point on the crest of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam.

Dam Safety Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage. Dams are assigned one of three classes based on the nature of their hazard potential:

- Class A (Low Hazard) includes dams located where failure may damage uninhabited low value non-residential buildings, agricultural land, or low volume roads.
- Class B (Intermediate Hazard) includes dams located where failure may damage highways or secondary railroads, cause interruption of use or service of public utilities, cause minor damage to isolated homes, or cause minor damage to commercial and industrial buildings. Damage to these structures will be considered minor only when they are located in backwater areas not subjected to the direct path of the breach flood wave; and they will experience no more than 1.5 feet of flood rise due to breaching above the lowest ground elevation adjacent to the outside foundation walls or no more than 1.5 feet of flood rise due to breaching above the lowest floor elevation of the structure.
- Class C (High Hazard) includes dams located where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.

Table 4.20 – Dam Hazard Classifications

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads	Less than 25 vehicles per day
	Economic damage	Less than $30,000
Intermediate	Damage to highways, interruption of service	25 to less than 250 vehicles per day
	Economic damage	$30,000 to less than $200,000
	Loss of human life*	Probable loss of 1 or more human lives
High	Economic damage	More than $200,000
	*Probable loss of human life due to breached roadway or bridge on or below the dam	250 or more vehicles per day

Source: NCDENR

Failure of a dam or levee would affect only a negligible area but could cause death and serious property damage within the affected area.

Impact: 3 – Critical

Spatial Extent: 1 – Negligible

Historical Occurrences

The National Performance of Dams Program at Stanford University maintains a database of historical dam incidents. Per NPDP records, there are no known historical failures or near-failures at any dams in the Pamlico Sound Region.

Probability of Future Occurrence

Given the limited presence of levees and high hazard dams in the Region and the lack of any prior incidents, it can be concluded that dam or levee failure is unlikely. However, it is possible that with heavy rain events becoming more frequent and intense, conditions conducive to failures may occur more frequently in the future.

Probability: 1 – Unlikely

Climate Change

Studies have been conducted to investigate the impact of climate change scenarios on dam safety. The safety of dams for the future climate can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future, and this increase will affect the safety of the dams in the future. Studies concluded that the total hydrological failure probability of a dam will increase in the future climate and that the extent and depth of flood waters will increase by the future dam break scenario. These changes would likely produce similar impacts on levees.

Vulnerability Assessment

Methodologies and Assumptions

Dam inundation areas were not available for the identified dams; therefore, a quantitative vulnerability assessment could not be completed. Vulnerability to dam failure discussed below is based on anecdotal evidence and theoretical understanding of potential risks. Levee failure risk is based on the risk assessment information provided by the USACE's NLD.

People

A person's immediate vulnerability to a dam failure is directly associated with the person's distance downstream of the dam as well as proximity to the stream carrying the floodwater from the failure. For dams that have an Emergency Action Plan (EAP), the vulnerability of loss of life for persons in their homes or on their property may be mitigated by following the EAP evacuation procedures; however, the displaced persons may still incur sheltering costs. For persons located on the river (e.g. for recreation) the vulnerability of loss of life is significant.

People are also vulnerable to the loss of the uses of the lake upstream of a dam following failure. Several uses are minor, such as aesthetics or recreational use. However, some lakes serve as drinking water supplies and their loss could disrupt the drinking water supply and present a public health problem.

The NLD estimates that 50 people are at risk to levee failure in the Pamlico Sound Region, all located in Beaufort County.

Property

Vulnerability of the built environment includes damage to the dam or levee itself and any man-made feature located within the inundation area caused by the failure. Downstream of the dam, vulnerability includes potential damage to homes, personal property, commercial buildings and property, and government owned buildings and property; destruction of bridge or culvert crossings; weakening of bridge supports through scour; and damage or destruction of public or private infrastructure that cross the stream such as water and sewer lines, gas lines and power lines. Water dependent structures on the lake upstream of the dam, such as docks/piers, floating structures or water intake structures, may be damaged by the rapid reduction in water level during the failure.

Similarly, levee failures can result in inundation and damages to buildings, personal property, and infrastructure. If a levee fails or is overtopped, the resulting flooding may be severe, as the levee then acts as a barrier, preventing drainage of the flood waters. According to NLD, there are 38 buildings at risk in leveed areas, worth an estimated $7.8 million.

Environment

Aquatic species within the lake will either be displaced or destroyed due to dam failure. The velocity of the flood wave will likely destroy riparian and instream vegetation and destroy wetland function. The flood wave will like cause erosion within and adjacent to the stream. Deposition of eroded deposits may choke instream habitat or disrupt riparian areas. Sediments within the lake bottom and any low oxygen water from within the lake will be dispersed, potentially causing fish kills or releasing heavy metals found in the lake sediment layers.

Consequence Analysis

Table 4.21 summarizes the potential negative consequences of dam and levee failure.

Table 4.21 – Consequence Analysis – Dam and Levee Failure

Category	Consequences
Public	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the inundation area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas. Consequences include erosion, water quality degradation, wildlife displacement or destruction, and habitat destruction.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage and length of investigation.
Public Confidence in the Jurisdiction's Governance	Localized impact expected to primarily adversely affect only the dam owner and local entities.

Hazard Summary by Jurisdiction

The following table summarizes dam and levee failure hazard risk by jurisdiction. Warning time and duration are inherent to the hazard and remain constant across jurisdictions. Spatial extent of any dam failure will be negligible relative to the planning area. Jurisdictions with high hazard dams upstream or within their boundaries were assigned a probability rating of possible and an impact score of critical. Jurisdictions with no high hazard dams were assigned a probability rating of unlikely and an impact rating of limited.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	2	3	1	4	3	2.4	M
City of Washington	1	2	1	4	3	1.8	L
Town of Aurora	1	2	1	4	3	1.8	L
Town of Bath	1	2	1	4	3	1.8	L
Town of Belhaven	1	2	1	4	3	1.8	L

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Chocowinity	1	2	1	4	3	1.8	L
Town of Pantego	1	2	1	4	3	1.8	L
Town of Washington Park	1	2	1	4	3	1.8	L
Carteret County	2	3	1	4	3	2.4	M
Town of Atlantic Beach	1	2	1	4	3	1.8	L
Town of Beaufort	1	2	1	4	3	1.8	L
Town of Bogue	1	2	1	4	3	1.8	L
Town of Cape Carteret	1	2	1	4	3	1.8	L
Town of Cedar Point	1	2	1	4	3	1.8	L
Town of Emerald Isle	1	2	1	4	3	1.8	L
Town of Indian Beach	1	2	1	4	3	1.8	L
Town of Morehead City	2	3	1	4	3	2.4	M
Town of Newport	1	2	1	4	3	1.8	L
Town of Peletier	1	2	1	4	3	1.8	L
Town of Pine Knoll Shores	1	2	1	4	3	1.8	L
Craven County	2	3	1	4	3	2.4	M
City of Havelock	1	2	1	4	3	1.8	L
City of New Bern	1	2	1	4	3	1.8	L
Town of Bridgeton	1	2	1	4	3	1.8	L
Town of Cove City	1	2	1	4	3	1.8	L
Town of Dover	1	2	1	4	3	1.8	L
Town of River Bend	1	2	1	4	3	1.8	L
Town of Trent Woods	1	2	1	4	3	1.8	L
Town of Vanceboro	1	2	1	4	3	1.8	L
Pamlico County	2	3	1	4	3	2.4	M
Town of Alliance	1	2	1	4	3	1.8	L
Town of Arapahoe	1	2	1	4	3	1.8	L
Town of Bayboro	1	2	1	4	3	1.8	L
Town of Grantsboro	1	2	1	4	3	1.8	L
Town of Mesic	1	2	1	4	3	1.8	L
Town of Minnesott Beach	1	2	1	4	3	1.8	L
Town of Oriental	1	2	1	4	3	1.8	L
Town of Stonewall	1	2	1	4	3	1.8	L
Town of Vandemere	1	2	1	4	3	1.8	L

4.5.3 Drought

Hazard Background

Drought is a deficiency in precipitation over an extended period. It is a normal, recurrent feature of climate that occurs in virtually all climate zones. The duration of a drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. Studying the paleoclimate record is often helpful in identifying when long-lasting droughts have occurred. Common types of drought are detailed below in Table 4.22.

Table 4.22 – Types of Drought

Type	Details
Meteorological Drought	Meteorological Drought is based on the degree of dryness (rainfall deficit) and the length of the dry period.
Agricultural Drought	Agricultural Drought is based on the impacts to agriculture by factors such as rainfall deficits, soil water deficits, reduced ground water, or reservoir levels needed for irrigation.
Hydrological Drought	Hydrological Drought is based on the impact of rainfall deficits on the water supply such as stream flow, reservoir and lake levels, and ground water table decline.
Socioeconomic Drought	Socioeconomic drought is based on the impact of drought conditions (meteorological, agricultural, or hydrological drought) on supply and demand of some economic goods. Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related deficit in water supply.

The wide variety of disciplines affected by drought, its diverse geographical and temporal distribution, and the many scales drought operates on make it difficult to develop both a definition to describe drought and an index to measure it. Many quantitative measures of drought have been developed in the United States, depending on the discipline affected, the region being considered, and the particular application. Several indices developed by Wayne Palmer, as well as the Standardized Precipitation Index, are useful for describing the many scales of drought.

The U.S. Drought Monitor provides a summary of drought conditions across the United States and Puerto Rico. Often described as a blend of art and science, the Drought Monitor map is updated weekly by combining a variety of data-based drought indices and indicators and local expert input into a single composite drought indicator.

The **Palmer Drought Severity Index** (PDSI) devised in 1965, was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered most effective for unirrigated cropland. It primarily reflects long-term drought and has been used extensively to initiate drought relief. It is more complex than the Standardized Precipitation Index (SPI) and the Drought Monitor.

The **Standardized Precipitation Index** (SPI) is a way of measuring drought that is different from the Palmer Drought Severity Index (PDSI). Like the PDSI, this index is negative for drought, and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (precipitation), demand (evapotranspiration) and loss (runoff).

The State of North Carolina has a Drought Assessment and Response Plan as an Annex to its Emergency Operations Plan. This plan provides the framework to coordinate statewide response to a drought incident.

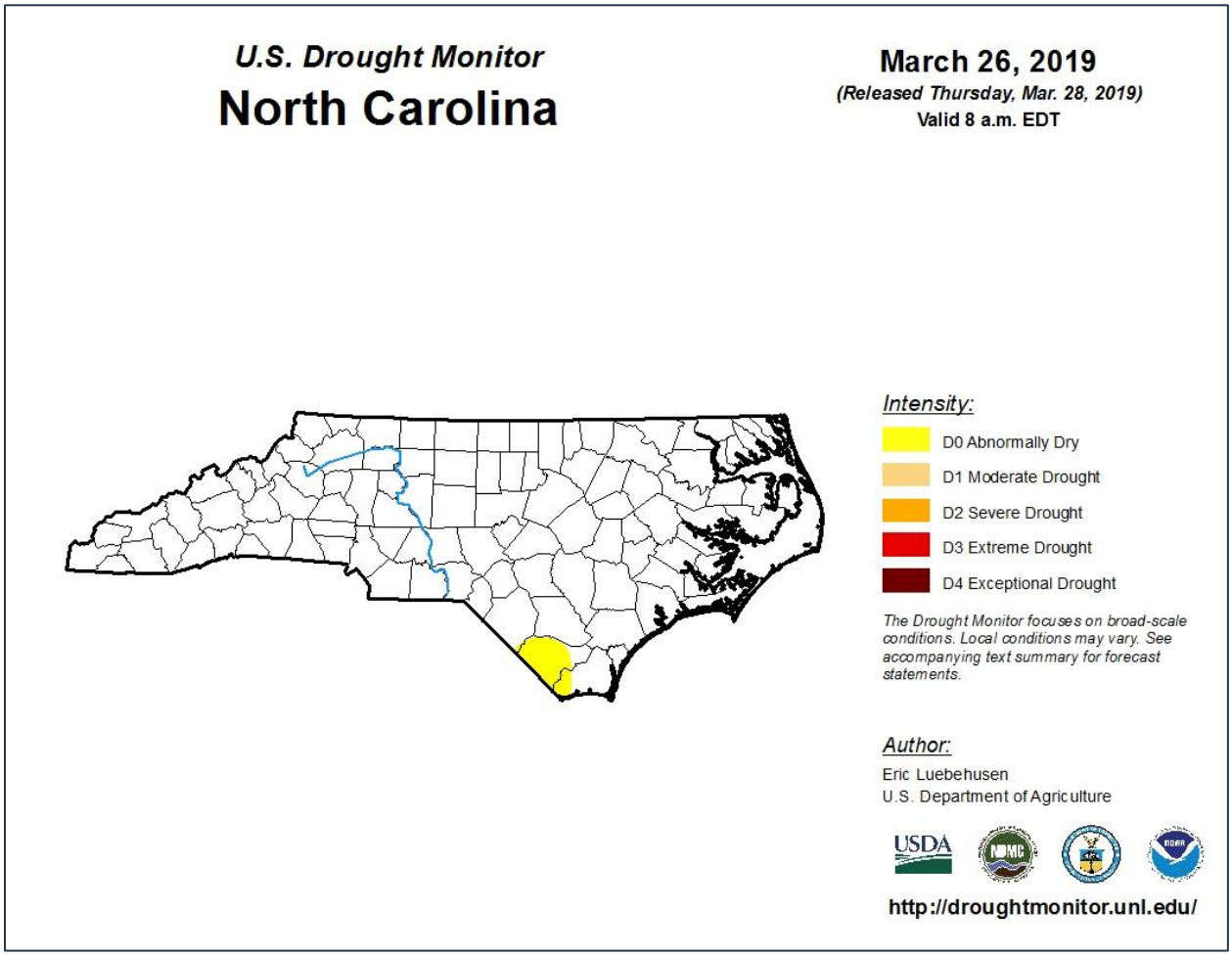
Warning Time: 1 – More than 24 hours

Duration: 4 – More than one week

Location

Drought is a regional hazard that can cover an entire the entire planning area, and in some cases the entire state. The figure below notes the U.S. Drought Monitor's drought ratings for North Carolina as of March 26, 2019; as of that date, the Pamlico Sound Region was experiencing no impacts of drought.

Figure 4.13 – U.S. Drought Monitor for Week of March 26, 2019



Source: U.S. Drought Monitor

Extent

Drought extent can be defined in terms of intensity, using the U.S. Drought Monitor scale. The Drought Monitor Scale measures drought episodes with input from the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keetch-Byram Drought Index, soil moisture indicators, and other inputs as well as information on how drought is affecting people. Figure 4.14 details the classifications used by the U.S. Drought Monitor. A category of D2 (severe) or higher on the U.S. Drought Monitor Scale can typically result in crop or pasture losses, water shortages, and the need to institute water restrictions.

Figure 4.14 – U.S. Drought Monitor Classifications

Category	Description	Possible Impacts	Ranges				
			Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: ▪ short-term dryness slowing planting, growth of crops or pastures Coming out of drought: ▪ some lingering water deficits ▪ pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	▪ Some damage to crops, pastures ▪ Streams, reservoirs, or wells low, some water shortages developing or imminent ▪ Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	▪ Crop or pasture losses likely ▪ Water shortages common ▪ Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	▪ Major crop/pasture losses ▪ Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	▪ Exceptional and widespread crop/pasture losses ▪ Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: US Drought Monitor

The most severe drought to impact the Pamlico Sound Region within the past 20 years occurred between March 2007 and May 2008, during which time all four counties experienced 51 consecutive weeks of drought conditions, reaching severe drought in Carteret and Pamlico Counties and extreme drought in Beaufort and Craven Counties.

Impact: 1 – Minor

Spatial Extent: 4 – Large

Historical Occurrences

U.S. Drought Monitor records drought intensity weekly throughout the country. The North Carolina Department of Environmental Quality (NCDEQ) Division of Water Resources maintains records of Drought Monitor data for the state as far back as January 2000. Table 4.23 presents the number of weeks that each county in the Pamlico Sound Region spent in drought by intensity over the period from 2000 to 2019, for which the Drought Monitor has records for 973 weeks.

Table 4.23 – Weeks in Drought, 2000-2019

	Weeks in Drought						% of time in Severe Drought or Worse
County	Total	D0	D1	D2	D3	D4	
Beaufort	288	163	76	45	4	0	5.0%
Carteret	283	168	73	34	8	0	4.3%
Craven	293	168	78	43	4	0	4.8%
Pamlico	284	159	81	44	0	0	4.5%

Source: NCDEQ Division of Water Resources, Drought Monitor History

The National Drought Mitigation Center (NDMC), located at the University of Nebraska in Lincoln, provides a clearinghouse for information on the effects of drought, based on reports from media, observers, impact records, and other sources.

According to the NDMC's Drought Impact Reporter, during the 10-year period from January 2009 through December 2018, 289 drought impacts were noted for the State of North Carolina, of which 2 were

reported for Beaufort County, 5 for Carteret County, 3 for Pamlico County, and 20 for Craven County. Table 4.24 summarizes the impacts reported by category and the years impacts were reported for each category. Note that the Drought Impact Reporter assigns multiple categories to each impact.

Table 4.24 – Drought Impacts Reported for Pamlico Sound Region Counties, Jan. 2009 - Dec. 2018

Category	Impacts	Years Reported
Agriculture	17	2016, 2015, 2014, 2013, 2012, 2011, 2010
Business & Industry	1	2018
Fire	1	2011
Plants & Wildlife	13	2017, 2016, 2015, 2014
Relief, Response & Restrictions	3	2012, 2010
Society & Public Health	2	2014, 2011
Tourism & Recreation	1	2018
Water Supply & Quality	6	2018, 2017, 2016, 2012, 2011

Source: Drought Impact Reporter, http://droughtreporter.unl.edu

Probability of Future Occurrence

Probability: 3 – Likely

Over the 20-year (973 week) period from 1999 through 2018, the Pamlico Sound Region averaged 287 weeks in drought conditions ranging from abnormally dry (D0) to extreme drought (D3). This equates to a 29.5 percent chance of severe drought in any given week. Of this time, an average of 45.5 weeks were categorized as a severe (D2) drought or greater; which equates to a 4.7 percent chance of severe drought in any given week.

Climate Change

The Fourth National Climate Assessment reports that average and extreme temperatures are increasing across the country and average annual precipitation is decreasing in the Southeast. Heavy precipitation events are becoming more frequent, meaning that there will likely be an increase in the average number of consecutive dry days. As temperature is projected to continue rising, evaporation rates are expected to increase, resulting in decreased surface soil moisture levels. Together, these factors suggest that drought will increase in intensity and duration in the Southeast.

Vulnerability Assessment

Methodologies and Assumptions

Vulnerability to drought in the Region is determined based on historical occurrences of drought in the planning area and generalized concerns regarding potential drought consequences. Agricultural vulnerability was estimated using data from the 2012 Census of Agriculture and a review of past claims related to drought.

People

Drought can affect people's physical and mental health. For those economically dependent on a reliable water supply, drought may cause anxiety or depression about economic losses, reduced incomes, and other employment impacts. Conflicts may arise over water shortages. People may be forced to pay more for water, food, and utilities affected by increased water costs.

Drought may also cause health problems due to poorer water quality from lower water levels. If accompanied by extreme heat, drought can also result in higher incidents of heat stroke and even loss of human life.

Property

Drought is unlikely to cause damages to the built environment. However, in areas with shrinking and expansive soils, drought may lead to structural damages.

Drought may also cause severe property loss for the agricultural industry in terms of crop and livestock losses. The USDA's Risk Management Agency (RMA) maintains a database of all paid crop insurance claims. Between 2007-2017, the sum of claims paid for crop damage as a result of drought in the Pamlico Sound Region was $46,641,462, or an average of $4,240,133 in losses every year. Losses were greatest in Beaufort, both in terms of acres affected and losses claimed. Table 4.25 through Table 4.28 summarize the crop losses due to drought reported in the RMA system by county.

Table 4.25 – Crop Losses Resulting from Drought, Beaufort County, 2007-2017

Year	Determined Acres	Indemnity Amount
2007	16,085.08	$2,223,329.00
2008	46,472.70	$8,341,607.00
2009	1,796.05	$180,435.00
2010	19,975.13	$2,455,019.00
2011	60,206.47	$16,639,325.00
2012	928.74	$49,998.00
2014	16.00	$537.00
2015	2,440.90	$366,595.93
2016	186.83	$19,560.80
2017	814.34	$75,883.00
Total	**148,922.25**	**$30,352,289.73**

Source: USDA Risk Management Agency

Table 4.26 – Crop Losses Resulting from Drought, Carteret County, 2007-2017

Year	Determined Acres	Indemnity Amount
2007	2,498.90	$105,756.00
2008	6,133.44	$871,361.00
2009	824.97	$97,609.00
2010	5,778.25	$498,181.00
2011	4,081.22	$1,761,233.00
2012	12.77	$2,476.00
2015	844.74	$91,755.50
2017	262.58	$28,110.75
Total	**20,436.87**	**$3,456,482.25**

Source: USDA Risk Management Agency

Table 4.27 – Crop Losses Resulting from Drought, Craven County, 2007-2017

Year	Determined Acres	Indemnity Amount
2007	12584.83	$1,355,027.00
2008	14427.81	$2,735,837.00
2009	2490.20	$332,621.00
2010	10704.85	$1,359,443.00
2011	12185.40	$2,898,439.00
2012	481.27	$54,439.00
2013	138.11	$14,707.00
2014	347.70	$47,402.00

Year	Determined Acres	Indemnity Amount
2015	4759.00	$595,145.64
2016	1193.44	$395,114.80
2017	1116.69	$88,045.25
Total	**60,429.29**	**$9,876,220.69**

Source: USDA Risk Management Agency

Table 4.28 – Crop Losses Resulting from Drought, Pamlico County, 2007-2017

Year	Determined Acres	Indemnity Amount
2007	1,262.14	$173,240.00
2008	1,803.56	$398,296.00
2009	1,635.05	$283,415.00
2010	1,362.61	$193,177.00
2011	6,914.71	$1,698,610.00
2012	56.70	$10,301.00
2014	640.40	$72,968.00
2015	794.42	$108,368.00
2017	18.46	$18,094.40
Total	**14,488.04**	**$2,956,469.40**

Source: USDA Risk Management Agency

Environment

Drought can affect local wildlife by shrinking food supplies and damaging habitats. Sometimes this damage is only temporary, and other times it is irreversible. Wildlife may face increased disease rates due to limited access to food and water. Increased stress on endangered species could cause extinction.

Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees die from a lack of precipitation, increased insect infestations, and diseases—all of which are associated with drought—they become fuel for wildfire. Long periods of drought can result in more intense wildfires, which bring additional consequences for the economy, the environment, and society. Drought may also increase likelihood of wind and water erosion of soils.

Consequence Analysis

Table 4.29 summarizes the potential negative consequences of drought.

Table 4.29 – Consequence Analysis – Drought

Category	Consequences
Public	Can cause anxiety or depression about economic losses, conflicts over water shortages, reduced incomes, fewer recreational activities, higher incidents of heat stroke, and fatality.
Responders	Impacts to responders are unlikely. Exceptional drought conditions may impact the amount of water immediately available to respond to wildfires.
Continuity of Operations (including Continued Delivery of Services)	Drought would have minimal impacts on continuity of operations due to the relatively long warning time that would allow for plans to be made to maintain continuity of operations.
Property, Facilities and Infrastructure	Drought has the potential to affect water supply for residential, commercial, institutional, industrial, and government-owned areas. Drought can reduce water supply in wells and reservoirs. Utilities may be forced to increase rates.
Environment	Environmental impacts include strain on local plant and wildlife; increased probability of erosion and wildfire.

Category	Consequences
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs. Businesses that depend on farming may experience secondary impacts. Extreme drought has the potential to impact local businesses in landscaping, recreation and tourism, and public utilities.
Public Confidence in the Jurisdiction's Governance	When drought conditions persist with no relief, local or State governments must often institute water restrictions, which may impact public confidence.

Hazard Summary by Jurisdiction

The following table summarizes drought hazard risk by jurisdiction. Warning time, duration and spatial extent are inherent to the hazard and remain constant across jurisdictions. The majority of damages that result from drought are to crops and other agriculture-related activities as well as water-dependent recreation industries. The magnitude of the impacts is typically greater in unincorporated areas; impacts are likely higher in Beaufort County, which has also experienced the most crop losses due to drought. In developed areas, the magnitude of drought is less severe, with lawns and local gardens affected and potential impacts on local water supplies during severe, prolonged drought.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	2	4	1	4	2.8	H
City of Washington	3	1	4	1	4	2.5	H
Town of Aurora	3	1	4	1	4	2.5	H
Town of Bath	3	1	4	1	4	2.5	H
Town of Belhaven	3	1	4	1	4	2.5	H
Town of Chocowinity	3	1	4	1	4	2.5	H
Town of Pantego	3	1	4	1	4	2.5	H
Town of Washington Park	3	1	4	1	4	2.5	H
Carteret County	3	2	4	1	4	2.8	H
Town of Atlantic Beach	3	1	4	1	4	2.5	H
Town of Beaufort	3	1	4	1	4	2.5	H
Town of Bogue	3	1	4	1	4	2.5	H
Town of Cape Carteret	3	1	4	1	4	2.5	H
Town of Cedar Point	3	1	4	1	4	2.5	H
Town of Emerald Isle	3	1	4	1	4	2.5	H
Town of Indian Beach	3	1	4	1	4	2.5	H
Town of Morehead City	3	1	4	1	4	2.5	H
Town of Newport	3	1	4	1	4	2.5	H
Town of Peletier	3	1	4	1	4	2.5	H
Town of Pine Knoll Shores	3	1	4	1	4	2.5	H
Craven County	3	2	4	1	4	2.8	H
City of Havelock	3	1	4	1	4	2.5	H
City of New Bern	3	1	4	1	4	2.5	H
Town of Bridgeton	3	1	4	1	4	2.5	H
Town of Cove City	3	1	4	1	4	2.5	H
Town of Dover	3	1	4	1	4	2.5	H
Town of River Bend	3	1	4	1	4	2.5	H
Town of Trent Woods	3	1	4	1	4	2.5	H
Town of Vanceboro	3	1	4	1	4	2.5	H
Pamlico County	3	2	4	1	4	2.8	H
Town of Alliance	3	1	4	1	4	2.5	H
Town of Arapahoe	3	1	4	1	4	2.5	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Bayboro	3	1	4	1	4	2.5	H
Town of Grantsboro	3	1	4	1	4	2.5	H
Town of Mesic	3	1	4	1	4	2.5	H
Town of Minnesott Beach	3	1	4	1	4	2.5	H
Town of Oriental	3	1	4	1	4	2.5	H
Town of Stonewall	3	1	4	1	4	2.5	H
Town of Vandemere	3	1	4	1	4	2.5	H

4.5.4 Earthquake

Hazard Background

An earthquake is a movement or shaking of the ground. Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth's outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

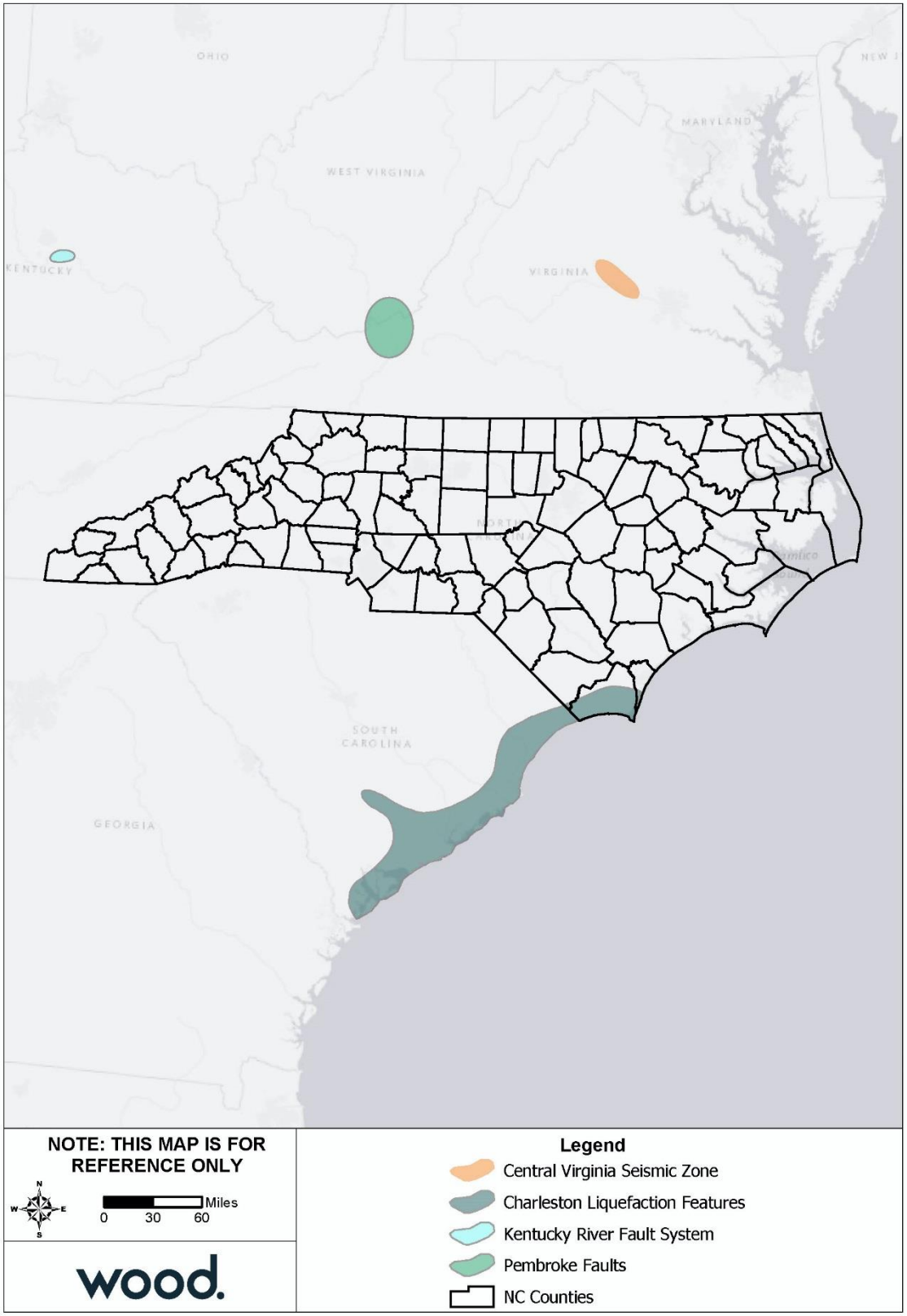
Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

Location

Figure 4.15 reflects the Quaternary faults that present an earthquake hazard for the Pamlico Sound Region based on data from the USGS Earthquake Hazards Program.

Figure 4.15 – U.S. Quaternary Faults



Source: USGS Earthquake Hazards Program

All of North Carolina is subject to earthquakes to varying degrees, with the western and southern region most vulnerable to a damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8.0 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines in eastern Tennessee and throughout North Carolina that could produce less severe shaking.

Extent

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. A detailed description of the Richter Scale is given in Table 4.30. Although the Richter scale is usually used by the news media when reporting the intensity of earthquakes and is the scale most familiar to the public, the scale currently used by the scientific community in the United States is called the Modified Mercalli Intensity (MMI) scale. The MMI scale is an arbitrary ranking based on observed effects. Table 4.31 shows descriptions for levels of earthquake intensity on the MMI scale compared to the Richter scale. Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4.30 – Richter Scale

Magnitude	Effects
Less than 3.5	Generally not felt, but recorded.
3.5 – 5.4	Often felt, but rarely causes damage.
5.4 – 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 – 6.9	Can be destructive in areas up to 100 kilometers across where people live.
7.0 – 7.9	Major earthquake. Can cause serious damage over larger areas.
8.0 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: FEMA

Table 4.31 – Comparison of Richter Scale and Modified Mercalli Intensity (MMI) Scale

MMI	Richter Scale	Felt Intensity
I	0 – 1.9	Not felt. Marginal and long period effects of large earthquakes.
II	2.0 – 2.9	Felt by persons at rest, on upper floors, or favorably placed.
III	3.0 – 3.9	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV	4.0 – 4.3	Hanging objects swing. Vibration like passing of heavy trucks. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink the upper range of IV, wooden walls and frame creak.
V	4.4 – 4.8	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Pendulum clocks stop, start.
VI	4.9 – 5.4	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Books, etc., fall off shelves. Pictures fall off walls. Furniture moved. Weak plaster and masonry D cracked. Small bells ring. Trees, bushes shaken.
VII	5.5 – 6.1	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Waves on ponds. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VII	6.2 – 6.5	Steering of motor cars is affected. Damage to masonry C; partial collapse. Some damage to masonry B. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory

MMI	Richter Scale	Felt Intensity
		stacks, monuments, towers, elevated tanks. Frame houses moved on foundations. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX	6.6 – 6.9	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.
X	7.0 – 7.3	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI	7.4 – 8.1	Rails bent greatly. Underground pipelines completely out of service.
XII	> 8.1	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown in the air.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces. Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces. Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces. Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.
Source: Oklahoma State Hazard Mitigation Plan.

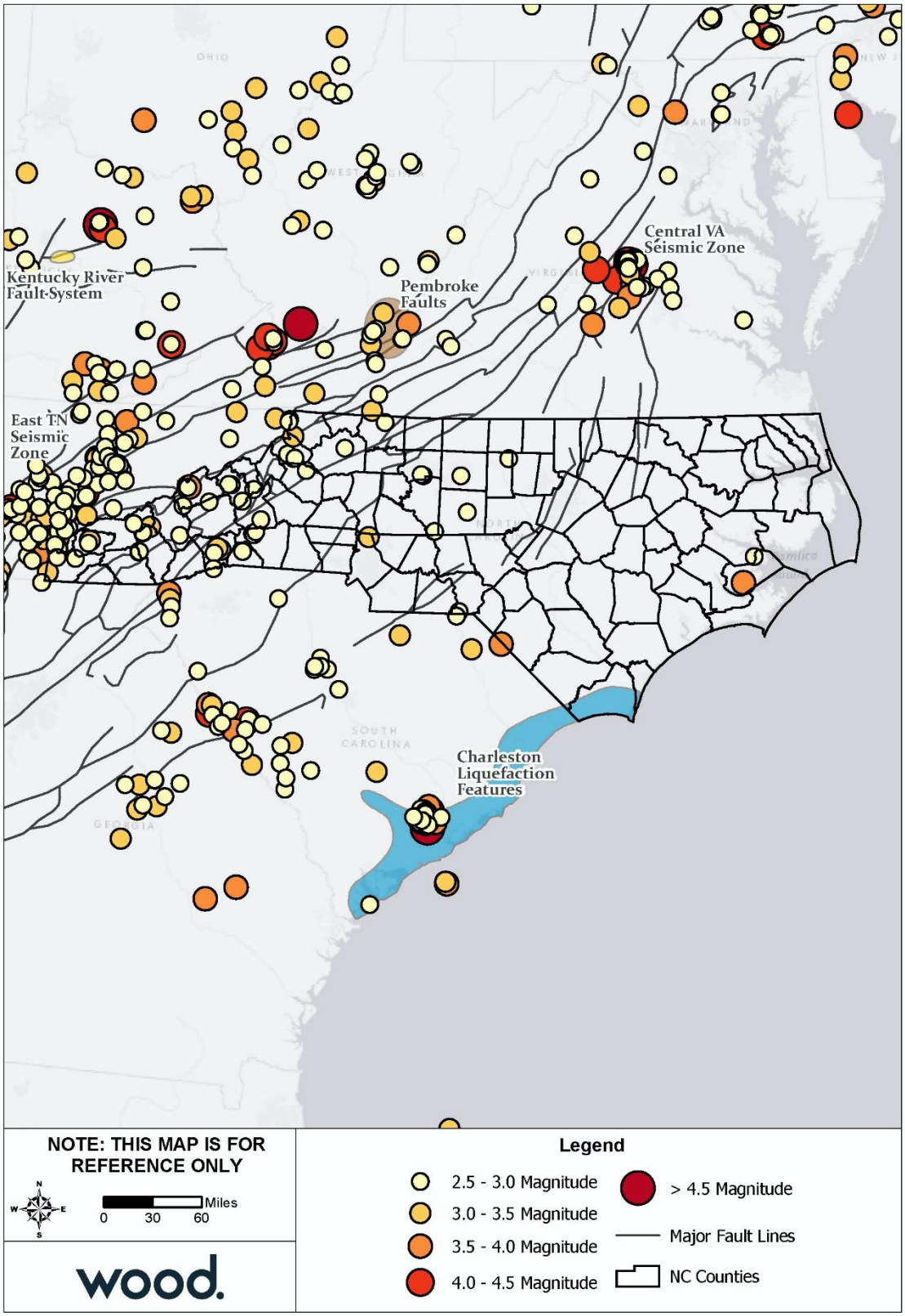
Impact: 1 – Minor

Spatial Extent: 4 – Large

Historical Occurrences

The USGS Earthquake Hazards Program maintains a database of all historical earthquakes of a magnitude 2.5 and greater. Figure 4.16 shows historical earthquakes by magnitude in relation to North Carolina and the Quaternary Faults identified by USGS. This includes events from 1973 to 2019. Based on USGS records, there have been two earthquakes with epicenters in the Pamlico Sound Region during this period.

Figure 4.16 – Historical Earthquakes by Magnitude, 1973-2019



Source: USGS Earthquakes Hazard Program

The above map documents all earthquakes that have occurred within North Carolina; however, given the long distances across which earthquake impacts can be felt, these events do not encompass all earthquakes that have affected North Carolina.

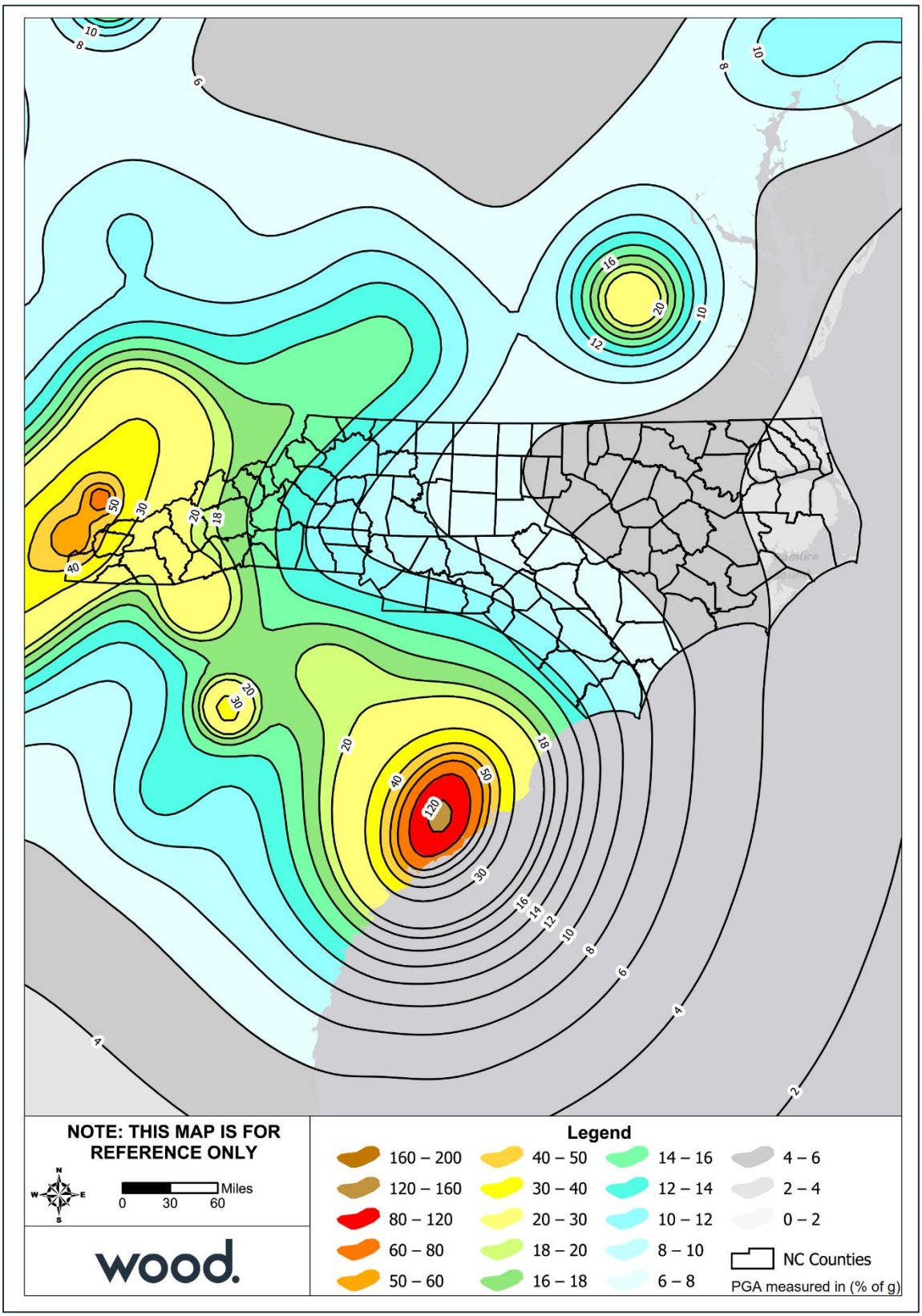
Probability of Future Occurrence

Ground motion is the movement of the earth's surface due to earthquakes or explosions. It is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travels through the earth and along its surface. Ground motion is amplified when surface waves of unconsolidated materials bounce off of or are refracted by adjacent solid bedrock. The probability of ground motion is depicted in USGS earthquake hazard maps by showing, by contour values, the earthquake ground motions (of a particular frequency) that have a common given probability of being exceeded in 50 years.

Figure 4.17 reflects the seismic hazard for the Pamlico Sound Region based on the national USGS map of peak acceleration with two percent probability of exceedance in 50 years. To produce these estimates, the ground motions being considered at a given location are those from all future possible earthquake magnitudes at all possible distances from that location. The ground motion coming from a particular magnitude and distance is assigned an annual probability equal to the annual probability of occurrence of the causative magnitude and distance. The method assumes a reasonable future catalog of earthquakes, based upon historical earthquake locations and geological information on the recurrence rate of fault ruptures. When all the possible earthquakes and magnitudes have been considered, a ground motion value is determined such that the annual rate of its being exceeded has a certain value.

Therefore, for the given probability of exceedance, two percent, the locations shaken more frequently will have larger ground motions. The Pamlico Sound Region is located within the dark and light gray zones, representing a low peak acceleration of 0.02 to 0.06% g.

Figure 4.17 – Seismic Hazard Information for North Carolina



Source: USGS Earthquake Hazards Program

Based on this data, it can be reasonably assumed that an earthquake event affecting the Region is unlikely.

Probability: 1 – Unlikely

Climate Change

Scientists are beginning to believe there may be a connection between climate change and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences. However, currently no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked with climate change. While not conclusive, early research suggest that more intense earthquakes and tsunamis may eventually be added to the adverse consequences that are caused by climate change.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to earthquake impacts was estimated using data from the North Carolina Emergency Management (NCEM) IRISK database, which was compiled in NCEM's Risk Management Tool.

People

Earthquake events in the Pamlico Sound Region are unlikely to produce more than mild ground shaking; therefore, injury or death is unlikely. Objects falling from shelves generally pose the greatest threat to safety.

Table 4.32 and Table 4.33 detail the population estimated to be at risk from a 250-year earthquake and a 500-year earthquake, respectively, according to the NCEM IRISK database.

Table 4.32 – Estimated Population Impacted by 250-Year Earthquake

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Beaufort									
Unincorporated Beaufort County	31,461	0	0%	5,785	0	0%	1,832	0	0%
City of Washington	11,838	0	0%	2,177	0	0%	689	0	0%
Town of Aurora	690	0	0%	127	0	0%	40	0	0%
Town of Bath	558	0	0%	103	0	0%	33	0	0%
Town of Belhaven	1,795	0	0%	330	0	0%	105	0	0%
Town of Chocowinity	808	0	0%	149	0	0%	47	0	0%
Town of Pantego	161	0	0%	30	0	0%	9	0	0%
Town of Washington Park	446	0	0%	82	0	0%	26	0	0%
Subtotal Beaufort	**47,757**	**0**	**0%**	**8,783**	**0**	**0%**	**2,781**	**0**	**0%**
Carteret									
Unincorporated Carteret County	25,146	0	0%	4,791	0	0%	1,234	0	0%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Town of Atlantic Beach	1,467	0	0%	279	0	0%	72	0	0%
Town of Beaufort	5,345	0	0%	1,018	0	0%	262	0	0%
Town of Bogue	670	0	0%	128	0	0%	33	0	0%
Town of Cape Carteret	1,947	0	0%	371	0	0%	96	0	0%
Town of Cedar Point	1,617	0	0%	308	0	0%	79	0	0%
Town of Emerald Isle	3,642	0	0%	694	0	0%	179	0	0%
Town of Indian Beach	120	0	0%	23	0	0%	6	0	0%
Town of Morehead City	15,422	0	0%	2,938	0	0%	757	0	0%
Town of Newport	8,929	0	0%	1,701	0	0%	438	0	0%
Town of Peletier	808	0	0%	154	0	0%	40	0	0%
Town of Pine Knoll Shores	1,335	0	0%	254	0	0%	65	0	0%
Subtotal Carteret	**66,448**	**0**	**0%**	**12,659**	**0**	**0%**	**3,261**	**0**	**0%**
Craven									
Unincorporated Craven County	42,854	43	0.1%	6,546	7	0.1%	3,180	3	0.1%
City of Havelock	21,490	0	0%	3,282	0	0%	1,595	0	0%
City of New Bern	29,720	5	0%	4,539	1	0%	2,205	0	0%
Town of Bridgeton	455	0	0%	69	0	0%	34	0	0%
Town of Cove City	392	0	0%	60	0	0%	29	0	0%
Town of Dover	400	50	12.5%	61	8	13.1%	30	4	13.3%
Town of River Bend	3,052	0	0%	466	0	0%	226	0	0%
Town of Trent Woods	4,156	0	0%	635	0	0%	308	0	0%
Town of Vanceboro	989	0	0%	151	0	0%	73	0	0%
Subtotal Craven	**103,508**	**98**	**0.1%**	**15,809**	**16**	**0.1%**	**7,680**	**7**	**0.1%**
Pamlico									
Unincorporated Pamlico County	7,546	0	0%	1,641	0	0%	344	0	0%
Town of Alliance	732	0	0%	159	0	0%	33	0	0%
Town of Arapahoe	552	0	0%	120	0	0%	25	0	0%
Town of Bayboro	1,037	0	0%	226	0	0%	47	0	0%
Town of Grantsboro	633	0	0%	138	0	0%	29	0	0%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Town of Mesic	216	0	0%	47	0	0%	10	0	0%
Town of Minnesott Beach	435	0	0%	95	0	0%	20	0	0%
Town of Oriental	1,459	0	0%	317	0	0%	67	0	0%
Town of Stonewall	274	0	0%	60	0	0%	12	0	0%
Town of Vandemere	254	0	0%	55	0	0%	12	0	0%
Subtotal Pamlico	**13,138**	**0**	**0%**	**2,858**	**0**	**0%**	**599**	**0**	**0%**
Region Total	**230,851**	**98**	**0%**	**40,109**	**16**	**0%**	**14,321**	**7**	**0%**

Source: NCEM Risk Management Tool

Table 4.33 – Estimated Population Impacted by 500-Year Earthquake

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Beaufort									
Unincorporated Beaufort County	31,461	30,041	95.5%	5,785	5,524	95.5%	1,832	1,749	95.5%
City of Washington	11,838	11,838	100%	2,177	2,177	100%	689	689	100%
Town of Aurora	690	690	100%	127	127	100%	40	40	100%
Town of Bath	558	558	100%	103	103	100%	33	33	100%
Town of Belhaven	1,795	984	54.8%	330	181	54.8%	105	58	55.2%
Town of Chocowinity	808	808	100%	149	149	100%	47	47	100%
Town of Pantego	161	161	100%	30	30	100%	9	9	100%
Town of Washington Park	446	446	100%	82	82	100%	26	26	100%
Subtotal Beaufort	**47,757**	**45,526**	**95.3%**	**8,783**	**8373**	**95.3%**	**2,781**	**2651**	**95.3%**
Carteret									
Unincorporated Carteret County	25,146	19,799	78.7%	4,791	3,772	78.7%	1,234	972	78.8%
Town of Atlantic Beach	1,467	1,467	100%	279	279	100%	72	72	100%
Town of Beaufort	5,345	5,345	100%	1,018	1,018	100%	262	262	100%
Town of Bogue	670	670	100%	128	128	100%	33	33	100%
Town of Cape Carteret	1,947	1,947	100%	371	371	100%	96	96	100%
Town of Cedar Point	1,617	1,617	100%	308	308	100%	79	79	100%
Town of Emerald Isle	3,642	3,642	100%	694	694	100%	179	179	100%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Town of Indian Beach	120	120	100%	23	23	100%	6	6	100%
Town of Morehead City	15,422	15,422	100%	2,938	2,938	100%	757	757	100%
Town of Newport	8,929	8,929	100%	1,701	1,701	100%	438	438	100%
Town of Peletier	808	808	100%	154	154	100%	40	40	100%
Town of Pine Knoll Shores	1,335	1,335	100%	254	254	100%	65	65	100%
Subtotal Carteret	**66,448**	**61,101**	**92%**	**12,659**	**11,640**	**92%**	**3,261**	**2,999**	**92%**
Craven									
Unincorporated Craven County	42,854	42,854	100%	6,546	6,546	100%	3,180	3,180	100%
City of Havelock	21,490	21,490	100%	3,282	3,282	100%	1,595	1,595	100%
City of New Bern	29,720	29,720	100%	4,539	4,539	100%	2,205	2,205	100%
Town of Bridgeton	455	455	100%	69	69	100%	34	34	100%
Town of Cove City	392	392	100%	60	60	100%	29	29	100%
Town of Dover	400	400	100%	61	61	100%	30	30	100%
Town of River Bend	3,052	3,052	100%	466	466	100%	226	226	100%
Town of Trent Woods	4,156	4,156	100%	635	635	100%	308	308	100%
Town of Vanceboro	989	989	100%	151	151	100%	73	73	100%
Subtotal Craven	**103,508**	**103,508**	**100%**	**15,809**	**15,809**	**100%**	**7,680**	**7,680**	**100%**
Pamlico									
Unincorporated Pamlico County	7,546	7,183	95.2%	1,641	1,562	95.2%	344	327	95.1%
Town of Alliance	732	732	100%	159	159	100%	33	33	100%
Town of Arapahoe	552	552	100%	120	120	100%	25	25	100%
Town of Bayboro	1,037	1,037	100%	226	226	100%	47	47	100%
Town of Grantsboro	633	633	100%	138	138	100%	29	29	100%
Town of Mesic	216	216	100%	47	47	100%	10	10	100%
Town of Minnesott Beach	435	435	100%	95	95	100%	20	20	100%
Town of Oriental	1,459	1,459	100%	317	317	100%	67	67	100%
Town of Stonewall	274	274	100%	60	60	100%	12	12	100%
Town of Vandemere	254	254	100%	55	55	100%	12	12	100%
Subtotal Pamlico	**13,138**	**12,775**	**97.2%**	**2,858**	**2,779**	**97.2%**	**599**	**582**	**97.2%**
Region Total	**230,851**	**222,910**	**96.6%**	**40,109**	**38,601**	**96.2%**	**14,321**	**13,912**	**97.1%**

Source: NCEM Risk Management Tool

Property

In a severe earthquake event, buildings can be damaged by the shaking itself or by the ground beneath them settling to a different level than it was before the earthquake (subsidence). Buildings can even sink into the ground if soil liquefaction occurs. If a structure (a building, road, etc.) is built across a fault, the ground displacement during an earthquake could seriously damage that structure.

Earthquakes can also cause damages to infrastructure, resulting in secondary hazards. Damages to dams or levees could cause failures and subsequent flooding. Fires can be started by broken gas lines and power lines. Fires can be a serious problem, especially if the water lines that feed the fire hydrants have been damaged as well.

The Pamlico Sound Region has not been impacted by an earthquake with more than a moderate intensity, so damage to the built environment is unlikely.

Table 4.34 through Table 4.35 detail the estimated buildings impacted from varying magnitudes of earthquake events.

Table 4.34 – Estimated Buildings Impacted by 250-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	0	0%	$0	165	0.90%	$2,249	4	0%	$18	169	0.90%	$2,267
City of Washington	5,559	0	0%	$0	82	1.50%	$2,431	2	0%	$14	84	1.50%	$2,445
Town of Aurora	559	0	0%	$0	2	0.40%	$15	0	0%	$0	2	0.40%	$15
Town of Bath	553	0	0%	$0	8	1.40%	$40	0	0%	$0	8	1.40%	$40
Town of Belhaven	1,062	0	0%	$0	4	0.40%	$22	0	0%	$0	4	0.40%	$22
Town of Chocowinity	392	0	0%	$0	7	1.80%	$915	1	0.30%	$7	8	2%	$921
Town of Pantego	126	0	0%	$0	1	0.80%	$0	0	0%	$0	1	0.80%	$0
Town of Washington Park	229	0	0%	$0	1	0.40%	$1	0	0%	$0	1	0.40%	$1
Subtotal Beaufort	**27,801**	**0**	**0%**	**$0**	**270**	**1%**	**$5,673**	**7**	**0%**	**$39**	**277**	**1%**	**$5,711**
Carteret													
Unincorporated Carteret County	15,309	0	0%	$0	46	0.30%	$216	3	0%	$5	49	0.30%	$220
Town of Atlantic Beach	3,412	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Beaufort	3,277	0	0%	$0	3	0.10%	$9	0	0%	$0	3	0.10%	$9
Town of Bogue	363	0	0%	$0	3	0.80%	$8	4	1.10%	$31	7	1.90%	$39
Town of Cape Carteret	989	0	0%	$0	11	1.10%	$22	0	0%	$0	11	1.10%	$22
Town of Cedar Point	1,367	0	0%	$0	14	1%	$83	0	0%	$0	14	1%	$83
Town of Emerald Isle	5,712	0	0%	$0	27	0.50%	$72	1	0%	$9	28	0.50%	$81
Town of Indian Beach	899	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Morehead City	7,827	0	0%	$0	25	0.30%	$150	0	0%	$0	25	0.30%	$150
Town of Newport	4,085	0	0%	$0	31	0.80%	$73	0	0%	$0	31	0.80%	$73
Town of Peletier	529	0	0%	$0	13	2.50%	$73	0	0%	$0	13	2.50%	$73
Town of Pine Knoll Shores	1,757	0	0%	$0	1	0.10%	$6	0	0%	$0	1	0.10%	$6
Subtotal Carteret	**45,526**	**0**	**0%**	**$0**	**174**	**0.40%**	**$712**	**8**	**0%**	**$45**	**182**	**0.40%**	**$756**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	21	0.10%	$2	151	0.70%	$5,658	29	0.10%	$556	201	0.90%	$6,216
City of Havelock	5,366	0	0%	$0	8	0.10%	$110	0	0%	$0	8	0.10%	$110
City of New Bern	12,738	0	0%	$0	88	0.70%	$4,222	28	0.20%	$617	116	0.90%	$4,839
Town of Bridgeton	317	0	0%	$0	5	1.60%	$248	1	0.30%	$6	6	1.90%	$254
Town of Cove City	274	0	0%	$0	8	2.90%	$13	0	0%	$0	8	2.90%	$13
Town of Dover	281	32	11.40%	$2	1	0.40%	$3	3	1.10%	$86	36	12.80%	$91
Town of River Bend	1,545	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Trent Woods	1,910	0	0%	$0	2	0.10%	$28	1	0.10%	$31	3	0.20%	$58
Town of Vanceboro	467	0	0%	$0	4	0.90%	$93	2	0.40%	$36	6	1.30%	$130
Subtotal Craven	**46,031**	**53**	**0.10%**	**$4**	**267**	**0.60%**	**$10,375**	**64**	**0.10%**	**$1,332**	**384**	**0.80%**	**$11,711**
Pamlico													
Unincorporated Pamlico County	6,385	0	0%	$0	12	0.20%	$51	1	0%	$3	13	0.20%	$54
Town of Alliance	575	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Arapahoe	428	0	0%	$0	1	0.20%	$3	0	0%	$0	1	0.20%	$3
Town of Bayboro	514	0	0%	$0	2	0.40%	$6	0	0%	$0	2	0.40%	$6
Town of Grantsboro	581	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Mesic	185	0	0%	$0	1	0.50%	$5	0	0%	$0	1	0.50%	$5
Town of Minnesott Beach	401	0	0%	$0	2	0.50%	$1	0	0%	$0	2	0.50%	$1
Town of Oriental	1,377	0	0%	$0	1	0.10%	$2	0	0%	$0	1	0.10%	$2
Town of Stonewall	226	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Vandemere	190	0	0%	$0	1	0.50%	$6	0	0%	$0	1	0.50%	$6
Subtotal Pamlico	**10,862**	**0**	**0%**	**$0**	**20**	**0.20%**	**$74**	**1**	**0%**	**$3**	**21**	**0.20%**	**$77**
Region Total	**130,220**	**53**	**0%**	**$4**	**731**	**0.60%**	**$16,834**	**80**	**0.10%**	**$1,419**	**864**	**0.70%**	**$18,255**

Source: NCEM Risk Management Tool

Table 4.35 – Estimated Buildings Impacted by 500-Year Earthquake Event

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,208	83.90%	$141,806	1,997	10.30%	$160,445	336	1.70%	$89,025	18,541	96%	$391,276
City of Washington	5,559	4,619	83.10%	$62,418	738	13.30%	$262,001	193	3.50%	$62,625	5,550	99.80%	$387,044
Town of Aurora	559	439	78.50%	$5,358	86	15.40%	$6,206	33	5.90%	$3,919	558	99.80%	$15,483
Town of Bath	553	470	85%	$3,994	50	9%	$3,271	33	6%	$5,817	553	100%	$13,082
Town of Belhaven	1,062	503	47.40%	$3,010	108	10.20%	$8,311	24	2.30%	$4,269	635	59.80%	$15,589
Town of Chocowinity	392	321	81.90%	$7,834	43	11%	$22,813	27	6.90%	$5,492	391	99.70%	$36,139
Town of Pantego	126	99	78.60%	$90	16	12.70%	$1,060	11	8.70%	$725	126	100%	$1,875
Town of Washington Park	229	216	94.30%	$3,422	13	5.70%	$852	0	0%	$0	229	100%	$4,274
Subtotal Beaufort	**27,801**	**22,875**	**82.30%**	**$227,932**	**3,051**	**11%**	**$464,959**	**657**	**2.40%**	**$171,872**	**26,583**	**95.60%**	**$864,762**
Carteret													
Unincorporated Carteret County	15,309	11,068	72.30%	$95,700	992	6.50%	$64,540	218	1.40%	$39,003	12,278	80.20%	$199,243
Town of Atlantic Beach	3,412	3,241	95%	$31,082	152	4.50%	$12,133	9	0.30%	$614	3,402	99.70%	$43,829
Town of Beaufort	3,277	2,911	88.80%	$23,757	280	8.50%	$37,627	79	2.40%	$18,239	3,270	99.80%	$79,623
Town of Bogue	363	324	89.30%	$4,494	30	8.30%	$2,167	9	2.50%	$2,529	363	100%	$9,190
Town of Cape Carteret	989	874	88.40%	$14,780	89	9%	$12,289	26	2.60%	$3,619	989	100%	$30,688
Town of Cedar Point	1,367	1,258	92%	$21,957	99	7.20%	$13,801	10	0.70%	$3,505	1,367	100%	$39,263
Town of Emerald Isle	5,712	5,532	96.80%	$135,375	150	2.60%	$17,775	20	0.40%	$5,000	5,702	99.80%	$158,150
Town of Indian Beach	899	864	96.10%	$19,410	23	2.60%	$2,384	8	0.90%	$787	895	99.60%	$22,580
Town of Morehead City	7,827	6,754	86.30%	$74,982	829	10.60%	$105,037	217	2.80%	$66,478	7,800	99.70%	$246,497
Town of Newport	4,085	3,648	89.30%	$31,372	334	8.20%	$27,724	98	2.40%	$16,201	4,080	99.90%	$75,297
Town of Peletier	529	472	89.20%	$6,567	49	9.30%	$9,082	8	1.50%	$1,575	529	100%	$17,224
Town of Pine Knoll Shores	1,757	1,649	93.90%	$37,416	70	4%	$7,383	34	1.90%	$5,401	1,753	99.80%	$50,200
Subtotal Carteret	**45,526**	**38,595**	**84.80%**	**$496,892**	**3,097**	**6.80%**	**$311,942**	**736**	**1.60%**	**$162,951**	**42,428**	**93.20%**	**$971,784**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,955	90.60%	$219,142	1,875	8.10%	$298,190	288	1.20%	$154,134	23,118	99.90%	$671,466
City of Havelock	5,366	4,840	90.20%	$42,859	371	6.90%	$91,080	147	2.70%	$188,706	5,358	99.90%	$322,645
City of New Bern	12,738	11,164	87.60%	$156,375	1,254	9.80%	$502,320	298	2.30%	$157,643	12,716	99.80%	$816,338
Town of Bridgeton	317	235	74.10%	$1,896	68	21.50%	$9,795	12	3.80%	$1,203	315	99.40%	$12,894
Town of Cove City	274	234	85.40%	$2,617	28	10.20%	$2,575	11	4%	$5,668	273	99.60%	$10,860
Town of Dover	281	257	91.50%	$3,508	7	2.50%	$1,138	17	6%	$5,616	281	100%	$10,262
Town of River Bend	1,545	1,513	97.90%	$18,738	24	1.60%	$32,314	7	0.50%	$1,208	1,544	99.90%	$52,260
Town of Trent Woods	1,910	1,866	97.70%	$30,059	22	1.20%	$6,643	21	1.10%	$12,473	1,909	99.90%	$49,175
Town of Vanceboro	467	368	78.80%	$5,513	68	14.60%	$10,690	31	6.60%	$7,590	467	100%	$23,793
Subtotal Craven	**46,031**	**41,432**	**90%**	**$480,707**	**3,717**	**8.10%**	**$954,745**	**832**	**1.80%**	**$534,241**	**45,981**	**99.90%**	**$1,969,693**
Pamlico													
Unincorporated Pamlico County	6,385	5,522	86.50%	$24,912	498	7.80%	$22,043	68	1.10%	$7,577	6,088	95.30%	$54,532
Town of Alliance	575	481	83.70%	$2,338	80	13.90%	$6,398	14	2.40%	$1,021	575	100%	$9,756
Town of Arapahoe	428	386	90.20%	$2,074	26	6.10%	$1,516	16	3.70%	$3,674	428	100%	$7,264
Town of Bayboro	514	404	78.60%	$1,939	73	14.20%	$3,930	36	7%	$19,031	513	99.80%	$24,900
Town of Grantsboro	581	527	90.70%	$2,392	36	6.20%	$3,192	17	2.90%	$3,114	580	99.80%	$8,698
Town of Mesic	185	170	91.90%	$649	10	5.40%	$207	5	2.70%	$86	185	100%	$943
Town of Minnesott Beach	401	384	95.80%	$3,403	15	3.70%	$6,419	2	0.50%	$168	401	100%	$9,990
Town of Oriental	1,377	1,257	91.30%	$5,950	105	7.60%	$4,721	14	1%	$1,314	1,376	99.90%	$11,985
Town of Stonewall	226	199	88.10%	$778	21	9.30%	$913	6	2.70%	$794	226	100%	$2,486
Town of Vandemere	190	168	88.40%	$410	8	4.20%	$628	14	7.40%	$630	190	100%	$1,668
Subtotal Pamlico	**10,862**	**9,498**	**87.40%**	**$44,845**	**872**	**8%**	**$49,967**	**192**	**1.80%**	**$37,409**	**10,562**	**97.20%**	**$132,222**
Region Total	**130,220**	**112,400**	**86.30%**	**$1,250,376**	**10,737**	**8.20%**	**$1,781,613**	**2,417**	**1.90%**	**$906,473**	**125,554**	**96.40%**	**$3,938,461**

Source: NCEM Risk Management Tool

Environment

An earthquake is unlikely to cause substantial impacts to the natural environment in the Pamlico Sound Region. Impacts to the built environment (e.g. ruptured gas line) could damage the surrounding environment. However, this type damage is unlikely based on historical occurrences.

Consequence Analysis

Table 4.36 summarizes the potential negative consequences of earthquake.

Table 4.36 – Consequence Analysis – Earthquake

Category	Consequences
Public	Impact expected to be severe for people who are unprotected or unable to take shelter; moderate to light impacts are expected for those who are protected.
Responders	Responders may be required to enter unstable structures or compromised infrastructure. Adverse impacts are expected to be severe for unprotected personnel and moderate to light for protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel in the area of the incident may require relocation of operations and lines of succession execution. Disruption of lines of communication and destruction of facilities may extensively postpone delivery of services.
Property, Facilities and Infrastructure	Damage to facilities and infrastructure in the area of the incident may be extensive for facilities, people, infrastructure, and HazMat.
Environment	May cause extensive damage, creating denial or delays in the use of some areas. Remediation may be needed.
Economic Condition of the Jurisdiction	Local economy and finances expected to be adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes earthquake hazard risk by jurisdiction. Earthquake risk is uniform across the planning area.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	1	1	4	4	1	1.9	L
City of Washington	1	1	4	4	1	1.9	L
Town of Aurora	1	1	4	4	1	1.9	L
Town of Bath	1	1	4	4	1	1.9	L
Town of Belhaven	1	1	4	4	1	1.9	L
Town of Chocowinity	1	1	4	4	1	1.9	L
Town of Pantego	1	1	4	4	1	1.9	L
Town of Washington Park	1	1	4	4	1	1.9	L
Carteret County	1	1	4	4	1	1.9	L
Town of Atlantic Beach	1	1	4	4	1	1.9	L
Town of Beaufort	1	1	4	4	1	1.9	L
Town of Bogue	1	1	4	4	1	1.9	L
Town of Cape Carteret	1	1	4	4	1	1.9	L
Town of Cedar Point	1	1	4	4	1	1.9	L
Town of Emerald Isle	1	1	4	4	1	1.9	L
Town of Indian Beach	1	1	4	4	1	1.9	L
Town of Morehead City	1	1	4	4	1	1.9	L
Town of Newport	1	1	4	4	1	1.9	L

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Peletier	1	1	4	4	1	1.9	L
Town of Pine Knoll Shores	1	1	4	4	1	1.9	L
Craven County	1	1	4	4	1	1.9	L
City of Havelock	1	1	4	4	1	1.9	L
City of New Bern	1	1	4	4	1	1.9	L
Town of Bridgeton	1	1	4	4	1	1.9	L
Town of Cove City	1	1	4	4	1	1.9	L
Town of Dover	1	1	4	4	1	1.9	L
Town of River Bend	1	1	4	4	1	1.9	L
Town of Trent Woods	1	1	4	4	1	1.9	L
Town of Vanceboro	1	1	4	4	1	1.9	L
Pamlico County	1	1	4	4	1	1.9	L
Town of Alliance	1	1	4	4	1	1.9	L
Town of Arapahoe	1	1	4	4	1	1.9	L
Town of Bayboro	1	1	4	4	1	1.9	L
Town of Grantsboro	1	1	4	4	1	1.9	L
Town of Mesic	1	1	4	4	1	1.9	L
Town of Minnesott Beach	1	1	4	4	1	1.9	L
Town of Oriental	1	1	4	4	1	1.9	L
Town of Stonewall	1	1	4	4	1	1.9	L
Town of Vandemere	1	1	4	4	1	1.9	L

4.5.5 Extreme Heat

Hazard Background

Per information provided by FEMA, in most of the United States extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. In extreme heat, evaporation is slowed and the body must work extra hard to maintain a normal temperature, which can lead to death by overwork of the body. Extreme heat often results in the highest annual number of deaths among all weather-related disasters. Per Ready.gov:

- Extreme heat can occur quickly and without warning
- Older adults, children, and sick or overweight individuals are at greater risk from extreme heat
- Humidity increases the feeling of heat as measured by heat index

Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index Chart in Figure 4.18 uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 4.18 – Heat Index Chart

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: National Weather Service (NWS) http://www.nws.noaa.gov/os/heat/heat_index.shtml

Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a heat index that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

During these conditions, the human body has difficulties cooling through the normal method of the evaporation of perspiration. Health risks rise when a person is over exposed to heat.

The most dangerous place to be during an extreme heat incident is in a permanent home, with little or no air conditioning. Those at greatest risk for heat-related illness include people 65 years of age and older, young children, people with chronic health problems such as heart disease or asthma, people who are obese, people who are socially isolated, and people who are on certain medications, such as tranquilizers, antidepressants, sleeping pills, or drugs for Parkinson's disease. However, even young and healthy

individuals are susceptible if they participate in strenuous physical activities during hot weather or are not acclimated to hot weather. Table 4.37 lists typical symptoms and health impacts of exposure to extreme heat.

Table 4.37 – Typical Health Impacts of Extreme Heat

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F) and the night time minimum Heat Index is 80°F or above for two or more consecutive days. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

Impacts of extreme heat are not only focused on human health, as prolonged heat exposure can have devastating impacts on infrastructure as well. Prolonged high heat exposure increases the risk of pavement deterioration, as well as railroad warping or buckling. High heat also puts a strain on energy systems and consumption, as air conditioners are run at a higher rate and for longer; extreme heat can also reduce transmission capacity over electric systems.

Warning Time: 1 – More than 24 hours

Duration: 2 – Less than 24 hours

Location

The entire planning area is susceptible to high temperatures and incidents of extreme heat.

Extent

The extent of extreme heat can be defined by the maximum apparent temperature reached. Apparent temperature is a function of ambient air temperature and relative humidity and is reported as the heat index. The National Weather Service Forecast Office in Raleigh sets the following criteria for heat advisory and excessive heat warning:

- **Heat Advisory** – Heat Index of 105°F to 109°F for 3 hours or more. Can also be issued for lower values 100ºF to 104ºF for heat lasting several consecutive days
- **Excessive Heat Watch** – Potential for heat index values of 110°F or hotter within 24 to 48 hours. Also issued during prolonged heat waves when the heat index is near 110°F
- **Excessive Heat Warning** – Heat Index of 110°F or greater for any duration

Impact: 3 – Critical

Spatial Extent: 4 – Large

Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA), 2017 was North Carolina's hottest year on record; that record stretches back 123 years to 1895.

NCEI does not record any incidents of heat or excessive heat for the Pamlico Sound Region counties. However, heat index records maintained by the North Carolina Climate Office indicate that the Region regularly experiences heat index temperatures above 100°F. Table 4.38 and Table 4.39 provide counts of heat index values by threshold recorded from 1999-2018 at the Craven County Airport weather station (KEWN) and the Beaufort Smith Field weather station (KMRH), respectively, used as indicators for the Pamlico Region overall. Counts are provided as the number of hours in a given year where the heat index reached or exceeded 100°F.

Table 4.38 – Historical Heat Index Counts, Craven County Airport (KEWN), 1999-2018

Year	Heat Index Value				Total
	100-104°F	105-109°F	110-114°F	≥115°F	
1999	101	53	11	4	169
2000	31	17	3	2	53
2001	38	17	1	0	56
2002	80	40	9	0	129
2003	68	23	9	0	100
2004	31	2	0	0	33
2005	58	33	6	3	100
2006	39	26	6	0	71
2007	46	18	9	10	83
2008	83	27	0	0	110
2009	27	6	0	0	33
2010	112	49	5	0	166
2011	99	62	10	0	171
2012	71	57	18	5	151
2013	61	22	4	0	87
2014	67	16	0	0	83
2015	98	45	2	0	145
2016	127	51	4	0	182
2017	93	34	6	0	133
2018	56	10	0	0	66
Sum	**1,386**	**608**	**103**	**24**	**2,121**
Average	**69**	**30**	**5**	**1**	**106**

Source: North Carolina Climate Office, Heat Index Climatology Tool

Table 4.39 – Historical Heat Index Counts, Beaufort Smith Field (KMRH), 2000-2018

Year	Heat Index Value				Total
	100-104°F	105-109°F	110-114°F	≥115°F	
2000	21	0	0	0	21
2001	21	0	0	0	21
2002	55	13	2	0	70
2003	7	0	0	0	7
2004	46	2	0	0	48
2005	49	20	0	0	69

Year	Heat Index Value				Total
	100-104°F	105-109°F	110-114°F	≥115°F	
2006	34	6	0	0	40
2007	32	3	0	0	35
2008	2	0	0	0	2
2009	2	0	0	0	2
2010	24	0	0	0	24
2011	133	44	7	1	185
2012	51	10	0	5	66
2013	2	0	0	0	2
2014	21	0	0	0	21
2015	73	5	0	0	78
2016	132	8	0	0	140
2017	73	14	3	0	90
2018	19	0	0	0	19
Sum	**797**	**125**	**12**	**6**	**940**
Average	**42**	**7**	**1**	**0**	**49**

Source: North Carolina Climate Office, Heat Index Climatology Tool

According to this data, the Region averages between 49 and 106 hours per year with heat index values above 100°F. The frequency and intensity of higher temperatures is greater in inland areas of the region compared to coastal locations.

Probability of Future Occurrence

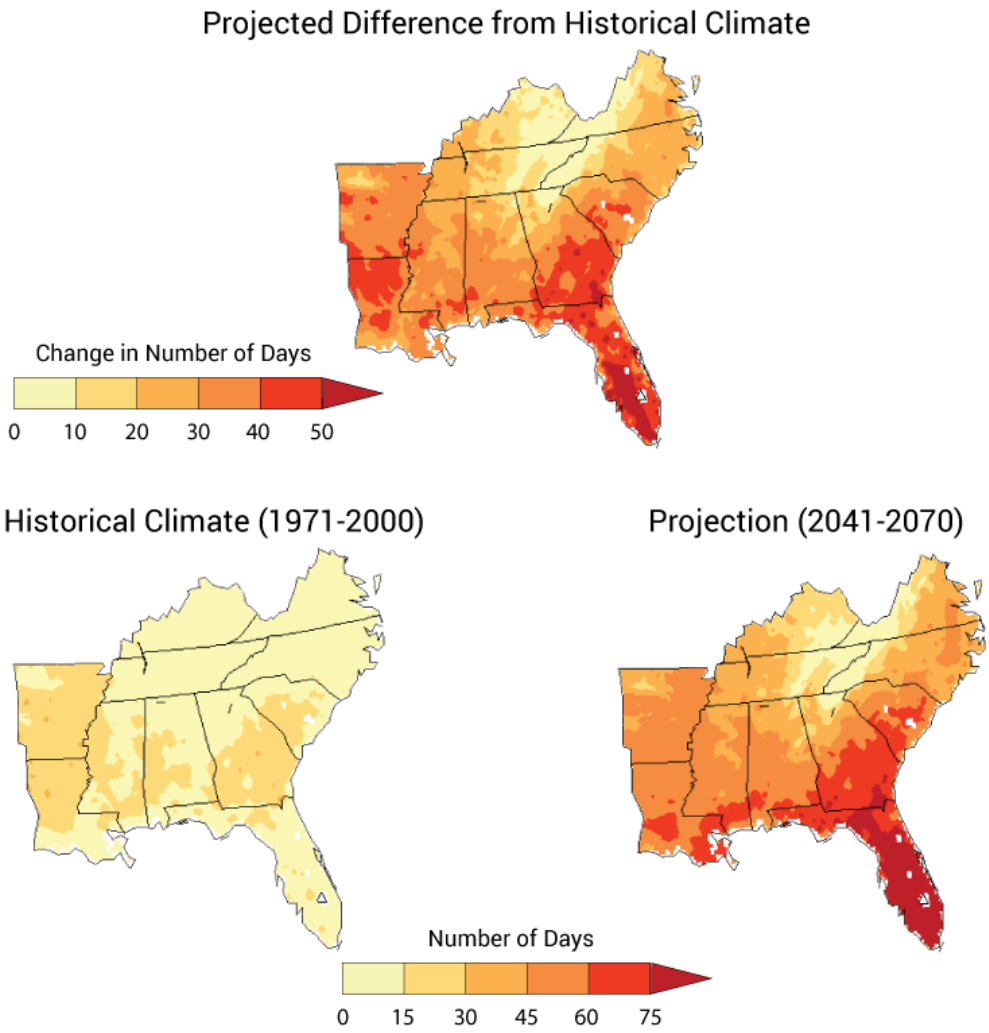
Data was gathered from the North Carolina State Climate Office's Heat Index Climatology Tool using the Craven County Airport and Beaufort Smith Field weather stations as approximations for the Pamlico Sound Region. Based on 20 years of available data, the Region averages 49-106 hours per year with heat index temperatures above 100°F. Heat index temperatures surpassed 100°F every year; this occurred for at least 2 hours a year at the Beaufort Smith Field station and at least 33 hours per year at the Craven County Airport station.

Probability: 4 – Highly Likely

Climate Change

Research shows that average temperatures will continue to rise in the Southeast United States and globally, directly affecting the Pamlico Sound Region in North Carolina. Per the Fourth National Climate Assessment, "extreme temperatures are projected to increase even more than average temperatures. Cold waves are projected to become less intense and heat waves more intense." The number of days over 95°F is expected to increase by between 10 and 30 days annually, as shown in Figure 4.19.

Figure 4.19 – Projected Change in Number of Days Over 95°F



Source: NOAA NCDC from 2014 National Climate Assessment

Vulnerability Assessment

Methodologies and Assumptions

No data is available to assess the vulnerability of people or property in the planning area to extreme heat.

People

Extreme heat can cause heat stroke and even loss of human life. The elderly and the very young are most at risk to the effects of heat. People who are isolated, people who work outdoors and/or do strenuous labor, people with chronic health problems such as heart disease or asthma, people who are obese, and people who are on certain medications, such as tranquilizers, antidepressants, sleeping pills, or drugs for Parkinson's disease are also more vulnerable to extreme heat.

Property

Extreme heat is unlikely to cause significant damages to the built environment. However, road surfaces can be damaged as asphalt softens, and concrete sections may buckle under expansion caused by heat.

Train rails may also distort or buckle under the stress of head induced expansion. Power transmission lines may sag from expansion and if contact is made with vegetation the line may short out causing power outages. Additional power demand for cooling also increases power line temperature adding to heat impacts.

Extreme heat can also cause significant agricultural losses. Between 2007-2017, the sum of claims paid for crop damage due to heat in the Pamlico Sound Region was $5,712,455, or an average of $519,314 in losses every year. Losses were greatest in 2010. Table 4.40 through Table 4.43 summarize the crop losses due to drought in reported in the RMA system.

Table 4.40 – Crop Losses Resulting from Heat, Beaufort County, 2007-2017

Year	Determined Acres	Indemnity Amount
2008	867.10	$137,586.00
2009	138.02	$19,485.00
2010	13,960.44	$1,838,235.00
2011	2,065.35	$702,270.00
2012	952.77	$178,685.00
2015	154.85	$25,502.40
2016	485.68	$135,925.30
2017	8.42	$1,946.70
Total	**18,632.62**	**$3,039,635.40**

Source: USDA Risk Management Agency

Table 4.41 – Crop Losses Resulting from Heat, Carteret County, 2007-2017

Year	Determined Acres	Indemnity Amount
2010	4,739.70	$820,053.00
2011	106.77	$14,302.00
2015	34.64	$2,127.20
Total	**4,881.11**	**$836,482.20**

Source: USDA Risk Management Agency

Table 4.42 – Crop Losses Resulting from Heat, Craven County, 2007-2017

Year	Determined Acres	Indemnity Amount
2010	266.25	$37,313.00
2011	1,057.53	$226,654.00
2012	221.74	$33,746.00
2015	319.94	$84,964.30
2016	382.96	$58,688.60
2017	482.45	$30,080.50
Total	**2,730.87**	**$471,446.40**

Source: USDA Risk Management Agency

Table 4.43 – Crop Losses Resulting from Heat, Pamlico County, 2007-2017

Year	Determined Acres	Indemnity Amount
2009	20.48	$12,561.00
2010	2,388.76	$961,384.00
2011	640.86	$387,622.00
2015	32.30	$3,324.00
Total	**3,082.40**	**$1,364,891.00**

Source: USDA Risk Management Agency

Environment

Wild animals are vulnerable to heat disorders similar to humans, including mortality. Vegetation growth will be stunted or plants may be killed if temperatures rise above their tolerance extremes.

Consequence Analysis

Table 4.44 summarizes the potential negative consequences of extreme heat.

Table 4.44 – Consequence Analysis – Extreme Heat

Category	Consequences
Public	Extreme heat may cause illness and/or death.
Responders	Consequences may be greater for responders if their work requires exertion and/or wearing heavy protective gear.
Continuity of Operations (including Continued Delivery of Services)	Continuity of operations is not expected to be impacted by extreme heat because warning time for these events is long.
Property, Facilities and Infrastructure	Minor impacts may occur, including possible damages to road surfaces and power lines.
Environment	Environmental impacts include strain on local plant and wildlife, including potential for illness or death.
Economic Condition of the Jurisdiction	Farmers may face crop losses or increased livestock costs.
Public Confidence in the Jurisdiction's Governance	Extreme heat is unlikely to impact public confidence.

Hazard Summary by Jurisdiction

The following table summarizes extreme heat hazard risk by jurisdiction. Extreme heat risk does not vary significantly by jurisdiction; however, potential impact is greater in Beaufort County where agricultural vulnerability is greater.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	4	3	4	1	3	3.3	H
City of Washington	4	2	4	1	3	3.0	H
Town of Aurora	4	2	4	1	3	3.0	H
Town of Bath	4	2	4	1	3	3.0	H
Town of Belhaven	4	2	4	1	3	3.0	H
Town of Chocowinity	4	2	4	1	3	3.0	H
Town of Pantego	4	2	4	1	3	3.0	H
Town of Washington Park	4	2	4	1	3	3.0	H
Carteret County	4	2	4	1	3	3.0	H
Town of Atlantic Beach	4	2	4	1	3	3.0	H
Town of Beaufort	4	2	4	1	3	3.0	H
Town of Bogue	4	2	4	1	3	3.0	H
Town of Cape Carteret	4	2	4	1	3	3.0	H
Town of Cedar Point	4	2	4	1	3	3.0	H
Town of Emerald Isle	4	2	4	1	3	3.0	H
Town of Indian Beach	4	2	4	1	3	3.0	H
Town of Morehead City	4	2	4	1	3	3.0	H
Town of Newport	4	2	4	1	3	3.0	H
Town of Peletier	4	2	4	1	3	3.0	H
Town of Pine Knoll Shores	4	2	4	1	3	3.0	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Craven County	4	2	4	1	3	3.0	H
City of Havelock	4	2	4	1	3	3.0	H
City of New Bern	4	2	4	1	3	3.0	H
Town of Bridgeton	4	2	4	1	3	3.0	H
Town of Cove City	4	2	4	1	3	3.0	H
Town of Dover	4	2	4	1	3	3.0	H
Town of River Bend	4	2	4	1	3	3.0	H
Town of Trent Woods	4	2	4	1	3	3.0	H
Town of Vanceboro	4	2	4	1	3	3.0	H
Pamlico County	4	2	4	1	3	3.0	H
Town of Alliance	4	2	4	1	3	3.0	H
Town of Arapahoe	4	2	4	1	3	3.0	H
Town of Bayboro	4	2	4	1	3	3.0	H
Town of Grantsboro	4	2	4	1	3	3.0	H
Town of Mesic	4	2	4	1	3	3.0	H
Town of Minnesott Beach	4	2	4	1	3	3.0	H
Town of Oriental	4	2	4	1	3	3.0	H
Town of Stonewall	4	2	4	1	3	3.0	H
Town of Vandemere	4	2	4	1	3	3.0	H

4.5.6 Flood

Hazard Background

Flooding is defined by the rising and overflowing of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. Flooding can result from an overflow of inland waters or an unusual accumulation or runoff of surface waters from any source.

Flooding is the most frequent and costly of all natural hazards in the United States, and has caused more than 10,000 death(s) since 1900. Approximately 90 percent of presidentially declared disasters result from flood-related natural hazard events. As a whole, frequent, localized flooding problems that do not meet federal disaster declaration thresholds ultimately cause the majority of damages across the United States.

Sources and Types of Flooding

Flooding within the Pamlico Sound Region can be attributed to three main sources as noted below.

Riverine Flooding: During heavy rainfall events, the primary riverine flooding sources in the Pamlico Sound Region are as follows, per each county's effective Flood Insurance Study:

- **Beaufort County**: Acre Swamp, Aggie Run/Old Ford Swamp/Big Swamp, Bailey Creek, Bear Creek, Bounts Creek, Broad Creek/Beaverdam Swamp, Broad Creek Tributaries, Chapel Branch, Cherry Run and Tributaries, Chocowinity Creek and Tributaries, Cindy Edwards Branch, Cypress Run, Durham Creek and Tributary, Fork Swamp, Hall Swamp and its tributaries, Tributary A, Harvey Creek, Herring Run, Horse Branch and Tributary, Joe Branch, Latham Creek/Gum Swamp, Maple Branch and Tributary, Mitchell Branch, Morris Run, Patego Creek, Pineygrove Branch, Poundpole Swamp Branch, Pungo Swamp, Runyon Creek/Herring Run, Tankard Creek, Tranters Creek and White Branch.
- **Carteret County**: Deep Creek and Little Deep Creek.
- **Craven County**: Clubfoot Creek, East Prong Slocum Creek and Tributary, Jimmies Creek, Maple Cypress, Mauls Swamp, Mills Branch, Mills Branch Tributary, Morris Branch, Mosley Creek into Neuse River, Mosley Creek Tributary, Samuels Creek/Rocky Run, Scotts Creek, Snake Branch, Southwest Prong Slocum Creek, Swift Creek, Trent River Tributary, Tucker Creek, Village Creek, and Wilson Creek.
- **Pamlico County**: Greens Creek, Kershaw Creek, Morris Creek, North Prong Bay River, Smith Creek, South Prong Bay River, Thomas Creek, and Trent Creek.

These rivers and their tributaries are susceptible to overflowing their banks during and following excessive precipitation events. Though less common, riverine flood events (such as the "1%-annual-chance flood") will cause significantly more damage and economic disruption for the area than incidences of localized stormwater flooding.

Coastal Flooding: All lands bordering the coast along the Atlantic Ocean and in low-lying coastal plains are susceptible to tidal effects and flooding. Coastal land such as sand bars, barrier islands and deltas provide a buffer zone to help protect human life and real property relative to the sea much as flood plains provide a buffer zone along rivers and other bodies of water. Coastal floods usually occur because of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high tides, and tropical storms and hurricanes.

Wind-driven surge generated in the Atlantic Ocean and pushed into Pamlico Sound and other waters is the primary source of flooding in the Region. The areas susceptible to surge flooding are summarized from each county's FIS as follows:

- **Beaufort County**: surge moves from Pamlico Sound further into Back Creek, Bailey Creek, Bath Creek, Jacks Creek and its tributaries, Pamlico River, Pantego Creek, Pungo River, Rowland Creek, Snode Creek and South Creek.
- **Carteret County**: surge propagates into Bogue Inlet, Bogue Sound, Core Sound, Goose Bay, the Intracoastal Waterway, Pamlico Sound, Shackleford Slue, the Straits, and further into Adams Creek, the Neuse River, the Newport River, and the White Oak River.
- **Craven County**: surge extends from Pamlico Sound into the Neuse River, Hancock Creek, Jack Smith Creek, Lawson Creek, Pamlico River, downstream portions of Rocky Run/Samuels Creek, Slocum Creek, Southwest Prong Slocum Creek, and the Trent River.
- **Pamlico County**: surge moves from Pamlico Sound further into Bay River, Big Porpoise Bay, Jones Bay, Kershaw Creek, Middle Bay, Morris Creek, Pamlico River, Smith Creek, Thomas Creek, Trent Creek, Whittaker Creek, and Raccoon Creek.

Several of the waterbodies vulnerable to coastal flooding are also susceptible to riverine flooding, indicating the potential for compounding risk when hurricane and tropical storm events bring both coastal surge and heavy rainfall.

Flash Flooding: A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, possibly from slow-moving intense thunderstorms and sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the NFIP and can also happen in areas not associated with floodplains. Flash flood hazards caused by surface water runoff are most common in urbanized areas, where greater population density generally equates to more impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated.

Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

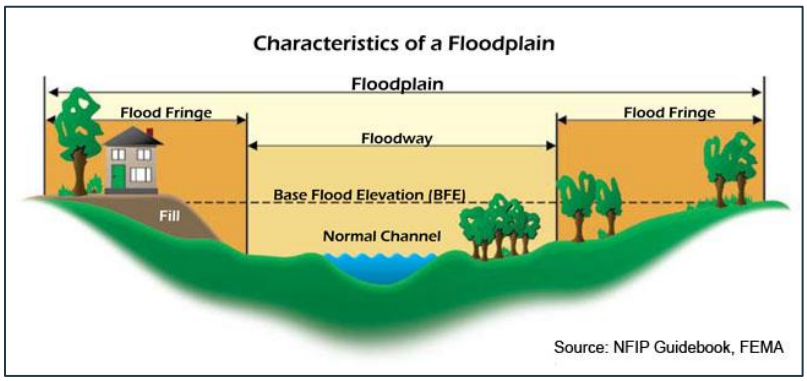
Localized flooding may be caused by the following issues:

- **Inadequate Capacity –** An undersized/under capacity pipe system can cause water to back-up behind a structure which can lead to areas of ponded water and/or overtopping of banks.
- **Clogged Inlets** – Debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.
- **Blocked Drainage Outfalls** – Debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, leading to back-up of stormwater within the system.
- **Improper Grade** – Poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

Flooding and Floodplains

In the case of riverine flooding, the area adjacent to a channel is the floodplain, as shown in Figure 4.20. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Figure 4.20 – Characteristics of a Floodplain



In its common usage, the floodplain most often refers to that area that is inundated by the "100-year flood," which is the flood that has a 1% chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 1%-annual-chance flood, which is the minimum standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will likely occur, they are in many ways often the most predictable and manageable hazard.

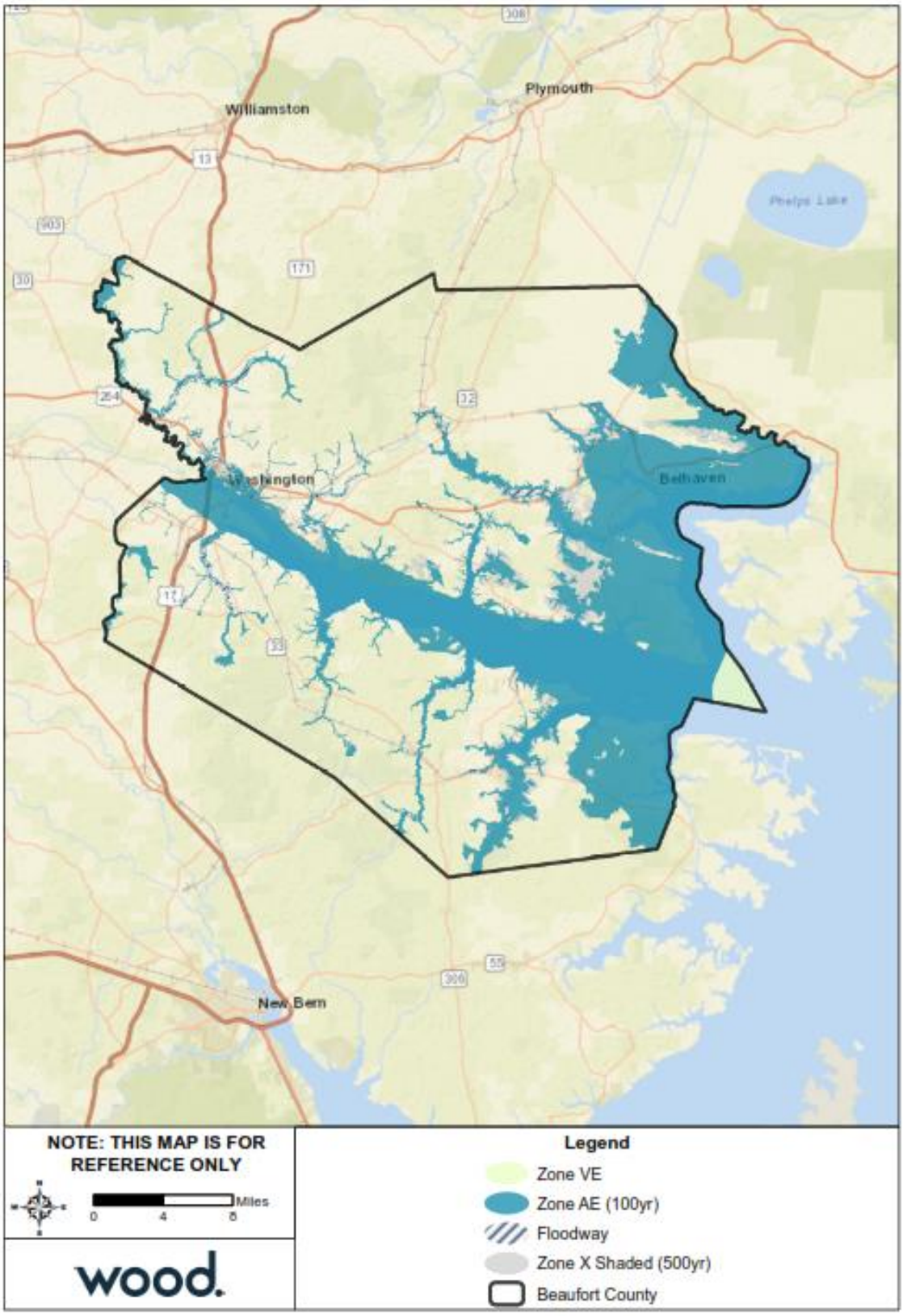
Warning Time: 3 – 6 to 12 hours

Duration: 3 – Less than 1 week

Location

Figure 4.21 through Figure 4.24 reflect the effective mapped flood insurance zones for the Pamlico Sound Region by county.

Figure 4.21 – FEMA Flood Hazard Areas in Beaufort County

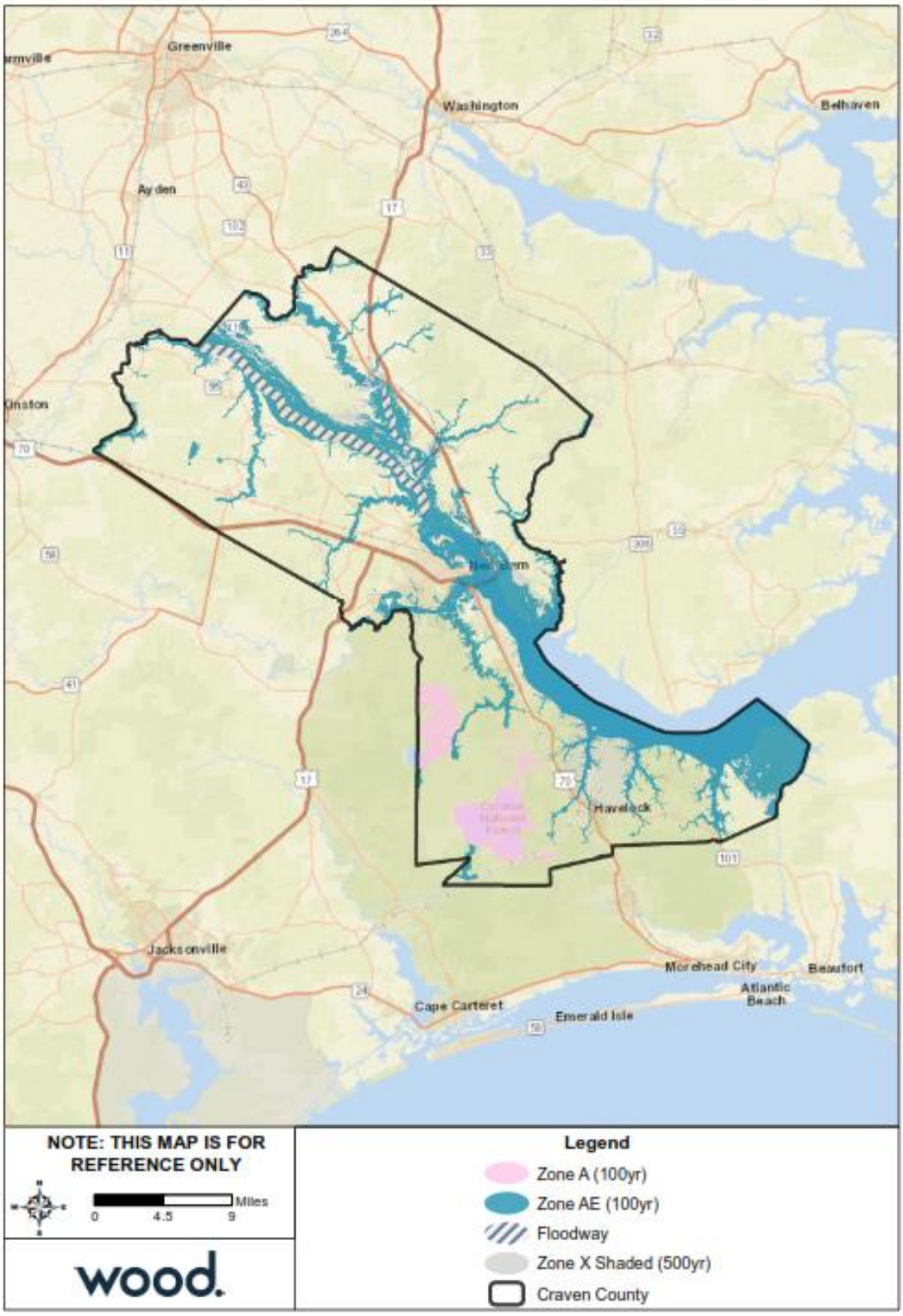


Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.22 – FEMA Flood Hazard Areas in Carteret County

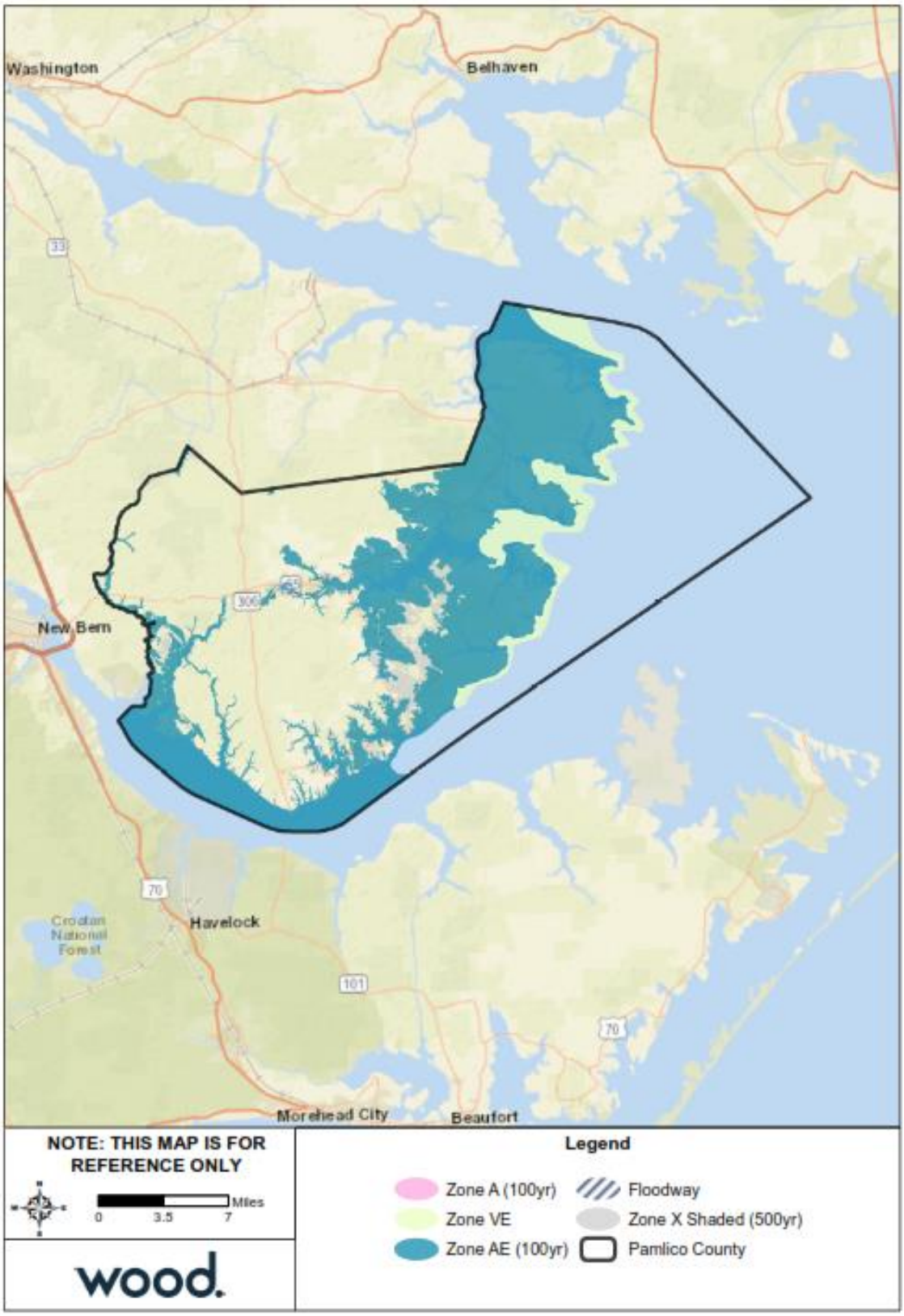
Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.23 – FEMA Flood Hazard Areas in Craven County



Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Figure 4.24 – FEMA Flood Hazard Areas in Pamlico County



Source: FEMA Effective DFIRM retrieved from North Carolina Flood Risk Information System

Extent

Flood extent can be defined by the amount of land in the floodplain and the potential magnitude of flooding as measured by flood height and velocity.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 100-year flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within the Pamlico Sound Region using the Effective DFIRMs, with most recent updates and/or revisions dated July 7, 2014 for Beaufort County, November 3, 2005 for Carteret County, April 16, 2013 for Craven County, and July 2, 2004 for Pamlico County. Table 4.45 summarizes the flood insurance zones identified by the Digital FIRMs (DFIRMs) within the Region.

Table 4.45 – Mapped Flood Insurance Zones within the Pamlico Sound Region

Zone	Description
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects. The Coastal AE Zone is differentiated from the AE Zone by the Limit of Moderate Wave Action (LiMWA) and includes areas susceptible to wave action between 1.5 to 3 feet.
AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
0.2% Annual Chance (Shaded Zone X)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (Unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. Zone X (unshaded) is used on new and revised maps in place of Zone C.

Source: FEMA

Table 4.46 provides a summary by county of the Region's total area by flood zone on the effective DFIRM. Over 43 percent of the Region falls within the SFHA. Carteret County has the greatest proportion of total

area in the SFHA, at over 66 percent, while Craven County has the smallest relative SFHA at just over 27 percent of the county's total area.

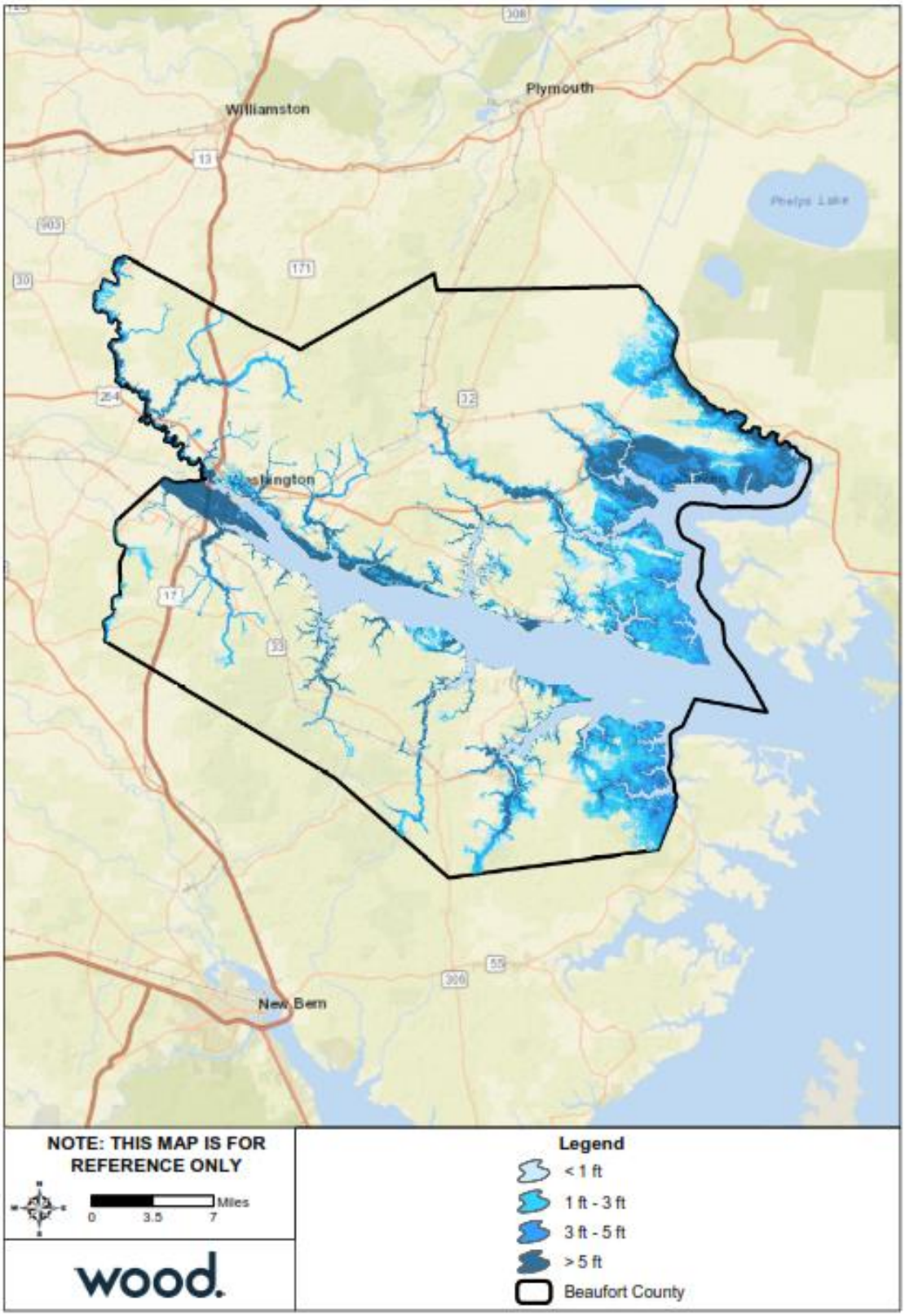
Figure 4.25 through Figure 4.28 show the depth of flooding estimated to occur from a 1% annual chance flood by county.

Table 4.46 – Flood Zone Acreage in the Pamlico Sound Region by County

Flood Zone	Acreage	Percent of Total (%)
Beaufort		
Zone A	1.34	0.00
Zone AE	211,715.95	34.29
Zone VE	3,560.22	0.58
Zone X (500-year)	19,292.26	3.13
Zone X Unshaded	382,771.26	62.00
Subtotal	617,341.04	--
Carteret		
Zone AE	375,639.64	56.61
Zone AO	1,165.53	0.18
Zone VE	65,014.65	9.80
Zone X (500-year)	34,046.50	5.13
Zone X Unshaded	116,927.22	17.62
Open Water	70,717.89	10.66
Subtotal	663,511.42	--
Craven		
Zone A	19,340.10	3.91
Zone AE	115,854.51	23.41
Zone X (500-year)	11,390.77	2.30
Zone X Unshaded	348,244.47	70.38
Subtotal	494,829.85	--
Pamlico		
Zone A	55.96	0.02
Zone AE	129,537.19	36.09
Zone VE	17,321.87	4.83
Zone X (500-year)	9,763.84	2.72
Zone X Unshaded	115,446.38	32.17
Open Water	86,753.70	24.17
Subtotal	358,878.94	
Pamlico Sound Region		
Zone A	19,397.40	0.91
Zone AE	832,747.29	39.01
Zone AO	1,165.53	0.05
Zone VE	85,896.74	4.02
Zone X (500-year)	74,493.37	3.49
Zone X Unshaded	963,389.33	45.13
Open Water	157,471.59	7.38
Total	**2,134,561.24**	--

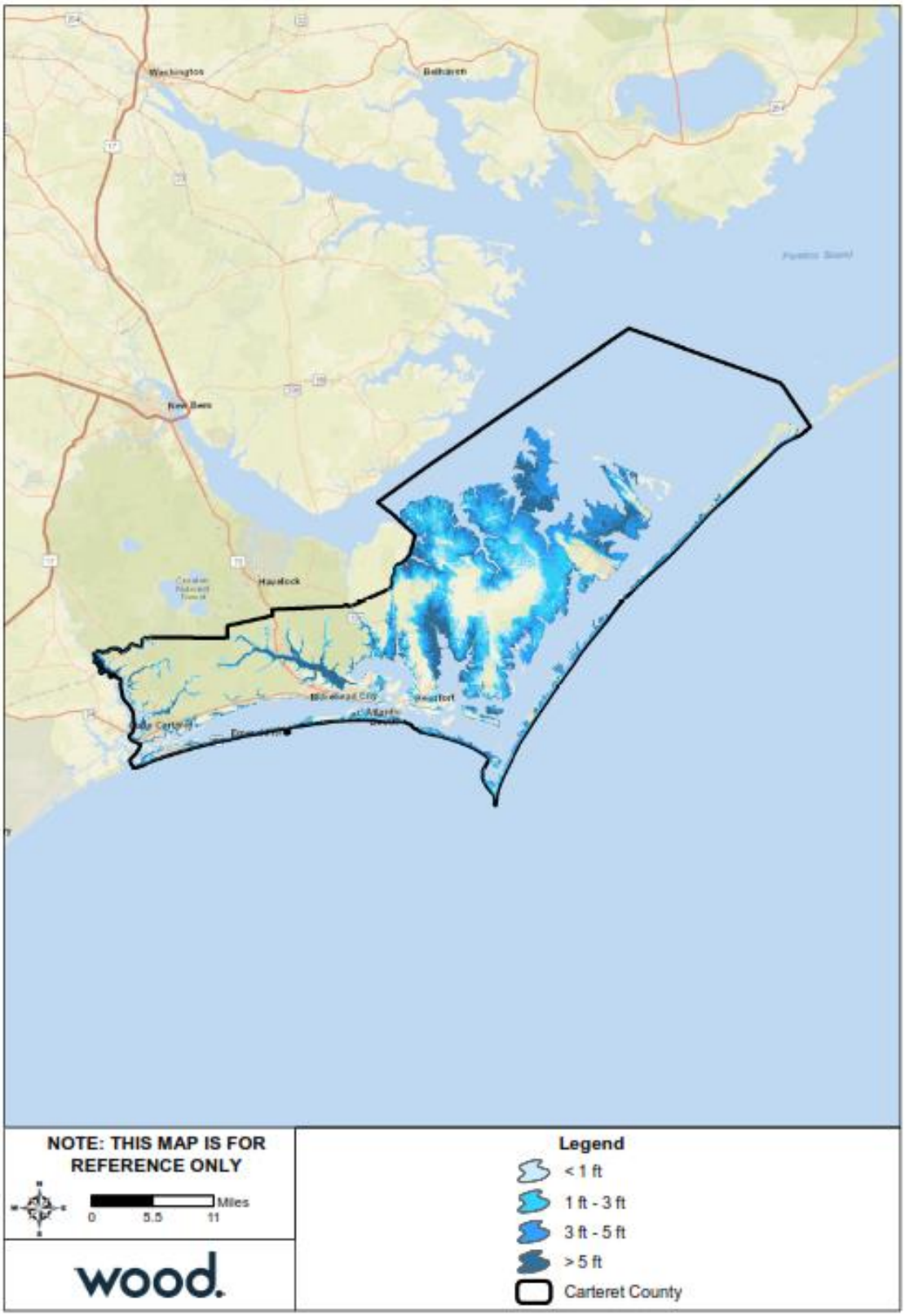
Source: FEMA Effective DFIRM

Figure 4.25 – Flood Depth, 100-Year Floodplain, Beaufort County



Source: FEMA Effective DFIRM

Figure 4.26 – Flood Depth, 100-Year Floodplain, Carteret County

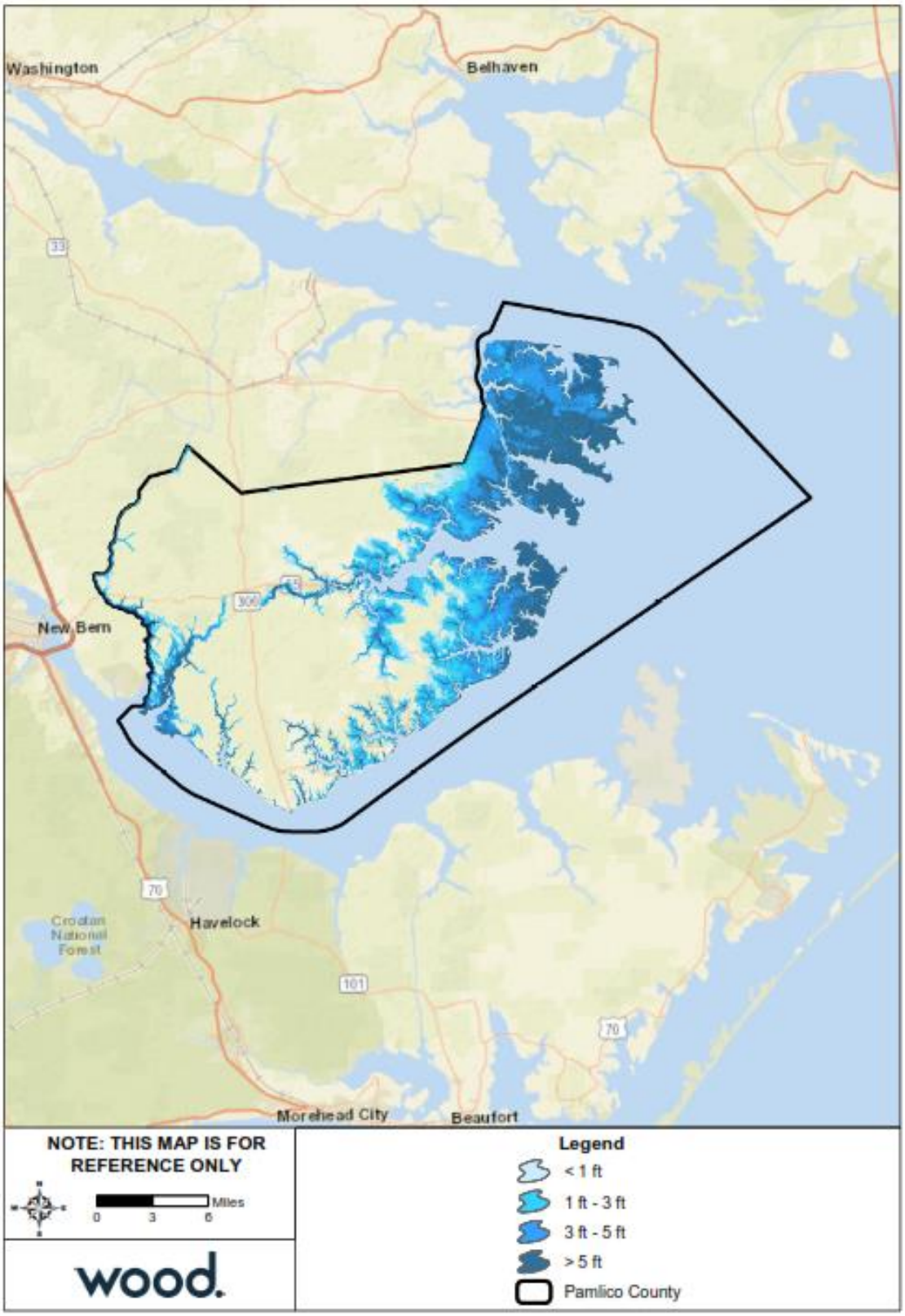


Source: FEMA Effective DFIRM

Figure 4.27 – Flood Depth, 100-Year Floodplain, Craven County

Source: FEMA Effective DFIRM

Figure 4.28 – Flood Depth, 100-Year Floodplain, Pamlico County



Source: FEMA Effective DFIRM

The NFIP utilizes the 1%-annual-chance flood as a basis for floodplain management. The FIS defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on average during any 100-year period (recurrence intervals). Considered another way, area within a 100-year flood zone has a one percent probability of being flooded during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are typically insured against flooding.

Impact: 3 – Critical

Spatial Extent: 3 – Moderate

Historical Occurrences

According to NCEI Storm Events Database records, 125 flood-related events were reported during the 20-year period from 1999 through 2018, across 59 separate days. These events caused 1 death, $1,253,000 in property damages, and $55,500,000 in crop damages. Table 4.47 summarizes these historical occurrences of flooding by county and event type. It should be noted that only those historical occurrences listed in the NCEI database are shown here and that other, unrecorded or unreported events may have occurred within the planning area during this timeframe.

Table 4.47 – NCEI Records of Flooding, 1999-2018

Type	Event Count	Deaths/ Injuries	Property Damage	Crop Damage
Beaufort				
Coastal Flood	2	0/0	$0	$0
Flash Flood	19	0/0	$625,000	$55,000,000
Flood	7	0/0	$0	$0
Heavy Rain	1	0/0	$0	$0
Carteret				
Coastal Flood	9	0/0	$1,000	$0
Flash Flood	19	0/0	$10,000	$0
Flood	16	0/0	$5,000	$0
Heavy Rain	4	0/0	$0	$0
Craven				
Coastal Flood	5	0/0	$1,000	$0
Flash Flood	16	0/0	$500,000	$0
Flood	9	1/0	$101,000	$0
Heavy Rain	4	0/0	$0	$0
Pamlico				
Coastal Flood	3	0/0	$0	$0
Flash Flood	9	0/0	$10,000	$0
Flood	1	0/0	$0	$0
Heavy Rain	1	0/0	$0	$0
Region Total				
Coastal Flood	19	0/0	$2,000	$0
Flash Flood	63	0/0	$1,145,000	$55,500,000
Flood	33	1/0	$106,000	$0
Heavy Rain	10	0/0	$0	$0
Total	**125**	**1/0**	**$1,253,000**	**$55,500,000**

Source: NCEI

The following event narratives are provided in the NCEI Storm Events Database and illustrate the impacts of flood events on the Region:

September 16, 1999 – Heavy rains continued to fall over eastern North Carolina in association with Hurricane Floyd. Widespread heavy rain fell west of a line from Beaufort to Columbia. Doppler Radar estimated 4 to 8 inches of rain with local amounts of 6 to 10 inches. New River Marine Corp Air Station reported a storm total precipitation amount of 8.26 inches. Tropical Storm Dennis left most rivers and streams in eastern North Carolina swollen and near flood stage. The additional runoff from Hurricane Floyd produced some the worst flooding of the century. Many rivers rose to over 15 feet above flood stage.

September 18, 2000 – Major flooding reported in James City and most of southern Craven county. A section of Old Cherry Point Road washed out. Some townhomes in Havelock also flooded.

July 27, 2002 – Up to 4-5 inches of rain fall over Morehead City in a 3 hour time period. This caused flooding of many major roads in Morehead City and Atlantic Beach. Numerous vehicles were flooded and abandoned.

October 8, 2005 – A combination of weather systems including the remnants of Tropical Storm Tammy and low pressure associated with an approaching cold front linked up to cause flooding rains across the area. During a three day period from October 6th through the 8th portions of eastern North Carolina received up to a foot of rainfall. Six to eight inch rainfall totals were common across much of the area. This resulted in flash flooding and widespread flooding across Beaufort, Carteret, Craven, Duplin, Lenoir, Martin, Onslow, Pamlico, and Pitt counties. Many roads across the area were closed due to flooding, and property damage was reported in several counties.

August 12, 2009 – A nearly stationary line of thunderstorms developed just inland of the coast along the sea breeze during the afternoon of August 12, 2009. Torrential rain occurred for several hours centered near Havelock. Rainfall amounts of 6 to 10 inches were reported in a three to four hour period leading to significant flooding in the Havelock area.

September 30, 2010 – Torrential rain moved across most of Carteret, Pamlico, Craven, and Beaufort Counties during the late afternoon and evening of September 30th as the remnants of Tropical Storm Nicole moved north across the region. This rain fell on saturated ground from very heavy rain the previous few days. Significant flash flooding developed especially for areas from Emerald Isle and Cape Carteret east toward Morehead City. Rapid water rises washed out several roads in the western portion of Carteret County with some subdivisions briefly cutoff form major roads. Minor flooding of a few residences was reported over the western portion of the county. In Pamlico, flooding occurred along Highway 55 from Bayboro west. A few roads were flooded and closed with minor damage to a few homes. Flooding in Craven affected Vanceboro to New Bern. Many roads were flooded and closed with several homes and businesses flooded with some rescues required. Floods occurred around Washington in Beaufort County, with many roads impassable and several homes and businesses flooded. Many acres of crops were destroyed by the flood waters.

October 3-4, 2015 – Low pressure south of eastern North Carolina combined with strong high pressure to the north produced strong onshore flow October 2nd through the 5th. These onshore winds led to locally heavy rain and significant coastal flooding in many areas. Large swells from distant Hurricane Joaquin also enhanced waves along the coast leading to very rough surf. Water levels rose 4.5 to 5.5 feet above normal at times adjacent to the Pamlico Sound flooding many roads and making them impassable. Waterfront roads were also flooded and closed at times in Beaufort and Morehead City, New Bern, and Washington.

September 14-15, 2018 – Hurricane Florence was a long-lived Cape Verde hurricane and the wettest tropical cyclone on record in the Carolinas. Florence was the sixth named storm, third hurricane, and the first major hurricane of the 2018 Atlantic hurricane season. Hurricane Florence made landfall near Wrightsville Beach early on Saturday September 15, and weakened further as it slowly moved inland. Florence produced extensive wind damage along the North Carolina coast from Cape Lookout, across Carteret, Onslow, Pender and New Hanover counties. Thousands of downed trees caused widespread power outages to nearly all of eastern North Carolina. The historic legacy of Hurricane Florence will be record breaking storm surge of 9 to 13 feet and widespread devastating rainfall of 20 to 30 inches, locally up to 36 inches, which produced catastrophic and life-threatening flooding. The hardest hit areas included New Bern, Newport, Belhaven, Oriental, North Topsail Beach and Jacksonville, along with southeast Carteret County, or basically south of a line from Kinston to Cedar Island. A storm total rainfall of 34.00 inches was reported in Swansboro, while the NWS office in Newport recorded 25.20 inches. Wind gusts of 106 mph were reported at Cape Lookout with 105 mph at Fort Macon.

Probability of Future Occurrence

By definition of the 100-year flood event, SFHAs are defined as those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in these areas have a 26 percent chance of flooding over the life of a 30-year mortgage.

The 500-year flood area is defined as those areas that will be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year; it is not the flood that will occur once every 500 years.

The Region is also at risk to other magnitudes of flooding and other types of flooding, such as stormwater floods, storm surge, and other tidal flooding, which have varying probabilities. According to past records, all counties in the region have between 70% to 100% likelihood of experiencing flooding in any given year. For the Region as a whole, future flooding is considered likely. However, exposure to flood hazards varies across jurisdictions, and probability of flooding is lower in those jurisdictions without any land in the SFHA, which includes Cove City, Dover, and Arapahoe.

Probability: 3 – Likely

Climate Change

Per the Fourth National Climate Assessment, frequency and intensity of heavy precipitation events is expected to increase across the country. Additionally, increases in precipitation totals are expected in the Southeast. Therefore, with more rainfall falling in more intense incidents, the region may experience more frequent flash flooding. Increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to flooding was estimated using data from the NCEMIRISK database, which was compiled in NCEM's Risk Management Tool.

As a subset of the building vulnerability analysis, exposure of pre-FIRM structures was also estimated. Pre-FIRM structures are those built prior to the adoption of flood protection building standards when a community received a FEMA FIRM and joined the NFIP. Because of this lack of building protection, these structures are assumed to be at greater risk to the flood hazard. Table 4.48 below provides the NFIP entry

date for each participating jurisdiction, which was used to determine which buildings were constructed pre-FIRM. Due to the limited data available on construction dates for structures in the planning area, pre-FIRM building counts were estimated using the following methodology: If the NFIP entry date for a given community is between January and June, buildings constructed the same year as the entry date are considered to be post-FIRM (e.g., if the NFIP entry date is 02/01/1991, buildings constructed in 1990 and before are pre-FIRM. Buildings constructed from 1991 to the present are post-FIRM.). If the NFIP entry date is between July and December, then the following year applies for the year built cut-off (e.g., if the NFIP entry date is 12/18/2007, buildings constructed in the year 2007 and before are pre-FIRM, 2008 and newer are post-FIRM).

Table 4.48 – NFIP Entry Dates

NFIP Entry Date	Jurisdiction
12/01/72	Town of Beaufort
11/22/76	Town of Washington Park
02/02/77	City of Washington
02/16/77	Town of Morehead City
03/15/77	Town of Atlantic Beach
04/01/77	Town of Cape Carteret, Town of Emerald Isle
05/16/77	Town of Belhaven
05/15/78	Town of Newport
09/28/79	Town of Pine Knoll Shores
05/15/80	Carteret County (Unincorporated Area), Town of Bogue, Town of Cedar Point
03/04/85	Town of Indian Beach
08/05/85	Town of Pantego, Town of Alliance, Town of Minnesott Beach
09/04/85	Pamlico County (Unincorporated Area), Town of Grantsboro
12/04/85	Town of Bayboro, Town of Mesic, Town of Oriental, Town of Stonewall, Town of Vandemere
01/03/86	Town of Aurora
08/19/86	Town of River Bend
02/04/87	Beaufort County (Unincorporated Area), Town of Bath
05/04/87	Town of Vanceboro, Craven County (Unincorporated Area), City of Havelock, City of New Bern, Town of Bridgeton
09/08/99	Town of Trent Woods
05/15/03	Town of Chocowinity
07/16/03	Town of Peletier
07/02/04	Town of Cove City, Town of Dover, Town of Arapahoe

Source: Federal Emergency Management Agency Community Status Book Report: Communities Participating in the National Flood Program, August 2013

Effective FEMA DFIRM data was used to identify flood hazard areas. Flood zones used in the vulnerability analysis consist of Zone AE (1%-annual-chance flood), Zone AE Floodway, and the 0.2%-annual-chance flood hazard area.

People

Certain health hazards are common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or where their wastes are stored can contribute polluted waters to the receiving streams.

Debris also poses a risk both during and after a flood. During a flood, debris carried by floodwaters can cause physical injury from impact. During the recovery process, people may often need to clear debris out of their properties but may encounter dangers such as sharp materials or rusty nails that pose a risk of tetanus. People must be aware of these dangers prior to a flood so that they understand the risks and take necessary precautions before, during, and after a flood.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e.coli and other disease causing agents. Viral infections can also pose a health hazard following a flood.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly. The Region has recently experienced these hazards; for example, after Hurricane Florence, four residents of the Town of Oriental contracted severe cases of Vibrio, which caused months of antibiotic treatment for three patients and an immediate leg amputation for the fourth. All four residents had been cleaning material brought in by floodwaters prior to contracting the virus.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If a local water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Floods can also result in fatalities. Individuals face particularly high risk when driving through flooded streets. According to NCEI records, there has been 1 death in the Region in the last 20 years caused by a flood event.

Table 4.49 details the population at risk from the 1% annual chance flood event, according to data from the NCEM IRISK database. Note that development and population growth have occurred since the original analysis for the IRISK dataset was performed, therefore actual population at risk is likely higher.

Table 4.49 – Population Impacted by the 100-Year Flood Event

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	% of Total		Number	% of Total		Number	% of Total
Beaufort									
Unincorporated Beaufort County	31,461	8,906	28.3%	5,785	1,638	28.3%	1,832	519	28.3%
City of Washington	11,838	5,667	47.9%	2,177	1,042	47.9%	689	330	47.9%
Town of Aurora	690	212	30.7%	127	39	30.7%	40	12	30%
Town of Bath	558	152	27.2%	103	28	27.2%	33	9	27.3%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	% of Total		Number	% of Total		Number	% of Total
Town of Belhaven	1,795	1,795	100%	330	330	100%	105	105	100%
Town of Chocowinity	808	0	0%	149	0	0%	47	0	0%
Town of Pantego	161	107	66.5%	30	20	66.7%	9	6	66.7%
Town of Washington Park	446	372	83.4%	82	68	82.9%	26	22	84.6%
Subtotal Beaufort	**47,757**	**17,211**	**36%**	**8,783**	**3165**	**36%**	**2,781**	**1003**	**36.1%**
Carteret									
Unincorporated Carteret County	25,146	10,440	41.5%	4,791	1,989	41.5%	1,234	512	41.5%
Town of Atlantic Beach	1,467	649	44.2%	279	124	44.4%	72	32	44.4%
Town of Beaufort	5,345	1,322	24.7%	1,018	252	24.8%	262	65	24.8%
Town of Bogue	670	62	9.3%	128	12	9.4%	33	3	9.1%
Town of Cape Carteret	1,947	382	19.6%	371	73	19.7%	96	19	19.8%
Town of Cedar Point	1,617	374	23.1%	308	71	23.1%	79	18	22.8%
Town of Emerald Isle	3,642	537	14.7%	694	102	14.7%	179	26	14.5%
Town of Indian Beach	120	38	31.7%	23	7	30.4%	6	2	33.3%
Town of Morehead City	15,422	1,905	12.4%	2,938	363	12.4%	757	94	12.4%
Town of Newport	8,929	490	5.5%	1,701	93	5.5%	438	24	5.5%
Town of Peletier	808	27	3.3%	154	5	3.2%	40	1	2.5%
Town of Pine Knoll Shores	1,335	114	8.5%	254	22	8.7%	65	6	9.2%
Subtotal Carteret	**66,448**	**16,340**	**24.6%**	**12,659**	**3113**	**24.6%**	**3,261**	**802**	**24.6%**
Craven									
Unincorporated Craven County	42,854	6,190	14.4%	6,546	945	14.4%	3,180	459	14.4%
City of Havelock	21,490	80	0.4%	3,282	12	0.4%	1,595	6	0.4%
City of New Bern	29,720	4,806	16.2%	4,539	734	16.2%	2,205	357	16.2%
Town of Bridgeton	455	271	59.6%	69	41	59.4%	34	20	58.8%
Town of Cove City	392	0	0%	60	0	0%	29	0	0%
Town of Dover	400	0	0%	61	0	0%	30	0	0%
Town of River Bend	3,052	735	24.1%	466	112	24%	226	54	23.9%
Town of Trent Woods	4,156	365	8.8%	635	56	8.8%	308	27	8.8%
Town of Vanceboro	989	38	3.8%	151	6	4%	73	3	4.1%
Subtotal Craven	**103,508**	**12,485**	**12.1%**	**15,809**	**1,906**	**12.1%**	**7,680**	**926**	**12.1%**
Pamlico									
Unincorporated Pamlico County	7,546	3,306	43.8%	1,641	719	43.8%	344	151	43.9%
Town of Alliance	732	74	10.1%	159	16	10.1%	33	3	9.1%
Town of Arapahoe	552	0	0%	120	0	0%	25	0	0%
Town of Bayboro	1,037	390	37.6%	226	85	37.6%	47	18	38.3%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	% of Total		Number	% of Total		Number	% of Total
Town of Grantsboro	633	5	0.8%	138	1	0.7%	29	0	0%
Town of Mesic	216	213	98.6%	47	46	97.9%	10	10	100%
Town of Minnesott Beach	435	2	0.5%	95	0	0%	20	0	0%
Town of Oriental	1,459	701	48%	317	152	47.9%	67	32	47.8%
Town of Stonewall	274	96	35%	60	21	35%	12	4	33.3%
Town of Vandemere	254	215	84.6%	55	47	85.5%	12	10	83.3%
Subtotal Pamlico	**13,138**	**5,002**	**38.1%**	**2,858**	**1,087**	**38%**	**599**	**228**	**38.1%**
Region Total	**230,851**	**51,038**	**22.1%**	**40,109**	**9,271**	**23.1%**	**14,321**	**2,959**	**20.7%**

Source: NCEM Risk Management Tool

Property

Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters.

Table 4.50 details the property at risk from the 1% annual chance flood event, according to data from the NCEM IRISK database. As with population vulnerability data, actual property at risk is likely higher due to the amount of development that has occurred since the original analysis for the IRISK dataset was performed.

The damage estimates for the 1% annual chance flood even total $404,967,412, which equates to a loss ratio of 2.3 percent. The loss ratio is the damage estimate divided by the total potential exposure (i.e., total value of all buildings in the planning area), displayed as a percentage of value at risk. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from an event. These counts only account for damage to buildings and could likely be underestimated.

The sectors at greatest risk to flooding are Commercial Facilities, Government Facilities, and Critical Manufacturing.

Table 4.51 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings across all jurisdictions, by sector and flood event. Vulnerability of CIKR as well as High Potential Loss Properties, where applicable, can be found by jurisdiction in each community's annex to this plan.

Table 4.50 – Buildings Impacted by the 100-Year Flood Event

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort															
Unincorporated Beaufort County	19,321	214	1.1%	4,809	24.9%	$69,675,339	112	0.6%	$1,004,463	15	0.1%	$353,570	4,936	25.5%	$71,033,372
City of Washington	5,559	97	1.7%	2,221	40%	$21,727,510	133	2.4%	$3,284,897	18	0.3%	$769,466	2,372	42.7%	$25,781,872
Town of Aurora	559	10	1.8%	135	24.2%	$632,961	3	0.5%	$18,155	3	0.5%	$47,479	141	25.2%	$698,595
Town of Bath	553	4	0.7%	128	23.1%	$626,184	1	0.2%	$203	0	0%	$0	129	23.3%	$626,387
Town of Belhaven	1,062	28	2.6%	918	86.4%	$14,676,387	98	9.2%	$2,311,252	26	2.4%	$1,105,930	1,042	98.1%	$18,093,569
Town of Chocowinity	392	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Pantego	126	6	4.8%	66	52.4%	$270,072	3	2.4%	$131,384	2	1.6%	$21,775	71	56.3%	$423,231
Town of Washington Park	229	7	3.1%	180	78.6%	$3,835,796	6	2.6%	$57,955	0	0%	$0	186	81.2%	$3,893,751
Subtotal Beaufort	**27,801**	**366**	**1.3%**	**8,457**	**30.4%**	**$111,444,249**	**356**	**1.3%**	**$6,808,309**	**64**	**0.2%**	**$2,298,220**	**8,877**	**31.9%**	**$120,550,777**
Carteret															
Unincorporated Carteret County	15,309	2,933	19.2%	5,842	38.2%	$81,923,801	228	1.5%	$3,327,752	59	0.4%	$2,602,478	6,129	40%	$87,854,031
Town of Atlantic Beach	3,412	854	25%	1,437	42.1%	$21,447,778	48	1.4%	$1,160,851	2	0.1%	$26,787	1,487	43.6%	$22,635,416
Town of Beaufort	3,277	390	11.9%	721	22%	$12,204,412	46	1.4%	$826,413	2	0.1%	$26,927	769	23.5%	$13,057,751
Town of Bogue	363	10	2.8%	30	8.3%	$918,658	2	0.6%	$80,749	0	0%	$0	32	8.8%	$999,407
Town of Cape Carteret	989	67	6.8%	170	17.2%	$6,951,735	6	0.6%	$182,611	0	0%	$0	176	17.8%	$7,134,346
Town of Cedar Point	1,367	151	11%	292	21.4%	$9,784,706	15	1.1%	$458,100	0	0%	$0	307	22.5%	$10,242,806
Town of Emerald Isle	5,712	129	2.3%	814	14.3%	$35,044,191	7	0.1%	$108,566	0	0%	$0	821	14.4%	$35,152,757
Town of Indian Beach	899	220	24.5%	277	30.8%	$238,843	1	0.1%	$13,359	0	0%	$0	278	30.9%	$252,202
Town of Morehead City	7,827	544	7%	835	10.7%	$22,473,305	74	0.9%	$1,763,768	1	0%	$916	910	11.6%	$24,237,990
Town of Newport	4,085	66	1.6%	201	4.9%	$1,007,008	1	0%	$5,783	0	0%	$0	202	4.9%	$1,012,791
Town of Peletier	529	12	2.3%	16	3%	$32,263	0	0%	$0	0	0%	$0	16	3%	$32,263
Town of Pine Knoll Shores	1,757	19	1.1%	143	8.1%	$2,473,375	1	0.1%	$3,207	0	0%	$0	144	8.2%	$2,476,583
Subtotal Carteret	**45,526**	**5,395**	**11.9%**	**10,778**	**23.7%**	**$194,500,075**	**429**	**0.9%**	**$7,931,159**	**64**	**0.1%**	**$2,657,108**	**11,271**	**24.8%**	**$205,088,343**

Jurisdiction	All Buildings	Number of Pre-FIRM Buildings at Risk		Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven															
Unincorporated Craven County	23,133	1,430	6.2%	3,027	13.1%	$21,917,259	34	0.1%	$431,076	5	0%	$76,365	3,066	13.3%	$22,424,700
City of Havelock	5,366	12	0.2%	18	0.3%	$41,825	0	0%	$0	2	0%	$8,394,367	20	0.4%	$8,436,192
City of New Bern	12,738	1,531	12%	1,815	14.2%	$13,016,009	53	0.4%	$782,782	8	0.1%	$180,533	1,876	14.7%	$13,979,325
Town of Bridgeton	317	112	35.3%	141	44.5%	$487,341	4	1.3%	$22,169	1	0.3%	$27,619	146	46.1%	$537,128
Town of Cove City	274	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Dover	281	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of River Bend	1,545	215	13.9%	366	23.7%	$2,904,745	0	0%	$0	0	0%	$0	366	23.7%	$2,904,745
Town of Trent Woods	1,910	151	7.9%	164	8.6%	$908,986	0	0%	$0	0	0%	$0	164	8.6%	$908,986
Town of Vanceboro	467	11	2.4%	14	3%	$30,798	0	0%	$0	0	0%	$0	14	3%	$30,798
Subtotal Craven	**46,031**	**3,462**	**7.5%**	**5,545**	**12%**	**$39,306,963**	**91**	**0.2%**	**$1,236,027**	**16**	**0%**	**$8,678,884**	**5,652**	**12.3%**	**$49,221,874**
Pamlico															
Unincorporated Pamlico County	6,385	1,526	23.9%	2,542	39.8%	$20,035,347	122	1.9%	$878,057	12	0.2%	$331,118	2,676	41.9%	$21,244,521
Town of Alliance	575	39	6.8%	49	8.5%	$122,694	0	0%	$0	0	0%	$0	49	8.5%	$122,694
Town of Arapahoe	428	0	0%	0	0%	$0	0	0%	$0	0	0%	$0	0	0%	$0
Town of Bayboro	514	132	25.7%	152	29.6%	$416,153	11	2.1%	$55,275	0	0%	$0	163	31.7%	$471,428
Town of Grantsboro	581	0	0%	4	0.7%	$4,387	0	0%	$0	0	0%	$0	4	0.7%	$4,387
Town of Mesic	185	136	73.5%	168	90.8%	$1,270,287	9	4.9%	$22,980	2	1.1%	$18,146	179	96.8%	$1,311,413
Town of Minnesott Beach	401	1	0.2%	2	0.5%	$8,360	0	0%	$0	0	0%	$0	2	0.5%	$8,360
Town of Oriental	1,377	300	21.8%	606	44%	$5,131,080	21	1.5%	$224,783	1	0.1%	$16,280	628	45.6%	$5,372,143
Town of Stonewall	226	65	28.8%	70	31%	$193,574	2	0.9%	$3,721	0	0%	$0	72	31.9%	$197,295
Town of Vandemere	190	124	65.3%	142	74.7%	$1,028,862	8	4.2%	$86,669	7	3.7%	$258,647	157	82.6%	$1,374,177
Subtotal Pamlico	**10,862**	**2,323**	**21.4%**	**3,735**	**34.4%**	**$28,210,744**	**173**	**1.6%**	**$1,271,485**	**22**	**0.2%**	**$624,191**	**3,930**	**36.2%**	**$30,106,418**
Region Total	**130,220**	**11,546**	**8.9%**	**28,515**	**21.9%**	**$373,462,031**	**1,049**	**0.8%**	**$17,246,980**	**166**	**0.1%**	**$14,258,403**	**29,730**	**22.8%**	**$404,967,412**

Source: NCEM Risk Management Tool

The sectors at greatest risk to flooding are Commercial Facilities, Government Facilities, and Critical Manufacturing.

Table 4.51 – Critical Infrastructure and Key Resources Buildings at Risk to Flood Events by Sector

Sector	100 Year		Floodway	
	Number of Buildings at Risk	Estimated Damages	Number of Buildings at Risk	Estimated Damages
Banking and Finance	13	$240,930		
Commercial Facilities	714	$15,315,415	12	$221,298
Communications	1	$1,396		
Critical Manufacturing	150	$2,200,439		
Emergency Services	7	$318,954		
Energy	1	$5,807		
Food and Agriculture	191	$487,065	18	$52,265
Government Facilities	49	$10,224,643	1	$9,316
Healthcare and Public Health	27	$829,528	1	$152,398
Nuclear Reactors, Materials and Waste	1	$60,907		
Transportation system	15	$411,652		
Transportation Systems	101	$2,021,386	2	$18,566
Water	3	$99,122		
Total	**1,273**	**$32,217,244**	**34**	**$453,843**

Source: NCEM Risk Management Tool

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed to examine repetitive losses within the Region.

According to March 2019 NFIP records, there are a total of 4,517 repetitive loss properties within the Pamlico Region, of which 71.2 percent are insured. As of each property's first claim, 4,310 properties were residential and 207 were nonresidential. Of all properties on the list, 319 were located outside the SFHA at the time of their first claim.

There are 622 properties on the list classified as severe repetitive loss properties. A severe repetitive loss property is classified as such if it has four or more separate claim payments of more than $5,000 each (including building and contents payments) or two or more separate claim payments (building only) where the total of the payments exceeds the current value of the property.

Table 4.52 summarizes repetitive loss properties by jurisdiction as identified by FEMA through the NFIP. Jurisdictions without any repetitive losses are not listed in the table.

Table 4.52 – Repetitive Loss Properties by Jurisdiction

Jurisdiction	Total RL Properties	Total Number of Losses	Percent Insured	Total Amount of Claims Payments	Average Claim Paid	Count of SRL Properties
Beaufort						
Unincorporated Beaufort County	965	3,286	63%	$58,763,464.46	$18,152.66	219
City of Washington	201	655	58%	$12,174,008.14	$17,479.21	36
Town of Aurora	2	7	100%	$137,299.82	$19,646.11	0
Town of Bath	5	16	80%	$235,993.72	$93,326.27	1

Jurisdiction	Total RL Properties	Total Number of Losses	Percent Insured	Total Amount of Claims Payments	Average Claim Paid	Count of SRL Properties
Town of Belhaven	363	1,405	59%	$19,819,192.49	$13,360.14	82
Town of Pantego	2	4	50%	$74,221.00	$18,555.26	0
Town of Washington Park	78	298	83%	$4,933,546.12	$16,451.53	16
Carteret						
Unincorporated Carteret County	572	1,645	71%	$34,353,595.54	$21,043.13	59
Town of Atlantic Beach	116	396	72%	$9,158,767.32	$26,291.70	27
Town of Beaufort	20	56	55%	$774,782.87	$12,681.10	1
Town of Bogue	6	17	33%	$397,420.68	$20,860.10	0
Town of Cape Carteret	17	51	47%	$1,017,804.11	$19,581.47	1
Town of Cedar Point	40	136	35%	$3,515,057.79	$20,055.94	8
Town of Emerald Isle	123	349	79%	$5,486,302.37	$15,229.37	8
Town of Morehead City	37	107	65%	$1,855,892.72	$15,784.15	3
Town of Newport	2	4	50%	$28,437.38	$7,109.35	0
Town of Peletier	1	3	0%	$15,072.22	$5,024.07	0
Town of Pine Knoll Shores	17	36	59%	$378,320.31	$10,363.55	0
Craven						
Unincorporated Craven County	445	1,181	81%	$51,851,307.35	$48,464.35	39
City of Havelock	24	65	71%	$2,551,388.79	$38,177.74	5
City of New Bern	261	789	75%	$27,494,404.38	$38,215.71	28
Town of Bridgeton	16	46	94%	$1,486,367.21	$33,078.31	2
Town of River Bend	148	425	80%	$21,184,457.51	$53,061.22	13
Town of Trent Woods	38	102	82%	$5,534,951.65	$57,938.10	4
Town of Vanceboro	1	2	0%	$12,636.06	$6,318.03	0
Pamlico						
Unincorporated Pamlico County	572	1,480	75%	$36,126,347.69	$23,300.68	38
Town of Alliance	1	2	100%	$16,130.30	$8,065.15	0
Town of Bayboro	12	27	83%	$595,203.96	$22,938.97	0
Town of Mesic	9	23	89%	$615,814.78	$24,661.82	0
Town of Minnesott Beach	2	5	100%	$34,941.32	$6,553.07	0
Town of Oriental	368	993	88%	$26,221,127.07	$25,421.27	26
Town of Stonewall	7	19	86%	$335,993.61	$17,908.42	2
Town of Vandemere	46	132	72%	$4,390,605.76	$33,095.59	4
Total Region	**4,517**	**13,762**	**71%**	**$331,570,856.50**	**$25,344.77**	**622**

Source: FEMA/ISO, 2019
Note: RL = Repetitive Loss; SRL = Severe Repetitive Loss

Environment

During a flood event, chemicals and other hazardous substances may end up contaminating local water bodies. Flooding kills animals and in general disrupts the ecosystem. Snakes and insects may also make their way to the flooded areas.

Floods can also cause significant erosion, which can alter streambanks and deposit sediment, changing the flow of streams and rivers and potentially reducing the drainage capacity of those waterbodies.

Consequence Analysis

Table 4.53 summarizes the potential detrimental consequences of flood.

Table 4.53 – Consequence Analysis - Flood

Category	Consequences
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	First responders are at risk when attempting to rescue people from their homes. They are subject to the same health hazards as the public. Flood waters may prevent access to areas in need of response or the flood may prevent access to the critical facilities themselves which may prolong response time. Damage to personnel will generally be localized to those in the flood areas at the time of the incident and is expected to be limited.
Continuity of Operations (including Continued Delivery of Services)	Floods can severely disrupt normal operations, especially when there is a loss of power. Damage to facilities in the affected area may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities and Infrastructure	Buildings and infrastructure, including transportation and utility infrastructure, may be damaged or destroyed. Impacts are expected to be localized to the area of the incident. Severe damage is possible.
Environment	Chemicals and other hazardous substances may contaminate local water bodies. Wildlife and livestock deaths possible. The localized impact is expected to be severe for incident areas and moderate to light for other areas affected by the flood or HazMat spills. Flood may also adversely affect water quality by increasing nutrient and sediment loads in waterbodies.
Economic Condition of the Jurisdiction	Local economy and finances will be adversely affected, possibly for an extended period of time. During floods (especially flash floods), roads, bridges, farms, houses and automobiles are destroyed. Additionally, the local government must deploy firemen, police and other emergency response personnel and equipment to help the affected area. It may take years for the affected communities to be re-built and business to return to normal.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes flood hazard risk by jurisdiction. Warning time and duration are inherent to the hazard. Spatial extent was assigned according to the amount of area within the SFHA, adjusted in some cases based on the understanding that other sources of flooding and other levels of flooding may occur beyond the SFHA. Due to the coastal geography of the region, flood risk due to storm surge, high tide flooding, flash flooding, and stormwater flooding can impact the region; an impact rating of critical was assigned uniformly across the region. Communities were assigned a probability of likely unless they have no area in the SFHA, in which case probability was lowered to possible.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	3	3	3	3	3.0	H
City of Washington	3	3	3	3	3	3.0	H
Town of Aurora	3	3	3	3	3	3.0	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Bath	3	3	4	3	3	3.2	H
Town of Belhaven	3	3	4	3	3	3.2	H
Town of Chocowinity	3	3	2	3	3	2.8	H
Town of Pantego	3	3	4	3	3	3.2	H
Town of Washington Park	3	3	4	3	3	3.2	H
Carteret County	3	3	3	3	3	3.0	H
Town of Atlantic Beach	3	3	4	3	3	3.2	H
Town of Beaufort	3	3	4	3	3	3.2	H
Town of Bogue	3	3	3	3	3	3.0	H
Town of Cape Carteret	3	3	3	3	3	3.0	H
Town of Cedar Point	3	3	3	3	3	3.0	H
Town of Emerald Isle	3	3	3	3	3	3.0	H
Town of Indian Beach	3	3	4	3	3	3.2	H
Town of Morehead City	3	3	4	3	3	3.2	H
Town of Newport	3	3	3	3	3	3.0	H
Town of Peletier	3	3	3	3	3	3.0	H
Town of Pine Knoll Shores	3	3	3	3	3	3.0	H
Craven County	3	3	3	3	3	3.0	H
City of Havelock	3	3	3	3	3	3.0	H
City of New Bern	3	3	3	3	3	3.0	H
Town of Bridgeton	3	3	4	3	3	3.2	H
Town of Cove City	2	3	1	3	3	2.3	M
Town of Dover	2	3	1	3	3	2.3	M
Town of River Bend	3	3	3	3	3	3.0	H
Town of Trent Woods	3	3	3	3	3	3.0	H
Town of Vanceboro	3	3	3	3	3	3.0	H
Pamlico County	3	3	3	3	3	3.0	H
Town of Alliance	3	3	3	3	3	3.0	H
Town of Arapahoe	2	3	1	3	3	2.3	M
Town of Bayboro	3	3	3	3	3	3.0	H
Town of Grantsboro	3	3	2	3	3	2.8	H
Town of Mesic	3	3	4	3	3	3.2	H
Town of Minnesott Beach	3	3	3	3	3	3.0	H
Town of Oriental	3	3	4	3	3	3.2	H
Town of Stonewall	3	3	4	3	3	3.2	H
Town of Vandemere	3	3	4	3	3	3.2	H

4.5.7 Hurricane and Tropical Storm

Hazard Background

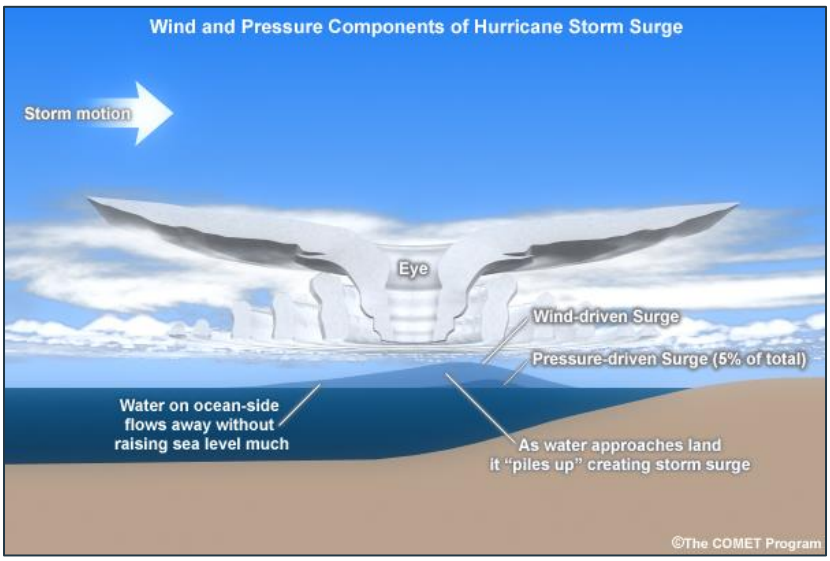
Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

The greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 4.29. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level to heights impacting roads, homes and other critical infrastructure. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

The maximum potential storm surge for a location depends on several different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries. Other factors which can impact storm surge are the width and slope of the continental shelf and the depth of the ocean bottom. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Much of the North Carolina coast has a narrow continental shelf, with mile-deep waters generally only 20-30 miles off the coast.

Figure 4.29 – Components of Hurricane Storm Surge



Source: NOAA/The COMET Program

Damage during hurricanes may also result from inland flooding from associated heavy rainfall. For example, Hurricane Floyd, which made landfall as a Category 2 storm, caused the worst inland flooding disaster in North Carolina's history. Rainfall amounts exceeded 20 inches in certain locales and 67 counties sustained damages.

Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful.

Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. There are two main components to a nor'easter: (1) a Gulf Stream low-pressure system (counter-clockwise winds) generated off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic, and pulled up the East Coast by strong northeasterly winds at the leading edge of the storm; and (2) an Arctic high-pressure system (clockwise winds) which meets the low-pressure system with cold, arctic air blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation and can produce dangerously high winds and heavy seas. As the low-pressure system deepens, the intensity of the winds and waves increases and can cause serious damage to coastal areas as the storm moves northeast.

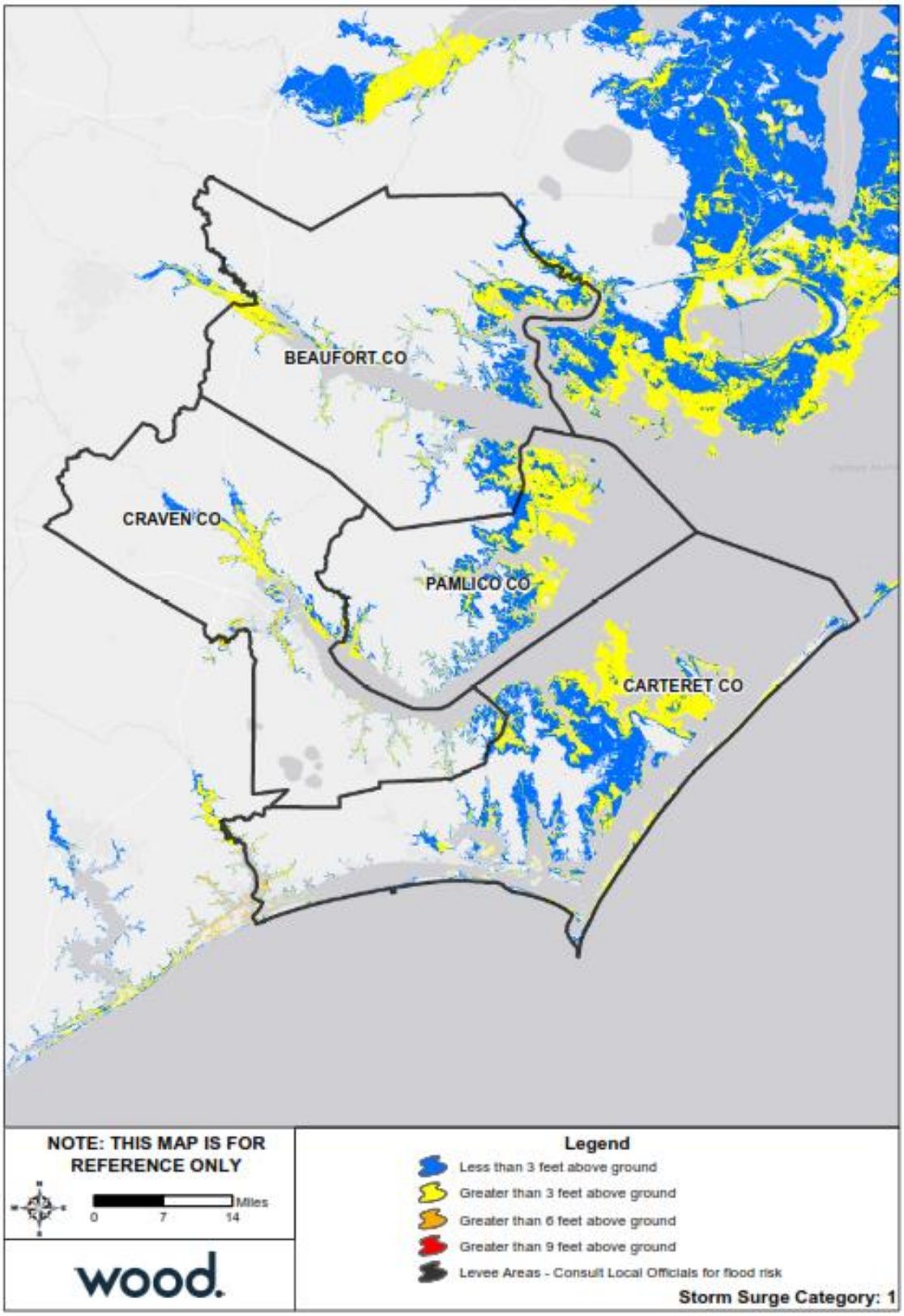
Warning Time: 1 – More than 24 hours

Duration: 3 – Less than 1 week

Location

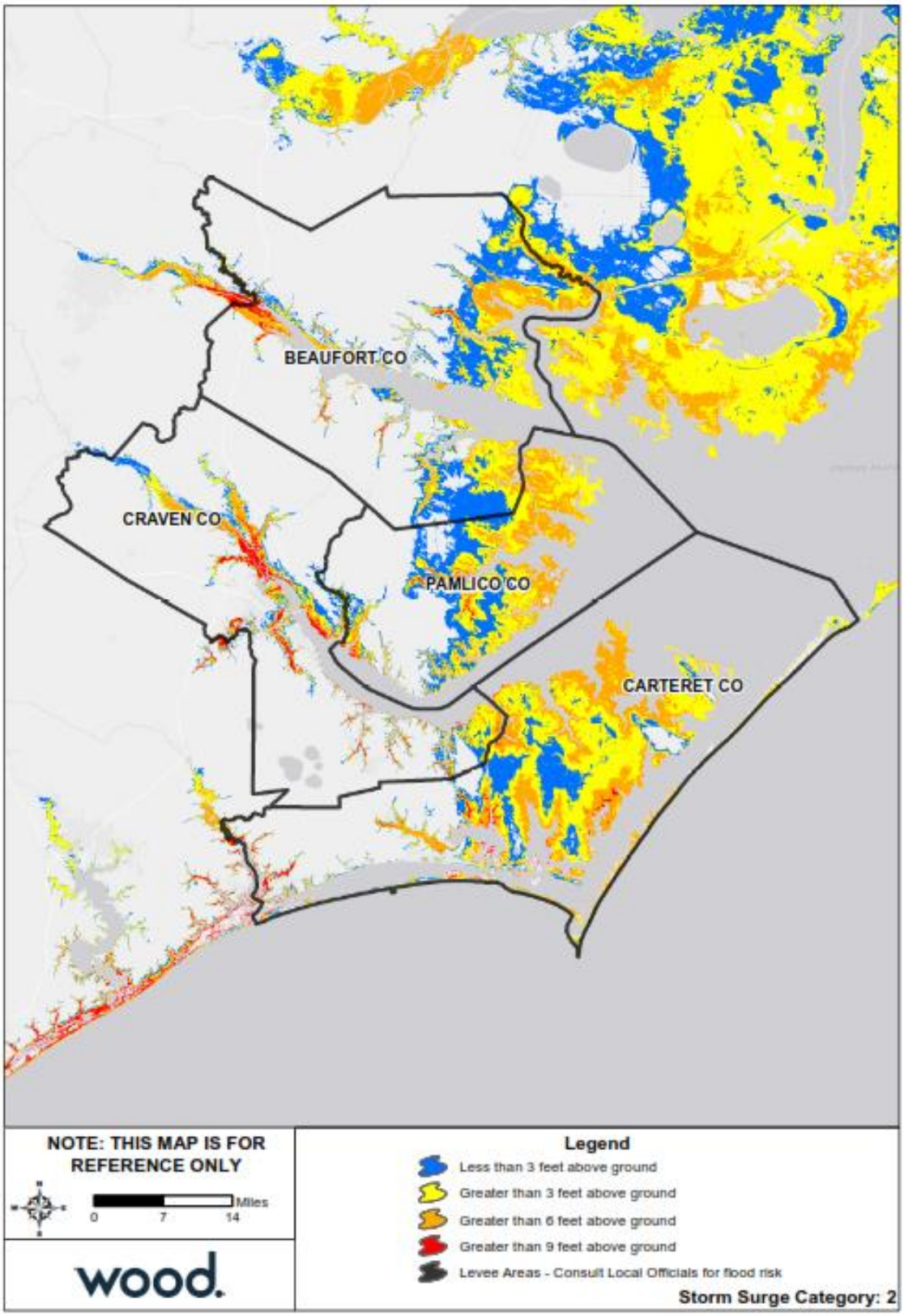
Hurricanes and tropical storms can impact the entire Pamlico Sound Region. Wind impacts can affect the region uniformly, while storm surge impacts are more limited, affecting areas along coastal and estuarine shorelines and reaching further inland depending on the height of the surge. Figure 4.30 through Figure 4.34 show the estimated extent of surge by storm category according to NOAA SLOSH data.

Figure 4.30 – Category 1 Storm Surge Inundation



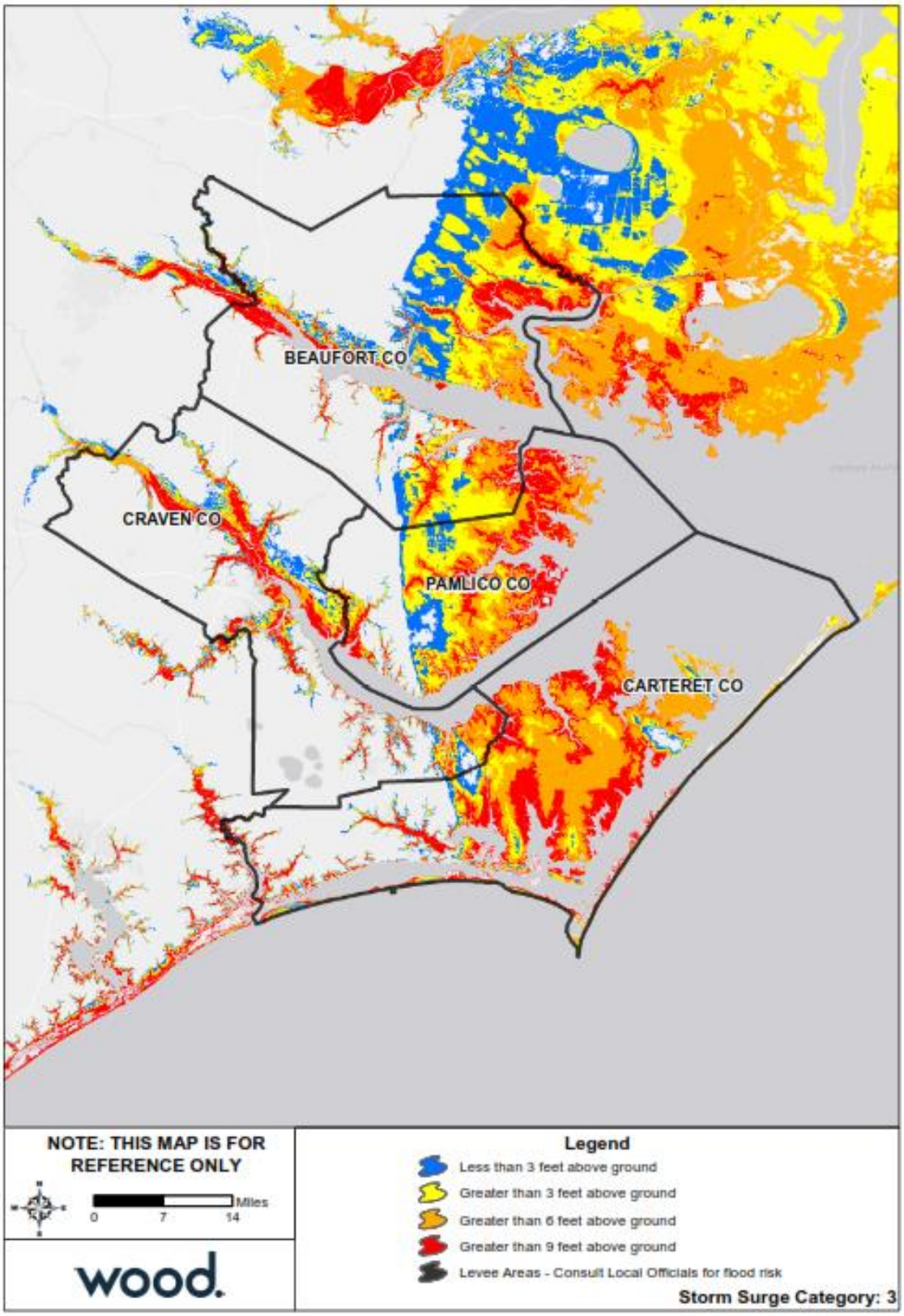
Source: NOAA National Storm Surge Hazard Maps – Version 2

Figure 4.31 – Category 2 Storm Surge Inundation



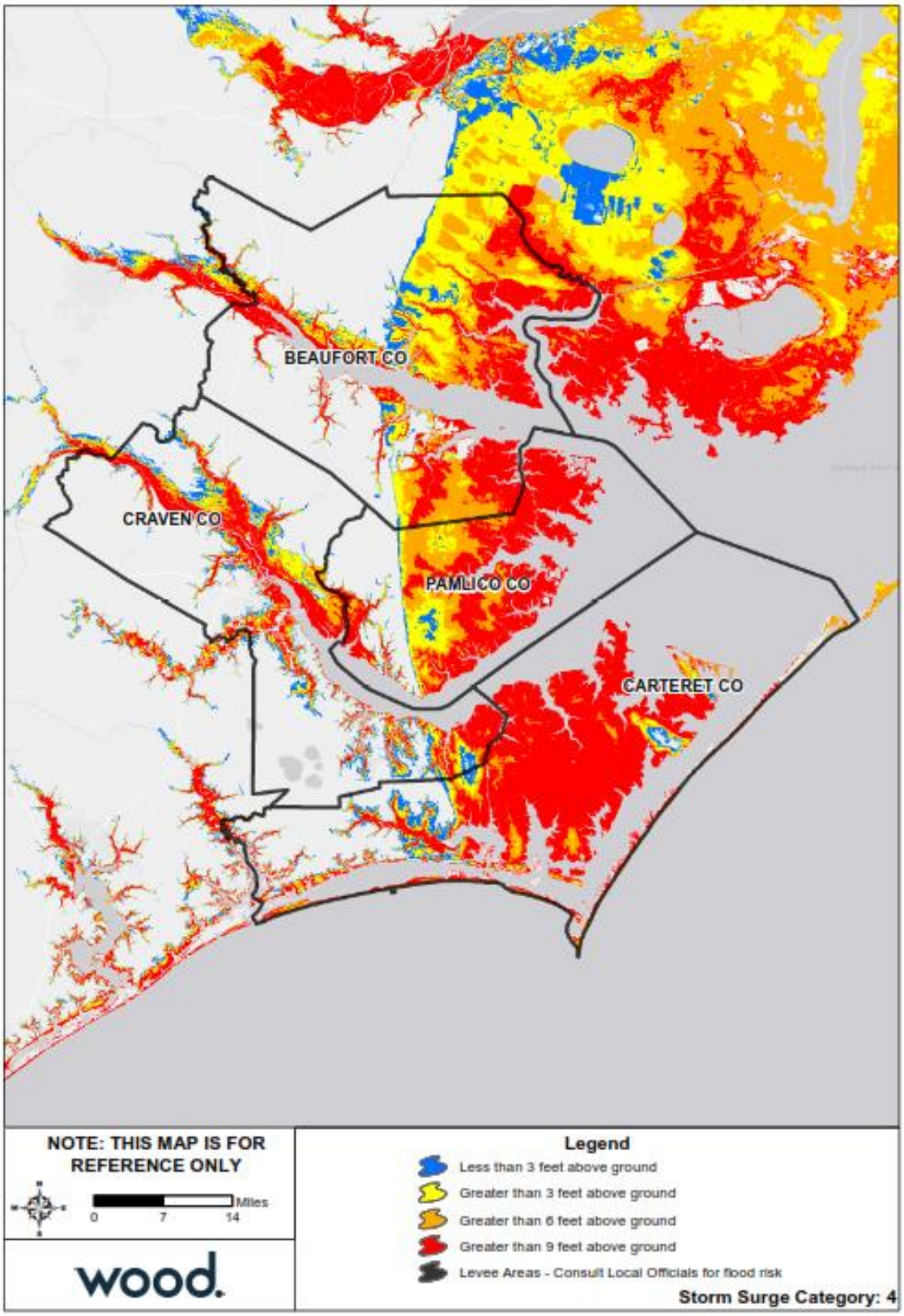
Source: NOAA National Storm Surge Hazard Maps – Version 2

Figure 4.32 – Category 3 Storm Surge Inundation



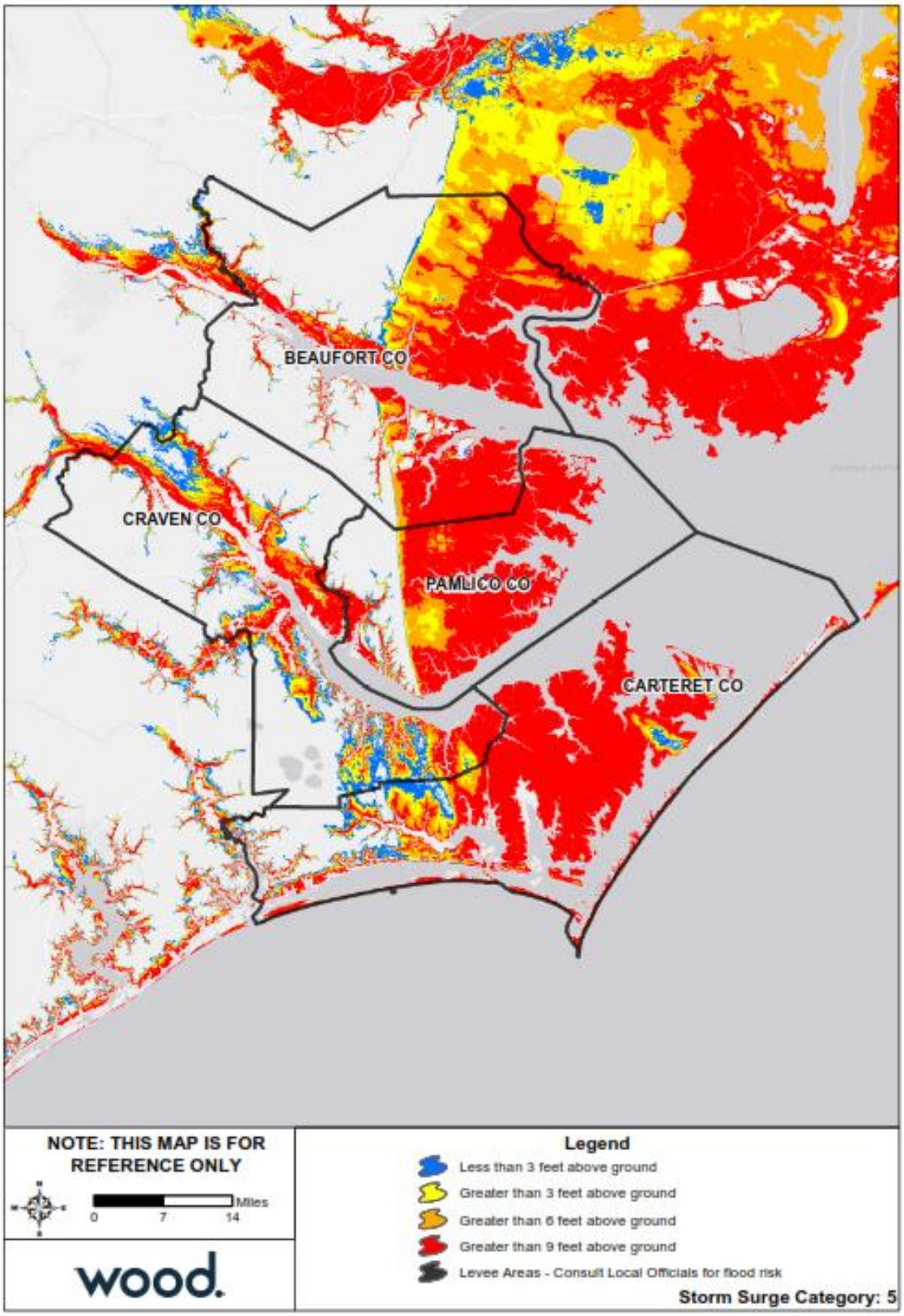
Source: NOAA National Storm Surge Hazard Maps – Version 2

Figure 4.33 – Category 4 Storm Surge Inundation



Source: NOAA National Storm Surge Hazard Maps – Version 2

Figure 4.34 – Category 5 Storm Surge Inundation



Source: NOAA National Storm Surge Hazard Maps – Version 2

Extent

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane.

Hurricane force winds can extend outward by about 35 miles from the eye of a small hurricane to more than 150 miles from the center of a large hurricane. Tropical storm force winds may extend even further, up to approximately 300 miles from the eye of a large hurricane. In general, the front right quadrant of a storm, relative to its direction of movement, is the most dangerous part of the storm. Wind speeds are highest in this area due to the additive impact of the atmospheric steering winds and the storm winds.

Hurricane intensity is further classified by the Saffir-Simpson Scale, detailed in Table 4.54, which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

Table 4.54 – Saffir-Simpson Scale

Category	Maximum Sustained Wind Speed (MPH)	Types of Damage
1	74–95	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	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	111–129	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.
4	130–156	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	157 +	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 Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as “major” hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. Table 4.55 describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

Table 4.55 – Hurricane Damage Classifications

Storm Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Source: National Hurricane Center; Federal Emergency Management Agency

Located on the coast and along estuarine areas, the Pamlico Sound Region is susceptible to every category of hurricane.

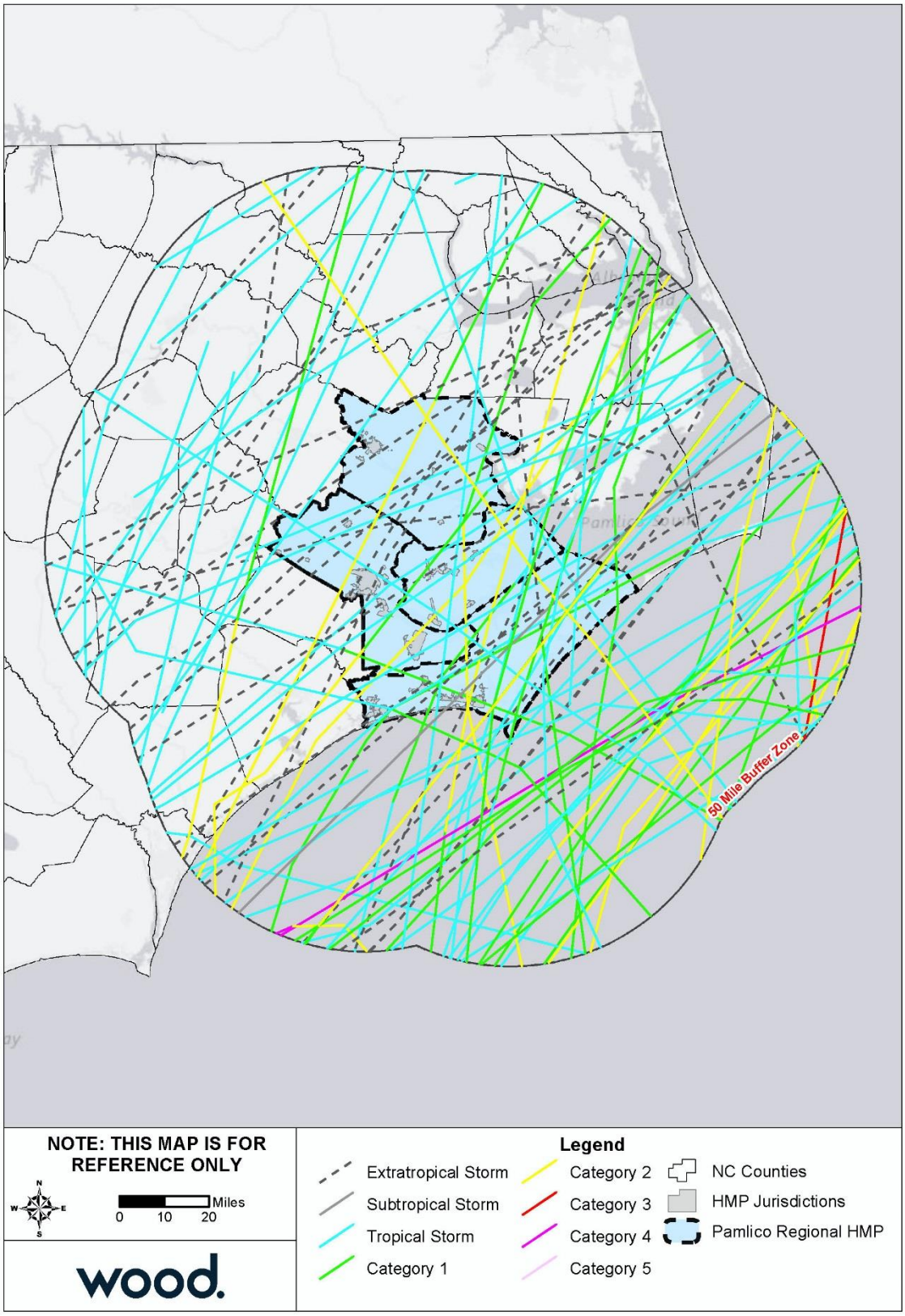
Impact: 4 – Catastrophic

Spatial Extent: 4 – Large

Historical Occurrences

According to the Office of Coastal Management's Tropical Cyclone Storm Segments data, which is a subset of the International Best Track Archive for Climate Stewardship (IBTrACS) dataset, 97 hurricanes and tropical storms have passed within 50 miles of the Pamlico Sound Region since 1900. These storm tracks are shown in Figure 4.35. The date, storm name, storm category, and maximum wind speed of each event are detailed in Table 4.56.

Figure 4.35 – Hurricane/Tropical Storm Tracks within 50 miles of the Pamlico Sound Region, 1900-2016



Source: NOAA Office of Coastal Management

Table 4.56 – Hurricane/Tropical Storm Tracks within 50 Miles of Pamlico Sound Region, 1900-2016

Date	Storm Name	Max Storm Category*	Max Wind Speed (mph)*
10/13/1900	Unnamed	Extratropical Storm	40
7/11/1901	Unnamed	Category 1	81
9/18/1901	Unnamed	Tropical Storm	40
6/29/1907	Unnamed	Extratropical Storm	58
5/29/1908	Unnamed	Category 1	75
7/31/1908	Unnamed	Category 1	81
7/31/1908	Unnamed	Tropical Storm	69
9/1/1908	Unnamed	Tropical Storm	52
8/28/1910	Unnamed	Extratropical Storm	46
10/20/1910	Unnamed	Tropical Storm	69
6/15/1912	Unnamed	Extratropical Storm	46
9/3/1913	Unnamed	Category 1	86
5/16/1916	Unnamed	Tropical Storm	40
9/6/1916	Unnamed	Tropical Storm	52
8/24/1918	Unnamed	Category 1	75
8/26/1924	Unnamed	Category 2	104
9/17/1924	Unnamed	Extratropical Storm	52
9/30/1924	Unnamed	Extratropical Storm	69
12/2/1925	Unnamed	Extratropical Storm	81
9/19/1928	Unnamed	Extratropical Storm	81
9/12/1930	Unnamed	Category 1	92
9/16/1932	Unnamed	Extratropical Storm	58
8/23/1933	Unnamed	Category 2	98
9/16/1933	Unnamed	Category 2	109
9/3/1934	Unnamed	Tropical Storm	46
9/8/1934	Unnamed	Category 1	92
9/6/1935	Unnamed	Tropical Storm	58
7/31/1937	Unnamed	Tropical Storm	63
10/11/1942	Unnamed	Extratropical Storm	52
10/12/1942	Unnamed	Extratropical Storm	52
8/2/1944	Unnamed	Tropical Storm	69
9/14/1944	Unnamed	Category 3	121
6/25/1945	Unnamed	Category 1	75
7/6/1946	Unnamed	Tropical Storm	52
9/25/1947	Unnamed	Extratropical Storm	40
8/24/1949	Unnamed	Category 2	109
9/12/1949	Unnamed	Tropical Storm	52
8/14/1953	Barbara	Category 1	92
5/29/1954	Unnamed	Tropical Storm	46
8/30/1954	Carol	Category 2	109
8/12/1955	Connie	Category 2	98
9/19/1955	Ione	Category 2	109
9/27/1956	Flossy	Extratropical Storm	58
10/17/1956	Unnamed	Extratropical Storm	58
9/27/1958	Helene	Category 4	138

Date	Storm Name	Max Storm Category*	Max Wind Speed (mph)*
7/10/1959	Cindy	Tropical Storm	40
8/2/1959	Unnamed	Tropical Storm	46
7/29/1960	Brenda	Tropical Storm	69
9/12/1960	Donna	Category 2	104
9/14/1961	Unnamed	Tropical Storm	40
8/28/1962	Alma	Category 1	75
9/13/1964	Dora	Tropical Storm	52
10/16/1964	Isbell	Category 1	75
9/17/1967	Doria	Tropical Storm	52
10/20/1968	Gladys	Category 1	86
8/27/1971	Doria	Tropical Storm	63
9/30/1971	Ginger	Category 1	86
6/22/1972	Agnes	Tropical Storm	52
6/29/1975	Amy	Tropical Storm	40
10/27/1975	Hallie	Tropical Storm	52
8/20/1981	Dennis	Tropical Storm	63
6/19/1982	Subtrop:Unnamed	Subtropical Storm	69
9/12/1984	Diana	Category 4	132
9/27/1985	Gloria	Category 2	104
11/22/1985	Kate	Tropical Storm	52
8/17/1986	Charley	Category 1	75
8/19/1991	Bob	Category 2	109
6/6/1995	Allison	Extratropical Storm	46
6/19/1996	Arthur	Tropical Storm	46
7/12/1996	Bertha	Category 2	104
10/8/1996	Josephine	Extratropical Storm	52
7/24/1997	Danny	Tropical Storm	46
8/27/1998	Bonnie	Category 2	109
9/4/1998	Earl	Extratropical Storm	58
9/4/1999	Dennis	Tropical Storm	69
9/16/1999	Floyd	Category 2	104
10/18/1999	Irene	Category 2	109
9/23/2000	Helene	Tropical Storm	40
9/10/2002	Gustav	Tropical Storm	63
10/12/2002	Kyle	Tropical Storm	46
9/18/2003	Isabel	Category 2	104
8/3/2004	Alex	Category 2	98
8/14/2004	Charley	Tropical Storm	69
9/14/2005	Ophelia	Category 1	86
6/14/2006	Alberto	Extratropical Storm	40
9/1/2006	Ernesto	Tropical Storm	58
6/3/2007	Barry	Extratropical Storm	46
9/9/2007	Gabrielle	Tropical Storm	58
7/20/2008	Cristobal	Tropical Storm	52
9/6/2008	Hanna	Tropical Storm	69
8/27/2011	Irene	Category 1	86
5/30/2012	Beryl	Tropical Storm	46

Date	Storm Name	Max Storm Category*	Max Wind Speed (mph)*
6/7/2013	Andrea	Extratropical Storm	46
7/4/2014	Arthur	Category 2	98
6/7/2016	Colin	Extratropical Storm	52
9/3/2016	Hermine	Tropical Storm	63
10/9/2016	Matthew	Category 1	81

*Reports the most intense category and wind speed that occurred within 50 miles of the Pamlico Sound Region, not for the storm event overall.
Source: Office of Coastal Management, 2019. https://marinecadastre.gov/data/

The above list of storms is not an exhaustive list of hurricanes that have affected the Pamlico Sound Region. Several storms, including Hurricane Irene (2011) and Hurricane Sandy, have passed further than 50 miles away from the Pamlico Sound Region yet had strong enough wind or rain impacts to affect the region. NCEI records hurricane and tropical storm events across the region by county and zone; therefore, one event that impacts all four counties in the region is recorded for each county. During the 20-year period from 1999 through 2018, NCEI records 72 hurricane and tropical storm reports across 22 separate days. These events are summarized in Table 4.57 by storm. All death, injury, and damage records were combined from all counties/zones. Where property damage estimates were broken out by type, NCEI reports only the value of wind-related damages. Event narratives following this table provide a fuller scope of the impacts from selected events.

Table 4.57 – Recorded Hurricane/Tropical Storm Winds in Pamlico Sound Region Counties, 1999-2018

Date	Storm	Deaths/ Injuries	Property Damage	Crop Damage
8/30 – 9/1/1999	Hurricane Dennis	0/0	$9,100,000	$15,700,000
9/14 – 9/15/1999	Hurricane Floyd	2/0	$29,500,000	$12,200,000
10/16/1999	Hurricane Irene	1/0	$0	$0
9/10/2002	Tropical Storm Gustav	0/0	$2,000	$0
9/17/2003	Hurricane Isabel	0/0	$72,100,000	$14,200,000
8/3/2004	Hurricane Alex	0/0	$45,000	$0
8/14/2004	Tropical Storm Charley	0/0	$875,000	$450,000
9/13/2005	Hurricane Ophelia	0/5	$28,450,000	$8,000,000
8/31/2006	Tropical Storm Ernesto	0/0	$185,000	$1,200,000
9/5/2008	Tropical Storm Hanna	0/0	$30,000	$0
9/2/2010	Hurricane Earl	0/0	$5,000	$0
8/26/2011	Hurricane Irene	0/0	$55,000,000	$40,000,000
10/28/2012	Hurricane Sandy	0/0	$0	$0
6/6/2013	Tropical Storm Andrea	0/0	$0	$0
7/3/2014	Hurricane Arthur	0/0	$0	$0
5/8/2015	Tropical Storm Ana	0/0	$0	$0
9/2/2016	Hurricane Hermine	0/0	$5,000	$0
10/8/2016	Hurricane Matthew	0/0	$0	$0
9/13/2018	Hurricane Florence	0/0	$34,140,000	$0
10/11/2018	Hurricane Michael	0/0	$0	$0
	Total	**3/5**	**$229,437,000**	**$91,750,000**

Source: NCEI

August 30 – September 1, 1999 – Unfortunately the hurricane approached eastern North Carolina during one of the highest astronomical tides of the month. In the New Bern area near the Trent River...6 feet of water was reported. Oriental in Pamlico County reported tides 6 to 8 feet above normal. Residents of Cedar Island in Carteret County, Ocracoke in Hyde County, and others in Pamlico County reported this

was the highest water since 1933. The Cape Lookout C-Man station reported sustained winds of 70 mph with gusts to 91 mph. The greatest rainfall occurred over Carteret, southern Craven, Outer Banks Hyde, and Outer Banks Dare County. Doppler radar estimates were near 6 to 8 inches with isolated areas of 8 to 10. A Cooperative observer in Morehead City reported 7.83 inches. No tornadoes were reported and only minor fresh water flooding was reported. No fatalities were reported in direct relationship to Hurricane Dennis.

October 16, 1999 – One fatality was reported in western Beaufort County. A male was driving an automobile on Highway 264 when the vehicle hydroplaned. Craven and Lenoir Counties were obviously the most affected. River levels remained above flood stage on the Neuse River since before Hurricane Floyd. Additionally, major flooding occurred along the Swift Creek near Vanceboro back to levels similar to but not as bad as Hurricane Floyd.

September 17, 2003 – Eastern Carteret, eastern Pamlico, southern Craven, Beaufort, and Hyde counties experienced significant storm surge damage with hundreds of homes flooded in most of these counties. The highest storm surges were experienced in the lower reaches of the Neuse River where water levels rose to as high as 10.5 feet at the mouth of Adams Creek. Storm surge values ranged from 6 to 10 feet across eastern Pamlico county with the highest water levels recorded near Oriental. A 4 to 7 foot storm surge occurred across Core Sound in eastern Carteret county, except water levels rose between 8 and 10 feet along the South River and Big Creek. Storm surge values were around 7 feet in portions of Beaufort county in Washington, and Belhaven. Virtually every business on Main Street in Belhaven was flooded with 2 to 3 feet of water. Hurricane force winds were also experienced in parts of the inland counties of Jones, Craven, and Pitt counties during the afternoon of September 18th where inland hurricane wind warnings had been in effect for 11 hours. Other counties west of the center of the storm experienced wind gusts between 60 and 65 mph.

September 13, 2005 – Highest winds and damages occurred across this area where winds gusted to near 100 mph, and storm surges of up to 6 feet resulted in structural damages totaling near 35 million dollars. The highest surge was reported along the lower reaches of the Neuse River in southern Craven County where water levels rose to 8 feet, during the night of the 14th. Minor wind damage occurred across the inland counties of Duplin, Jones, Lenoir, and Craven where tropical storm force wind gusts blew shingles off roofs, and downed trees and power lines. The combination of surge from Pamlico Sound and heavy storm total rainfall, from 4 to 9 inches, resulted in the flooding of streams, roads, and lower elevations in Beaufort, Carteret, Craven, Jones, Onslow, and Pamlico counties.

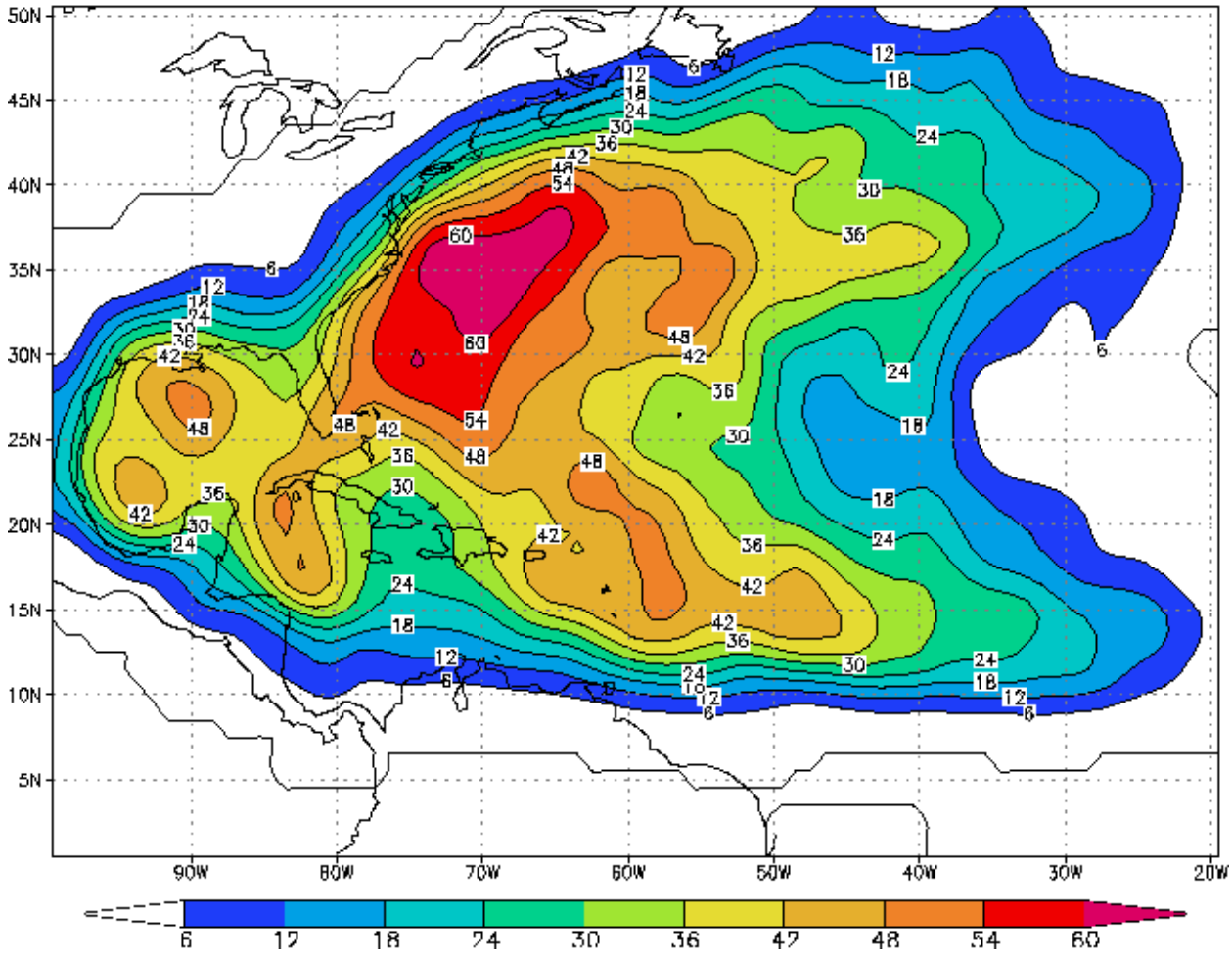
September 13, 2018 – Florence produced extensive wind damage along the North Carolina coast from Cape Lookout, across Carteret, Onslow, Pender and New Hanover counties. Thousands of downed trees caused widespread power outages to nearly all of eastern North Carolina. The historic legacy of Hurricane Florence will be record breaking storm surge of 9 to 13 feet and widespread devastating rainfall of 20 to 30 inches, locally up to 36 inches, which produced catastrophic and life-threatening flooding. The hardest hit areas included New Bern, Newport, Belhaven, Oriental, North Topsail Beach and Jacksonville, along with southeast Carteret County, or basically south of a line from Kinston to Cedar Island. A storm total rainfall of 34.00 inches was reported in Swansboro, while the NWS office in Newport recorded 25.20 inches. Wind gusts of 106 mph were reported at Cape Lookout with 105 mph at Fort Macon.

Probability of Future Occurrence

Figure 4.36 shows, for any particular location, the chance of a hurricane or tropical storm affecting the area sometime during the Atlantic hurricane season. The figure was created by the National Oceanic and Atmospheric Administration's (NOAA) Hurricane Research Division, using data from 1944 to 1999 and shows the number of times a storm or hurricane was located within approximately 100 miles of a given

spot in the Atlantic basin. Per this data, there is approximately a 36-48% chance of a hurricane impacting the Pamlico Sound Region in any given year.

Figure 4.36 – Empirical Probability of a Named Hurricane or Tropical Storm



Source: National Oceanic and Atmospheric Administration, Hurricane Research Division

On average, North Carolina experiences a hurricane approximately once every two years. Substantial hurricane damage is typically most likely to be expected in the easternmost counties of the state; however, hurricane and tropical storm-force winds have significantly impacted areas far inland.

Per NCEI records, the Pamlico Sound Region has been impacted by hurricane and tropical storm winds 20 times over the 20-year period from 1999 through 2018, equating to a 100 percent annual probability of occurrence. Of these events, 14 were Category 1 strength winds or greater. Based on these occurrences, there is a 70 percent annual probability of a severe event impacting the Region.

Probability: 3 – Likely

Climate Change

One of the primary factors contributing to the origin and growth of tropical storm and hurricanes systems is water temperature. Per the Fourth National Climate Assessment, "There is growing evidence that the tropics have expanded poleward by about 70 to 200 miles in each hemisphere since satellite measurements began in 1979, with an accompanying shift of the subtropical dry zones, midlatitude jets,

and both midlatitude and tropical cyclone tracks." It is unclear as of yet whether these changes can be attributed to climate change, but current climate science suggests cyclones would become more frequent and intense as water temperatures warm. In addition to occurring with greater frequency, intense hurricanes are also expected to produce greater amounts of rainfall. The 2017 hurricane season is considered an indicator of these potential changes.

Vulnerability Assessment

Methodologies and Assumptions

Property at risk to hurricanes was estimated using data from the NCEMIRISK database, which was compiled in NCEM's Risk Management Tool. The vulnerability data displayed below is for wind-related damages. Hurricanes may also cause substantial damages from heavy rains and subsequent flooding, which is addressed in Section 4.5.6 Flood.

People

The very young, the elderly and the handicapped are especially vulnerable to harm from hurricanes. For those who are unable to evacuate for medical reasons, there should be provision to take care of special-needs patients and those in hospitals and nursing homes. Many of these patients are either oxygen-dependent, insulin-dependent, or in need of intensive medical care. There is a need to provide ongoing treatment for these vulnerable citizens, either on the coast or by air evacuation to upland hospitals. The stress from disasters such as a hurricane can result in immediate and long-term physical and emotional health problems among victims.

Property

General damages to property are both direct (what the winds associated with hurricanes physically destroy) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the hurricane, or due to the damages caused by the storm. Depending on the size and strength of the hurricane, associated winds are capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of structures to damage.

Secondary impacts of damage due to hurricane winds often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These impacts of a hurricane put tremendous strain on a community. In the immediate aftermath of a hurricane, the focus is on emergency services.

Table 4.58 through Table 4.62 detail buildings at risk and provide damage estimates across all jurisdictions for the 25-, 50-, 100-, 300-, and 700-year hurricane wind events. All scenarios impacted the same number of buildings but with varying severity of damage.

The damage estimates for the 100-year hurricane wind event total $1,769,932,192, which equates to a loss ratio of 9.9 percent. The loss ratio is the damage estimate divided by the total potential exposure (i.e., total value of all buildings in the planning area), displayed as a percentage of value at risk. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from an event. These damage estimates account for only wind impacts and actual damages would likely be higher due to flooding. Therefore, the Region would likely experience a higher overall loss ratio from the 100-year hurricane event and face difficulty recovering from such an event.

Table 4.58 – Buildings at Risk from 25-Year Hurricane Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$11,720,845	1,999	10.3%	$2,308,979	341	1.8%	$1,911,400	18,974	98.2%	$15,941,224
City of Washington	5,559	4,614	83%	$2,871,981	739	13.3%	$24,472,872	193	3.5%	$1,043,053	5,546	99.8%	$28,387,907
Town of Aurora	559	439	78.5%	$434,238	86	15.4%	$57,839	33	5.9%	$107,515	558	99.8%	$599,591
Town of Bath	553	470	85%	$544,840	50	9%	$29,930	33	6%	$90,375	553	100%	$665,144
Town of Belhaven	1,062	856	80.6%	$569,930	109	10.3%	$96,157	32	3%	$95,294	997	93.9%	$761,381
Town of Chocowinity	392	321	81.9%	$300,211	43	11%	$128,445	27	6.9%	$69,048	391	99.7%	$497,704
Town of Pantego	126	99	78.6%	$80,236	16	12.7%	$8,742	11	8.7%	$38,717	126	100%	$127,694
Town of Washington Park	229	171	74.7%	$146,954	13	5.7%	$75,424	0	0%	$0	184	80.3%	$222,378
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$16,669,235**	**3,055**	**11%**	**$27,178,388**	**670**	**2.4%**	**$3,355,402**	**27,329**	**98.3%**	**$47,203,023**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$22,291,669	971	6.3%	$2,104,516	234	1.5%	$3,753,110	14,794	96.6%	$28,149,294
Town of Atlantic Beach	3,412	3,221	94.4%	$13,870,591	152	4.5%	$858,437	9	0.3%	$29,410	3,382	99.1%	$14,758,438
Town of Beaufort	3,277	2,880	87.9%	$6,623,965	277	8.5%	$1,613,085	79	2.4%	$951,212	3,236	98.7%	$9,188,263
Town of Bogue	363	324	89.3%	$676,974	30	8.3%	$61,036	9	2.5%	$40,894	363	100%	$778,905
Town of Cape Carteret	989	874	88.4%	$1,621,784	89	9%	$213,167	26	2.6%	$77,803	989	100%	$1,912,753
Town of Cedar Point	1,367	1,258	92%	$1,982,431	99	7.2%	$511,521	10	0.7%	$97,956	1,367	100%	$2,591,907
Town of Emerald Isle	5,712	5,140	90%	$25,580,989	147	2.6%	$398,782	20	0.4%	$350,995	5,307	92.9%	$26,330,765
Town of Indian Beach	899	790	87.9%	$3,154,912	23	2.6%	$132,214	7	0.8%	$45,063	820	91.2%	$3,332,188
Town of Morehead City	7,827	6,711	85.7%	$17,085,220	821	10.5%	$2,547,302	217	2.8%	$3,510,346	7,749	99%	$23,142,867
Town of Newport	4,085	3,648	89.3%	$4,565,854	334	8.2%	$782,396	98	2.4%	$467,862	4,080	99.9%	$5,816,112
Town of Peletier	529	472	89.2%	$636,058	49	9.3%	$646,398	8	1.5%	$122,579	529	100%	$1,405,035
Town of Pine Knoll Shores	1,757	1,395	79.4%	$11,764,412	70	4%	$562,056	34	1.9%	$419,777	1,499	85.3%	$12,746,245
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$109,854,859**	**3,062**	**6.7%**	**$10,430,910**	**751**	**1.6%**	**$9,867,007**	**44,115**	**96.9%**	**$130,152,772**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$17,793,314	1,869	8.1%	$6,987,207	288	1.2%	$2,083,449	22,954	99.2%	$26,863,970
City of Havelock	5,366	4,840	90.2%	$5,617,802	371	6.9%	$5,087,947	148	2.8%	$28,000,025	5,359	99.9%	$38,705,775
City of New Bern	12,738	11,129	87.4%	$7,719,116	1,252	9.8%	$12,634,511	298	2.3%	$6,007,489	12,679	99.5%	$26,361,115
Town of Bridgeton	317	232	73.2%	$123,193	68	21.5%	$41,524	12	3.8%	$5,231	312	98.4%	$169,948
Town of Cove City	274	234	85.4%	$180,862	28	10.2%	$17,162	11	4%	$109,675	273	99.6%	$307,699
Town of Dover	281	257	91.5%	$162,866	7	2.5%	$7,565	17	6%	$65,638	281	100%	$236,068
Town of River Bend	1,545	1,513	97.9%	$1,285,141	24	1.6%	$251,157	7	0.5%	$11,072	1,544	99.9%	$1,547,370
Town of Trent Woods	1,910	1,866	97.7%	$1,840,447	22	1.2%	$55,046	21	1.1%	$65,034	1,909	99.9%	$1,960,527
Town of Vanceboro	467	368	78.8%	$292,727	68	14.6%	$237,712	31	6.6%	$253,789	467	100%	$784,228
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$35,015,468**	**3,709**	**8.1%**	**$25,319,831**	**833**	**1.8%**	**$36,601,402**	**45,778**	**99.5%**	**$96,936,700**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$5,567,914	478	7.5%	$347,201	73	1.1%	$73,647	6,229	97.6%	$5,988,761
Town of Alliance	575	481	83.7%	$267,914	80	13.9%	$27,941	14	2.4%	$5,240	575	100%	$301,095
Town of Arapahoe	428	386	90.2%	$257,259	26	6.1%	$35,408	16	3.7%	$62,799	428	100%	$355,466
Town of Bayboro	514	404	78.6%	$250,040	73	14.2%	$23,883	36	7%	$72,801	513	99.8%	$346,724
Town of Grantsboro	581	527	90.7%	$201,589	36	6.2%	$33,495	17	2.9%	$28,582	580	99.8%	$263,667
Town of Mesic	185	170	91.9%	$76,464	10	5.4%	$1,142	5	2.7%	$931	185	100%	$78,537
Town of Minnesott Beach	401	384	95.8%	$976,693	15	3.7%	$127,513	2	0.5%	$7,617	401	100%	$1,111,822
Town of Oriental	1,377	1,207	87.7%	$2,937,020	98	7.1%	$128,625	13	0.9%	$32,329	1,318	95.7%	$3,097,973
Town of Stonewall	226	199	88.1%	$135,252	21	9.3%	$9,446	6	2.7%	$9,601	226	100%	$154,298
Town of Vandemere	190	133	70%	$67,016	1	0.5%	$60	6	3.2%	$2,107	140	73.7%	$69,183
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$10,737,161**	**838**	**7.7%**	**$734,714**	**188**	**1.7%**	**$295,654**	**10,595**	**97.5%**	**$11,767,526**
Region Total	**130,220**	**114,711**	**88.1%**	**$172,276,723**	**10,664**	**8.2%**	**$63,663,843**	**2,442**	**1.9%**	**$50,119,465**	**127,817**	**98.2%**	**$286,060,021**

Source: NCEM Risk Management Tool

Table 4.59 – Buildings at Risk from 50-Year Hurricane Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$32,033,136	1,999	10.3%	$6,726,910	341	1.8%	$5,221,315	18,974	98.2%	$43,981,362
City of Washington	5,559	4,614	83%	$7,742,331	739	13.3%	$41,835,331	193	3.5%	$2,787,826	5,546	99.8%	$52,365,488
Town of Aurora	559	439	78.5%	$1,189,314	86	15.4%	$197,751	33	5.9%	$338,887	558	99.8%	$1,725,951
Town of Bath	553	470	85%	$1,460,480	50	9%	$104,795	33	6%	$285,201	553	100%	$1,850,476
Town of Belhaven	1,062	856	80.6%	$1,502,143	109	10.3%	$393,956	32	3%	$271,483	997	93.9%	$2,167,582
Town of Chocowinity	392	321	81.9%	$827,210	43	11%	$388,420	27	6.9%	$240,882	391	99.7%	$1,456,513
Town of Pantego	126	99	78.6%	$205,733	16	12.7%	$27,653	11	8.7%	$104,100	126	100%	$337,487
Town of Washington Park	229	171	74.7%	$365,044	13	5.7%	$151,071	0	0%	$0	184	80.3%	$516,115
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$45,325,391**	**3,055**	**11%**	**$49,825,887**	**670**	**2.4%**	**$9,249,694**	**27,329**	**98.3%**	**$104,400,974**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$57,238,069	971	6.3%	$5,930,363	234	1.5%	$8,361,880	14,794	96.6%	$71,530,312
Town of Atlantic Beach	3,412	3,221	94.4%	$38,995,047	152	4.5%	$2,343,123	9	0.3%	$86,815	3,382	99.1%	$41,424,985
Town of Beaufort	3,277	2,880	87.9%	$19,565,211	277	8.5%	$4,239,667	79	2.4%	$2,480,784	3,236	98.7%	$26,285,662
Town of Bogue	363	324	89.3%	$1,678,685	30	8.3%	$231,963	9	2.5%	$123,372	363	100%	$2,034,020
Town of Cape Carteret	989	874	88.4%	$4,419,320	89	9%	$734,128	26	2.6%	$267,859	989	100%	$5,421,307
Town of Cedar Point	1,367	1,258	92%	$5,360,677	99	7.2%	$1,225,521	10	0.7%	$292,556	1,367	100%	$6,878,754
Town of Emerald Isle	5,712	5,140	90%	$76,115,336	147	2.6%	$1,393,891	20	0.4%	$837,999	5,307	92.9%	$78,347,226
Town of Indian Beach	899	790	87.9%	$7,950,192	23	2.6%	$432,787	7	0.8%	$162,621	820	91.2%	$8,545,600
Town of Morehead City	7,827	6,711	85.7%	$43,226,196	821	10.5%	$8,268,491	217	2.8%	$10,446,048	7,749	99%	$61,940,734
Town of Newport	4,085	3,648	89.3%	$11,373,284	334	8.2%	$1,775,835	98	2.4%	$1,096,959	4,080	99.9%	$14,246,078
Town of Peletier	529	472	89.2%	$1,631,985	49	9.3%	$1,083,979	8	1.5%	$287,980	529	100%	$3,003,945
Town of Pine Knoll Shores	1,757	1,395	79.4%	$29,464,704	70	4%	$1,648,858	34	1.9%	$1,230,526	1,499	85.3%	$32,344,088
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$297,018,706**	**3,062**	**6.7%**	**$29,308,606**	**751**	**1.6%**	**$25,675,399**	**44,115**	**96.9%**	**$352,002,711**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$58,660,932	1,869	8.1%	$21,350,571	288	1.2%	$7,666,113	22,954	99.2%	$87,677,617
City of Havelock	5,366	4,840	90.2%	$12,164,340	371	6.9%	$11,634,149	148	2.8%	$54,479,294	5,359	99.9%	$78,277,784
City of New Bern	12,738	11,129	87.4%	$21,331,779	1,252	9.8%	$26,292,937	298	2.3%	$12,310,562	12,679	99.5%	$59,935,278
Town of Bridgeton	317	232	73.2%	$353,340	68	21.5%	$145,833	12	3.8%	$18,988	312	98.4%	$518,161
Town of Cove City	274	234	85.4%	$373,424	28	10.2%	$61,521	11	4%	$263,303	273	99.6%	$698,249
Town of Dover	281	257	91.5%	$428,977	7	2.5%	$28,696	17	6%	$298,527	281	100%	$756,199
Town of River Bend	1,545	1,513	97.9%	$2,471,522	24	1.6%	$541,711	7	0.5%	$32,448	1,544	99.9%	$3,045,681
Town of Trent Woods	1,910	1,866	97.7%	$3,968,864	22	1.2%	$154,784	21	1.1%	$200,909	1,909	99.9%	$4,324,557
Town of Vanceboro	467	368	78.8%	$643,420	68	14.6%	$527,402	31	6.6%	$747,065	467	100%	$1,917,888
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$100,396,598**	**3,709**	**8.1%**	**$60,737,604**	**833**	**1.8%**	**$76,017,209**	**45,778**	**99.5%**	**$237,151,414**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$18,012,314	478	7.5%	$1,492,214	73	1.1%	$534,408	6,229	97.6%	$20,038,935
Town of Alliance	575	481	83.7%	$1,492,445	80	13.9%	$436,347	14	2.4%	$82,246	575	100%	$2,011,038
Town of Arapahoe	428	386	90.2%	$604,506	26	6.1%	$118,070	16	3.7%	$257,837	428	100%	$980,414
Town of Bayboro	514	404	78.6%	$1,364,425	73	14.2%	$381,041	36	7%	$1,220,233	513	99.8%	$2,965,699
Town of Grantsboro	581	527	90.7%	$779,427	36	6.2%	$293,607	17	2.9%	$272,939	580	99.8%	$1,345,973
Town of Mesic	185	170	91.9%	$466,260	10	5.4%	$27,795	5	2.7%	$12,949	185	100%	$507,004
Town of Minnesott Beach	401	384	95.8%	$2,674,223	15	3.7%	$326,657	2	0.5%	$27,548	401	100%	$3,028,428
Town of Oriental	1,377	1,207	87.7%	$8,555,561	98	7.1%	$451,605	13	0.9%	$122,412	1,318	95.7%	$9,129,578
Town of Stonewall	226	199	88.1%	$1,061,255	21	9.3%	$175,073	6	2.7%	$117,836	226	100%	$1,354,164
Town of Vandemere	190	133	70%	$424,253	1	0.5%	$713	6	3.2%	$28,683	140	73.7%	$453,649
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$35,434,669**	**838**	**7.7%**	**$3,703,122**	**188**	**1.7%**	**$2,677,091**	**10,595**	**97.5%**	**$41,814,882**
Region Total	**130,220**	**114,711**	**88.1%**	**$478,175,364**	**10,664**	**8.2%**	**$143,575,219**	**2,442**	**1.9%**	**$113,619,393**	**127,817**	**98.2%**	**$735,369,981**

Source: NCEM Risk Management Tool

Table 4.60 – Buildings at Risk from 100-Year Hurricane Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$87,367,047	1,999	10.3%	$16,864,536	341	1.8%	$12,923,282	18,974	98.2%	$117,154,865
City of Washington	5,559	4,614	83%	$21,701,059	739	13.3%	$65,695,170	193	3.5%	$6,525,003	5,546	99.8%	$93,921,232
Town of Aurora	559	439	78.5%	$3,268,979	86	15.4%	$605,401	33	5.9%	$877,127	558	99.8%	$4,751,506
Town of Bath	553	470	85%	$4,372,763	50	9%	$326,618	33	6%	$836,860	553	100%	$5,536,240
Town of Belhaven	1,062	856	80.6%	$4,293,333	109	10.3%	$1,437,240	32	3%	$796,588	997	93.9%	$6,527,161
Town of Chocowinity	392	321	81.9%	$2,316,982	43	11%	$1,133,556	27	6.9%	$697,661	391	99.7%	$4,148,199
Town of Pantego	126	99	78.6%	$574,349	16	12.7%	$90,769	11	8.7%	$270,501	126	100%	$935,618
Town of Washington Park	229	171	74.7%	$1,105,258	13	5.7%	$253,041	0	0%	$0	184	80.3%	$1,358,299
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$124,999,770**	**3,055**	**11%**	**$86,406,331**	**670**	**2.4%**	**$22,927,022**	**27,329**	**98.3%**	**$234,333,120**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$139,088,721	971	6.3%	$14,911,144	234	1.5%	$17,708,217	14,794	96.6%	$171,708,082
Town of Atlantic Beach	3,412	3,221	94.4%	$92,408,095	152	4.5%	$5,499,819	9	0.3%	$225,437	3,382	99.1%	$98,133,351
Town of Beaufort	3,277	2,880	87.9%	$49,411,265	277	8.5%	$10,376,339	79	2.4%	$5,662,739	3,236	98.7%	$65,450,342
Town of Bogue	363	324	89.3%	$3,940,001	30	8.3%	$664,402	9	2.5%	$318,731	363	100%	$4,923,134
Town of Cape Carteret	989	874	88.4%	$11,052,803	89	9%	$2,091,511	26	2.6%	$787,273	989	100%	$13,931,586
Town of Cedar Point	1,367	1,258	92%	$13,092,126	99	7.2%	$2,695,282	10	0.7%	$760,436	1,367	100%	$16,547,844
Town of Emerald Isle	5,712	5,140	90%	$186,949,988	147	2.6%	$3,791,390	20	0.4%	$1,844,220	5,307	92.9%	$192,585,599
Town of Indian Beach	899	790	87.9%	$17,367,738	23	2.6%	$1,023,443	7	0.8%	$407,833	820	91.2%	$18,799,014
Town of Morehead City	7,827	6,711	85.7%	$102,546,059	821	10.5%	$22,822,828	217	2.8%	$26,780,819	7,749	99%	$152,149,707
Town of Newport	4,085	3,648	89.3%	$28,108,770	334	8.2%	$3,937,403	98	2.4%	$2,463,353	4,080	99.9%	$34,509,526
Town of Peletier	529	472	89.2%	$3,906,819	49	9.3%	$1,767,852	8	1.5%	$575,054	529	100%	$6,249,725
Town of Pine Knoll Shores	1,757	1,395	79.4%	$65,233,611	70	4%	$3,669,481	34	1.9%	$2,784,127	1,499	85.3%	$71,687,219
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$713,105,996**	**3,062**	**6.7%**	**$73,250,894**	**751**	**1.6%**	**$60,318,239**	**44,115**	**96.9%**	**$846,675,129**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$152,661,145	1,869	8.1%	$41,694,086	288	1.2%	$19,483,580	22,954	99.2%	$213,838,812
City of Havelock	5,366	4,840	90.2%	$27,182,310	371	6.9%	$25,252,553	148	2.8%	$99,741,790	5,359	99.9%	$152,176,653
City of New Bern	12,738	11,129	87.4%	$77,229,749	1,252	9.8%	$63,703,330	298	2.3%	$27,217,871	12,679	99.5%	$168,150,949
Town of Bridgeton	317	232	73.2%	$2,228,560	68	21.5%	$754,770	12	3.8%	$181,085	312	98.4%	$3,164,414
Town of Cove City	274	234	85.4%	$954,153	28	10.2%	$194,728	11	4%	$553,396	273	99.6%	$1,702,276
Town of Dover	281	257	91.5%	$1,242,177	7	2.5%	$99,045	17	6%	$996,128	281	100%	$2,337,350
Town of River Bend	1,545	1,513	97.9%	$10,335,793	24	1.6%	$1,622,137	7	0.5%	$127,196	1,544	99.9%	$12,085,126
Town of Trent Woods	1,910	1,866	97.7%	$22,139,554	22	1.2%	$1,022,241	21	1.1%	$1,947,166	1,909	99.9%	$25,108,962
Town of Vanceboro	467	368	78.8%	$1,655,597	68	14.6%	$1,121,762	31	6.6%	$1,741,733	467	100%	$4,519,091
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$295,629,038**	**3,709**	**8.1%**	**$135,464,652**	**833**	**1.8%**	**$151,989,945**	**45,778**	**99.5%**	**$583,083,633**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$44,809,864	478	7.5%	$4,150,988	73	1.1%	$1,783,825	6,229	97.6%	$50,744,677
Town of Alliance	575	481	83.7%	$3,600,803	80	13.9%	$1,298,387	14	2.4%	$238,776	575	100%	$5,137,967
Town of Arapahoe	428	386	90.2%	$1,433,558	26	6.1%	$348,409	16	3.7%	$844,923	428	100%	$2,626,890
Town of Bayboro	514	404	78.6%	$3,355,615	73	14.2%	$1,055,578	36	7%	$3,646,350	513	99.8%	$8,057,542
Town of Grantsboro	581	527	90.7%	$1,982,139	36	6.2%	$766,383	17	2.9%	$742,992	580	99.8%	$3,491,514
Town of Mesic	185	170	91.9%	$1,217,573	10	5.4%	$80,138	5	2.7%	$37,858	185	100%	$1,335,569
Town of Minnesott Beach	401	384	95.8%	$6,517,430	15	3.7%	$760,812	2	0.5%	$65,785	401	100%	$7,344,027
Town of Oriental	1,377	1,207	87.7%	$21,084,596	98	7.1%	$1,228,359	13	0.9%	$343,341	1,318	95.7%	$22,656,296
Town of Stonewall	226	199	88.1%	$2,568,338	21	9.3%	$425,651	6	2.7%	$304,807	226	100%	$3,298,796
Town of Vandemere	190	133	70%	$1,063,095	1	0.5%	$1,667	6	3.2%	$82,270	140	73.7%	$1,147,032
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$87,633,011**	**838**	**7.7%**	**$10,116,372**	**188**	**1.7%**	**$8,090,927**	**10,595**	**97.5%**	**$105,840,310**
Region Total	**130,220**	**114,711**	**88.1%**	**$1,221,367,815**	**10,664**	**8.2%**	**$305,238,249**	**2,442**	**1.9%**	**$243,326,133**	**127,817**	**98.2%**	**$1,769,932,192**

Source: NCEM Risk Management Tool

Table 4.61 – Buildings at Risk from 300-Year Hurricane Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$263,064,050	1,999	10.3%	$52,210,306	341	1.8%	$32,711,880	18,974	98.2%	$347,986,235
City of Washington	5,559	4,614	83%	$58,017,531	739	13.3%	$105,436,686	193	3.5%	$14,482,424	5,546	99.8%	$177,936,641
Town of Aurora	559	439	78.5%	$15,732,297	86	15.4%	$3,438,552	33	5.9%	$4,044,355	558	99.8%	$23,215,204
Town of Bath	553	470	85%	$11,126,616	50	9%	$831,490	33	6%	$2,210,082	553	100%	$14,168,188
Town of Belhaven	1,062	856	80.6%	$10,732,189	109	10.3%	$3,942,371	32	3%	$2,095,134	997	93.9%	$16,769,694
Town of Chocowinity	392	321	81.9%	$5,519,632	43	11%	$2,989,057	27	6.9%	$1,710,429	391	99.7%	$10,219,118
Town of Pantego	126	99	78.6%	$1,391,060	16	12.7%	$263,983	11	8.7%	$654,577	126	100%	$2,309,620
Town of Washington Park	229	171	74.7%	$3,101,970	13	5.7%	$407,466	0	0%	$0	184	80.3%	$3,509,435
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$368,685,345**	**3,055**	**11%**	**$169,519,911**	**670**	**2.4%**	**$57,908,881**	**27,329**	**98.3%**	**$596,114,135**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$500,837,790	971	6.3%	$54,414,441	234	1.5%	$54,848,306	14,794	96.6%	$610,100,537
Town of Atlantic Beach	3,412	3,221	94.4%	$286,294,272	152	4.5%	$19,012,225	9	0.3%	$984,529	3,382	99.1%	$306,291,025
Town of Beaufort	3,277	2,880	87.9%	$168,624,173	277	8.5%	$42,026,489	79	2.4%	$21,532,224	3,236	98.7%	$232,182,886
Town of Bogue	363	324	89.3%	$13,872,914	30	8.3%	$2,376,113	9	2.5%	$1,161,227	363	100%	$17,410,254
Town of Cape Carteret	989	874	88.4%	$40,378,858	89	9%	$8,883,648	26	2.6%	$3,507,148	989	100%	$52,769,654
Town of Cedar Point	1,367	1,258	92%	$46,362,169	99	7.2%	$9,843,047	10	0.7%	$2,791,538	1,367	100%	$58,996,754
Town of Emerald Isle	5,712	5,140	90%	$586,164,654	147	2.6%	$13,446,333	20	0.4%	$5,574,179	5,307	92.9%	$605,185,166
Town of Indian Beach	899	790	87.9%	$50,014,257	23	2.6%	$2,867,558	7	0.8%	$1,150,053	820	91.2%	$54,031,868
Town of Morehead City	7,827	6,711	85.7%	$365,473,374	821	10.5%	$96,981,941	217	2.8%	$101,893,441	7,749	99%	$564,348,757
Town of Newport	4,085	3,648	89.3%	$106,384,183	334	8.2%	$15,516,382	98	2.4%	$10,706,354	4,080	99.9%	$132,606,919
Town of Peletier	529	472	89.2%	$13,938,107	49	9.3%	$4,814,467	8	1.5%	$1,801,528	529	100%	$20,554,102
Town of Pine Knoll Shores	1,757	1,395	79.4%	$194,486,950	70	4%	$9,986,630	34	1.9%	$7,719,284	1,499	85.3%	$212,192,864
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$2,372,831,701**	**3,062**	**6.7%**	**$280,169,274**	**751**	**1.6%**	**$213,669,811**	**44,115**	**96.9%**	**$2,866,670,786**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$437,733,617	1,869	8.1%	$98,946,782	288	1.2%	$60,623,927	22,954	99.2%	$597,304,326
City of Havelock	5,366	4,840	90.2%	$84,373,879	371	6.9%	$65,529,377	148	2.8%	$179,919,123	5,359	99.9%	$329,822,379
City of New Bern	12,738	11,129	87.4%	$232,399,777	1,252	9.8%	$208,765,654	298	2.3%	$64,748,919	12,679	99.5%	$505,914,351
Town of Bridgeton	317	232	73.2%	$5,318,017	68	21.5%	$3,179,845	12	3.8%	$498,490	312	98.4%	$8,996,352
Town of Cove City	274	234	85.4%	$4,974,486	28	10.2%	$1,128,560	11	4%	$2,140,752	273	99.6%	$8,243,798
Town of Dover	281	257	91.5%	$3,200,925	7	2.5%	$248,584	17	6%	$2,374,319	281	100%	$5,823,828
Town of River Bend	1,545	1,513	97.9%	$24,270,600	24	1.6%	$3,808,328	7	0.5%	$383,188	1,544	99.9%	$28,462,116
Town of Trent Woods	1,910	1,866	97.7%	$52,451,092	22	1.2%	$2,235,814	21	1.1%	$4,848,303	1,909	99.9%	$59,535,209
Town of Vanceboro	467	368	78.8%	$4,130,455	68	14.6%	$2,284,385	31	6.6%	$3,218,751	467	100%	$9,633,591
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$848,852,848**	**3,709**	**8.1%**	**$386,127,329**	**833**	**1.8%**	**$318,755,772**	**45,778**	**99.5%**	**$1,553,735,950**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$100,474,557	478	7.5%	$9,344,453	73	1.1%	$4,113,059	6,229	97.6%	$113,932,069
Town of Alliance	575	481	83.7%	$7,607,014	80	13.9%	$3,046,063	14	2.4%	$579,689	575	100%	$11,232,766
Town of Arapahoe	428	386	90.2%	$3,227,354	26	6.1%	$826,504	16	3.7%	$2,031,385	428	100%	$6,085,243
Town of Bayboro	514	404	78.6%	$7,233,154	73	14.2%	$2,359,411	36	7%	$8,714,298	513	99.8%	$18,306,864
Town of Grantsboro	581	527	90.7%	$4,450,892	36	6.2%	$1,885,485	17	2.9%	$1,769,388	580	99.8%	$8,105,764
Town of Mesic	185	170	91.9%	$2,741,217	10	5.4%	$168,074	5	2.7%	$94,647	185	100%	$3,003,938
Town of Minnesott Beach	401	384	95.8%	$13,563,999	15	3.7%	$1,585,752	2	0.5%	$118,170	401	100%	$15,267,920
Town of Oriental	1,377	1,207	87.7%	$43,139,841	98	7.1%	$2,771,368	13	0.9%	$775,791	1,318	95.7%	$46,687,000
Town of Stonewall	226	199	88.1%	$5,061,594	21	9.3%	$815,438	6	2.7%	$702,337	226	100%	$6,579,369
Town of Vandemere	190	133	70%	$2,338,039	1	0.5%	$3,427	6	3.2%	$196,543	140	73.7%	$2,538,009
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$189,837,661**	**838**	**7.7%**	**$22,805,975**	**188**	**1.7%**	**$19,095,307**	**10,595**	**97.5%**	**$231,738,942**
Region Total	**130,220**	**114,711**	**88.1%**	**$3,780,207,555**	**10,664**	**8.2%**	**$858,622,489**	**2,442**	**1.9%**	**$609,429,771**	**127,817**	**98.2%**	**$5,248,259,813**

Source: NCEM Risk Management Tool

Table 4.62 – Buildings at Risk from 700-Year Hurricane Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$513,338,879	1,999	10.3%	$87,158,522	341	1.8%	$64,809,847	18,974	98.2%	$665,307,248
City of Washington	5,559	4,614	83%	$132,505,330	739	13.3%	$179,735,817	193	3.5%	$31,282,904	5,546	99.8%	$343,524,051
Town of Aurora	559	439	78.5%	$25,727,827	86	15.4%	$5,949,831	33	5.9%	$6,845,734	558	99.8%	$38,523,391
Town of Bath	553	470	85%	$23,545,699	50	9%	$1,830,179	33	6%	$5,126,839	553	100%	$30,502,717
Town of Belhaven	1,062	856	80.6%	$22,429,873	109	10.3%	$8,426,112	32	3%	$4,649,227	997	93.9%	$35,505,211
Town of Chocowinity	392	321	81.9%	$11,213,346	43	11%	$6,815,547	27	6.9%	$3,657,800	391	99.7%	$21,686,692
Town of Pantego	126	99	78.6%	$2,815,817	16	12.7%	$651,904	11	8.7%	$1,388,569	126	100%	$4,856,290
Town of Washington Park	229	171	74.7%	$7,162,324	13	5.7%	$693,507	0	0%	$0	184	80.3%	$7,855,832
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$738,739,095**	**3,055**	**11%**	**$291,261,419**	**670**	**2.4%**	**$117,760,920**	**27,329**	**98.3%**	**$1,147,761,432**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$720,508,172	971	6.3%	$80,255,168	234	1.5%	$77,438,683	14,794	96.6%	$878,202,023
Town of Atlantic Beach	3,412	3,221	94.4%	$376,671,346	152	4.5%	$27,319,638	9	0.3%	$1,589,229	3,382	99.1%	$405,580,213
Town of Beaufort	3,277	2,880	87.9%	$232,755,835	277	8.5%	$66,693,265	79	2.4%	$33,528,345	3,236	98.7%	$332,977,445
Town of Bogue	363	324	89.3%	$19,868,307	30	8.3%	$3,200,014	9	2.5%	$1,726,476	363	100%	$24,794,797
Town of Cape Carteret	989	874	88.4%	$58,231,741	89	9%	$13,623,638	26	2.6%	$5,418,650	989	100%	$77,274,029
Town of Cedar Point	1,367	1,258	92%	$66,512,481	99	7.2%	$14,834,944	10	0.7%	$3,989,580	1,367	100%	$85,337,005
Town of Emerald Isle	5,712	5,140	90%	$764,080,450	147	2.6%	$18,682,055	20	0.4%	$7,705,495	5,307	92.9%	$790,468,000
Town of Indian Beach	899	790	87.9%	$67,135,322	23	2.6%	$3,795,557	7	0.8%	$1,434,650	820	91.2%	$72,365,528
Town of Morehead City	7,827	6,711	85.7%	$525,799,352	821	10.5%	$149,961,838	217	2.8%	$147,313,026	7,749	99%	$823,074,216
Town of Newport	4,085	3,648	89.3%	$158,509,039	334	8.2%	$24,833,890	98	2.4%	$17,787,594	4,080	99.9%	$201,130,522
Town of Peletier	529	472	89.2%	$20,445,133	49	9.3%	$7,188,836	8	1.5%	$2,673,215	529	100%	$30,307,185
Town of Pine Knoll Shores	1,757	1,395	79.4%	$258,300,610	70	4%	$13,033,752	34	1.9%	$10,123,707	1,499	85.3%	$281,458,069
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$3,268,817,788**	**3,062**	**6.7%**	**$423,422,595**	**751**	**1.6%**	**$310,728,650**	**44,115**	**96.9%**	**$4,002,969,032**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$737,079,513	1,869	8.1%	$165,305,617	288	1.2%	$100,740,992	22,954	99.2%	$1,003,126,121
City of Havelock	5,366	4,840	90.2%	$149,269,540	371	6.9%	$103,718,633	148	2.8%	$260,236,766	5,359	99.9%	$513,224,939
City of New Bern	12,738	11,129	87.4%	$418,224,435	1,252	9.8%	$354,862,109	298	2.3%	$109,915,965	12,679	99.5%	$883,002,509
Town of Bridgeton	317	232	73.2%	$8,668,570	68	21.5%	$5,705,938	12	3.8%	$888,323	312	98.4%	$15,262,831
Town of Cove City	274	234	85.4%	$4,974,486	28	10.2%	$1,128,560	11	4%	$2,140,752	273	99.6%	$8,243,798
Town of Dover	281	257	91.5%	$6,827,576	7	2.5%	$476,009	17	6%	$4,354,849	281	100%	$11,658,433
Town of River Bend	1,545	1,513	97.9%	$46,868,227	24	1.6%	$6,659,318	7	0.5%	$694,050	1,544	99.9%	$54,221,595
Town of Trent Woods	1,910	1,866	97.7%	$99,215,748	22	1.2%	$4,009,381	21	1.1%	$8,687,397	1,909	99.9%	$111,912,526
Town of Vanceboro	467	368	78.8%	$8,874,661	68	14.6%	$4,535,020	31	6.6%	$5,558,554	467	100%	$18,968,235
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$1,480,002,756**	**3,709**	**8.1%**	**$646,400,585**	**833**	**1.8%**	**$493,217,648**	**45,778**	**99.5%**	**$2,619,620,987**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$172,501,849	478	7.5%	$16,139,663	73	1.1%	$6,638,442	6,229	97.6%	$195,279,954
Town of Alliance	575	481	83.7%	$12,831,913	80	13.9%	$5,227,719	14	2.4%	$1,052,023	575	100%	$19,111,654
Town of Arapahoe	428	386	90.2%	$5,987,102	26	6.1%	$1,403,265	16	3.7%	$3,408,106	428	100%	$10,798,474
Town of Bayboro	514	404	78.6%	$12,241,065	73	14.2%	$3,992,885	36	7%	$15,091,075	513	99.8%	$31,325,025
Town of Grantsboro	581	527	90.7%	$8,233,521	36	6.2%	$3,658,073	17	2.9%	$3,180,747	580	99.8%	$15,072,342
Town of Mesic	185	170	91.9%	$4,775,687	10	5.4%	$254,272	5	2.7%	$179,154	185	100%	$5,209,112
Town of Minnesott Beach	401	384	95.8%	$22,349,571	15	3.7%	$2,696,209	2	0.5%	$167,727	401	100%	$25,213,507
Town of Oriental	1,377	1,207	87.7%	$69,197,017	98	7.1%	$4,758,142	13	0.9%	$1,306,943	1,318	95.7%	$75,262,102
Town of Stonewall	226	199	88.1%	$7,746,597	21	9.3%	$1,232,522	6	2.7%	$1,281,900	226	100%	$10,261,019
Town of Vandemere	190	133	70%	$4,018,972	1	0.5%	$5,969	6	3.2%	$354,072	140	73.7%	$4,379,013
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$319,883,294**	**838**	**7.7%**	**$39,368,719**	**188**	**1.7%**	**$32,660,189**	**10,595**	**97.5%**	**$391,912,202**
Region Total	**130,220**	**114,711**	**88.1%**	**$5,807,442,933**	**10,664**	**8.2%**	**$1,400,453,318**	**2,442**	**1.9%**	**$954,367,407**	**127,817**	**98.2%**	**$8,162,263,653**

Source: NCEM Risk Management Tool

Environment

Hurricane winds can cause massive damage to the natural environment, uprooting trees and other debris within the storm's path. Animals can either be killed directly by the storm or impacted indirectly through changes in habitat and food availability caused by high winds and intense rainfall. Endangered species can be dramatically impacted. Forests can be completely defoliated by strong winds.

Consequence Analysis

Table 4.63 summarizes the potential negative consequences of hurricanes and tropical storms.

Table 4.63 – Consequence Analysis – Hurricane and Tropical Storm

Category	Consequences
Public	Impacts include injury or death, loss of property, outbreak of diseases, mental trauma and loss of livelihoods. Power outages and flooding are likely to displace people from their homes. Water can become polluted such that if consumed, diseases and infection can be easily spread. Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed, resulting in cascading impacts on the public.
Responders	Localized impact expected to limit damage to personnel in the inundation area at the time of the incident.
Continuity of Operations (including Continued Delivery of Services)	Damage to facilities/personnel from flooding or wind may require temporary relocation of some operations. Operations may be interrupted by power outages. Disruption of roads and/or utilities may postpone delivery of some services. Regulatory waivers may be needed locally. Fulfillment of some contracts may be difficult. Impact may reduce deliveries.
Property, Facilities and Infrastructure	Structural damage to buildings may occur; loss of glass windows and doors by high winds and debris; loss of roof coverings, partial wall collapses, and other damages requiring significant repairs are possible in a major (category 3 to 5) hurricane.
Environment	Hurricanes can devastate wooded ecosystems and remove all the foliation from forest canopies, and they can change habitats so drastically that the indigenous animal populations suffer as a result. Specific foods can be taken away as high winds will often strip fruits, seeds and berries from bushes and trees. Secondary impacts may occur; for example, high winds and debris may result in damage to an above-ground fuel tank, resulting in a significant chemical spill.
Economic Condition of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damages. Intangible impacts also likely, including business interruption and additional living expenses.
Public Confidence in the Jurisdiction's Governance	Likely to impact public confidence due to possibility of major event requiring substantial response and long-term recovery effort.

Hazard Summary by Jurisdiction

The following table summarizes hurricane and tropical storm hazard risk by jurisdiction. Most aspects of hurricane risk do not vary substantially by jurisdiction. While hurricanes have the possibility of being catastrophic across all jurisdictions, certain areas may be even more vulnerable. Mobile home units are more vulnerable to wind damage; therefore, Beaufort and Pamlico Counties, which have higher rates of mobile homes, may experience more severe impacts.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	4	4	1	3	3.3	H
City of Washington	3	4	4	1	3	3.3	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Aurora	3	4	4	1	3	3.3	H
Town of Bath	3	4	4	1	3	3.3	H
Town of Belhaven	3	4	4	1	3	3.3	H
Town of Chocowinity	3	4	4	1	3	3.3	H
Town of Pantego	3	4	4	1	3	3.3	H
Town of Washington Park	3	4	4	1	3	3.3	H
Carteret County	3	4	4	1	3	3.3	H
Town of Atlantic Beach	3	4	4	1	3	3.3	H
Town of Beaufort	3	4	4	1	3	3.3	H
Town of Bogue	3	4	4	1	3	3.3	H
Town of Cape Carteret	3	4	4	1	3	3.3	H
Town of Cedar Point	3	4	4	1	3	3.3	H
Town of Emerald Isle	3	4	4	1	3	3.3	H
Town of Indian Beach	3	4	4	1	3	3.3	H
Town of Morehead City	3	4	4	1	3	3.3	H
Town of Newport	3	4	4	1	3	3.3	H
Town of Peletier	3	4	4	1	3	3.3	H
Town of Pine Knoll Shores	3	4	4	1	3	3.3	H
Craven County	3	4	4	1	3	3.3	H
City of Havelock	3	4	4	1	3	3.3	H
City of New Bern	3	4	4	1	3	3.3	H
Town of Bridgeton	3	4	4	1	3	3.3	H
Town of Cove City	3	4	4	1	3	3.3	H
Town of Dover	3	4	4	1	3	3.3	H
Town of River Bend	3	4	4	1	3	3.3	H
Town of Trent Woods	3	4	4	1	3	3.3	H
Town of Vanceboro	3	4	4	1	3	3.3	H
Pamlico County	3	4	4	1	3	3.3	H
Town of Alliance	3	4	4	1	3	3.3	H
Town of Arapahoe	3	4	4	1	3	3.3	H
Town of Bayboro	3	4	4	1	3	3.3	H
Town of Grantsboro	3	4	4	1	3	3.3	H
Town of Mesic	3	4	4	1	3	3.3	H
Town of Minnesott Beach	3	4	4	1	3	3.3	H
Town of Oriental	3	4	4	1	3	3.3	H
Town of Stonewall	3	4	4	1	3	3.3	H
Town of Vandemere	3	4	4	1	3	3.3	H

4.5.8 Severe Weather (Thunderstorm Winds, Lightning & Hail)

Hazard Background

Thunderstorm Winds

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at earth's surface and causes strong winds associated with thunderstorms.

There are four ways in which thunderstorms can organize: single cell, multi-cell cluster, multi-cell lines (squall lines), and supercells. Even though supercell thunderstorms are most frequently associated with severe weather phenomena, thunderstorms most frequently organize into clusters or lines. Warm, humid conditions are favorable for the development of thunderstorms. The average single cell thunderstorm is approximately 15 miles in diameter and lasts less than 30 minutes at a single location. However, thunderstorms, especially when organized into clusters or lines, can travel intact for distances exceeding 600 miles.

Thunderstorms are responsible for the development and formation of many severe weather phenomena, posing great hazards to the population and landscape. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms are capable of producing tornadoes and waterspouts. While conditions for thunderstorm conditions may be anticipated within a few hours, severe conditions are difficult to predict. Regardless of severity, storms generally pass within a few hours.

Warning Time: 4 – Less than six hours

Duration: 1 – Less than six hours

Lightning

Lightning is a sudden electrical discharge released from the atmosphere that follows a course from cloud to ground, cloud to cloud, or cloud to surrounding air, with light illuminating its path. Lightning's unpredictable nature causes it to be one of the most feared weather elements.

All thunderstorms produce lightning, which often strikes outside of the area where it is raining and is known to fall more than 10 miles away from the rainfall area. When lightning strikes, electricity shoots through the air and causes vibrations creating the sound of thunder. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start building fires and wildland fires, and damage electrical systems and equipment.

The watch/warning time for a given storm is usually a few hours. There is no warning time for any given lightning strike. Lightning strikes are instantaneous. Storms that cause lightning usually pass within a few hours.

Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

Hail

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere causing them to freeze. The raindrops form into small frozen droplets and then continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen rain droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow.

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 mph, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 mph. The largest hailstone recorded in the United States was found in Vivian, South Dakota on July 23, 2010; it measured eight inches in diameter, almost the size of a soccer ball. While soccer-ball-sized hail is the exception, but even small pea sized hail can do damage.

Hailstorms in North Carolina cause damage to property, crops, and the environment, and kill and injure livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are the other things most commonly damaged by hail. Hail has been known to cause injury to humans; occasionally, these injuries can be fatal.

The onset of thunderstorms with hail is generally rapid. However, advancements in meteorological forecasting allow for some warning. Storms usually pass in a few hours.

Warning Time: 4 – Less than 6 hours

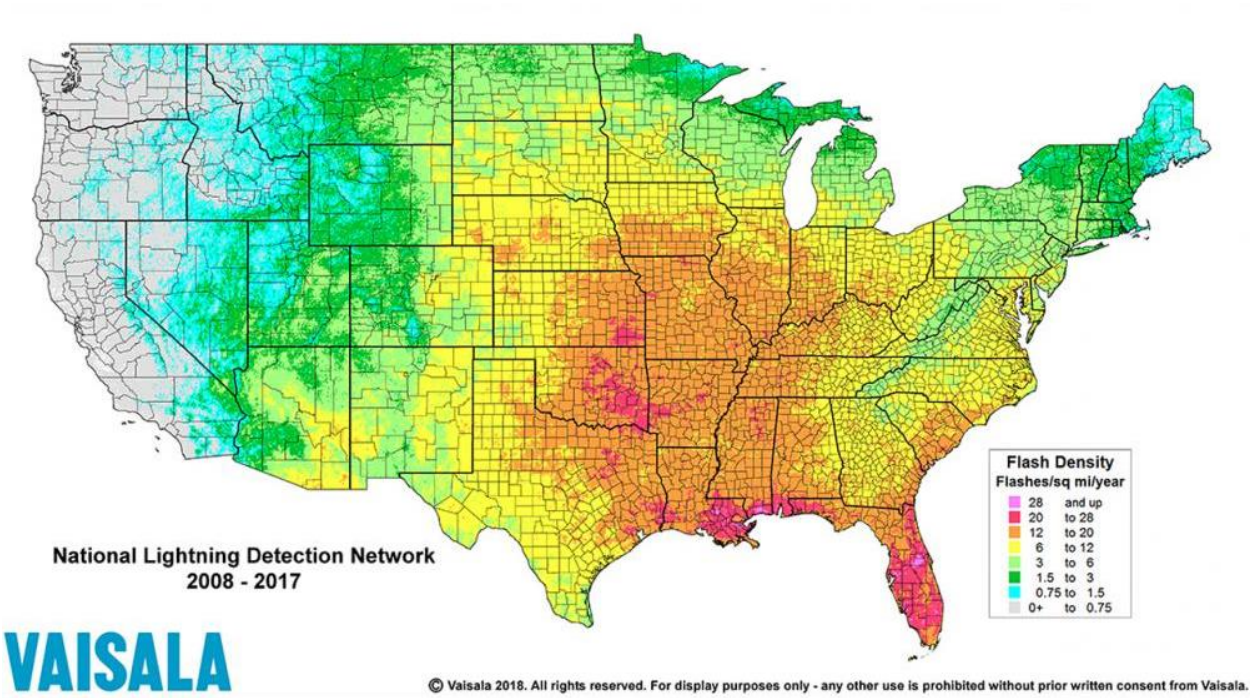
Duration: 1 – Less than 6 hours

Location

Thunderstorm wind, lightning, and hail events do not have a defined vulnerability zone. The scope of lightning and hail is generally defined to the footprint of its associated thunderstorm. The entirety of the Pamlico Sound Region shares equal risk to the threat of severe weather.

According to the Vaisala flash density map, shown in Figure 4.37, the majority of the Pamlico Sound Region is located in an area that experiences between 6 and 20 lightning flashes per square mile per year. It should be noted that future lightning occurrences may exceed these figures.

Figure 4.37 – Lightning Flash Density (2008-2017)



Source: Vaisala

Extent

Thunderstorm Winds

The magnitude of a thunderstorm event can be defined by the storm's maximum wind speed and its impacts. NCEI divides wind events into several types including High Wind, Strong Wind, Thunderstorm Wind, Tornado and Hurricane. For this severe weather risk assessment, High Wind, Strong Wind and Thunderstorm Wind data was collected. Hurricane Wind and Tornadoes are addressed as individual hazards. The following definitions come from the NCEI Storm Data Preparation document.

- **High Wind** – Sustained non-convective winds of 40mph or greater lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration on a widespread or localized basis.
- **Strong Wind** – Non-convective winds gusting less than 58 mph, or sustained winds less than 40 mph, resulting in a fatality, injury, or damage.
- **Thunderstorm Wind** – Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 58 mph, or winds of any speed (non-severe thunderstorm winds below 58 mph) producing a fatality, injury or damage.

The strongest recorded thunderstorm wind event in the county occurred on June 9, 2007 with a measured gust of 92 mph at Harkers Island and estimated gusts of 70 mph elsewhere across the region. Overall, the event caused $110,000 in property damage, including downed power poles and a structure fire due to lightning.

Impact: 2 – Limited

Spatial Extent: 4 – Large

Lightning

Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide.

Table 4.64 – Lightning Activity Level Scale

Lightning Activity Level Scale	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground lightning strikes in a five minute period
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five minute period
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five minute period
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five minute period
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Source: National Weather Service

With the right conditions in place, the entire county is susceptible to each lightning activity level as defined by the LAL. Most lightning strikes cause limited damage to specific structures in a limited area, and cause very few injuries or fatalities, and minimal disruption on quality of life.

Impact: 1 – Minor

While the total area vulnerable to a lightning strike corresponds to the footprint of a given thunderstorm, a specific lightning strike is usually a localized event and occurs randomly. It should be noted that while lightning is most often affiliated with severe thunderstorms, it may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall. The entire Pamlico Sound Region is considered uniformly exposed to the threat of lightning.

Spatial Extent: 1 – Negligible

Hail

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4.65 indicates the hailstone measurements utilized by the National Weather Service.

Table 4.65 – Hailstone Measurement Comparison Chart

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf ball
2.0 inch	Hen egg
2.5 inch	Tennis ball
2.75 inch	Baseball

Average Diameter	Corresponding Household Object
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

The Tornado and Storm Research Organization (TORRO) has further described hail sizes by their typical damage impacts. Table 4.66 describes typical intensity and damage impacts of the various sizes of hail.

Table 4.66 – Tornado and Storm Research Organization Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > softball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University

It should be noted that in addition to hail diameter, factors including number and density of hailstones, hail fall speed, and surface wind speeds affect severity.

The average hailstone size recorded between 1999 and 2018 in the Pamlico Sound Region was a little over 1" in diameter. The largest hailstones recorded during this period were 2.75", recorded on four separate dates. The worst instance occurred on July 28, 2014 in Havelock, where many cars suffered damages from cracked or broken windshields and windows and mobile homes sustained broken windows and severe damage to siding.

Impact: 1 – Minor

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. The Pamlico Sound Region is uniformly exposed to severe thunderstorms; therefore, the entire planning area is equally exposed to hail which may be produced by such storms. However, large-scale hail tends to occur in a more localized area within the storm.

Spatial Extent: 2 – Small

Historical Occurrences

Thunderstorm Winds

Between January 1, 1999 and December 31, 2018, the NCEI recorded 381 separate incidents of high winds, strong winds, and thunderstorm winds, occurring on 191 separate days. These events caused $698,000 in recorded property damage, 41 injuries and 2 fatalities. The recorded gusts averaged 61 mph, with the highest gust recorded at 85 mph. Of these events, 44 caused property damage. Wind gusts with property damage recorded averaged $15,800 in damage, with two gusts causing a reported $100,000 in damage each (in Beaufort County on March 8, 2005 and in Carteret County on June 9, 2007). All incidents causing property damage are recorded below:

Table 4.67 – Recorded Wind Events with Property Damages in the Pamlico Sound Region, 1999-2018

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Grantsboro	5/22/2000	2128	77	0	0	$20,000
Cherry Pt Lndg	5/28/2000	1423	-	0	0	$15,000
Beaufort	5/28/2000	1521	-	0	0	$10,000
Blounts Creek Statio	7/16/2000	1553	75	0	0	$10,000
Florence	8/16/2000	2315	-	0	0	$30,000
Havelock	8/18/2000	1855	-	0	0	$50,000
Cove City	5/28/2001	1030	70	0	0	$1,000
New Bern	5/28/2001	1030	75	0	0	$10,000
Washington Park	5/13/2002	2035	60	0	0	$3,000
Belhaven	7/10/2002	1421	71	0	0	$4,000
Atlantic Beach	12/10/2003	2245	58	0	0	$1,000
New Bern	12/10/2003	2255	72	0	0	$7,000
Beaufort (Zone)	3/7/2004	2215	58	0	0	$5,000
Craven (Zone)	3/7/2004	2215	58	0	0	$4,000
Atlantic Beach	4/13/2004	1325	60	0	0	$10,000
Countywide	3/8/2005	1125	62	0	0	$75,000
Countywide	3/8/2005	1130	85	0	0	$100,000
Countywide	3/8/2005	1138	58	0	0	$10,000
Countywide	3/8/2005	1142	63	0	0	$10,000
Newport	5/20/2005	2015	58	0	0	$5,000
Dover	7/28/2006	1716	63	0	0	$5,000
Washington	7/28/2006	2120	60	0	0	$10,000
Harkers Is	6/9/2007	1530	64	0	0	$100,000
Otway	6/9/2007	1530	69	0	0	$5,000
Trent Woods	1/7/2009	1842	63	0	0	$10,000
Aurora	6/26/2009	1524	69	0	0	$5,000
Beaufort (Zone)	2/10/2010	800	52	0	0	$500
Craven (Zone)	2/10/2010	830	52	0	0	$500
Pamlico (Zone)	2/10/2010	1120	52	0	0	$500
Acre Station	6/29/2010	1441	63	0	0	$500
New Bern	6/29/2010	1731	63	0	0	$5,000
Beaufort	6/20/2011	200	76	0	0	$15,000
Beaufort Moorehd Arp	6/20/2011	203	75	0	0	$50,000

Location	Date	Time	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Pinetown	7/23/2012	720	58	0	0	$1,000
Atlantic Beach	12/26/2012	1450	81	0	0	$3,000
Granthams	1/31/2013	237	63	0	0	$25,000
Alliance	1/31/2013	247	58	0	0	$3,000
Carteret (Zone)	3/6/2013	1500	49	0	0	$500
Bayview	6/27/2013	1722	58	0	0	$500
Beaufort Moorehd Arp	2/16/2016	840	69	0	0	$5,000
Lennoxville	2/16/2016	855	63	0	0	$10,000
Bettie	2/16/2016	857	81	0	0	$10,000
Bettie	2/16/2016	858	85	0	0	$50,000
Granthams	7/5/2016	2014	58	0	0	$3,000
Total				**0**	**0**	**$698,000**

Source: NCEI

Of all 381 wind events during this period, there were 3 incidents that directly caused deaths or injuries. These incidents are recorded below:

Table 4.68 – Recorded Wind Events with Injuries and/or Fatalities, 1999-2018

Location	Event Type	Date	Wind Speed (mph)	Fatalities	Injuries	Property Damage
Mc Connell	Thunderstorm Wind	7/1/2012	69	2	0	$0
Washington Arpt	Thunderstorm Wind	7/1/2012	69	0	40	$0
Blounts Creek Statio	Thunderstorm Wind	6/5/2014	58	0	1	$0
			Total	**2**	**41**	**$0**

Source: NCEI

Lightning

According to NCEI data, there were 7 lightning strikes reported between 1999 and 2018. Of these, five events caused recorded property damage totaling over $6.1 million, with one event responsible for the majority of that damage. Two additional events directly caused two fatalities and one injury. No crop damage was recorded by these strikes. It should be noted that lightning events recorded by the NCEI are only those that are reported; it is certain that additional lightning incidents have occurred in the Region. Table 4.69 details NCEI-recorded lightning strikes from 1999 through 2018.

Table 4.69 – Recorded Lightning Strikes in the Pamlico Sound Region, 1999-2018

Location	Date	Time	Fatalities	Injuries	Property Damage
Washington	7/25/2001	1610	0	0	$2,000
Pantego	10/11/2002	1830	0	0	$100,000
North Harlowe	6/19/2003	1915	1	1	$0
Cherry Pt Mcas	6/8/2006	1400	1	0	$0
Newport	6/9/2007	1515	0	0	$5,000
Oriental	7/21/2010	2124	0	0	$6,000,000
Granthams	7/20/2012	1645	0	0	$500
		Total	**2**	**1**	**$6,107,500**

Source: NCEI

The following are a selection of narrative descriptions recorded in NCEI for lightning events that occurred in the Pamlico Sound Region:

July 25, 2001 – Lightning struck a tree which then fell onto a residence late in the afternoon. The residence suffered minor structural damage from the weight of the tree.

October 11, 2002 – Lightning struck a historic church near Pantego causing it to burn completely to the ground.

June 19, 2003 – Craven County Emergency Management reported a lightning fatality which occurred on Adams Creek in the Harlowe area of southeastern Craven County.

June 8, 2006 – Mother and unborn child killed by lightning strike just outside of Marine Squadron 1 Transport Building.

July 21, 2010 – House struck by lightning and burned in the River Dunes community in Oriental.

Most recorded property damage attributed to lightning was due to structure fires ignited by lightning. The highest rate of property damage recorded for a single incident was $6,000,000.

Hail

NCEI records 318 separate hail incidents across 117 days between January 1, 1999 and December 31, 2018 in the Pamlico Sound Region. Of these, eight events were reported to have directly caused property damage; there were no reported deaths, injuries or crop damage. The largest diameter hail recorded in the Region was 2.75 inches; hail this size fell on four separate occasions, in Beaufort, Craven, and Pamlico Counties. The average hail size in all storms was a little over one inch in diameter. Table 4.70 summarizes hail occurrences by county from 1999 through 2018.

Table 4.70 – Summary of Hail Occurrences by County, 1999-2018

County	Number of Occurrences	Average Hail Diameter	Total Property Damage
Beaufort County	99	1.08”	$150,000
Carteret County	58	0.92”	$0
Craven County	127	1.06”	$745,000
Pamlico County	34	1.07”	$25,000
Total	**318**	**1.04”**	**$920,000**

The following narratives provide detail on select hailstorms from the above list of NCEI recorded events:

May 21, 2000 – Widespread golf ball size hail damaged numerous automobiles in and around New Bern.

June 12, 2006 – Hail up to baseball size broke windows in cars and homes.

March 28, 2007 – A cold front moved slowly south across eastern North Carolina during the late morning and afternoon hours on March 28th. Ahead of the front temperatures warmed into the 80s leading to an unstable atmosphere. Scattered thunderstorms developed over mainly the northern counties during the afternoon and few produce large hail up to 2 inches in diameter. The large hail fell mainly over the cities of Washington and Greenville and resulted in dents on cars and a few reports of cracked windshields.

July 28, 2014 – Numerous showers and thunderstorms developed over during the afternoon and evening of July 28th along the North Carolina coast. Several of the storms became severe producing strong winds and very large hail. Baseball size hail in Havelock damaged many vehicle and structures.

Most hail damage reported was associated with dents and broken windows on cars; some reports indicated damage to siding and roofs on structures.

Probability of Future Occurrence

Based on historical occurrences recorded by NCEI for the 20-year period from 1999 through 2018, the Pamlico Sound Region averages 9.6 days with thunderstorm wind events per year. Over this same period, 7 lightning events were reported as having caused death, injury, or property damage, which equates to a 35 percent annual chance of a damaging lightning strike. Additionally, the region has averaged 5.85 days with reported hail incidents per year.

Based on these historical occurrences, there is a 100% chance that the Region will experience severe weather each year. The probability of a damaging impacts is also highly likely.

Probability: 4 – Highly Likely

Climate Change

Research on the effects of climate change on severe weather is limited. However, according to the Fourth National Climate Assessment, some preliminary studies suggest that the frequency and intensity of severe thunderstorms may increase as the climate changes. Warm, moist air near the surface is a key ingredient of "convective available potential energy" or CAPE. Increases in air temperature and moisture content due to climate change may increase CAPE, making the atmosphere more conducive to the development of severe storms in the future. Conversely, warming in the arctic may result in less wind shear in the mid-latitudes, making storms less likely. Modeling consistently shows that climate change could increase the frequency and intensity of severe storms, but more research is needed to fully understand the implications of climate change on severe storms.

Vulnerability Assessment

People

People and populations exposed to the elements are most vulnerable to severe weather. A common hazard associated with wind events is falling trees and branches. Risk of being struck by lightning is greater in open areas, at higher elevations, and on the water. Lightning can also cause cascading hazards, including power loss. Loss of power could critically impact those relying on energy to service, including those that need powered medical devices. Additionally, the ignition of fires is always a concern with lightning strikes.

The availability of sheltered locations such as basements, buildings constructed using hail-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. Individuals who work outdoors may face increased risk during severe weather events. Residents living in mobile homes are also more vulnerable to hail events due to the lack of shelter locations and the vulnerability of the housing unit to damages. Table 4.71 summarizes estimates of mobile home units in the Pamlico Sound Region by county as of 2017. Based on these figures, vulnerability is high in Beaufort and Pamlico Counties.

Table 4.71 – Mobile Home Units in the Pamlico Sound Region, 2017

County	Occupied Mobile Home Units	Total Occupied Housing Units	Percent of Occupied Housing
Beaufort County	4,733	18,978	24.9%
Carteret County	4,949	30,000	16.5%
Craven County	5,429	40,571	13.4%
Pamlico County	1,353	5,395	25.1%

Source: American Community Survey 2013-2017 5-Year Estimates

Since 1999, the NCEI records two fatalities and one injury attributed to lightning in the Pamlico Sound Region. NCEI records 2 fatalities and 41 injuries attributed to wind events in the Region. There are no injuries or fatalities attributed to hail.

Property

Property damage caused by lightning usually occurs in one of two ways – either by direct damages through fires ignited by lightning, or by secondary impacts due to power loss. According to data collected on lightning strikes in the Region, most recorded property damage was due to structure fires.

NCEI records $6,107,500 in property damages caused by lightning over the 20-year period from 1999-2018, which equates to an annualized loss of $305,375.

General damages to property from hail are direct, including destroyed windows, dented cars, and building, roof and siding damage in areas exposed to hail. Hail can also cause enough damage to cars to cause them to be totaled. The level of damage is commensurate with both a material's ability to withstand hail impacts, and the size of the hailstones that are falling. Construction practices and building codes can help maximize the resistance of the structures to damage. Large amounts of hail may need to be physically cleared from roadways and sidewalks, depending on accumulation. Hail can cause other cascading impacts, including power loss.

During the 20-year span of 1999 through 2018, NCEI reported $920,000 in damages caused by hail in the Pamlico Sound Region, which equates to an annualized loss of $46,000.

According to a National Insurance Crime Bureau (NICB) study of insurance claims from the Insurance Services Office (ISO) ClaimSearch database, between 2014 and 2016, North Carolina saw 45,274 separate hail damage claims.

It should be noted that property damage due to hail is usually insured loss, with damages covered under most major comprehensive insurance plans. Because of this, hail losses are notoriously underreported by the NCEI. It is difficult to find another accurate repository of hail damages, thus the NCEI is still used to form a baseline.

When strong enough, wind events can cause significant direct damage to buildings and infrastructure. NCEM's IRISK database estimates damages from increasing magnitudes of wind events, detailed in Table 4.72 through Table 4.76. Note that these tables sum the total estimated damage should every exposed property in each jurisdiction be impacted by an event of the given magnitude. Therefore, these tables are not an approximation of the total damages that would occur from an event of each magnitude because a thunderstorm wind event would not uniformly impact the entire Region. These tables should only be used to understand potential damages relative to storms of varying degrees of severity.

Table 4.72 – Estimated Buildings Impacted by 25-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$8,240,417	1,999	10.3%	$1,493,860	341	1.8%	$1,211,717	18,974	98.2%	$10,945,994
City of Washington	5,559	4,614	83%	$1,898,883	739	13.3%	$17,259,543	193	3.5%	$601,976	5,546	99.8%	$19,760,402
Town of Aurora	559	439	78.5%	$256,880	86	15.4%	$29,850	33	5.9%	$54,497	558	99.8%	$341,227
Town of Bath	553	470	85%	$347,965	50	9%	$15,371	33	6%	$47,787	553	100%	$411,123
Town of Belhaven	1,062	856	80.6%	$355,039	109	10.3%	$47,728	32	3%	$55,422	997	93.9%	$458,190
Town of Chocowinity	392	321	81.9%	$183,391	43	11%	$70,227	27	6.9%	$33,705	391	99.7%	$287,323
Town of Pantego	126	99	78.6%	$51,589	16	12.7%	$4,840	11	8.7%	$22,532	126	100%	$78,960
Town of Washington Park	229	171	74.7%	$95,536	13	5.7%	$46,429	0	0%	$0	184	80.3%	$141,965
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$11,429,700**	**3,055**	**11%**	**$18,967,848**	**670**	**2.4%**	**$2,027,636**	**27,329**	**98.3%**	**$32,425,184**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$5,061,017	971	6.3%	$357,202	234	1.5%	$791,337	14,794	96.6%	$6,209,556
Town of Atlantic Beach	3,412	3,221	94.4%	$1,781,052	152	4.5%	$88,814	9	0.3%	$2,108	3,382	99.1%	$1,871,974
Town of Beaufort	3,277	2,880	87.9%	$1,508,062	277	8.5%	$334,449	79	2.4%	$161,274	3,236	98.7%	$2,003,784
Town of Bogue	363	324	89.3%	$99,064	30	8.3%	$3,973	9	2.5%	$4,093	363	100%	$107,131
Town of Cape Carteret	989	874	88.4%	$256,384	89	9%	$18,349	26	2.6%	$5,691	989	100%	$280,424
Town of Cedar Point	1,367	1,258	92%	$314,635	99	7.2%	$50,687	10	0.7%	$8,115	1,367	100%	$373,437
Town of Emerald Isle	5,712	5,140	90%	$3,288,762	147	2.6%	$25,995	20	0.4%	$48,745	5,307	92.9%	$3,363,502
Town of Indian Beach	899	790	87.9%	$499,830	23	2.6%	$10,021	7	0.8%	$2,562	820	91.2%	$512,413
Town of Morehead City	7,827	6,711	85.7%	$2,781,944	821	10.5%	$214,162	217	2.8%	$313,314	7,749	99%	$3,309,420
Town of Newport	4,085	3,648	89.3%	$906,706	334	8.2%	$105,854	98	2.4%	$46,610	4,080	99.9%	$1,059,170
Town of Peletier	529	472	89.2%	$113,949	49	9.3%	$108,205	8	1.5%	$9,957	529	100%	$232,111
Town of Pine Knoll Shores	1,757	1,395	79.4%	$1,632,707	70	4%	$41,258	34	1.9%	$26,412	1,499	85.3%	$1,700,377
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$18,244,112**	**3,062**	**6.7%**	**$1,358,969**	**751**	**1.6%**	**$1,420,218**	**44,115**	**96.9%**	**$21,023,299**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$6,492,608	1,869	8.1%	$2,055,071	288	1.2%	$638,753	22,954	99.2%	$9,186,433
City of Havelock	5,366	4,840	90.2%	$1,010,349	371	6.9%	$575,223	148	2.8%	$3,983,207	5,359	99.9%	$5,568,779
City of New Bern	12,738	11,129	87.4%	$2,977,415	1,252	9.8%	$4,583,636	298	2.3%	$2,026,201	12,679	99.5%	$9,587,252
Town of Bridgeton	317	232	73.2%	$43,004	68	21.5%	$10,656	12	3.8%	$1,596	312	98.4%	$55,256
Town of Cove City	274	234	85.4%	$89,990	28	10.2%	$4,161	11	4%	$31,902	273	99.6%	$126,053
Town of Dover	281	257	91.5%	$63,721	7	2.5%	$2,396	17	6%	$11,883	281	100%	$78,000
Town of River Bend	1,545	1,513	97.9%	$496,129	24	1.6%	$90,948	7	0.5%	$2,777	1,544	99.9%	$589,854
Town of Trent Woods	1,910	1,866	97.7%	$729,371	22	1.2%	$17,520	21	1.1%	$20,074	1,909	99.9%	$766,965
Town of Vanceboro	467	368	78.8%	$131,686	68	14.6%	$95,815	31	6.6%	$65,904	467	100%	$293,405
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$12,034,273**	**3,709**	**8.1%**	**$7,435,426**	**833**	**1.8%**	**$6,782,297**	**45,778**	**99.5%**	**$26,251,997**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$1,943,837	478	7.5%	$70,173	73	1.1%	$21,090	6,229	97.6%	$2,035,101
Town of Alliance	575	481	83.7%	$178,394	80	13.9%	$14,292	14	2.4%	$2,574	575	100%	$195,259
Town of Arapahoe	428	386	90.2%	$72,517	26	6.1%	$6,201	16	3.7%	$12,662	428	100%	$91,380
Town of Bayboro	514	404	78.6%	$167,110	73	14.2%	$11,677	36	7%	$35,729	513	99.8%	$214,516
Town of Grantsboro	581	527	90.7%	$138,090	36	6.2%	$17,790	17	2.9%	$16,369	580	99.8%	$172,250
Town of Mesic	185	170	91.9%	$48,422	10	5.4%	$487	5	2.7%	$473	185	100%	$49,382
Town of Minnesott Beach	401	384	95.8%	$249,960	15	3.7%	$30,176	2	0.5%	$623	401	100%	$280,759
Town of Oriental	1,377	1,207	87.7%	$690,745	98	7.1%	$14,234	13	0.9%	$3,205	1,318	95.7%	$708,183
Town of Stonewall	226	199	88.1%	$86,906	21	9.3%	$3,734	6	2.7%	$4,252	226	100%	$94,891
Town of Vandemere	190	133	70%	$43,719	1	0.5%	$25	6	3.2%	$1,030	140	73.7%	$44,774
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$3,619,700**	**838**	**7.7%**	**$168,789**	**188**	**1.7%**	**$98,007**	**10,595**	**97.5%**	**$3,886,495**
Region Total	**130,220**	**114,711**	**88.1%**	**$45,327,785**	**10,664**	**8.2%**	**$27,931,032**	**2,442**	**1.9%**	**$10,328,158**	**127,817**	**98.2%**	**$83,586,975**

Source: NCEM Risk Management Tool

Table 4.73 – Estimated Buildings Impacted by 50-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$13,100,343	1,999	10.3%	$2,647,897	341	1.8%	$2,047,750	18,974	98.2%	$17,795,990
City of Washington	5,559	4,614	83%	$3,052,842	739	13.3%	$24,609,083	193	3.5%	$1,071,290	5,546	99.8%	$28,733,215
Town of Aurora	559	439	78.5%	$434,238	86	15.4%	$57,839	33	5.9%	$107,515	558	99.8%	$599,591
Town of Bath	553	470	85%	$544,840	50	9%	$29,930	33	6%	$90,375	553	100%	$665,144
Town of Belhaven	1,062	856	80.6%	$569,930	109	10.3%	$96,157	32	3%	$95,294	997	93.9%	$761,381
Town of Chocowinity	392	321	81.9%	$300,211	43	11%	$128,445	27	6.9%	$69,048	391	99.7%	$497,704
Town of Pantego	126	99	78.6%	$80,236	16	12.7%	$8,742	11	8.7%	$38,717	126	100%	$127,694
Town of Washington Park	229	171	74.7%	$146,954	13	5.7%	$75,424	0	0%	$0	184	80.3%	$222,378
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$18,229,594**	**3,055**	**11%**	**$27,653,517**	**670**	**2.4%**	**$3,519,989**	**27,329**	**98.3%**	**$49,403,097**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$8,058,144	971	6.3%	$641,213	234	1.5%	$1,384,258	14,794	96.6%	$10,083,615
Town of Atlantic Beach	3,412	3,221	94.4%	$3,817,593	152	4.5%	$198,397	9	0.3%	$5,178	3,382	99.1%	$4,021,167
Town of Beaufort	3,277	2,880	87.9%	$2,423,612	277	8.5%	$586,945	79	2.4%	$312,060	3,236	98.7%	$3,322,617
Town of Bogue	363	324	89.3%	$170,328	30	8.3%	$7,715	9	2.5%	$7,433	363	100%	$185,475
Town of Cape Carteret	989	874	88.4%	$419,126	89	9%	$33,506	26	2.6%	$11,262	989	100%	$463,894
Town of Cedar Point	1,367	1,258	92%	$508,190	99	7.2%	$101,413	10	0.7%	$16,411	1,367	100%	$626,015
Town of Emerald Isle	5,712	5,140	90%	$5,476,425	147	2.6%	$52,263	20	0.4%	$87,593	5,307	92.9%	$5,616,281
Town of Indian Beach	899	790	87.9%	$810,176	23	2.6%	$18,881	7	0.8%	$5,067	820	91.2%	$834,124
Town of Morehead City	7,827	6,711	85.7%	$5,698,748	821	10.5%	$567,902	217	2.8%	$902,809	7,749	99%	$7,169,459
Town of Newport	4,085	3,648	89.3%	$1,416,823	334	8.2%	$191,739	98	2.4%	$92,813	4,080	99.9%	$1,701,375
Town of Peletier	529	472	89.2%	$180,220	49	9.3%	$197,370	8	1.5%	$20,668	529	100%	$398,258
Town of Pine Knoll Shores	1,757	1,395	79.4%	$2,822,957	70	4%	$80,644	34	1.9%	$57,128	1,499	85.3%	$2,960,729
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$31,802,342**	**3,062**	**6.7%**	**$2,677,988**	**751**	**1.6%**	**$2,902,680**	**44,115**	**96.9%**	**$37,383,009**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$10,405,540	1,869	8.1%	$3,639,822	288	1.2%	$1,143,099	22,954	99.2%	$15,188,461
City of Havelock	5,366	4,840	90.2%	$1,673,785	371	6.9%	$1,102,829	148	2.8%	$7,328,958	5,359	99.9%	$10,105,571
City of New Bern	12,738	11,129	87.4%	$4,952,367	1,252	9.8%	$7,901,958	298	2.3%	$3,657,880	12,679	99.5%	$16,512,205
Town of Bridgeton	317	232	73.2%	$74,204	68	21.5%	$21,209	12	3.8%	$2,849	312	98.4%	$98,262
Town of Cove City	274	234	85.4%	$130,403	28	10.2%	$8,646	11	4%	$62,033	273	99.6%	$201,082
Town of Dover	281	257	91.5%	$103,248	7	2.5%	$4,194	17	6%	$28,483	281	100%	$135,924
Town of River Bend	1,545	1,513	97.9%	$838,631	24	1.6%	$155,474	7	0.5%	$5,709	1,544	99.9%	$999,814
Town of Trent Woods	1,910	1,866	97.7%	$1,208,809	22	1.2%	$31,675	21	1.1%	$36,351	1,909	99.9%	$1,276,835
Town of Vanceboro	467	368	78.8%	$200,554	68	14.6%	$153,574	31	6.6%	$131,325	467	100%	$485,453
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$19,587,541**	**3,709**	**8.1%**	**$13,019,381**	**833**	**1.8%**	**$12,396,687**	**45,778**	**99.5%**	**$45,003,607**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$3,037,071	478	7.5%	$137,605	73	1.1%	$39,689	6,229	97.6%	$3,214,365
Town of Alliance	575	481	83.7%	$267,914	80	13.9%	$27,941	14	2.4%	$5,240	575	100%	$301,095
Town of Arapahoe	428	386	90.2%	$113,947	26	6.1%	$11,457	16	3.7%	$20,426	428	100%	$145,830
Town of Bayboro	514	404	78.6%	$250,040	73	14.2%	$23,883	36	7%	$72,801	513	99.8%	$346,724
Town of Grantsboro	581	527	90.7%	$201,589	36	6.2%	$33,495	17	2.9%	$28,582	580	99.8%	$263,667
Town of Mesic	185	170	91.9%	$76,464	10	5.4%	$1,142	5	2.7%	$931	185	100%	$78,537
Town of Minnesott Beach	401	384	95.8%	$390,144	15	3.7%	$50,056	2	0.5%	$1,457	401	100%	$441,658
Town of Oriental	1,377	1,207	87.7%	$1,098,496	98	7.1%	$30,778	13	0.9%	$7,134	1,318	95.7%	$1,136,408
Town of Stonewall	226	199	88.1%	$135,252	21	9.3%	$9,446	6	2.7%	$9,601	226	100%	$154,298
Town of Vandemere	190	133	70%	$67,016	1	0.5%	$60	6	3.2%	$2,107	140	73.7%	$69,183
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$5,637,933**	**838**	**7.7%**	**$325,863**	**188**	**1.7%**	**$187,968**	**10,595**	**97.5%**	**$6,151,765**
Region Total	**130,220**	**114,711**	**88.1%**	**$75,257,410**	**10,664**	**8.2%**	**$43,676,749**	**2,442**	**1.9%**	**$19,007,324**	**127,817**	**98.2%**	**$137,941,478**

Source: NCEM Risk Management Tool

Table 4.74 – Estimated Buildings Impacted by 100-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$21,340,802	1,999	10.3%	$4,549,976	341	1.8%	$3,402,476	18,974	98.2%	$29,293,254
City of Washington	5,559	4,614	83%	$4,847,754	739	13.3%	$32,976,108	193	3.5%	$1,781,134	5,546	99.8%	$39,604,995
Town of Aurora	559	439	78.5%	$724,659	86	15.4%	$111,069	33	5.9%	$198,749	558	99.8%	$1,034,477
Town of Bath	553	470	85%	$877,517	50	9%	$58,159	33	6%	$167,280	553	100%	$1,102,956
Town of Belhaven	1,062	856	80.6%	$1,502,143	109	10.3%	$393,956	32	3%	$271,483	997	93.9%	$2,167,582
Town of Chocowinity	392	321	81.9%	$499,492	43	11%	$228,856	27	6.9%	$134,696	391	99.7%	$863,045
Town of Pantego	126	99	78.6%	$205,733	16	12.7%	$27,653	11	8.7%	$104,100	126	100%	$337,487
Town of Washington Park	229	171	74.7%	$227,777	13	5.7%	$111,647	0	0%	$0	184	80.3%	$339,424
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$30,225,877**	**3,055**	**11%**	**$38,457,424**	**670**	**2.4%**	**$6,059,918**	**27,329**	**98.3%**	**$74,743,220**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$12,583,096	971	6.3%	$1,141,977	234	1.5%	$2,235,871	14,794	96.6%	$15,960,945
Town of Atlantic Beach	3,412	3,221	94.4%	$8,378,808	152	4.5%	$512,574	9	0.3%	$16,619	3,382	99.1%	$8,908,001
Town of Beaufort	3,277	2,880	87.9%	$3,961,970	277	8.5%	$994,073	79	2.4%	$566,366	3,236	98.7%	$5,522,410
Town of Bogue	363	324	89.3%	$277,299	30	8.3%	$15,304	9	2.5%	$13,259	363	100%	$305,863
Town of Cape Carteret	989	874	88.4%	$657,526	89	9%	$61,896	26	2.6%	$22,127	989	100%	$741,549
Town of Cedar Point	1,367	1,258	92%	$795,201	99	7.2%	$187,717	10	0.7%	$31,680	1,367	100%	$1,014,598
Town of Emerald Isle	5,712	5,140	90%	$8,951,028	147	2.6%	$104,453	20	0.4%	$146,103	5,307	92.9%	$9,201,585
Town of Indian Beach	899	790	87.9%	$1,272,767	23	2.6%	$35,647	7	0.8%	$10,296	820	91.2%	$1,318,710
Town of Morehead City	7,827	6,711	85.7%	$10,018,967	821	10.5%	$1,302,394	217	2.8%	$1,983,388	7,749	99%	$13,304,749
Town of Newport	4,085	3,648	89.3%	$2,112,715	334	8.2%	$326,955	98	2.4%	$172,479	4,080	99.9%	$2,612,149
Town of Peletier	529	472	89.2%	$273,853	49	9.3%	$322,882	8	1.5%	$40,810	529	100%	$637,544
Town of Pine Knoll Shores	1,757	1,395	79.4%	$4,694,656	70	4%	$213,643	34	1.9%	$117,469	1,499	85.3%	$5,025,769
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$53,977,886**	**3,062**	**6.7%**	**$5,219,515**	**751**	**1.6%**	**$5,356,467**	**44,115**	**96.9%**	**$64,553,872**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$15,693,263	1,869	8.1%	$5,976,849	288	1.2%	$1,920,827	22,954	99.2%	$23,590,939
City of Havelock	5,366	4,840	90.2%	$2,605,575	371	6.9%	$1,966,489	148	2.8%	$17,385,715	5,359	99.9%	$21,957,779
City of New Bern	12,738	11,129	87.4%	$7,719,116	1,252	9.8%	$12,634,511	298	2.3%	$6,007,489	12,679	99.5%	$26,361,115
Town of Bridgeton	317	232	73.2%	$123,193	68	21.5%	$41,524	12	3.8%	$5,231	312	98.4%	$169,948
Town of Cove City	274	234	85.4%	$180,862	28	10.2%	$17,162	11	4%	$109,675	273	99.6%	$307,699
Town of Dover	281	257	91.5%	$162,866	7	2.5%	$7,565	17	6%	$65,638	281	100%	$236,068
Town of River Bend	1,545	1,513	97.9%	$1,285,141	24	1.6%	$251,157	7	0.5%	$11,072	1,544	99.9%	$1,547,370
Town of Trent Woods	1,910	1,866	97.7%	$1,840,447	22	1.2%	$55,046	21	1.1%	$65,034	1,909	99.9%	$1,960,527
Town of Vanceboro	467	368	78.8%	$292,727	68	14.6%	$237,712	31	6.6%	$253,789	467	100%	$784,228
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$29,903,190**	**3,709**	**8.1%**	**$21,188,015**	**833**	**1.8%**	**$25,824,470**	**45,778**	**99.5%**	**$76,915,673**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$4,669,731	478	7.5%	$267,921	73	1.1%	$79,374	6,229	97.6%	$5,017,026
Town of Alliance	575	481	83.7%	$396,021	80	13.9%	$57,501	14	2.4%	$11,222	575	100%	$464,744
Town of Arapahoe	428	386	90.2%	$172,908	26	6.1%	$20,531	16	3.7%	$34,437	428	100%	$227,875
Town of Bayboro	514	404	78.6%	$366,359	73	14.2%	$51,552	36	7%	$154,139	513	99.8%	$572,050
Town of Grantsboro	581	527	90.7%	$280,720	36	6.2%	$60,311	17	2.9%	$51,059	580	99.8%	$392,090
Town of Mesic	185	170	91.9%	$115,666	10	5.4%	$2,891	5	2.7%	$1,902	185	100%	$120,459
Town of Minnesott Beach	401	384	95.8%	$610,447	15	3.7%	$81,146	2	0.5%	$3,664	401	100%	$695,257
Town of Oriental	1,377	1,207	87.7%	$1,779,489	98	7.1%	$65,736	13	0.9%	$15,974	1,318	95.7%	$1,861,199
Town of Stonewall	226	199	88.1%	$217,731	21	9.3%	$23,780	6	2.7%	$19,981	226	100%	$261,492
Town of Vandemere	190	133	70%	$101,878	1	0.5%	$127	6	3.2%	$4,349	140	73.7%	$106,355
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$8,710,950**	**838**	**7.7%**	**$631,496**	**188**	**1.7%**	**$376,101**	**10,595**	**97.5%**	**$9,718,547**
Region Total	**130,220**	**114,711**	**88.1%**	**$122,817,903**	**10,664**	**8.2%**	**$65,496,450**	**2,442**	**1.9%**	**$37,616,956**	**127,817**	**98.2%**	**$225,931,312**

Source: NCEM Risk Management Tool

Table 4.75 – Estimated Buildings Impacted by 300-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$53,533,915	1,999	10.3%	$10,693,091	341	1.8%	$8,127,371	18,974	98.2%	$72,354,377
City of Washington	5,559	4,614	83%	$13,117,764	739	13.3%	$53,056,406	193	3.5%	$4,382,831	5,546	99.8%	$70,557,001
Town of Aurora	559	439	78.5%	$2,023,259	86	15.4%	$364,425	33	5.9%	$565,624	558	99.8%	$2,953,308
Town of Bath	553	470	85%	$2,571,512	50	9%	$196,167	33	6%	$514,524	553	100%	$3,282,203
Town of Belhaven	1,062	856	80.6%	$2,592,927	109	10.3%	$805,494	32	3%	$480,531	997	93.9%	$3,878,952
Town of Chocowinity	392	321	81.9%	$832,410	43	11%	$388,420	27	6.9%	$240,882	391	99.7%	$1,461,713
Town of Pantego	126	99	78.6%	$350,481	16	12.7%	$52,547	11	8.7%	$171,162	126	100%	$574,190
Town of Washington Park	229	171	74.7%	$643,122	13	5.7%	$200,143	0	0%	$0	184	80.3%	$843,266
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$75,665,390**	**3,055**	**11%**	**$65,756,693**	**670**	**2.4%**	**$14,482,925**	**27,329**	**98.3%**	**$155,905,010**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$29,954,887	971	6.3%	$3,176,278	234	1.5%	$4,984,332	14,794	96.6%	$38,115,497
Town of Atlantic Beach	3,412	3,221	94.4%	$13,870,591	152	4.5%	$858,437	9	0.3%	$29,410	3,382	99.1%	$14,758,438
Town of Beaufort	3,277	2,880	87.9%	$10,143,687	277	8.5%	$2,496,330	79	2.4%	$1,448,048	3,236	98.7%	$14,088,065
Town of Bogue	363	324	89.3%	$676,974	30	8.3%	$61,036	9	2.5%	$40,894	363	100%	$778,905
Town of Cape Carteret	989	874	88.4%	$1,621,784	89	9%	$213,167	26	2.6%	$77,803	989	100%	$1,912,753
Town of Cedar Point	1,367	1,258	92%	$1,982,431	99	7.2%	$511,521	10	0.7%	$97,956	1,367	100%	$2,591,907
Town of Emerald Isle	5,712	5,140	90%	$25,580,989	147	2.6%	$398,782	20	0.4%	$350,995	5,307	92.9%	$26,330,765
Town of Indian Beach	899	790	87.9%	$3,154,912	23	2.6%	$132,214	7	0.8%	$45,063	820	91.2%	$3,332,188
Town of Morehead City	7,827	6,711	85.7%	$17,085,220	821	10.5%	$2,547,302	217	2.8%	$3,510,346	7,749	99%	$23,142,867
Town of Newport	4,085	3,648	89.3%	$4,565,854	334	8.2%	$782,396	98	2.4%	$467,862	4,080	99.9%	$5,816,112
Town of Peletier	529	472	89.2%	$636,058	49	9.3%	$646,398	8	1.5%	$122,579	529	100%	$1,405,035
Town of Pine Knoll Shores	1,757	1,395	79.4%	$11,764,412	70	4%	$562,056	34	1.9%	$419,777	1,499	85.3%	$12,746,245
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$121,037,799**	**3,062**	**6.7%**	**$12,385,917**	**751**	**1.6%**	**$11,595,065**	**44,115**	**96.9%**	**$145,018,777**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$34,681,987	1,869	8.1%	$13,512,676	288	1.2%	$4,874,214	22,954	99.2%	$53,068,877
City of Havelock	5,366	4,840	90.2%	$5,617,802	371	6.9%	$5,087,947	148	2.8%	$28,000,025	5,359	99.9%	$38,705,775
City of New Bern	12,738	11,129	87.4%	$17,659,445	1,252	9.8%	$26,276,151	298	2.3%	$12,194,046	12,679	99.5%	$56,129,643
Town of Bridgeton	317	232	73.2%	$353,340	68	21.5%	$145,833	12	3.8%	$18,988	312	98.4%	$518,161
Town of Cove City	274	234	85.4%	$373,424	28	10.2%	$61,521	11	4%	$263,303	273	99.6%	$698,249
Town of Dover	281	257	91.5%	$428,977	7	2.5%	$28,696	17	6%	$298,527	281	100%	$756,199
Town of River Bend	1,545	1,513	97.9%	$2,471,522	24	1.6%	$541,711	7	0.5%	$32,448	1,544	99.9%	$3,045,681
Town of Trent Woods	1,910	1,866	97.7%	$3,808,558	22	1.2%	$154,784	21	1.1%	$200,909	1,909	99.9%	$4,164,252
Town of Vanceboro	467	368	78.8%	$643,420	68	14.6%	$527,402	31	6.6%	$747,065	467	100%	$1,917,888
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$66,038,475**	**3,709**	**8.1%**	**$46,336,721**	**833**	**1.8%**	**$46,629,525**	**45,778**	**99.5%**	**$159,004,725**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$10,557,512	478	7.5%	$704,802	73	1.1%	$246,404	6,229	97.6%	$11,508,718
Town of Alliance	575	481	83.7%	$946,018	80	13.9%	$238,662	14	2.4%	$46,024	575	100%	$1,230,704
Town of Arapahoe	428	386	90.2%	$257,259	26	6.1%	$35,408	16	3.7%	$62,799	428	100%	$355,466
Town of Bayboro	514	404	78.6%	$864,001	73	14.2%	$212,512	36	7%	$665,009	513	99.8%	$1,741,523
Town of Grantsboro	581	527	90.7%	$548,854	36	6.2%	$180,168	17	2.9%	$162,591	580	99.8%	$891,614
Town of Mesic	185	170	91.9%	$286,281	10	5.4%	$14,603	5	2.7%	$7,305	185	100%	$308,189
Town of Minnesott Beach	401	384	95.8%	$976,693	15	3.7%	$127,513	2	0.5%	$7,617	401	100%	$1,111,822
Town of Oriental	1,377	1,207	87.7%	$5,123,558	98	7.1%	$258,679	13	0.9%	$68,152	1,318	95.7%	$5,450,390
Town of Stonewall	226	199	88.1%	$638,198	21	9.3%	$101,354	6	2.7%	$69,731	226	100%	$809,282
Town of Vandemere	190	133	70%	$261,441	1	0.5%	$437	6	3.2%	$16,492	140	73.7%	$278,370
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$20,459,815**	**838**	**7.7%**	**$1,874,138**	**188**	**1.7%**	**$1,352,124**	**10,595**	**97.5%**	**$23,686,078**
Region Total	**130,220**	**114,711**	**88.1%**	**$283,201,479**	**10,664**	**8.2%**	**$126,353,469**	**2,442**	**1.9%**	**$74,059,639**	**127,817**	**98.2%**	**$483,614,590**

Source: NCEM Risk Management Tool

Table 4.76 – Estimated Buildings Impacted by 700-Year Thunderstorm Winds

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Unincorporated Beaufort County	19,321	16,634	86.1%	$97,778,798	1,999	10.3%	$18,740,275	341	1.8%	$13,863,990	18,974	98.2%	$130,383,063
City of Washington	5,559	4,614	83%	$21,701,059	739	13.3%	$65,695,170	193	3.5%	$6,525,003	5,546	99.8%	$93,921,232
Town of Aurora	559	439	78.5%	$3,268,979	86	15.4%	$605,401	33	5.9%	$877,127	558	99.8%	$4,751,506
Town of Bath	553	470	85%	$4,372,763	50	9%	$326,618	33	6%	$836,860	553	100%	$5,536,240
Town of Belhaven	1,062	856	80.6%	$7,176,683	109	10.3%	$2,635,246	32	3%	$1,393,273	997	93.9%	$11,205,202
Town of Chocowinity	392	321	81.9%	$2,316,982	43	11%	$1,133,556	27	6.9%	$697,661	391	99.7%	$4,148,199
Town of Pantego	126	99	78.6%	$940,924	16	12.7%	$169,610	11	8.7%	$436,564	126	100%	$1,547,098
Town of Washington Park	229	171	74.7%	$1,105,258	13	5.7%	$253,041	0	0%	$0	184	80.3%	$1,358,299
Subtotal Beaufort	**27,801**	**23,604**	**84.9%**	**$138,661,446**	**3,055**	**11%**	**$89,558,917**	**670**	**2.4%**	**$24,630,478**	**27,329**	**98.3%**	**$252,850,839**
Carteret													
Unincorporated Carteret County	15,309	13,589	88.8%	$51,702,605	971	6.3%	$6,192,336	234	1.5%	$7,723,653	14,794	96.6%	$65,618,594
Town of Atlantic Beach	3,412	3,221	94.4%	$38,995,047	152	4.5%	$2,343,123	9	0.3%	$86,815	3,382	99.1%	$41,424,985
Town of Beaufort	3,277	2,880	87.9%	$19,565,211	277	8.5%	$4,239,667	79	2.4%	$2,480,784	3,236	98.7%	$26,285,662
Town of Bogue	363	324	89.3%	$1,081,965	30	8.3%	$127,234	9	2.5%	$74,373	363	100%	$1,283,573
Town of Cape Carteret	989	874	88.4%	$2,714,261	89	9%	$419,863	26	2.6%	$151,758	989	100%	$3,285,882
Town of Cedar Point	1,367	1,258	92%	$3,314,273	99	7.2%	$820,880	10	0.7%	$177,603	1,367	100%	$4,312,756
Town of Emerald Isle	5,712	5,140	90%	$45,290,644	147	2.6%	$793,458	20	0.4%	$555,547	5,307	92.9%	$46,639,649
Town of Indian Beach	899	790	87.9%	$5,121,510	23	2.6%	$253,578	7	0.8%	$92,184	820	91.2%	$5,467,272
Town of Morehead City	7,827	6,711	85.7%	$41,110,014	821	10.5%	$7,978,055	217	2.8%	$10,422,080	7,749	99%	$59,510,149
Town of Newport	4,085	3,648	89.3%	$7,247,931	334	8.2%	$1,204,861	98	2.4%	$738,759	4,080	99.9%	$9,191,550
Town of Peletier	529	472	89.2%	$1,029,017	49	9.3%	$854,432	8	1.5%	$195,007	529	100%	$2,078,456
Town of Pine Knoll Shores	1,757	1,395	79.4%	$22,732,194	70	4%	$1,512,318	34	1.9%	$754,742	1,499	85.3%	$24,999,254
Subtotal Carteret	**45,526**	**40,302**	**88.5%**	**$239,904,672**	**3,062**	**6.7%**	**$26,739,805**	**751**	**1.6%**	**$23,453,305**	**44,115**	**96.9%**	**$290,097,782**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Unincorporated Craven County	23,133	20,797	89.9%	$58,178,578	1,869	8.1%	$19,951,997	288	1.2%	$8,093,772	22,954	99.2%	$86,224,347
City of Havelock	5,366	4,840	90.2%	$8,349,798	371	6.9%	$7,900,102	148	2.8%	$40,005,433	5,359	99.9%	$56,255,334
City of New Bern	12,738	11,129	87.4%	$28,064,868	1,252	9.8%	$37,380,084	298	2.3%	$16,397,358	12,679	99.5%	$81,842,310
Town of Bridgeton	317	232	73.2%	$631,040	68	21.5%	$280,182	12	3.8%	$38,937	312	98.4%	$950,159
Town of Cove City	274	234	85.4%	$603,877	28	10.2%	$115,979	11	4%	$393,793	273	99.6%	$1,113,649
Town of Dover	281	257	91.5%	$743,166	7	2.5%	$56,732	17	6%	$583,594	281	100%	$1,383,492
Town of River Bend	1,545	1,513	97.9%	$3,471,302	24	1.6%	$763,670	7	0.5%	$52,779	1,544	99.9%	$4,287,750
Town of Trent Woods	1,910	1,866	97.7%	$5,789,712	22	1.2%	$264,799	21	1.1%	$378,457	1,909	99.9%	$6,432,968
Town of Vanceboro	467	368	78.8%	$1,039,770	68	14.6%	$784,287	31	6.6%	$1,195,144	467	100%	$3,019,200
Subtotal Craven	**46,031**	**41,236**	**89.6%**	**$106,872,111**	**3,709**	**8.1%**	**$67,497,832**	**833**	**1.8%**	**$67,139,267**	**45,778**	**99.5%**	**$241,509,209**
Pamlico													
Unincorporated Pamlico County	6,385	5,678	88.9%	$18,738,752	478	7.5%	$1,603,485	73	1.1%	$617,883	6,229	97.6%	$20,960,120
Town of Alliance	575	481	83.7%	$1,492,445	80	13.9%	$436,347	14	2.4%	$82,246	575	100%	$2,011,038
Town of Arapahoe	428	386	90.2%	$604,506	26	6.1%	$118,070	16	3.7%	$257,837	428	100%	$980,414
Town of Bayboro	514	404	78.6%	$1,364,425	73	14.2%	$381,041	36	7%	$1,220,233	513	99.8%	$2,965,699
Town of Grantsboro	581	527	90.7%	$836,713	36	6.2%	$293,607	17	2.9%	$272,939	580	99.8%	$1,403,259
Town of Mesic	185	170	91.9%	$466,260	10	5.4%	$27,795	5	2.7%	$12,949	185	100%	$507,004
Town of Minnesott Beach	401	384	95.8%	$2,674,223	15	3.7%	$326,657	2	0.5%	$27,548	401	100%	$3,028,428
Town of Oriental	1,377	1,207	87.7%	$8,555,561	98	7.1%	$451,605	13	0.9%	$122,412	1,318	95.7%	$9,129,578
Town of Stonewall	226	199	88.1%	$1,061,255	21	9.3%	$175,073	6	2.7%	$117,836	226	100%	$1,354,164
Town of Vandemere	190	133	70%	$424,253	1	0.5%	$713	6	3.2%	$28,683	140	73.7%	$453,649
Subtotal Pamlico	**10,862**	**9,569**	**88.1%**	**$36,218,393**	**838**	**7.7%**	**$3,814,393**	**188**	**1.7%**	**$2,760,566**	**10,595**	**97.5%**	**$42,793,353**
Region Total	**130,220**	**114,711**	**88.1%**	**$521,656,622**	**10,664**	**8.2%**	**$187,610,947**	**2,442**	**1.9%**	**$117,983,616**	**127,817**	**98.2%**	**$827,251,183**

Source: NCEM Risk Management Tool

Severe weather can also cause significant agricultural losses. Between 2007-2017, the sum of claims paid for crop damage due to hail and wind damages in the Region was $2,736,121, or an average of $248,738 in losses annually. Beaufort County was responsible for most of these claims. Table 4.77 through Table 4.80 summarize the crop losses due to severe weather by county, as reported in the RMA system.

Table 4.77 – Crop Losses Resulting from Severe Weather, Beaufort County, 2007-2017

Year	Determined Acres	Indemnity Amount
Hail		
2007	12.00	$27,524.00
2008	88.05	$171,884.00
2009	690.90	$164,871.00
2010	135.20	$13,305.00
2012	383.97	$53,605.00
2014	19.33	$60,329.10
2016	200.68	$36,043.75
2017	812.70	$211,329.00
Wind/Excess Wind		
2007	65.97	$131,518.00
2008	115.73	$208,262.00
2009	719.24	$203,639.00
2010	95.87	$220,950.00
2012	292.23	$257,582.00
2013	6.26	$4,943.00
2014	237.32	$288,503.90
2016	27.10	$22,245.50
2017	1.35	$990.00
Total	**3,903.90**	**$2,077,542.25**

Source: USDA Risk Management Agency

Table 4.78 – Crop Losses Resulting from Severe Weather, Carteret County, 2007-2017

Year	Determined Acres	Indemnity Amount
Hail		
2008	218.96	$68,510.00
Wind/Excess Wind		
2009	52.65	$3,606.00
Total	**271.61**	**$72,116.00**

Source: USDA Risk Management Agency

Table 4.79 – Crop Losses Resulting from Severe Weather, Craven County, 2007-2017

Year	Determined Acres	Indemnity Amount
Hail		
2007	34.55	$9,012.00
2008	40.27	$80,144.00
2014	17.24	$24,451.50
2015	215.00	$6,237.00
2016	4.66	$9,620.50
Wind/Excess Wind		
2008	15.42	$16,751.00
2009	93.56	$159,782.00
2012	22.50	$828.00

Year	Determined Acres	Indemnity Amount
2014	29.89	$50,969.00
2015	18.25	$1,219.50
2016	49.94	$109,025.60
2017	19.35	$42,553.10
Total	**560.63**	**$510,593.20**

Source: USDA Risk Management Agency

Table 4.80 – Crop Losses Resulting from Severe Weather, Pamlico County, 2007-2017

Year	Determined Acres	Indemnity Amount
Hail		
2014	13.16	$24,952.25
Wind/Excess Wind		
2014	20.58	$50,447.50
2015	7.00	$470.00
Total	**40.74**	**$75,869.75**

Source: USDA Risk Management Agency

Environment

The main environmental impact from wind is damage to trees or crops. Wind events can also bring down power lines, which could cause a fire and result in even greater environmental impacts. Lightning may also result in the ignition of wildfires. This is part of a natural process, however, and the environment will return to its original state in time.

Hail can cause extensive damage to the natural environment, pelting animals, trees and vegetation with hailstones. Melting hail can also increase both river and flash flood risk.

Consequence Analysis

Table 4.81 summarizes the potential negative consequences of severe weather.

Table 4.81 – Consequence Analysis – Severe Weather (Thunderstorm Winds, Lightning, and Hail)

Category	Consequences
Public	Injuries and fatalities possible
Responders	Injuries and fatalities unlikely; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	Possibility of structure fire ignition; potential for disruptions in power and communications infrastructure; destruction and/or damage to any exposed property, especially windows, cars and siding; mobile homes see increased risk
Environment	Potential fire ignition from lightning; hail damage to wildlife and foliage
Economic Condition of the Jurisdiction	Lightning damage contingent on target; can severely impact/destroy critical infrastructure and other economic drivers
Public Confidence in the Jurisdiction's Governance	Public confidence is not generally affected by severe weather events.

Hazard Summary by Jurisdiction

The following table summarizes severe weather hazard risk by jurisdiction. Most aspects of severe weather risk do not vary substantially by jurisdiction; however, wind and hail impacts may be greater in more highly developed areas with higher exposure in terms of both property and population density. Additionally, mobile home units are more vulnerable to wind damage. Mobile home units comprise approximately 25% of the housing mix of Beaufort County and Pamlico County; therefore, these areas may face more severe impacts from wind. Where priority ratings vary between thunderstorm wind, lightning, and hail for impact and spatial extent, these scores represent an average rating with greater weight given to thunderstorm wind because it occurs much more frequently.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	4	3	3	4	1	3.2	H
City of Washington	4	3	3	4	1	3.2	H
Town of Aurora	4	3	3	4	1	3.2	H
Town of Bath	4	3	3	4	1	3.2	H
Town of Belhaven	4	3	3	4	1	3.2	H
Town of Chocowinity	4	3	3	4	1	3.2	H
Town of Pantego	4	3	3	4	1	3.2	H
Town of Washington Park	4	3	3	4	1	3.2	H
Carteret County	4	2	3	4	1	2.9	H
Town of Atlantic Beach	4	2	3	4	1	2.9	H
Town of Beaufort	4	2	3	4	1	2.9	H
Town of Bogue	4	2	3	4	1	2.9	H
Town of Cape Carteret	4	2	3	4	1	2.9	H
Town of Cedar Point	4	2	3	4	1	2.9	H
Town of Emerald Isle	4	2	3	4	1	2.9	H
Town of Indian Beach	4	2	3	4	1	2.9	H
Town of Morehead City	4	2	3	4	1	2.9	H
Town of Newport	4	2	3	4	1	2.9	H
Town of Peletier	4	2	3	4	1	2.9	H
Town of Pine Knoll Shores	4	2	3	4	1	2.9	H
Craven County	4	2	3	4	1	2.9	H
City of Havelock	4	2	3	4	1	2.9	H
City of New Bern	4	2	3	4	1	2.9	H
Town of Bridgeton	4	2	3	4	1	2.9	H
Town of Cove City	4	2	3	4	1	2.9	H
Town of Dover	4	2	3	4	1	2.9	H
Town of River Bend	4	2	3	4	1	2.9	H
Town of Trent Woods	4	2	3	4	1	2.9	H
Town of Vanceboro	4	2	3	4	1	2.9	H
Pamlico County	4	3	3	4	1	3.2	H
Town of Alliance	4	3	3	4	1	3.2	H
Town of Arapahoe	4	3	3	4	1	3.2	H
Town of Bayboro	4	3	3	4	1	3.2	H
Town of Grantsboro	4	3	3	4	1	3.2	H
Town of Mesic	4	3	3	4	1	3.2	H
Town of Minnesott Beach	4	3	3	4	1	3.2	H
Town of Oriental	4	3	3	4	1	3.2	H
Town of Stonewall	4	3	3	4	1	3.2	H
Town of Vandemere	4	3	3	4	1	3.2	H

4.5.9 Severe Winter Storm

Hazard Background

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 or more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces.

All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

Warning Time: 1 – More than 24 hours

Advancements in meteorology and forecasting usually allow for mostly accurate forecasting a few days in advance of an impending storm.

Duration: 3 – Less than 1 week

Most storms have a duration of a few hours; however, impacts can last a few days after the initial incident until cleanup is completed.

Location

Severe winter storms are usually a regional hazard, impacting the entire planning area at the same time. The risk of a severe winter storm occurring is generally uniform across the Region.

Extent

NOAA uses the Regional Snowfall Index (RSI) to assess the societal impact of winter storms in the six easternmost regions in the United States. The index makes use of population and regional differences to assess the impact of snowfall. For example, areas which receive very little snowfall on average may be

more adversely affected than other regions, resulting in a higher severity. The Region may experience any level on the RSI scale. During the snowstorm of February 28 to March 3, 1980, which produced the greatest one-day snowfall amounts the region has experienced, the Region was classified as a Category 4 on the RSI scale. It is possible that more severe events and impacts could be felt in the future.

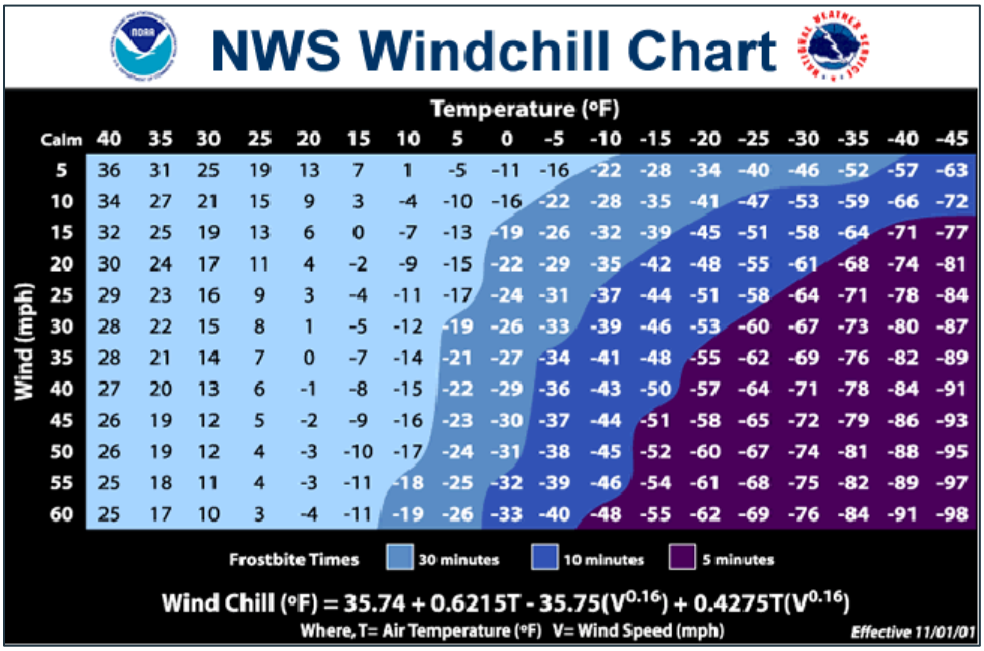
Table 4.82 – Regional Snowfall Index (RSI) Values

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18+	Extreme

Source: NOAA

Severe winter storms often involve a mix of hazardous weather conditions. The magnitude of an event can be defined based on the severity of each of the involved factors, including precipitation type, precipitation accumulation amounts, temperature, and wind. The NWS Wind Chill Temperature Index, shown in Figure 4.38, provides a formula for calculating the dangers of winter winds and freezing temperatures.

Figure 4.38 – NWS Wind Chill Temperature Index



Source: http://www.nws.noaa.gov/om/winter/windchill.shtml

Table 4.83 notes greatest recorded one-day snowfall totals for each county in the Pamlico Sound Region.

Table 4.83 – Greatest One-Day Snowfall by County

County	Inches	Location	Date
Beaufort	16.4 in.	Belhaven	March 3, 1980
Carteret	22.0 in.	Morehead City	March 3, 1980
Craven	12.5 in.	New Bern	January 30, 1965
Pamlico	18.0 in.	Bayboro	March 3, 1980

Source: North Carolina Climate Office

The most significant recorded snow depth over the last 20 years took place in February 2014, with recorded depths averaging 4-8 inches across the four-county area.

Impact: 2 – Limited

Spatial Extent: 4 – Large

The entirety of North Carolina is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The Pamlico Sound Region is accustomed to moderate winter weather due to nor'easters originating in the Gulf Stream and producing frozen precipitation. Given the atmospheric nature of the hazard, the entire planning area has uniform exposure to a winter storm.

Historical Occurrences

To get a full picture of the range of impacts of a severe winter storm, data for the following weather types as defined by the National Weather Service (NWS) Raleigh Forecast Office and tracked by NCEI were collected:

- **Blizzard** – A winter storm which produces the following conditions for 3 consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile.
- **Cold/Wind Chill** – Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory conditions of 0°F to -14°F with wind speeds 10 mph (9 kt) or greater.
- **Extreme Cold/Wind Chill** – A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria, defined as wind chill -15°F or lower with wind speeds 10 mph (9 kt) or greater.
- **Frost/Freeze** – A surface air temperature of 32°F or lower, or the formation of ice crystals on the ground or other surfaces, for a period of time long enough to cause human or economic impact, during the locally defined growing season.
- **Heavy Snow** – Snow accumulation meeting or exceeding 12 and/or 24 hour warning criteria of 3 and 4 inches, respectively.
- **Ice Storm** – Ice accretion meeting or exceeding locally/regionally defined warning criteria of ¼ inch or greater resulting in significant, widespread power outages, tree damage and dangerous travel. Issued only in those rare instances where just heavy freezing rain is expected and there will be no "mixed bag" precipitation meaning no snow, sleet or rain.
- **Sleet** – Sleet accumulations meeting or exceeding locally/regionally defined warning criteria of ½ inch or more.
- **Winter Storm** – A winter weather event that has more than one significant hazard and meets or exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements. Defined by NWS Raleigh Forecast Office as snow accumulations 3 inches or greater in 12 hours (4 inches or more in 24 hours); Freezing rain accumulations ¼ inch (6 mm) or greater; Sleet accumulations ½ inch (13 mm) or more. Issued when there is at least a 60% forecast confidence of any one of the three criteria being met.
- **Winter Weather** – A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria.

Table 4.84 summarizes the recorded severe winter storm events that have impacted each county in the Pamlico Sound Region according to NCEI Storm Events data for the 20-year period from 1999 through

2018. Note that many events impacted all or multiple counties. There were 25 unique reported incidents related to severe winter storms in the Pamlico Sound Region during this time. There was no reported property or crop damage resulting from these incidents; however, damages may have occurred that were not reported, and property and crop damages are possible impacts of future events. Similarly, there were no reported fatalities or injuries directly attributed to these events, but these types of impacts are possible in future events. No blizzard, cold/wind chill, extreme cold/wind chill, or sleet events were recorded.

Table 4.84 – Total Severe Winter Storm Impacts in the Pamlico Sound Region, 1999-2018

Event Type	Number of Recorded Incidents	Total Fatalities	Total Injuries	Total Property Damage	Total Crop Damage
Beaufort County					
Winter Storm	13	0	0	$0	$0
Winter Weather	3	0	0	$0	$0
Ice Storm	1	0	0	$0	$0
Heavy Snow	4	0	0	$0	$0
Frost/Freeze	1	0	0	$0	$0
Carteret County					
Winter Storm	8	0	0	$0	$0
Winter Weather	2	0	0	$0	$0
Ice Storm	1	0	0	$0	$0
Heavy Snow	3	0	0	$0	$0
Frost/Freeze	1	0	0	$0	$0
Craven County					
Winter Storm	8	0	0	$0	$0
Winter Weather	5	0	0	$0	$0
Ice Storm	2	0	0	$0	$0
Heavy Snow	6	0	0	$0	$0
Frost/Freeze	1	0	0	$0	$0
Pamlico County					
Winter Storm	9	0	0	$0	$0
Winter Weather	2	0	0	$0	$0
Ice Storm	0	0	0	$0	$0
Heavy Snow	4	0	0	$0	$0
Frost/Freeze	1	0	0	$0	$0
Pamlico Sound Region					
Winter Storm	13	0	0	$0	$0
Winter Weather	6	0	0	$0	$0
Ice Storm	2	0	0	$0	$0
Heavy Snow	6	0	0	$0	$0
Frost/Freeze	1	0	0	$0	$0
Total	**25**	**0**	**0**	**$0**	**$0**

Source: NCEI

A list of specific events that have impacted the Pamlico Sound Region are recorded in Table 4.85.

Table 4.85 – Recorded Severe Winter Storm Impacts in the Pamlico Sound Region, 1999-2018

Date	Event Type	Fatalities	Injuries	Property Damage	Crop Damage
12/3/2000	Heavy Snow	0	0	$0	$0
1/3/2002	Winter Storm	0	0	$0	$0
1/23/2003	Winter Storm	0	0	$0	$0
1/9/2004	Winter Weather	0	0	$0	$0

Date	Event Type	Fatalities	Injuries	Property Damage	Crop Damage
1/25/2004	Winter Storm	0	0	$0	$0
1/26/2004	Winter Storm	0	0	$0	$0
2/16/2004	Winter Weather	0	0	$0	$0
2/26/2004	Winter Weather	0	0	$0	$0
3/23/2004	Frost/Freeze	0	0	$0	$0
12/20/2004	Winter Storm	0	0	$0	$0
12/26/2004	Winter Storm	0	0	$0	$0
1/20/2009	Heavy Snow	0	0	$0	$0
1/30/2010	Winter Storm	0	0	$0	$0
2/12/2010	Heavy Snow	0	0	$0	$0
12/26/2010	Heavy Snow	0	0	$0	$0
1/10/2011	Heavy Snow	0	0	$0	$0
1/22/2011	Heavy Snow	0	0	$0	$0
1/28/2014	Winter Storm	0	0	$0	$0
2/11/2014	Winter Storm	0	0	$0	$0
1/9/2015	Winter Weather	0	0	$0	$0
2/16/2015	Ice Storm	0	0	$0	$0
2/24/2015	Ice Storm	0	0	$0	$0
2/12/2016	Winter Storm	0	0	$0	$0
1/3/2018	Winter Storm	0	0	$0	$0
1/17/2018	Winter Storm	0	0	$0	$0

Source: NCEI

Several storm impacts from NCEI are summarized below:

February 12, 2010 – A strong low pressure system moved northeast well offshore of the coast early February 13th. Widespread snow developed over the region during the evening of February 12th and continued into the morning of February 13th. Most of eastern North Carolina received between 4 and 7 inches of snowfall from this system. The Pamlico Sound Region saw 4 to 8 inches of snowfall.

February 11, 2014 - Low pressure developed along a stalled cold front off the NC coast during the day on February 11. All snow was reported on the northern coast, with a mesoscale snow band producing a corridor of 4-8 inches of snow from Jones County to central Outer Banks Dare County. Roads became snow and ice covered, and travel became treacherous through the day Tuesday. Precipitation came to an end Tuesday night, though temperatures remained well below freezing with roadways remaining treacherous. A second wave of wintry weather developed the morning of February 12. Minor accumulations of snow and freezing rain occurred inland, especially across the coastal plain, before changing to all rain during the afternoon.

January 11, 2018 - Low pressure deepening off the North Carolina coast produced significant snowfall over most of eastern North Carolina during the late evening of January 17th through the early morning of January 18th. Across the Pamlico Sound four-county region, snowfall ranged from less than 1 inch to 6 inches or more over the north coast. Roads were snow and ice covered, creating hazardous travel conditions.

The Pamlico Sound Region received one emergency declaration and one presidential disaster declaration since 1968 for incidents related to severe winter storms. As a state, North Carolina received eight disaster declarations related to severe winter storms during this timeframe.

Table 4.86 – Emergency & Disaster Declarations in Pamlico Sound Region due to Severe Winter Storms

Disaster Number	Date	Disaster Type	Incident Start	Incident End
234	1968	Severe Ice Storm	2/10/1968	2/10/1968
3110	1993	Severe Snowfall and Winter Storm	3/13/1993	3/17/1993

Source: FEMA, December 20, 2018

Probability of Future Occurrence

NCEI records 25 severe winter storm related events during the 20-year period from 1999 through 2018, which equates to an average of 1.25 events per year or more than 100 percent likelihood of an occurrence in any given year.

Probability: 4 – Highly Likely

Climate Change

According to the 2018 North Carolina Hazard Mitigation Plan, the uncertainty associated with potentially changing climate conditions creates uncertainty for predicting future severe winter storms. If it is determined that global temperatures are indeed rising, this could cause shorter and warmer winters in many areas; however, the likelihood of dangerously low temperatures may increase due to continuing trends of temperature extremes. Warmer winters, however, mean that precipitation that would normally fall as snow may begin to fall as rain or freezing rain instead.

Vulnerability Assessment

People

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm event. The leading cause of death during winter storms is from automobile or other transportation accidents due to poor visibility and/or slippery roads. Additionally, exhaustion and heart attacks caused by overexertion may result from winter storms.

Power outages during very cold winter storm conditions can also create potentially dangerous situations. Elderly people account for the largest percentage of hypothermia victims. In addition, if the power is out for an extended period, residents are forced to find alternative means to heat their homes. The danger arises from carbon monoxide released from improperly ventilated heating sources such as space or kerosene heaters, furnaces, and blocked chimneys. House fires also occur more frequently in the winter due to lack of proper safety precautions when using an alternative heating source.

Property

According to reported data of storm impacts recorded by the NCEI, between 1999 and 2018, the Pamlico Sound Region experienced no property damage related to the impacts of severe winter storm. Losses due to severe weather may not have been reported but should be expected during severe winter weather incidents.

Potential losses associated with winter storms include the cost of the removal of snow from roadways, debris cleanup, and indirect losses from power outages, lost productivity, and other factors. Additionally, severe ice is often associated with winter storms; and an icy roadway on a bridge or at a busy intersection, for example, threatens the safety of residents and visitors. Ice accumulation can also cause power outages and have a significant impact on public utilities.

Environment

Winter storm events may include ice or snow accumulation on trees which can cause large limbs, or even whole trees, to snap and potentially fall on buildings, cars, or power lines. This potential for winter debris creates a dangerous environment to be outside in; significant injury or fatality may occur if a large limb snaps while a local resident is out driving or walking underneath it.

Consequence Analysis

Table 4.87 summarizes the potential negative consequences of severe winter storm.

Table 4.87 – Consequence Analysis – Severe Winter Storm

Category	Consequences
Public	Localized impact expected to be severe for affected areas and moderate to light for other less affected areas.
Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for trained, equipped, and protected personnel.
Continuity of Operations (including Continued Delivery of Services)	Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities and Infrastructure	Localized impact to facilities and infrastructure in the areas of the incident. Power lines and roads most adversely affected.
Environment	Environmental damage to trees, bushes, etc.
Economic Condition of the Jurisdiction	Local economy and finances may be adversely affected, depending on damage.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes severe winter storm hazard risk by jurisdiction. Severe winter storm risk does not vary substantially by jurisdiction because these events are typically regional in nature.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	4	2	4	1	3	3.0	H
City of Washington	4	2	4	1	3	3.0	H
Town of Aurora	4	2	4	1	3	3.0	H
Town of Bath	4	2	4	1	3	3.0	H
Town of Belhaven	4	2	4	1	3	3.0	H
Town of Chocowinity	4	2	4	1	3	3.0	H
Town of Pantego	4	2	4	1	3	3.0	H
Town of Washington Park	4	2	4	1	3	3.0	H
Carteret County	4	2	4	1	3	3.0	H
Town of Atlantic Beach	4	2	4	1	3	3.0	H
Town of Beaufort	4	2	4	1	3	3.0	H
Town of Bogue	4	2	4	1	3	3.0	H
Town of Cape Carteret	4	2	4	1	3	3.0	H
Town of Cedar Point	4	2	4	1	3	3.0	H
Town of Emerald Isle	4	2	4	1	3	3.0	H
Town of Indian Beach	4	2	4	1	3	3.0	H
Town of Morehead City	4	2	4	1	3	3.0	H
Town of Newport	4	2	4	1	3	3.0	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Peletier	4	2	4	1	3	3.0	H
Town of Pine Knoll Shores	4	2	4	1	3	3.0	H
Craven County	4	2	4	1	3	3.0	H
City of Havelock	4	2	4	1	3	3.0	H
City of New Bern	4	2	4	1	3	3.0	H
Town of Bridgeton	4	2	4	1	3	3.0	H
Town of Cove City	4	2	4	1	3	3.0	H
Town of Dover	4	2	4	1	3	3.0	H
Town of River Bend	4	2	4	1	3	3.0	H
Town of Trent Woods	4	2	4	1	3	3.0	H
Town of Vanceboro	4	2	4	1	3	3.0	H
Pamlico County	4	2	4	1	3	3.0	H
Town of Alliance	4	2	4	1	3	3.0	H
Town of Arapahoe	4	2	4	1	3	3.0	H
Town of Bayboro	4	2	4	1	3	3.0	H
Town of Grantsboro	4	2	4	1	3	3.0	H
Town of Mesic	4	2	4	1	3	3.0	H
Town of Minnesott Beach	4	2	4	1	3	3.0	H
Town of Oriental	4	2	4	1	3	3.0	H
Town of Stonewall	4	2	4	1	3	3.0	H
Town of Vandemere	4	2	4	1	3	3.0	H

4.5.10 Tornado

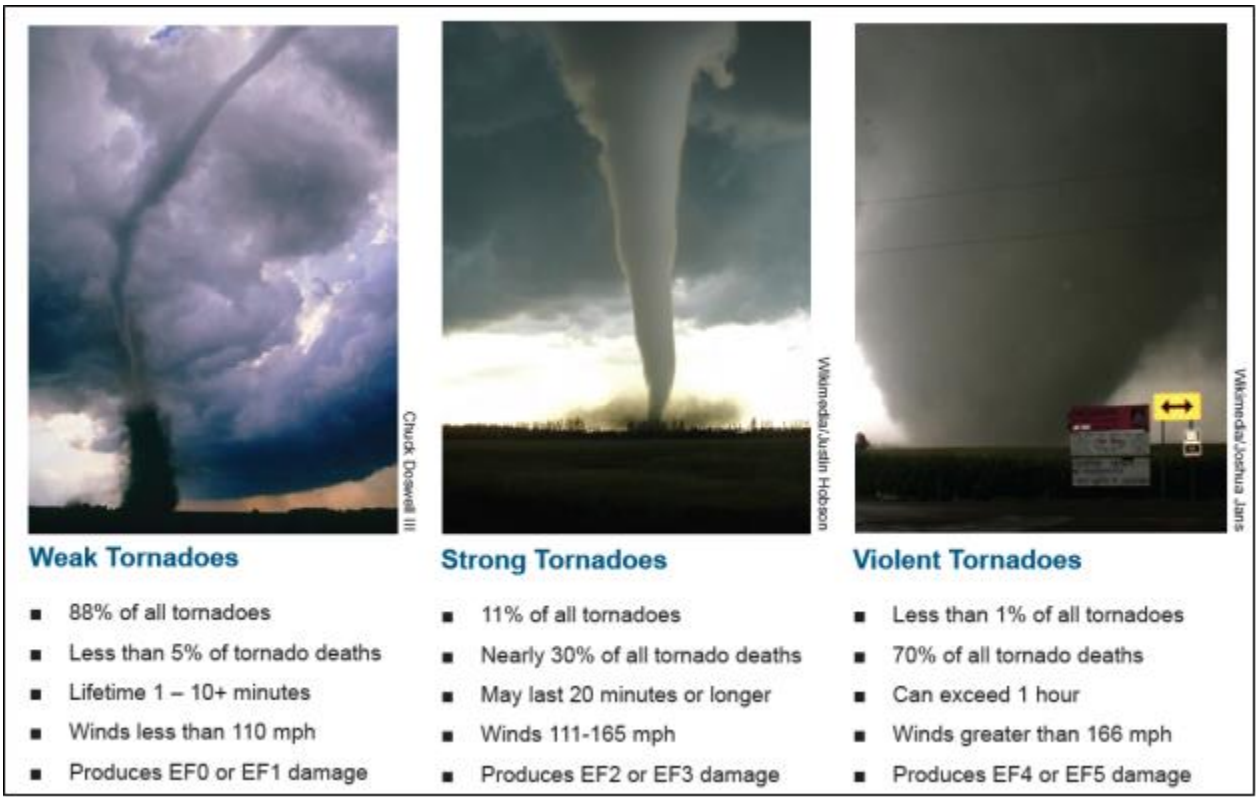
Hazard Background

According to the Glossary of Meteorology (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Tornadoes can appear from any direction. Most move from southwest to northeast, or west to east. Some tornadoes have changed direction amid path, or even backtracked.

Tornadoes are commonly produced by land falling tropical cyclones. Those making landfall along the Gulf coast traditionally produce more tornadoes than those making landfall along the Atlantic coast. Tornadoes that form within hurricanes are more common in the right front quadrant with respect to the forward direction but can occur in other areas as well. According to the NHC, about 10% of the tropical cyclone-related fatalities are caused by tornadoes. Tornadoes are more likely to be spawned within 24 hours of landfall and are usually within 30 miles of the tropical cyclone's center.

Tornadoes have the potential to produce winds in excess of 200 mph (EF5 on the Enhanced Fujita Scale) and can be very expansive – some in the Great Plains have exceeded two miles in width. Tornadoes associated with tropical cyclones, however, tend to be of lower intensity (EF0 to EF2) and much smaller in size than ones that form in the Great Plains.

Figure 4.39 – Types of Tornados



Source: NOAA National Weather Service

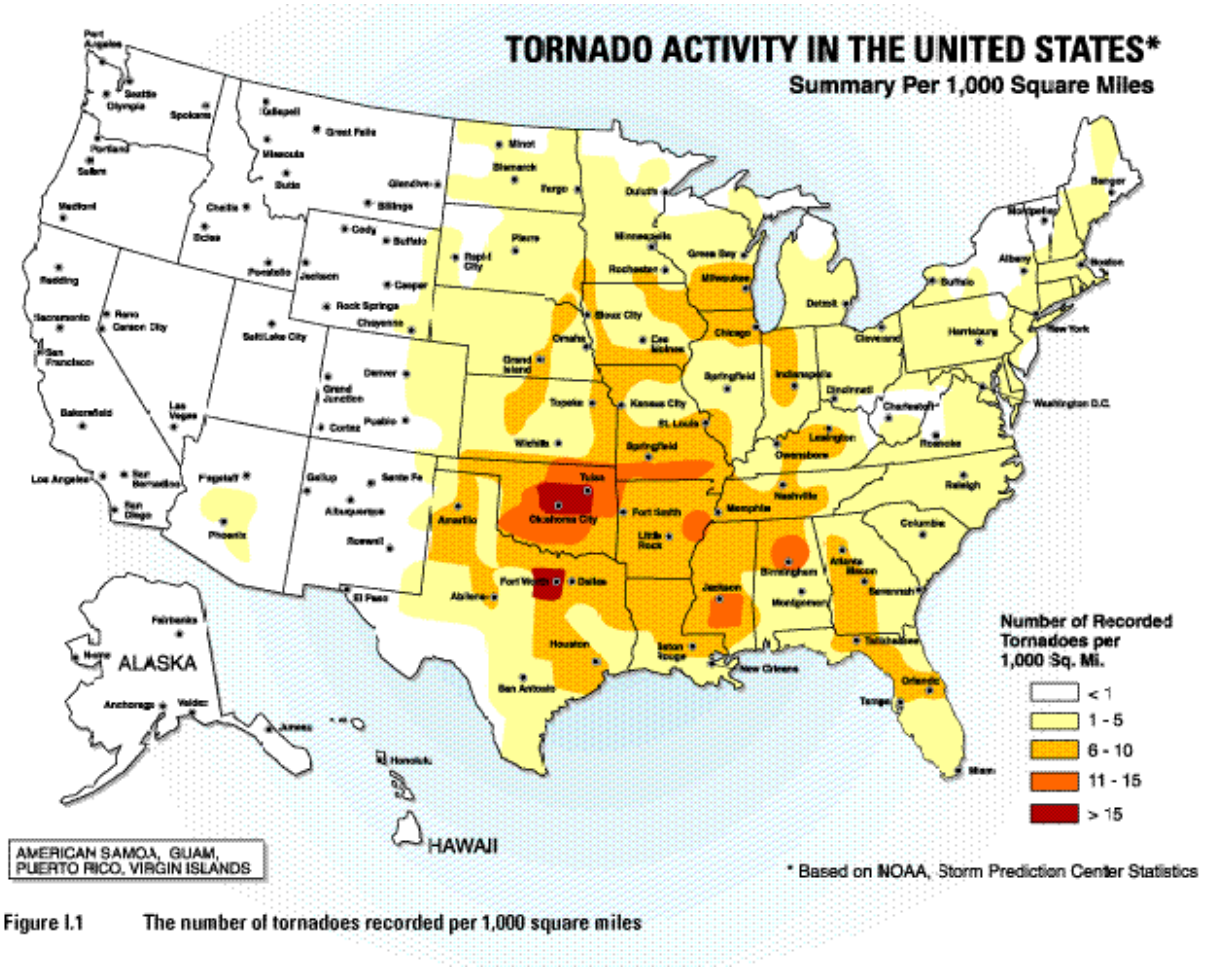
Warning Time: 4 – Less than 6 hours

Duration: 1 – Less than 6 hours

According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas and Florida respectively. Although the Great Plains

region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of "tornado alley"), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). The below figure shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

Figure 4.40 – Tornado Activity in the U.S.

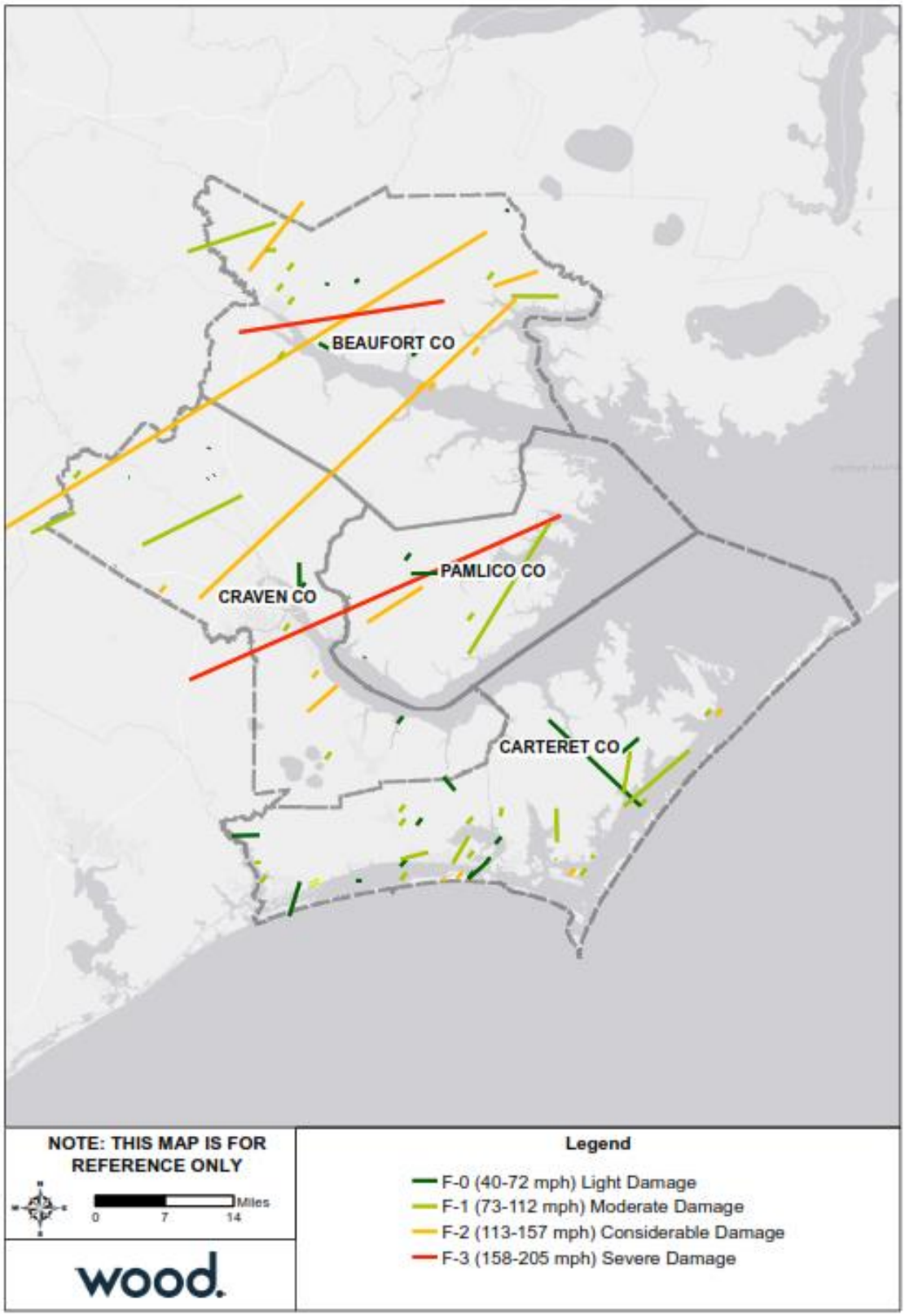


Source: American Society of Civil Engineers

Location

Figure 4.41 reflects the tracks of past tornados that passed through the Pamlico Sound Region from 1950 through 2018 according to data from the NOAA/National Weather Service Storm Prediction Center.

Figure 4.41 – Tornado Paths Through Pamlico Sound Region, 1950-2018



Source: NOAA/NWS Storm Prediction Center

Tornados can occur anywhere in the County. Tornadoes typically impact a small area, but damage may be extensive. Tornado locations are completely random, meaning risk to tornado isn't increased in one area of the county versus another. All of the Pamlico Sound Region is uniformly exposed to this hazard.

Extent

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita (EF) scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 4.88 shows the wind speeds associated with the enhanced Fujita scale ratings and the damage that could result at different levels of intensity.

Table 4.88 – Enhanced Fujita Scale

EF Number	3 Second Gust (mph)	Damage
0	65-85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	96-110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111-135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136-165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166-200	**Devastating damage.** Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
5	Over 200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m; high-rise buildings have significant structural deformation; incredible phenomena will occur.

The most intense tornado to pass through the Pamlico Sound Region in the past 20 years was an EF3 in April 2014. This tornado resulted in 16 injuries and $15,000,000 in property damage, the most of any tornado in the region.

Impact: 3 – Critical

Spatial Extent: 2 – Small

Historical Occurrences

NCEI storm reports were reviewed from 1999 through 2018 to assess whether recent trends varied from the longer historical record. According to NCEI, the Pamlico Sound Region experienced 62 tornado incidents between 1999 and 2018, causing no fatalities, 35 injuries, $34 million in property damage and $0 in crop damage. Table 4.89 shows historical tornadoes in the Pamlico Sound Region during this time period.

Table 4.89 – Recorded Tornadoes in Pamlico Sound Region, 1999-2018

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Dover, Tuscarora	4/11/1999	15:38	F0	0	0	0	0
Bridgeton	4/15/1999	21:45	F0	0	0	0	0
Davis	4/15/1999	22:05	F1	0	0	$500,000	0
Region	9/15/1999	15:15	F2	0	0	$1,000,000	0
Tuscarora	3/17/2000	00:10	F0	0	0	$50,000	0
Cape Carteret	4/15/2000	11:45	F0	0	0	$20,000	0
Bridgeton	4/15/2000	12:17	F1	0	1	$700,000	0
Morehead City	4/15/2000	12:45	F0	0	0	0	0
Stella	9/18/2000	15:37	F0	0	0	0	0
Cape Carteret	4/1/2001	15:30	F0	0	0	0	0
Morehead City	4/17/2001	15:00	F1	0	0	$100,000	0
Sealevel	4/17/2001	15:16	F0	0	0	$0	0
Pantego	10/11/2002	16:38	F2	0	0	$3,000,000	0
Belhaven	10/11/2002	17:45	F0	0	0	$20,000	0
Atlantic	10/11/2002	18:40	F0	0	0	0	0
Washington	5/10/2003	20:42	F0	0	0	0	0
Newport & Atlantic Beach	7/2/2003	09:55	F0	0	0	$2,000	0
Vanceboro	7/2/2003	13:40	F0	0	0	$2,000	0
Aurora	8/6/2003	11:30	F0	0	0	0	0
Morehead City	8/6/2003	16:45	F0	0	0	$50,000	0
Cedar Is	8/14/2003	11:01	F0	0	0	0	0
Morehead City	4/13/2004	13:35	F0	0	0	$10,000	0
Stacy & Williston	6/7/2004	10:53	F0	0	0	0	0
Dover, New Bern & Bayboro	6/23/2004	19:35	F0	0	0	0	0
Atlantic Beach	7/17/2004	16:19	F1	0	0	$80,000	0
Stella & Bath	8/13/2004	04:53	F1	0	3	$384,000	0
Harlowe & North Harlowe	8/15/2004	13:23	F0	0	0	0	0
James City, Grantsboro, & Merritt	10/13/2004	12:20	F0	0	0	$2,000	0
Atlantic Beach	6/25/2005	17:40	F0	0	0	$1,000	0
Broad Creek	7/13/2005	12:35	F0	0	0	$500	0
Salter Path	8/27/2005	14:15	F0	0	0	0	0
Atlantic Beach	6/14/2006	11:40	F0	0	0	$25,000	0
Sealevel	7/1/2006	11:30	F0	0	0	0	0
Stacy	8/27/2006	14:29	F0	0	0	$5,000	0
Morehead City & Stacy	8/31/2006	17:25	F0	0	0	$10,000	0

Location	Date	Time	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Smyrna	3/2/2007	08:40	EF0	0	0	$1,000	0
Old Ford	7/11/2007	18:00	EF1	0	0	$250,000	0
Old Ford	2/18/2008	04:38	EF1	0	0	$50,000	0
Bunyan & Chocowinity	4/20/2008	14:45	EF0	0	0	0	0
Leechville	4/28/2008	16:25	EF0	0	0	0	0
Newport, Crab Pt Vlg, Beaufort	5/11/2008	19:06	EF1	0	0	$40,000	0
Alligoods	4/11/2009	01:40	EF0	0	0	$100,000	0
Honolulu	5/5/2009	16:25	EF0	0	0	0	0
Vanceboro	5/7/2009	17:25	EF0	0	0	$10,000	0
Alligoods & Bunyon	7/17/2009	16:23	EF0	0	0	0	0
Vanceboro, Bath, Riverdale, Kennel Beach	4/16/2011	18:40	EF2	0	7	$4,004,000	0
Ft Barnwell, Pungo	4/28/2011	15:20	EF0	0	0	0	0
Leechville	8/26/2011	20:12	EF1	0	0	$200,000	0
Truttneys Lndg	5/30/2012	09:34	EF1	0	0	$600,000	0
Core Creek	12/26/2012	14:58	EF1	0	0	$10,000	0
Camp Glenn	11/26/2013	22:15	EF2	0	2	$6,500,000	0
Pantego	4/7/2014	14:49	EF2	0	5	$1,000,000	0
Chocowinity	4/25/2014	18:35	EF3	0	16	$15,000,000	0
Cove City	4/29/2014	13:25	EF0	0	0	0	0
Davis	2/16/2016	08:51	EF1	0	0	$100,000	0
Ocean	6/25/2016	12:45	EF0	0	1	$50,000	0
Straits, Marshallberg	9/2/2016	20:20	EF1	0	0	$225,000	0
Lowland, Cherry Pt. Lndg, Bettie, David, Otway, Kuhns	9/13/2018	10:23	EF1	0	0	0	0
Atlantic Beach	11/13/2018	04:45	EF1	0	0	0	0
Cape Carteret, Broad Creek, & Mill Creek	11/24/2018	14:06	EF2	0	0	0	0
Broad Creek	11/24/2018	14:10	EF2	0	0	0	0
Mill Creek	11/24/2018	14:40	EF0	0	0	0	0
Total				**0**	**35**	**$34,101,500**	**$0**

Source: NCEI

Specific incidents with some level of impact include:

April 16, 2011 – During the afternoon and evening of April 16, 2011, a large tornado outbreak occurred across eastern North Carolina. The EF2 tornado in the Pamlico Sound Region touched down in the Croatan Forest to the west of Highway 70 where it damaged numerous trees. The tornado crossed Highway 70 and did significant damage to the Riverdale area where it was estimated to be EF2 intensity with winds of 125 mph and a damage width of 200 yards. Numerous homes were severely damaged with several having

the second story or roof removed. The tornado continued to track northeast across the Neuse River. The tornado caused an estimated 4 million dollars of damage.

November 26, 2013 – Very strong southerly winds east of a low -pressure system led to warm and slightly unstable conditions over eastern North Carolina leading to heavy showers and isolated thunderstorms. A waterspout moved ashore off Bogue Sound and produced a 200-yard-wide EF1 tornado that tracked rapidly northeast across parts of Morehead City. The tornado first impacted the Carteret Community College with moderate structural damage to several buildings and numerous trees damaged. The tornado then lifted northeast producing minor damage to the Carteret General Hospital with several vehicles in the parking lot damaged. The tornado continued to track rapidly northeast across residential areas snapping or uprooting numerous trees, many that fell on homes producing minor to moderate damage. The tornado caused damage at Crab Point north of Morehead City before apparently moving over the Newport River and dissipating. Damage was estimated at 4 million dollars.

April 25, 2014 – A cold front approached eastern North Carolina during the afternoon of April 25th 2014. Two super-cell thunderstorms produced severe weather with multiple tornadoes reported in parts of Greene, Pitt and Beaufort counties.

The tornado in Beaufort touched down approximately 1.5 miles west of Chocowinity along Taylor Road causing damage to trees and mobile homes. The tornado then strengthened to a strong EF2 and impacted many homes and businesses from the intersection of U.S. Highway 17 and North Carolina Highway 33 eastward for about 1 mile. The tornado reached EF3 intensity with winds estimated at 150 mph as it impacted homes along Whichards Beach Road from near Warrens Way to Harbor Drive. Many homes, vehicles, and boats in this area were severely damaged or destroyed. The tornado then moved into the Washington Park area near Shorewood Drive and Daniels Drive after crossing the Pamlico River. Strong EF2 damage continued for about five miles as the tornado tracked eastward across U.S. Highway 264 to just north of the intersection of North Carolina Highway 32. Extensive damage occurred to numerous homes with some completely destroyed. The tornado continued to track east of North Carolina Highway 32 and north of U.S. Highway 264 for about 10 miles producing mainly EF0 to EF1 damage. The tornado finally dissipated near the Terra Ceia farms area. Overall, the storm caused an estimated 15 million dollars in damage and injured 16 people.

Probability of Future Occurrence

Probability of future occurrence was calculated based on past occurrences and was assumed to be uniform across the county.

In a 20-year span between 1999 and 2018, the Pamlico Sound Region experienced 62 separate tornado incidents over 52 separate days. This correlates to an over-100-percent annual probability that the county will experience a tornado somewhere in its boundaries. Only eight of these past tornado events were a magnitude EF2 or greater; therefore, the annual probability of a significant tornado event is approximately 40 percent.

Probability: 3 – Likely

Climate Change

There presently is not enough data or research to quantify the magnitude of change that climate change may have related to tornado frequency and intensity. NASA's Earth Observatory has conducted studies which aim to understand the interaction between climate change and tornadoes. Based on these studies meteorologists are unsure why some thunderstorms generate tornadoes and others don't, beyond knowing that they require a certain type of wind shear. Tornadoes spawn from approximately one percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes

rotation. Some studies show a potential for a decrease in wind shear in mid-latitude areas. Because of uncertainty with the influence of climate change on tornadoes, future updates to the mitigation plan should include the latest research on how the tornado hazard frequency and severity could change. The level of significance of this hazard should be revisited over time.

Vulnerability Assessment

People

People and populations exposed to the elements are most vulnerable to tornados. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. According to the 2017 American Community Survey (ACS), 16,464 occupied housing units (17.3%) in the Pamlico Sound Region are classified as "mobile homes or other types of housing." Based on an estimated average of 2.35 persons per household from the 2017 ACS, there are approximately 38,690 people in the Pamlico Sound Region living in mobile homes. Mobile home counts are provided in Table 4.90. Per this data, vulnerability based on housing type is high in Beaufort and Pamlico Counties.

Table 4.90 – Mobile Home Units in the Pamlico Sound Region, 2017

County	Occupied Mobile Home Units	Total Occupied Housing Units	Percent of Occupied Housing
Beaufort County	4,733	18,978	24.9%
Carteret County	4,949	30,000	16.5%
Craven County	5,429	40,571	13.4%
Pamlico County	1,353	5,395	25.1%

Source: American Community Survey 2013-2017 5-Year Estimates

Since 1950, the NCEI records two fatalities and 150 injuries attributed to tornadoes in the Pamlico Sound Region; these fatalities and injuries were the result of tornadoes rated as low as EF0, illustrating the destructive power of tornadoes and the dangers they pose to exposed populations without proper shelter.

Property

General damages to property are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado, or due to the damages caused by the tornado. Depending on the size of the tornado and its path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage.

Secondary impacts of tornado damage often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a tornado put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services.

Since 1950, damaging tornadoes in the County are directly responsible for $53 million worth of damage to property, and no reported damage to crops, according to NCEI data.

Table 4.91 through Table 4.95 detail the estimated buildings impacted from tornado events of magnitudes ranging from EF0 to EF4. Note that these tables provide an estimate of building damages should all exposed property be impacted by an event of the stated magnitude. Actual damages resulting from a tornado event of each magnitude would be lower because the event would impact only a fraction of the county.

Table 4.91 – Estimated Buildings Impacted by EF0 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	16,974	87.9%	$140,281,429	2,000	10.4%	$38,586,819	341	1.8%	$12,971,499	19,315	100%	$191,839,747
City of Washington	5,559	4,619	83.1%	$39,856,782	739	13.3%	$48,282,766	193	3.5%	$7,362,929	5,551	99.9%	$95,502,477
Town of Aurora	559	439	78.5%	$3,440,926	86	15.4%	$1,701,804	33	5.9%	$833,707	558	99.8%	$5,976,437
Town of Bath	553	470	85%	$5,089,537	50	9%	$646,523	33	6%	$1,221,624	553	100%	$6,957,683
Town of Belhaven	1,062	918	86.4%	$6,400,144	109	10.3%	$2,143,185	33	3.1%	$835,379	1,060	99.8%	$9,378,709
Town of Chocowinity	392	321	81.9%	$2,774,240	43	11%	$3,452,054	27	6.9%	$675,573	391	99.7%	$6,901,867
Town of Pantego	126	99	78.6%	$689,673	16	12.7%	$332,752	11	8.7%	$294,404	126	100%	$1,316,829
Town of Washington Park	229	216	94.3%	$2,468,792	13	5.7%	$190,551	0	0%	$0	229	100%	$2,659,343
Subtotal Beaufort	**27,801**	**24,056**	**86.5%**	**$201,001,523**	**3,056**	**11%**	**$95,336,454**	**671**	**2.4%**	**$24,195,115**	**27,783**	**99.9%**	**$320,533,092**
Carteret													
Carteret County (Unincorporated Area)	15,309	14,063	91.9%	$102,616,935	994	6.5%	$14,462,502	239	1.6%	$7,380,899	15,296	99.9%	$124,460,336
Town of Atlantic Beach	3,412	3,241	95%	$32,333,241	152	4.5%	$2,684,171	9	0.3%	$100,465	3,402	99.7%	$35,117,877
Town of Beaufort	3,277	2,911	88.8%	$23,033,281	280	8.5%	$12,169,702	80	2.4%	$3,187,242	3,271	99.8%	$38,390,225
Town of Bogue	363	324	89.3%	$2,407,180	30	8.3%	$397,598	9	2.5%	$146,821	363	100%	$2,951,600
Town of Cape Carteret	989	874	88.4%	$7,668,275	89	9%	$1,738,175	26	2.6%	$480,916	989	100%	$9,887,365
Town of Cedar Point	1,367	1,258	92%	$9,567,447	99	7.2%	$2,022,922	10	0.7%	$195,544	1,367	100%	$11,785,913
Town of Emerald Isle	5,712	5,532	96.8%	$73,040,989	150	2.6%	$2,523,571	20	0.4%	$353,109	5,702	99.8%	$75,917,669
Town of Indian Beach	899	864	96.1%	$7,617,848	23	2.6%	$462,663	8	0.9%	$61,081	895	99.6%	$8,141,591
Town of Morehead City	7,827	6,754	86.3%	$58,590,954	829	10.6%	$23,623,072	217	2.8%	$10,177,172	7,800	99.7%	$92,391,197
Town of Newport	4,085	3,648	89.3%	$22,784,065	334	8.2%	$5,002,889	98	2.4%	$2,292,925	4,080	99.9%	$30,079,879
Town of Peletier	529	472	89.2%	$2,657,082	49	9.3%	$1,251,121	8	1.5%	$133,142	529	100%	$4,041,345
Town of Pine Knoll Shores	1,757	1,649	93.9%	$24,126,017	70	4%	$1,698,066	34	1.9%	$483,635	1,753	99.8%	$26,307,718
Subtotal Carteret	**45,526**	**41,590**	**91.4%**	**$366,443,314**	**3,099**	**6.8%**	**$68,036,452**	**758**	**1.7%**	**$24,992,951**	**45,447**	**99.8%**	**$459,472,715**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	20,955	90.6%	$156,511,188	1,875	8.1%	$40,952,277	288	1.2%	$14,835,667	23,118	99.9%	$212,299,132
City of Havelock	5,366	4,840	90.2%	$30,911,889	371	6.9%	$16,170,111	148	2.8%	$21,718,146	5,359	99.9%	$68,800,146
City of New Bern	12,738	11,164	87.6%	$87,499,733	1,254	9.8%	$71,045,180	298	2.3%	$17,290,495	12,716	99.8%	$175,835,408
Town of Bridgeton	317	235	74.1%	$1,310,199	68	21.5%	$1,110,432	12	3.8%	$104,363	315	99.4%	$2,524,995
Town of Cove City	274	234	85.4%	$1,282,952	28	10.2%	$236,788	11	4%	$299,946	273	99.6%	$1,819,686
Town of Dover	281	257	91.5%	$1,523,777	7	2.5%	$85,422	17	6%	$288,937	281	100%	$1,898,136
Town of River Bend	1,545	1,513	97.9%	$11,807,436	24	1.6%	$4,009,072	7	0.5%	$96,137	1,544	99.9%	$15,912,645
Town of Trent Woods	1,910	1,866	97.7%	$21,639,277	22	1.2%	$1,102,631	21	1.1%	$1,049,042	1,909	99.9%	$23,790,949
Town of Vanceboro	467	368	78.8%	$2,430,461	68	14.6%	$1,267,396	31	6.6%	$1,380,821	467	100%	$5,078,679
Subtotal Craven	**46,031**	**41,432**	**90%**	**$314,916,912**	**3,717**	**8.1%**	**$135,979,309**	**833**	**1.8%**	**$57,063,554**	**45,982**	**99.9%**	**$507,959,776**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	5,801	90.9%	$34,419,421	498	7.8%	$4,212,672	73	1.1%	$707,889	6,372	99.8%	$39,339,982
Town of Alliance	575	481	83.7%	$2,496,888	80	13.9%	$1,076,457	14	2.4%	$105,744	575	100%	$3,679,089
Town of Arapahoe	428	386	90.2%	$2,008,582	26	6.1%	$263,957	16	3.7%	$353,208	428	100%	$2,625,747
Town of Bayboro	514	404	78.6%	$2,104,622	73	14.2%	$818,339	36	7%	$1,637,556	513	99.8%	$4,560,517
Town of Grantsboro	581	527	90.7%	$2,432,311	36	6.2%	$809,659	17	2.9%	$363,840	580	99.8%	$3,605,810
Town of Mesic	185	170	91.9%	$932,960	10	5.4%	$41,326	5	2.7%	$27,108	185	100%	$1,001,395
Town of Minnesott Beach	401	384	95.8%	$3,274,237	15	3.7%	$963,623	2	0.5%	$20,689	401	100%	$4,258,549
Town of Oriental	1,377	1,257	91.3%	$9,535,644	105	7.6%	$1,212,807	14	1%	$150,660	1,376	99.9%	$10,899,111
Town of Stonewall	226	199	88.1%	$1,050,094	21	9.3%	$216,652	6	2.7%	$255,795	226	100%	$1,522,542
Town of Vandemere	190	168	88.4%	$1,008,581	8	4.2%	$147,292	14	7.4%	$71,152	190	100%	$1,227,025
Subtotal Pamlico	**10,862**	**9,777**	**90%**	**$59,263,340**	**872**	**8%**	**$9,762,784**	**197**	**1.8%**	**$3,693,641**	**10,846**	**99.9%**	**$72,719,767**
Region Total	**130,220**	**116,855**	**89.7%**	**$941,625,089**	**10,744**	**8.3%**	**$309,114,999**	**2,459**	**1.9%**	**$109,945,261**	**130,058**	**99.9%**	**$1,360,685,350**

Source: NCEM Risk Management Tool

Table 4.92 – Estimated Buildings Impacted by EF1 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	16,974	87.9%	$1,005,327,780	2,000	10.4%	$258,957,826	341	1.8%	$74,107,709	19,315	100%	$1,338,393,315
City of Washington	5,559	4,619	83.1%	$285,510,517	739	13.3%	$304,707,452	193	3.5%	$45,660,819	5,551	99.9%	$635,878,788
Town of Aurora	559	439	78.5%	$23,975,033	86	15.4%	$10,020,866	33	5.9%	$4,950,598	558	99.8%	$38,946,496
Town of Bath	553	470	85%	$36,599,399	50	9%	$4,463,845	33	6%	$5,958,446	553	100%	$47,021,691
Town of Belhaven	1,062	918	86.4%	$45,701,242	109	10.3%	$13,678,983	33	3.1%	$5,684,496	1,060	99.8%	$65,064,721
Town of Chocowinity	392	321	81.9%	$18,812,352	43	11%	$21,843,018	27	6.9%	$4,279,011	391	99.7%	$44,934,380
Town of Pantego	126	99	78.6%	$5,002,247	16	12.7%	$2,212,837	11	8.7%	$1,748,497	126	100%	$8,963,581
Town of Washington Park	229	216	94.3%	$18,215,080	13	5.7%	$1,078,727	0	0%	$0	229	100%	$19,293,807
Subtotal Beaufort	**27,801**	**24,056**	**86.5%**	**$1,439,143,650**	**3,056**	**11%**	**$616,963,554**	**671**	**2.4%**	**$142,389,576**	**27,783**	**99.9%**	**$2,198,496,779**
Carteret													
Carteret County (Unincorporated Area)	15,309	14,063	91.9%	$728,104,489	994	6.5%	$93,013,793	239	1.6%	$40,572,545	15,296	99.9%	$861,690,827
Town of Atlantic Beach	3,412	3,241	95%	$225,944,589	152	4.5%	$17,246,442	9	0.3%	$808,807	3,402	99.7%	$243,999,839
Town of Beaufort	3,277	2,911	88.8%	$163,603,319	280	8.5%	$77,283,880	80	2.4%	$18,233,496	3,271	99.8%	$259,120,694
Town of Bogue	363	324	89.3%	$17,180,664	30	8.3%	$2,523,666	9	2.5%	$1,148,967	363	100%	$20,853,297
Town of Cape Carteret	989	874	88.4%	$54,582,249	89	9%	$13,116,509	26	2.6%	$2,632,267	989	100%	$70,331,025
Town of Cedar Point	1,367	1,258	92%	$66,045,787	99	7.2%	$12,095,930	10	0.7%	$1,574,251	1,367	100%	$79,715,968
Town of Emerald Isle	5,712	5,532	96.8%	$516,642,839	150	2.6%	$16,430,682	20	0.4%	$2,842,739	5,702	99.8%	$535,916,260
Town of Indian Beach	899	864	96.1%	$51,122,588	23	2.6%	$3,268,387	8	0.9%	$491,738	895	99.6%	$54,882,713
Town of Morehead City	7,827	6,754	86.3%	$411,871,540	829	10.6%	$146,169,837	217	2.8%	$65,104,736	7,800	99.7%	$623,146,113
Town of Newport	4,085	3,648	89.3%	$161,191,248	334	8.2%	$31,372,010	98	2.4%	$12,979,751	4,080	99.9%	$205,543,009
Town of Peletier	529	472	89.2%	$18,424,621	49	9.3%	$9,806,219	8	1.5%	$1,071,875	529	100%	$29,302,716
Town of Pine Knoll Shores	1,757	1,649	93.9%	$164,225,367	70	4%	$12,828,903	34	1.9%	$3,893,557	1,753	99.8%	$180,947,828
Subtotal Carteret	**45,526**	**41,590**	**91.4%**	**$2,578,939,300**	**3,099**	**6.8%**	**$435,156,258**	**758**	**1.7%**	**$151,354,729**	**45,447**	**99.8%**	**$3,165,450,289**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	20,955	90.6%	$1,131,838,825	1,875	8.1%	$252,879,548	288	1.2%	$92,168,984	23,118	99.9%	$1,476,887,357
City of Havelock	5,366	4,840	90.2%	$223,837,701	371	6.9%	$90,181,233	148	2.8%	$141,867,922	5,359	99.9%	$455,886,857
City of New Bern	12,738	11,164	87.6%	$633,935,768	1,254	9.8%	$413,238,729	298	2.3%	$98,346,031	12,716	99.8%	$1,145,520,528
Town of Bridgeton	317	235	74.1%	$9,520,717	68	21.5%	$6,805,971	12	3.8%	$769,136	315	99.4%	$17,095,825
Town of Cove City	274	234	85.4%	$9,210,042	28	10.2%	$1,166,925	11	4%	$2,414,746	273	99.6%	$12,791,713
Town of Dover	281	257	91.5%	$10,977,319	7	2.5%	$421,557	17	6%	$2,326,116	281	100%	$13,724,992
Town of River Bend	1,545	1,513	97.9%	$86,595,692	24	1.6%	$22,281,634	7	0.5%	$773,965	1,544	99.9%	$109,651,291
Town of Trent Woods	1,910	1,866	97.7%	$159,686,398	22	1.2%	$6,703,950	21	1.1%	$6,202,212	1,909	99.9%	$172,592,560
Town of Vanceboro	467	368	78.8%	$17,182,676	68	14.6%	$6,304,278	31	6.6%	$6,455,964	467	100%	$29,942,917
Subtotal Craven	**46,031**	**41,432**	**90%**	**$2,282,785,138**	**3,717**	**8.1%**	**$799,983,825**	**833**	**1.8%**	**$351,325,076**	**45,982**	**99.9%**	**$3,434,094,040**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	5,801	90.9%	$248,507,902	498	7.8%	$31,860,718	73	1.1%	$5,698,941	6,372	99.8%	$286,067,561
Town of Alliance	575	481	83.7%	$17,839,309	80	13.9%	$5,773,227	14	2.4%	$775,094	575	100%	$24,387,630
Town of Arapahoe	428	386	90.2%	$14,427,287	26	6.1%	$1,710,430	16	3.7%	$2,193,177	428	100%	$18,330,894
Town of Bayboro	514	404	78.6%	$15,146,942	73	14.2%	$4,850,213	36	7%	$10,098,305	513	99.8%	$30,095,460
Town of Grantsboro	581	527	90.7%	$17,322,687	36	6.2%	$4,920,343	17	2.9%	$2,733,715	580	99.8%	$24,976,746
Town of Mesic	185	170	91.9%	$6,743,403	10	5.4%	$261,378	5	2.7%	$218,239	185	100%	$7,223,020
Town of Minnesott Beach	401	384	95.8%	$23,561,497	15	3.7%	$7,737,293	2	0.5%	$166,557	401	100%	$31,465,346
Town of Oriental	1,377	1,257	91.3%	$69,388,886	105	7.6%	$7,604,278	14	1%	$1,212,903	1,376	99.9%	$78,206,067
Town of Stonewall	226	199	88.1%	$7,556,066	21	9.3%	$1,416,517	6	2.7%	$1,144,199	226	100%	$10,116,783
Town of Vandemere	190	168	88.4%	$7,313,319	8	4.2%	$1,023,283	14	7.4%	$572,820	190	100%	$8,909,422
Subtotal Pamlico	**10,862**	**9,777**	**90%**	**$427,807,298**	**872**	**8%**	**$67,157,680**	**197**	**1.8%**	**$24,813,950**	**10,846**	**99.9%**	**$519,778,929**
Region Total	**130,220**	**116,855**	**89.7%**	**$6,728,675,386**	**10,744**	**8.3%**	**$1,919,261,317**	**2,459**	**1.9%**	**$669,883,331**	**130,058**	**99.9%**	**$9,317,820,037**

Source: NCEM Risk Management Tool

Table 4.93 – Estimated Buildings Impacted by EF2 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	16,974	87.9%	$1,820,171,986	2,000	10.4%	$535,753,681	341	1.8%	$236,780,990	19,315	100%	$2,592,706,658
City of Washington	5,559	4,619	83.1%	$552,935,890	739	13.3%	$708,791,572	193	3.5%	$151,134,180	5,551	99.9%	$1,412,861,642
Town of Aurora	559	439	78.5%	$49,503,188	86	15.4%	$21,544,291	33	5.9%	$16,091,183	558	99.8%	$87,138,662
Town of Bath	553	470	85%	$67,423,309	50	9%	$9,944,001	33	6%	$17,549,010	553	100%	$94,916,320
Town of Belhaven	1,062	918	86.4%	$84,351,809	109	10.3%	$33,784,896	33	3.1%	$19,492,260	1,060	99.8%	$137,628,966
Town of Chocowinity	392	321	81.9%	$37,040,507	43	11%	$47,970,267	27	6.9%	$14,283,534	391	99.7%	$99,294,308
Town of Pantego	126	99	78.6%	$9,053,249	16	12.7%	$4,614,448	11	8.7%	$5,683,316	126	100%	$19,351,013
Town of Washington Park	229	216	94.3%	$34,640,539	13	5.7%	$2,524,134	0	0%	$0	229	100%	$37,164,674
Subtotal Beaufort	**27,801**	**24,056**	**86.5%**	**$2,655,120,477**	**3,056**	**11%**	**$1,364,927,290**	**671**	**2.4%**	**$461,014,473**	**27,783**	**99.9%**	**$4,481,062,243**
Carteret													
Carteret County (Unincorporated Area)	15,309	14,063	91.9%	$1,266,445,150	994	6.5%	$215,636,686	239	1.6%	$127,306,667	15,296	99.9%	$1,609,388,503
Town of Atlantic Beach	3,412	3,241	95%	$433,053,209	152	4.5%	$43,216,066	9	0.3%	$2,926,723	3,402	99.7%	$479,195,999
Town of Beaufort	3,277	2,911	88.8%	$330,270,505	280	8.5%	$172,335,409	80	2.4%	$58,293,508	3,271	99.8%	$560,899,422
Town of Bogue	363	324	89.3%	$31,341,438	30	8.3%	$5,664,230	9	2.5%	$4,123,426	363	100%	$41,129,094
Town of Cape Carteret	989	874	88.4%	$98,043,370	89	9%	$28,568,208	26	2.6%	$8,242,263	989	100%	$134,853,841
Town of Cedar Point	1,367	1,258	92%	$112,186,994	99	7.2%	$28,417,689	10	0.7%	$5,696,534	1,367	100%	$146,301,216
Town of Emerald Isle	5,712	5,532	96.8%	$970,847,336	150	2.6%	$37,118,394	20	0.4%	$10,286,642	5,702	99.8%	$1,018,252,373
Town of Indian Beach	899	864	96.1%	$94,980,397	23	2.6%	$7,081,870	8	0.9%	$1,779,385	895	99.6%	$103,841,653
Town of Morehead City	7,827	6,754	86.3%	$794,271,993	829	10.6%	$336,221,739	217	2.8%	$218,169,240	7,800	99.7%	$1,348,662,973
Town of Newport	4,085	3,648	89.3%	$287,923,409	334	8.2%	$71,448,618	98	2.4%	$41,296,642	4,080	99.9%	$400,668,669
Town of Peletier	529	472	89.2%	$34,983,631	49	9.3%	$19,924,413	8	1.5%	$3,878,653	529	100%	$58,786,697
Town of Pine Knoll Shores	1,757	1,649	93.9%	$342,676,096	70	4%	$25,452,600	34	1.9%	$14,089,098	1,753	99.8%	$382,217,793
Subtotal Carteret	**45,526**	**41,590**	**91.4%**	**$4,797,023,528**	**3,099**	**6.8%**	**$991,085,922**	**758**	**1.7%**	**$496,088,781**	**45,447**	**99.8%**	**$6,284,198,233**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	20,955	90.6%	$2,053,617,043	1,875	8.1%	$622,540,017	288	1.2%	$305,296,868	23,118	99.9%	$2,981,453,928
City of Havelock	5,366	4,840	90.2%	$429,836,586	371	6.9%	$242,818,091	148	2.8%	$479,226,130	5,359	99.9%	$1,151,880,808
City of New Bern	12,738	11,164	87.6%	$1,221,561,528	1,254	9.8%	$1,065,152,043	298	2.3%	$313,587,682	12,716	99.8%	$2,600,301,253
Town of Bridgeton	317	235	74.1%	$18,036,982	68	21.5%	$17,565,931	12	3.8%	$2,709,633	315	99.4%	$38,312,545
Town of Cove City	274	234	85.4%	$16,413,822	28	10.2%	$3,572,895	11	4%	$8,737,921	273	99.6%	$28,724,638
Town of Dover	281	257	91.5%	$19,583,516	7	2.5%	$1,374,128	17	6%	$8,417,208	281	100%	$29,374,852
Town of River Bend	1,545	1,513	97.9%	$166,021,460	24	1.6%	$52,473,219	7	0.5%	$2,800,645	1,544	99.9%	$221,295,324
Town of Trent Woods	1,910	1,866	97.7%	$302,481,313	22	1.2%	$14,782,564	21	1.1%	$20,121,378	1,909	99.9%	$337,385,255
Town of Vanceboro	467	368	78.8%	$32,636,893	68	14.6%	$18,152,127	31	6.6%	$18,537,749	467	100%	$69,326,769
Subtotal Craven	**46,031**	**41,432**	**90%**	**$4,260,189,143**	**3,717**	**8.1%**	**$2,038,431,015**	**833**	**1.8%**	**$1,159,435,214**	**45,982**	**99.9%**	**$7,458,055,372**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	5,801	90.9%	$448,359,412	498	7.8%	$65,953,112	73	1.1%	$20,621,999	6,372	99.8%	$534,934,523
Town of Alliance	575	481	83.7%	$32,305,811	80	13.9%	$15,641,271	14	2.4%	$2,725,849	575	100%	$50,672,931
Town of Arapahoe	428	386	90.2%	$26,005,045	26	6.1%	$4,087,223	16	3.7%	$7,263,039	428	100%	$37,355,307
Town of Bayboro	514	404	78.6%	$27,367,437	73	14.2%	$11,404,836	36	7%	$33,348,411	513	99.8%	$72,120,683
Town of Grantsboro	581	527	90.7%	$30,167,779	36	6.2%	$12,819,392	17	2.9%	$9,689,875	580	99.8%	$52,677,045
Town of Mesic	185	170	91.9%	$12,393,412	10	5.4%	$597,926	5	2.7%	$789,714	185	100%	$13,781,051
Town of Minnesott Beach	401	384	95.8%	$44,729,703	15	3.7%	$15,030,861	2	0.5%	$602,698	401	100%	$60,363,262
Town of Oriental	1,377	1,257	91.3%	$132,860,542	105	7.6%	$17,716,812	14	1%	$4,388,971	1,376	99.9%	$154,966,325
Town of Stonewall	226	199	88.1%	$13,442,763	21	9.3%	$3,122,180	6	2.7%	$3,193,227	226	100%	$19,758,170
Town of Vandemere	190	168	88.4%	$13,252,398	8	4.2%	$2,222,519	14	7.4%	$2,072,788	190	100%	$17,547,705
Subtotal Pamlico	**10,862**	**9,777**	**90%**	**$780,884,302**	**872**	**8%**	**$148,596,132**	**197**	**1.8%**	**$84,696,571**	**10,846**	**99.9%**	**$1,014,177,002**
Region Total	**130,220**	**116,855**	**89.7%**	**$12,493,217,450**	**10,744**	**8.3%**	**$4,543,040,359**	**2,459**	**1.9%**	**$2,201,235,039**	**130,058**	**99.9%**	**$19,237,492,850**

Source: NCEM Risk Management Tool

Table 4.94 – Estimated Buildings Impacted by EF3 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	16,974	87.9%	$2,161,103,258	2,000	10.4%	$621,370,157	341	1.8%	$369,604,109	19,315	100%	$3,152,077,524
City of Washington	5,559	4,619	83.1%	$703,580,468	739	13.3%	$875,378,168	193	3.5%	$237,242,382	5,551	99.9%	$1,816,201,018
Town of Aurora	559	439	78.5%	$70,035,124	86	15.4%	$26,552,378	33	5.9%	$25,186,905	558	99.8%	$121,774,407
Town of Bath	553	470	85%	$80,926,754	50	9%	$11,900,591	33	6%	$27,015,873	553	100%	$119,843,218
Town of Belhaven	1,062	918	86.4%	$103,047,467	109	10.3%	$44,717,833	33	3.1%	$30,763,551	1,060	99.8%	$178,528,851
Town of Chocowinity	392	321	81.9%	$53,127,320	43	11%	$58,600,014	27	6.9%	$22,450,943	391	99.7%	$134,178,276
Town of Pantego	126	99	78.6%	$10,448,413	16	12.7%	$5,289,670	11	8.7%	$8,895,975	126	100%	$24,634,058
Town of Washington Park	229	216	94.3%	$40,681,435	13	5.7%	$3,299,154	0	0%	$0	229	100%	$43,980,589
Subtotal Beaufort	**27,801**	**24,056**	**86.5%**	**$3,222,950,239**	**3,056**	**11%**	**$1,647,107,965**	**671**	**2.4%**	**$721,159,738**	**27,783**	**99.9%**	**$5,591,217,941**
Carteret													
Carteret County (Unincorporated Area)	15,309	14,063	91.9%	$1,473,026,986	994	6.5%	$277,181,050	239	1.6%	$198,130,109	15,296	99.9%	$1,948,338,145
Town of Atlantic Beach	3,412	3,241	95%	$573,728,924	152	4.5%	$58,469,011	9	0.3%	$4,655,279	3,402	99.7%	$636,853,214
Town of Beaufort	3,277	2,911	88.8%	$443,347,066	280	8.5%	$220,392,464	80	2.4%	$91,002,480	3,271	99.8%	$754,742,010
Town of Bogue	363	324	89.3%	$37,864,874	30	8.3%	$6,867,807	9	2.5%	$6,551,117	363	100%	$51,283,799
Town of Cape Carteret	989	874	88.4%	$117,249,849	89	9%	$35,082,732	26	2.6%	$12,823,187	989	100%	$165,155,768
Town of Cedar Point	1,367	1,258	92%	$136,161,149	99	7.2%	$36,519,589	10	0.7%	$9,060,970	1,367	100%	$181,741,708
Town of Emerald Isle	5,712	5,532	96.8%	$1,232,193,596	150	2.6%	$48,640,496	20	0.4%	$16,362,048	5,702	99.8%	$1,297,196,140
Town of Indian Beach	899	864	96.1%	$133,110,722	23	2.6%	$9,450,090	8	0.9%	$2,830,310	895	99.6%	$145,391,123
Town of Morehead City	7,827	6,754	86.3%	$1,045,493,578	829	10.6%	$438,962,082	217	2.8%	$343,125,079	7,800	99.7%	$1,827,580,740
Town of Newport	4,085	3,648	89.3%	$347,170,052	334	8.2%	$91,629,090	98	2.4%	$64,417,787	4,080	99.9%	$503,216,929
Town of Peletier	529	472	89.2%	$46,695,663	49	9.3%	$23,358,562	8	1.5%	$6,169,429	529	100%	$76,223,654
Town of Pine Knoll Shores	1,757	1,649	93.9%	$508,386,956	70	4%	$33,554,811	34	1.9%	$22,410,276	1,753	99.8%	$564,352,044
Subtotal Carteret	**45,526**	**41,590**	**91.4%**	**$6,094,429,415**	**3,099**	**6.8%**	**$1,280,107,784**	**758**	**1.7%**	**$777,538,071**	**45,447**	**99.8%**	**$8,152,075,274**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	20,955	90.6%	$2,393,348,445	1,875	8.1%	$782,132,369	288	1.2%	$479,293,448	23,118	99.9%	$3,654,774,262
City of Havelock	5,366	4,840	90.2%	$530,607,519	371	6.9%	$339,885,301	148	2.8%	$754,625,002	5,359	99.9%	$1,625,117,822
City of New Bern	12,738	11,164	87.6%	$1,511,526,531	1,254	9.8%	$1,431,463,290	298	2.3%	$489,334,396	12,716	99.8%	$3,432,324,217
Town of Bridgeton	317	235	74.1%	$21,796,371	68	21.5%	$22,448,991	12	3.8%	$4,293,516	315	99.4%	$48,538,877
Town of Cove City	274	234	85.4%	$19,073,084	28	10.2%	$5,165,994	11	4%	$13,898,634	273	99.6%	$38,137,712
Town of Dover	281	257	91.5%	$22,592,407	7	2.5%	$2,025,513	17	6%	$13,388,504	281	100%	$38,006,425
Town of River Bend	1,545	1,513	97.9%	$199,228,148	24	1.6%	$76,337,940	7	0.5%	$4,454,737	1,544	99.9%	$280,020,825
Town of Trent Woods	1,910	1,866	97.7%	$353,524,257	22	1.2%	$20,476,768	21	1.1%	$31,485,754	1,909	99.9%	$405,486,780
Town of Vanceboro	467	368	78.8%	$41,887,302	68	14.6%	$25,661,170	31	6.6%	$28,406,968	467	100%	$95,955,440
Subtotal Craven	**46,031**	**41,432**	**90%**	**$5,093,584,064**	**3,717**	**8.1%**	**$2,705,597,336**	**833**	**1.8%**	**$1,819,180,959**	**45,982**	**99.9%**	**$9,618,362,360**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	5,801	90.9%	$521,182,899	498	7.8%	$77,116,977	73	1.1%	$32,801,582	6,372	99.8%	$631,101,458
Town of Alliance	575	481	83.7%	$38,637,425	80	13.9%	$21,935,894	14	2.4%	$4,318,115	575	100%	$64,891,433
Town of Arapahoe	428	386	90.2%	$30,563,858	26	6.1%	$5,206,715	16	3.7%	$11,402,046	428	100%	$47,172,619
Town of Bayboro	514	404	78.6%	$32,102,438	73	14.2%	$14,891,658	36	7%	$52,329,854	513	99.8%	$99,323,950
Town of Grantsboro	581	527	90.7%	$34,814,163	36	6.2%	$17,548,032	17	2.9%	$15,367,563	580	99.8%	$67,729,759
Town of Mesic	185	170	91.9%	$14,668,173	10	5.4%	$712,297	5	2.7%	$1,256,127	185	100%	$16,636,598
Town of Minnesott Beach	401	384	95.8%	$55,300,566	15	3.7%	$19,834,912	2	0.5%	$958,658	401	100%	$76,094,135
Town of Oriental	1,377	1,257	91.3%	$161,858,744	105	7.6%	$23,287,931	14	1%	$6,981,146	1,376	99.9%	$192,127,821
Town of Stonewall	226	199	88.1%	$15,502,428	21	9.3%	$3,608,081	6	2.7%	$4,867,240	226	100%	$23,977,749
Town of Vandemere	190	168	88.4%	$15,326,256	8	4.2%	$2,430,462	14	7.4%	$3,297,000	190	100%	$21,053,718
Subtotal Pamlico	**10,862**	**9,777**	**90%**	**$919,956,950**	**872**	**8%**	**$186,572,959**	**197**	**1.8%**	**$133,579,331**	**10,846**	**99.9%**	**$1,240,109,240**
Region Total	**130,220**	**116,855**	**89.7%**	**$15,330,920,668**	**10,744**	**8.3%**	**$5,819,386,044**	**2,459**	**1.9%**	**$3,451,458,099**	**130,058**	**99.9%**	**$24,601,764,815**

Source: NCEM Risk Management Tool

Table 4.95 – Estimated Buildings Impacted by EF4 Tornado

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	16,974	87.9%	$2,177,194,035	2,000	10.4%	$632,023,217	341	1.8%	$395,668,754	19,315	100%	$3,204,886,006
City of Washington	5,559	4,619	83.1%	$717,993,757	739	13.3%	$904,469,412	193	3.5%	$251,504,355	5,551	99.9%	$1,873,967,524
Town of Aurora	559	439	78.5%	$72,964,593	86	15.4%	$27,302,013	33	5.9%	$26,834,322	558	99.8%	$127,100,928
Town of Bath	553	470	85%	$81,658,169	50	9%	$12,194,513	33	6%	$29,621,891	553	100%	$123,474,573
Town of Belhaven	1,062	918	86.4%	$104,430,603	109	10.3%	$46,724,966	33	3.1%	$32,307,008	1,060	99.8%	$183,462,577
Town of Chocowinity	392	321	81.9%	$55,646,861	43	11%	$59,840,395	27	6.9%	$23,746,242	391	99.7%	$139,233,498
Town of Pantego	126	99	78.6%	$10,448,413	16	12.7%	$5,361,834	11	8.7%	$9,477,767	126	100%	$25,288,014
Town of Washington Park	229	216	94.3%	$40,727,088	13	5.7%	$3,463,056	0	0%	$0	229	100%	$44,190,144
Subtotal Beaufort	**27,801**	**24,056**	**86.5%**	**$3,261,063,519**	**3,056**	**11%**	**$1,691,379,406**	**671**	**2.4%**	**$769,160,339**	**27,783**	**99.9%**	**$5,721,603,264**
Carteret													
Carteret County (Unincorporated Area)	15,309	14,063	91.9%	$1,480,431,919	994	6.5%	$287,052,408	239	1.6%	$213,197,512	15,296	99.9%	$1,980,681,839
Town of Atlantic Beach	3,412	3,241	95%	$591,440,460	152	4.5%	$62,230,561	9	0.3%	$4,822,336	3,402	99.7%	$658,493,357
Town of Beaufort	3,277	2,911	88.8%	$457,063,377	280	8.5%	$227,909,845	80	2.4%	$97,403,182	3,271	99.8%	$782,376,403
Town of Bogue	363	324	89.3%	$38,296,466	30	8.3%	$7,082,435	9	2.5%	$6,800,154	363	100%	$52,179,055
Town of Cape Carteret	989	874	88.4%	$118,407,772	89	9%	$36,221,558	26	2.6%	$13,806,607	989	100%	$168,435,937
Town of Cedar Point	1,367	1,258	92%	$138,571,182	99	7.2%	$38,131,211	10	0.7%	$9,386,128	1,367	100%	$186,088,521
Town of Emerald Isle	5,712	5,532	96.8%	$1,259,013,790	150	2.6%	$50,716,354	20	0.4%	$16,949,210	5,702	99.8%	$1,326,679,353
Town of Indian Beach	899	864	96.1%	$139,180,544	23	2.6%	$9,839,305	8	0.9%	$2,931,878	895	99.6%	$151,951,727
Town of Morehead City	7,827	6,754	86.3%	$1,075,772,963	829	10.6%	$456,542,608	217	2.8%	$362,542,697	7,800	99.7%	$1,894,858,268
Town of Newport	4,085	3,648	89.3%	$351,468,536	334	8.2%	$95,036,661	98	2.4%	$69,042,889	4,080	99.9%	$515,548,086
Town of Peletier	529	472	89.2%	$48,245,812	49	9.3%	$23,911,413	8	1.5%	$6,390,822	529	100%	$78,548,048
Town of Pine Knoll Shores	1,757	1,649	93.9%	$534,701,016	70	4%	$34,317,093	34	1.9%	$23,214,482	1,753	99.8%	$592,232,591
Subtotal Carteret	**45,526**	**41,590**	**91.4%**	**$6,232,593,837**	**3,099**	**6.8%**	**$1,328,991,452**	**758**	**1.7%**	**$826,487,897**	**45,447**	**99.8%**	**$8,388,073,185**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	20,955	90.6%	$2,399,124,161	1,875	8.1%	$818,626,714	288	1.2%	$508,005,348	23,118	99.9%	$3,725,756,223
City of Havelock	5,366	4,840	90.2%	$537,736,710	371	6.9%	$363,461,490	148	2.8%	$795,627,880	5,359	99.9%	$1,696,826,080
City of New Bern	12,738	11,164	87.6%	$1,532,407,473	1,254	9.8%	$1,505,606,500	298	2.3%	$524,142,316	12,716	99.8%	$3,562,156,289
Town of Bridgeton	317	235	74.1%	$21,989,792	68	21.5%	$23,672,663	12	3.8%	$4,477,588	315	99.4%	$50,140,043
Town of Cove City	274	234	85.4%	$19,129,398	28	10.2%	$5,635,330	11	4%	$14,397,395	273	99.6%	$39,162,123
Town of Dover	281	257	91.5%	$22,614,061	7	2.5%	$2,209,570	17	6%	$13,868,959	281	100%	$38,692,590
Town of River Bend	1,545	1,513	97.9%	$200,475,851	24	1.6%	$80,073,932	7	0.5%	$4,614,598	1,544	99.9%	$285,164,381
Town of Trent Woods	1,910	1,866	97.7%	$353,564,055	22	1.2%	$21,381,688	21	1.1%	$33,562,694	1,909	99.9%	$408,508,437
Town of Vanceboro	467	368	78.8%	$42,884,657	68	14.6%	$27,738,015	31	6.6%	$31,393,949	467	100%	$102,016,620
Subtotal Craven	**46,031**	**41,432**	**90%**	**$5,129,926,158**	**3,717**	**8.1%**	**$2,848,405,902**	**833**	**1.8%**	**$1,930,090,727**	**45,982**	**99.9%**	**$9,908,422,786**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	5,801	90.9%	$522,298,036	498	7.8%	$78,666,678	73	1.1%	$33,978,686	6,372	99.8%	$634,943,400
Town of Alliance	575	481	83.7%	$38,997,360	80	13.9%	$23,376,442	14	2.4%	$4,505,248	575	100%	$66,879,051
Town of Arapahoe	428	386	90.2%	$30,720,175	26	6.1%	$5,474,051	16	3.7%	$12,085,786	428	100%	$48,280,012
Town of Bayboro	514	404	78.6%	$32,244,643	73	14.2%	$15,598,412	36	7%	$55,510,185	513	99.8%	$103,353,240
Town of Grantsboro	581	527	90.7%	$34,913,897	36	6.2%	$18,451,258	17	2.9%	$16,001,540	580	99.8%	$69,366,695
Town of Mesic	185	170	91.9%	$14,749,640	10	5.4%	$737,651	5	2.7%	$1,301,204	185	100%	$16,788,495
Town of Minnesott Beach	401	384	95.8%	$56,106,247	15	3.7%	$20,224,991	2	0.5%	$993,060	401	100%	$77,324,298
Town of Oriental	1,377	1,257	91.3%	$163,518,851	105	7.6%	$24,355,440	14	1%	$7,231,668	1,376	99.9%	$195,105,959
Town of Stonewall	226	199	88.1%	$15,518,966	21	9.3%	$3,695,709	6	2.7%	$5,428,248	226	100%	$24,642,922
Town of Vandemere	190	168	88.4%	$15,333,295	8	4.2%	$2,446,116	14	7.4%	$3,415,315	190	100%	$21,194,727
Subtotal Pamlico	**10,862**	**9,777**	**90%**	**$924,401,110**	**872**	**8%**	**$193,026,748**	**197**	**1.8%**	**$140,450,940**	**10,846**	**99.9%**	**$1,257,878,799**
Region Total	**130,220**	**116,855**	**89.7%**	**$15,547,984,624**	**10,744**	**8.3%**	**$6,061,803,508**	**2,459**	**1.9%**	**$3,666,189,903**	**130,058**	**99.9%**	**$25,275,978,034**

Source: NCEM Risk Management Tool

Environment

Tornadoes can cause massive damage to the natural environment, uprooting trees and other debris within the tornado's path. This is part of a natural process, however, and the environment will return to its original state in time.

Consequence Analysis

Table 4.96 summarizes the potential negative consequences of tornado.

Table 4.96 – Consequence Analysis - Tornado

Category	Consequences
Public	Injuries; fatalities
Responders	Injuries; fatalities; potential impacts to response capabilities due to storm impacts
Continuity of Operations (including Continued Delivery of Services)	Potential impacts to continuity of operations due to storm impacts; delays in providing services
Property, Facilities and Infrastructure	The weakest tornadoes, EF0, can cause minor roof damage, while strong tornadoes can destroy frame buildings and even badly damage steel reinforced concrete structures. Buildings are vulnerable to direct impact from tornadoes and also from wind borne debris. Mobile homes are particularly susceptible to damage during tornadoes.
Environment	Potential devastating impacts in storm's path
Economic Condition of the Jurisdiction	Contingent on tornado's path; can severely impact/destroy critical infrastructure and other economic drivers
Public Confidence in the Jurisdiction's Governance	Public confidence in the jurisdiction's governance may be influenced by severe tornado events if response and recovery are not timely and effective.

Hazard Summary by Jurisdiction

The following table summarizes tornado hazard risk by jurisdiction. Tornado risk does not vary substantially by jurisdiction.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	3	1	4	1	2.5	H
City of Washington	3	3	1	4	1	2.5	H
Town of Aurora	3	3	1	4	1	2.5	H
Town of Bath	3	3	1	4	1	2.5	H
Town of Belhaven	3	3	1	4	1	2.5	H
Town of Chocowinity	3	3	1	4	1	2.5	H
Town of Pantego	3	3	1	4	1	2.5	H
Town of Washington Park	3	3	1	4	1	2.5	H
Carteret County	3	3	1	4	1	2.5	H
Town of Atlantic Beach	3	3	1	4	1	2.5	H
Town of Beaufort	3	3	1	4	1	2.5	H
Town of Bogue	3	3	1	4	1	2.5	H
Town of Cape Carteret	3	3	1	4	1	2.5	H
Town of Cedar Point	3	3	1	4	1	2.5	H
Town of Emerald Isle	3	3	1	4	1	2.5	H
Town of Indian Beach	3	3	1	4	1	2.5	H
Town of Morehead City	3	3	1	4	1	2.5	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Newport	3	3	1	4	1	2.5	H
Town of Peletier	3	3	1	4	1	2.5	H
Town of Pine Knoll Shores	3	3	1	4	1	2.5	H
Craven County	3	3	1	4	1	2.5	H
City of Havelock	3	3	1	4	1	2.5	H
City of New Bern	3	3	1	4	1	2.5	H
Town of Bridgeton	3	3	1	4	1	2.5	H
Town of Cove City	3	3	1	4	1	2.5	H
Town of Dover	3	3	1	4	1	2.5	H
Town of River Bend	3	3	1	4	1	2.5	H
Town of Trent Woods	3	3	1	4	1	2.5	H
Town of Vanceboro	3	3	1	4	1	2.5	H
Pamlico County	3	3	1	4	1	2.5	H
Town of Alliance	3	3	1	4	1	2.5	H
Town of Arapahoe	3	3	1	4	1	2.5	H
Town of Bayboro	3	3	1	4	1	2.5	H
Town of Grantsboro	3	3	1	4	1	2.5	H
Town of Mesic	3	3	1	4	1	2.5	H
Town of Minnesott Beach	3	3	1	4	1	2.5	H
Town of Oriental	3	3	1	4	1	2.5	H
Town of Stonewall	3	3	1	4	1	2.5	H
Town of Vandemere	3	3	1	4	1	2.5	H

4.5.11 Wildfire

Hazard Background

A wildfire is an uncontained fire that spreads through the environment. Wildfires have the ability to consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations possibly ensue. Not only do the flames impact the environment, but the massive volumes of smoke spread by certain atmospheric conditions also impact the health of nearby populations. There are three general types of fire spread that are recognized.

- **Ground fires** – burn organic matter in the soil beneath surface litter and are sustained by glowing combustion.
- **Surface fires** – spread with a flaming front and burn leaf litter, fallen branches and other fuels located at ground level.
- **Crown fires** – burn through the top layer of foliage on a tree, known as the canopy or crown fires. Crown fires, the most intense type of fire and often the most difficult to contain, need strong winds, steep slopes and a heavy fuel load to continue burning.

Generally, wildfires are started by humans, either through arson or carelessness. Fire intensity is controlled by both short-term weather conditions and longer-term vegetation conditions. During intense fires, understory vegetation, such as leaves, small branches, and other organic materials that accumulate on the ground, can become additional fuel for the fire. The most explosive conditions occur when dry, gusty winds blow across dry vegetation.

Weather plays a major role in the birth, growth and death of a wildfire. In support of forecasting for fire weather, the National Weather Service Fire Weather Program emerged in response to a need for weather support to large and dangerous wildfires. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires. The National Weather Service Newport-Morehead City Forecast Office provides year-round fire weather forecasts for the Pamlico Sound Region.

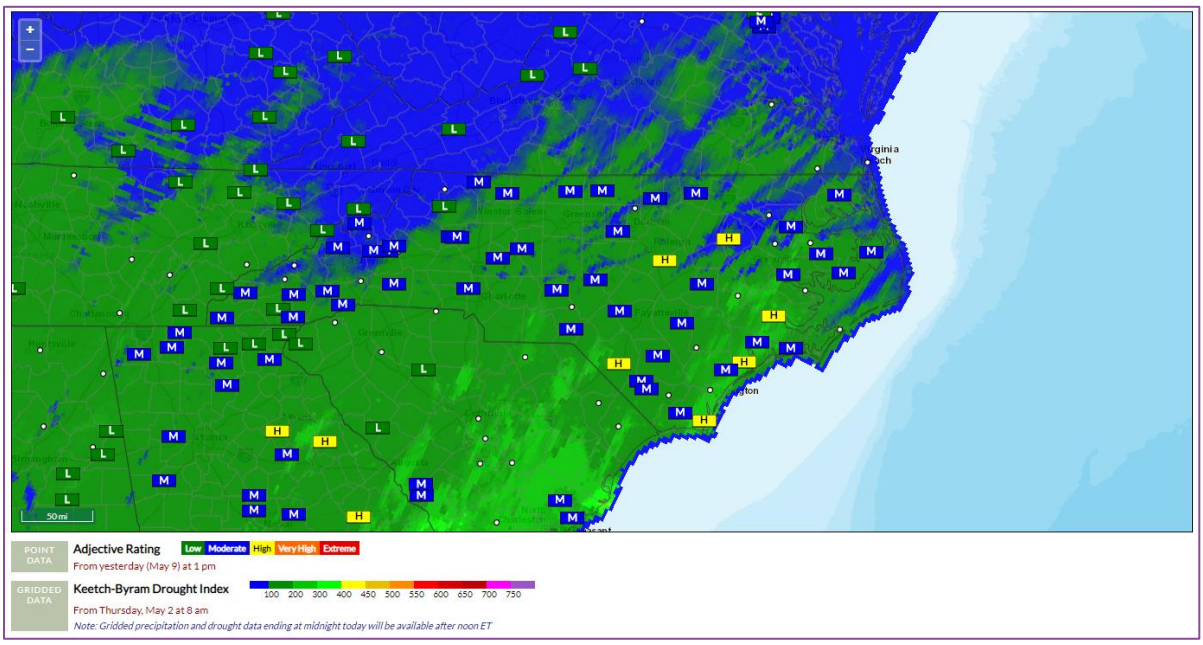
Weather conditions favorable to wildfire include drought, which increases flammability of surface fuels, and winds, which aid a wildfire's progress. The combination of wind, temperature, and humidity affects how fast wildland fires can spread. Rapid response can contain wildfires and limit their threat to property.

The Pamlico Sound Region experiences a variety of wildfire conditions found in the Keetch-Byram Drought Index, which is described in Table 4.97. The Keetch-Byram Drought Index (KBDI) for May 9, 2019 is shown in Figure 4.42 along with a Daily Fire Danger Estimate Adjective Rating for certain points across the state. The KBDI for the Pamlico Sound Region at this time was between 100 and 300, and the Fire Danger Estimate for the nearby area was "Moderate" to "High."

Table 4.97 – Keetch-Byram Drought Index Fire Danger Rating System

KBDI	Description
0-200	Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in sports and patches.
200-400	Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.
400-600	Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
600-800	Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

Figure 4.42 – Keetch-Byram Drought Index, May 2019



Source: USFS Wildland Fire Assessment System

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

Location

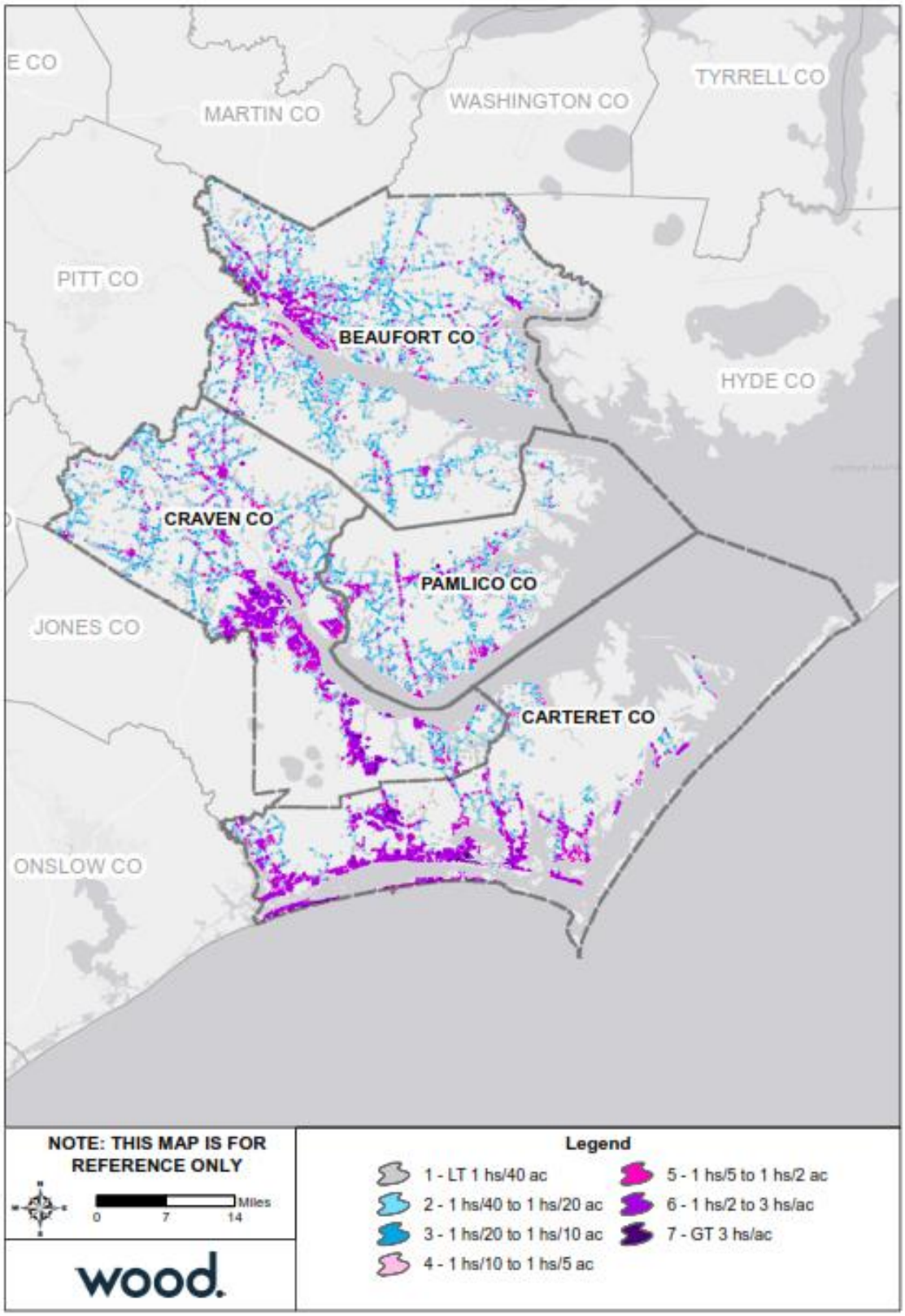
The location of wildfire risk can be defined by the acreage of Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels, and thus demarcates the spatial extent of wildfire risk. The WUI is essentially all the land in the county that is not heavily urbanized. The Southern Wildfire Risk Assessment (SWRA) estimates that 92 percent of the Pamlico Sound Region population lives within the WUI. The expansion of residential development from urban centers out into rural landscapes increases the potential for wildland fire threat to public safety and the potential for damage to forest resources and dependent industries. Population growth within the WUI substantially increases the risk of wildfire. Table 4.98 details the extent of the WUI in the Pamlico Sound Region, and Figure 4.43 maps the WUI.

Table 4.98 – Wildland Urban Interface, Population and Acres

	Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	2,726	1.3 %	156,414	31.3 %
	1hs/40ac to 1hs/20ac	4,407	2.1 %	83,858	16.8 %
	1hs/20ac to 1hs/10ac	9,247	4.4 %	78,432	15.7 %
	1hs/10ac to 1hs/5ac	14,415	6.8 %	60,081	12.0 %
	1hs/5ac to 1hs/2ac	30,754	14.5 %	56,873	11.4 %
	1hs/2ac to 3hs/1ac	129,274	61.1 %	61,314	12.3 %
	GT 3hs/1ac	20,772	9.8 %	2,460	0.5 %
	Total	**211,595**	**100.0 %**	**499,432**	**100.0 %**

Source: Southern Wildfire Risk Assessment

Figure 4.43 – Wildland Urban Interface, Pamlico Sound Region



Source: Southern Wildfire Risk Assessment

Extent

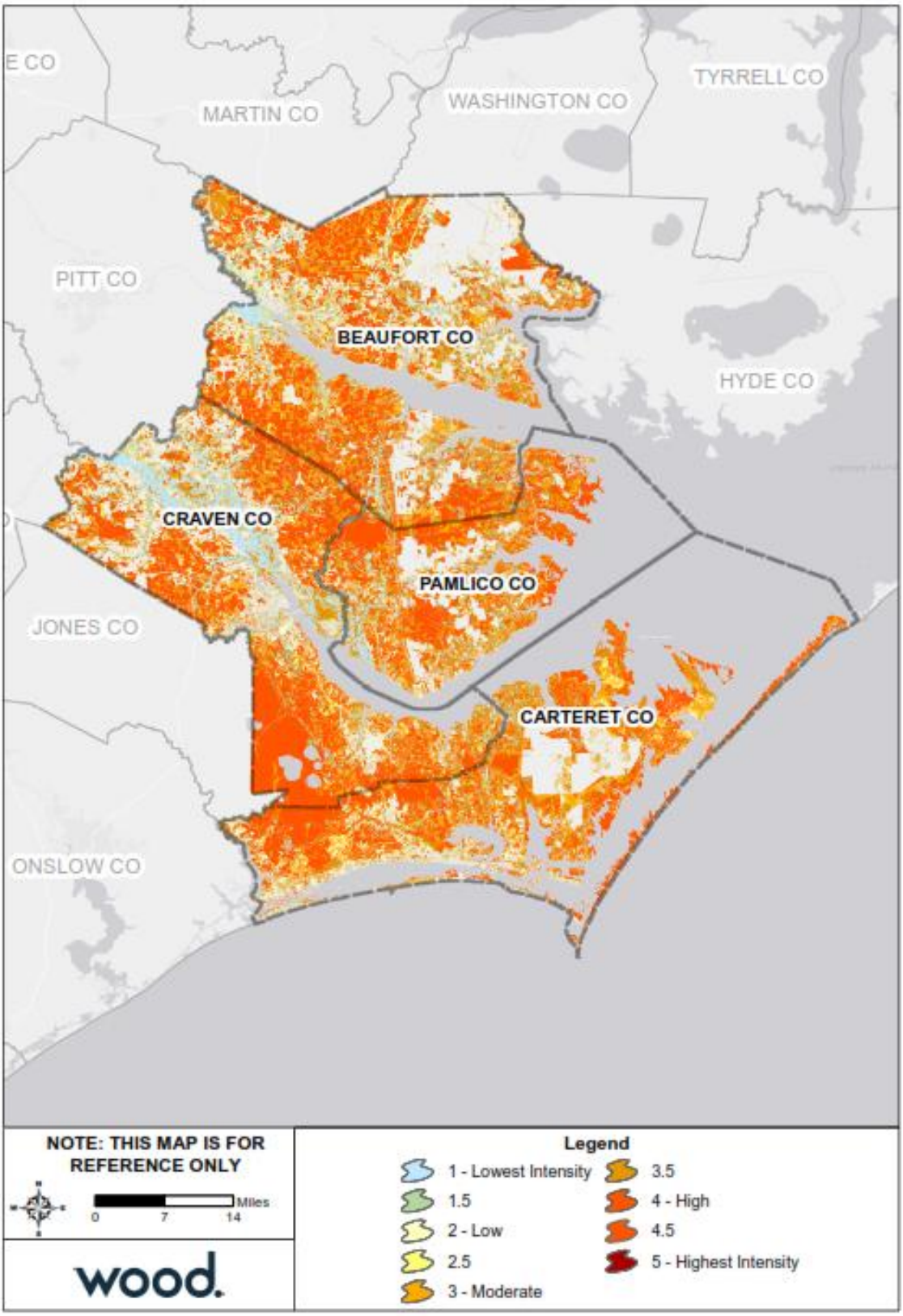
Wildfire extent can be defined by the fire's intensity and measured by the Characteristic Fire Intensity Scale, which identifies areas where significant fuel hazards which could produce dangerous fires exist. Fire Intensity ratings identify where significant fuel hazards and dangerous fire behavior potential exist based on fuels, topography, and a weighted average of four percentile weather categories. The Fire Intensity Scale consists of five classes, as defined by Southern Wildfire Risk Assessment. Figure 4.44 shows the potential fire intensity across the Pamlico Sound Region.

Table 4.99 – Fire Intensity Scale

Class	Description
1, Very Low	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
2, Low	Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
3, Moderate	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
4, High	Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
5, Very High	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Source: Southern Wildfire Risk Assessment

Figure 4.44 – Characteristic Fire Intensity, Pamlico Sound Region



Source: Southern Wildfire Risk Assessment

Approximately 25 percent of the Pamlico Sound Region may experience a Class 4 or Class 4.5 Fire Intensity, which poses significant harm or damage to life and property. Over 14 percent of the Region may experience Class 3 Fire Intensity, which has potential for harm to life and property but is easier to suppress with dozer and plows. The remainder of the Region is either non-burnable (49.1%) or would face a Class 1 or Class 2 Fire Intensity, which are easily suppressed.

Impact: 2 – Limited

Spatial Extent: 3 – Moderate

Historical Occurrences

The North Carolina Forest Service (NCFS) began keeping records of fire occurrence on private and state-owned lands in 1928. Since this time, there has been an average of approximately 4,000 fires burning more than 115,000 acres annually. Recently, within the last 10 years, the State has averaged closer to 3,200 fires per year and 15,000 acres burned annually.

Table 4.100 lists past occurrences of wildfire in the Pamlico Sound Region since 1999 as provided by the North Carolina Forest Service (NCFS). This data only accounts for occurrences within unincorporated areas, which fall under the NCFS jurisdiction, as well as larger events in incorporated areas where local fire departments requested NCFS support for fire suppression. Therefore, actual number of fires and acreage burned may be higher than what can be reported here.

Table 4.100 – Records for Wildfire in the Pamlico Sound Region, 1999-2018

Year	Wildfire Count	Acres Burned	Average Acreage Burned
1999	157	573.2	3.65
2000	127	2473.7	19.48
2001	188	671.0	3.57
2002	123	4484.8	36.46
2003	19	79.3	4.17
2004	96	1163.6	12.12
2005	109	597.6	5.48
2006	84	1673.8	19.93
2007	140	5668.8	40.49
2008	128	933.5	7.29
2009	75	1480.5	19.74
2010	88	475.1	5.40
2011	209	702.7	3.36
2012	59	200.5	3.40
2013	64	733.5	11.46
2014	64	219.6	3.43
2015	73	157.6	2.16
2016	71	212.3	2.99
2017	120	622.0	5.18
2018	77	453.4	5.89
Total	**2,071**	**23,576.4**	**11.38**

Source: NC Forest Service
Note: Records were not available for Pamlico County for 2003, therefore the total event count and acreage burned may be slightly higher than what is reported in this table.

Based on NCFS records, over the 20-year period from 1999 through 2018, the Pamlico Sound Region experienced 2,071 wildfire events that have burned over 23,500 acres of land, or approximately 11.4 acres per fire on average. Total fire counts and acreage burned by county are reported in each county's jurisdictional annex.

Probability of Future Occurrence

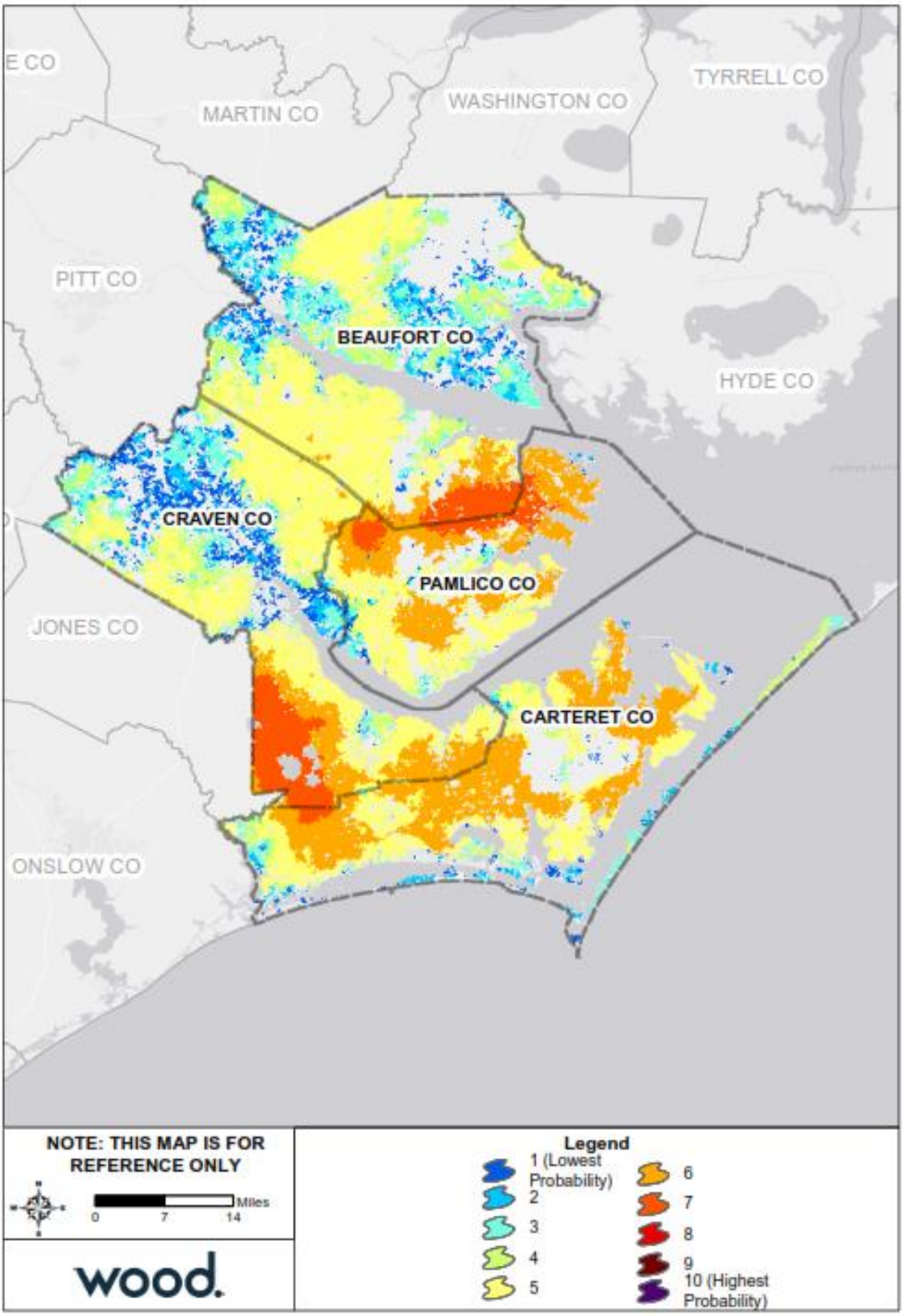
The Southern Wildfire Risk Assessment provides a Burn Probability analysis which predicts the probability of an area burning based on landscape conditions, weather, historical ignition patterns, and historical fire prevention and suppression efforts. Burn Probability data is generated by simulating fires under different weather, fire intensity, and other conditions. Values in the Burn Probability (BP) data layer indicate, for each pixel, the number of times that cell was burned by a modeled fire, divided by the total number of annual weather scenarios simulated. The simulations are calibrated to historical fire size distributions. The Burn Probability for the Pamlico Sound Region is presented in Table 4.101 and illustrated in Figure 4.45

Table 4.101 – Burn Probability, Pamlico Sound Region

	Class	Acres	Percent
	1	69,768	6.2 %
	2	66,183	5.8 %
	3	94,717	8.4 %
	4	113,326	10.0 %
	5	449,124	39.6 %
	6	261,797	23.1 %
	7	79,135	7.0 %
	8	0	0.0 %
	9	0	0.0 %
	10	0	0.0 %
	Total	**1,134,050**	**100.0 %**

Source: Southern Wildfire Risk Assessment

Figure 4.45 – Burn Probability, Pamlico Sound Region



Source: Southern Wildfire Risk Assessment

The entirety of the Pamlico Sound Region has a burn probability of 7 or less, and 70 percent of the region has a burn probability of 5 or less. The areas of highest burn probability are located in southwest Craven County as well as along the border of Pamlico and Beaufort counties.

The probability of wildfire across the Region is considered likely, defined as between a 10% and 100% annual chance of occurrence. While all jurisdictions fall within this threshold, the areas containing moderate burn probability, noted above, have a comparatively higher probability of occurrence.

Probability: 3 – Likely

Climate Change

Wildfires are usually prevalent with a combination of high temperatures and dry conditions, combustible fuels and an ignition source. Climate change has been linked to longer, warmer and drier conditions in the Southeast, exacerbating key potential conditions for a wildfire to spread.

Vulnerability Assessment

Methodologies and Assumptions

Population and property at risk to wildfire was estimated using data from the NCEM IRISK database, which was compiled in NCEM's Risk Management Tool.

Within IRISK, wildfire hazard areas were determined using the Wildland Fire Susceptibility Index (WFSI). The following parameters were applied:

- Areas with a WFSI value of 0.01 – 0.05 were considered to be at moderate risk.
- Areas with a WFSI value greater than 0.05 were considered to be at high risk.
- Areas with a WFSI value less than 0.01 were considered to not be at risk.

The WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility. Due to some necessary assumptions, mainly fuel homogeneity, it is not the true probability. But since all areas of the state have this value determined consistently, it allows for comparison and ordination of areas of the state as to the likelihood of an acre burning.

People

Wildfire can cause fatalities and human health hazards. Ensuring procedures are in place for rapid warning and evacuation are essential to reducing vulnerability. Table 4.102 details the population estimated to be at risk to wildfire according to the NCEM IRISK database.

Table 4.102 – Estimated Population Impacted by Wildfire

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Beaufort									
Beaufort County (Unincorporated Area)	31,461	21,520	68.4%	5,785	3,957	68.4%	1,832	1,253	68.4%
City of Washington	11,838	6,822	57.6%	2,177	1,255	57.6%	689	397	57.6%
Town of Aurora	690	594	86.1%	127	109	85.8%	40	34	85%
Town of Bath	558	350	62.7%	103	65	63.1%	33	21	63.6%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Town of Belhaven	1,795	160	8.9%	330	29	8.8%	105	9	8.6%
Town of Chocowinity	808	585	72.4%	149	108	72.5%	47	34	72.3%
Town of Pantego	161	60	37.3%	30	11	36.7%	9	3	33.3%
Town of Washington Park	446	432	96.9%	82	79	96.3%	26	25	96.2%
Subtotal Beaufort	**47,757**	**30,523**	**63.9%**	**8,783**	**5,613**	**63.9%**	**2781**	**1,776**	**63.9%**
Carteret									
Carteret County (Unincorporated Area)	25,146	22,060	87.7%	4,791	4,203	87.7%	1,234	1,083	87.8%
Town of Atlantic Beach	1,467	465	31.7%	279	88	31.5%	72	23	31.9%
Town of Beaufort	5,345	2,674	50%	1,018	509	50%	262	131	50%
Town of Bogue	670	670	100%	128	128	100%	33	33	100%
Town of Cape Carteret	1,947	1,340	68.8%	371	255	68.7%	96	66	68.8%
Town of Cedar Point	1,617	1,320	81.6%	308	251	81.5%	79	64	81%
Town of Emerald Isle	3,642	195	5.4%	694	37	5.3%	179	10	5.6%
Town of Indian Beach	120	25	20.8%	23	5	21.7%	6	1	16.7%
Town of Morehead City	15,422	11,784	76.4%	2,938	2,245	76.4%	757	578	76.4%
Town of Newport	8,929	8,792	98.5%	1,701	1,675	98.5%	438	431	98.4%
Town of Peletier	808	808	100%	154	154	100%	40	40	100%
Town of Pine Knoll Shores	1,335	1,240	92.9%	254	236	92.9%	65	60	92.3%
Subtotal Carteret	**66,448**	**51,373**	**77.3%**	**12,659**	**9,786**	**77.3%**	**3,261**	**2,520**	**77.3%**
Craven									
Craven County (Unincorporated Area)	42,854	24,589	57.4%	6,546	3,756	57.4%	3,180	1,825	57.4%
City of Havelock	21,490	14,265	66.4%	3,282	2,179	66.4%	1,595	1,059	66.4%
City of New Bern	29,720	9,453	31.8%	4,539	1,444	31.8%	2,205	701	31.8%
Town of Bridgeton	455	198	43.5%	69	30	43.5%	34	15	44.1%
Town of Cove City	392	67	17.1%	60	10	16.7%	29	5	17.2%
Town of Dover	400	6	1.5%	61	1	1.6%	30	0	0%
Town of River Bend	3,052	2,146	70.3%	466	328	70.4%	226	159	70.4%
Town of Trent Woods	4,156	1,788	43%	635	273	43%	308	133	43.2%
Town of Vanceboro	989	917	92.7%	151	140	92.7%	73	68	93.2%
Subtotal Craven	**103,508**	**53,429**	**51.6%**	**15,809**	**8,161**	**51.6%**	**7,680**	**3,965**	**51.6%**
Pamlico									
Pamlico County (Unincorporated Area)	7,546	6,386	84.6%	1,641	1,389	84.6%	344	291	84.6%
Town of Alliance	732	680	92.9%	159	148	93.1%	33	31	93.9%
Town of Arapahoe	552	552	100%	120	120	100%	25	25	100%

Jurisdiction	Total Population	Total Population at Risk		All Elderly Population	Elderly Population at Risk		All Children Population	Children at Risk	
		Number	Percent		Number	Percent		Number	Percent
Town of Bayboro	1,037	1,024	98.7%	226	223	98.7%	47	46	97.9%
Town of Grantsboro	633	620	97.9%	138	135	97.8%	29	28	96.6%
Town of Mesic	216	184	85.2%	47	40	85.1%	10	9	90%
Town of Minnesott Beach	435	276	63.4%	95	60	63.2%	20	13	65%
Town of Oriental	1,459	1,191	81.6%	317	259	81.7%	67	55	82.1%
Town of Stonewall	274	274	100%	60	60	100%	12	12	100%
Town of Vandemere	254	247	97.2%	55	53	96.4%	12	12	100%
Subtotal Pamlico	**13,138**	**11,434**	**87%**	**2,858**	**2,487**	**87%**	**599**	**522**	**87.1%**
Region Total	**230,851**	**146,759**	**63.6%**	**40,109**	**26,047**	**64.9%**	**14,321**	**8,783**	**61.3%**

Source: NCEM Risk Management Tool

Property

Wildfire can cause direct property losses, including damage to buildings, vehicles, landscaped areas, agricultural lands, and livestock. Construction practices and building codes can increase fire resistance and fire safety of structures. Techniques for reducing vulnerability to wildfire include using street design to ensure accessibility to fire trucks, incorporating fire resistant materials in building construction, and using landscaping practices to reduce flammability and the ability for fire to spread.

Table 4.103 details the buildings at risk to wildfire in the Pamlico Sound Region and Table 4.104 provides estimated critical facilities risk.

Table 4.103 – Estimated Buildings Impacted by Wildfire

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Beaufort													
Beaufort County (Unincorporated Area)	19,321	11,611	60.1%	$1,510,826,736	1,017	5.3%	$360,268,451	221	1.1%	$259,776,280	12,849	66.5%	$2,130,871,467
City of Washington	5,559	2,662	47.9%	$426,873,348	302	5.4%	$434,020,905	69	1.2%	$111,258,722	3,033	54.6%	$972,152,975
Town of Aurora	559	378	67.6%	$60,051,992	78	14%	$25,703,907	30	5.4%	$25,217,210	486	86.9%	$110,973,109
Town of Bath	553	295	53.3%	$48,481,771	29	5.2%	$7,653,073	17	3.1%	$11,125,154	341	61.7%	$67,259,999
Town of Belhaven	1,062	82	7.7%	$14,045,671	14	1.3%	$5,779,803	3	0.3%	$8,552,647	99	9.3%	$28,378,121
Town of Chocowinity	392	234	59.7%	$39,362,846	22	5.6%	$33,326,749	24	6.1%	$22,250,889	280	71.4%	$94,940,484
Town of Pantego	126	37	29.4%	$3,537,663	6	4.8%	$1,312,561	4	3.2%	$3,421,891	47	37.3%	$8,272,114
Town of Washington Park	229	209	91.3%	$39,112,915	12	5.2%	$3,445,450	0	0%	$0	221	96.5%	$42,558,365
Subtotal Beaufort	**27,801**	**15,508**	**55.8%**	**$2,142,292,942**	**1,480**	**5.3%**	**$871,510,899**	**368**	**1.3%**	**$441,602,793**	**17,356**	**62.4%**	**$3,455,406,634**
Carteret													
Carteret County (Unincorporated Area)	15,309	12,352	80.7%	$1,299,198,543	856	5.6%	$263,016,417	205	1.3%	$192,694,497	13,413	87.6%	$1,754,909,458
Town of Atlantic Beach	3,412	1,030	30.2%	$202,183,365	35	1%	$25,258,766	4	0.1%	$2,934,310	1,069	31.3%	$230,376,441
Town of Beaufort	3,277	1,459	44.5%	$240,046,274	81	2.5%	$171,393,453	28	0.9%	$43,983,758	1,568	47.8%	$455,423,486
Town of Bogue	363	324	89.3%	$38,296,466	30	8.3%	$7,114,611	9	2.5%	$6,805,065	363	100%	$52,216,142
Town of Cape Carteret	989	601	60.8%	$82,009,795	49	5%	$24,171,241	20	2%	$8,772,398	670	67.7%	$114,953,434
Town of Cedar Point	1,367	1,026	75.1%	$115,680,390	92	6.7%	$37,193,161	10	0.7%	$9,386,128	1,128	82.5%	$162,259,680
Town of Emerald Isle	5,712	296	5.2%	$60,315,964	8	0.1%	$1,658,421	3	0.1%	$624,343	307	5.4%	$62,598,727
Town of Indian Beach	899	174	19.4%	$47,430,334	17	1.9%	$7,536,357	6	0.7%	$2,257,130	197	21.9%	$57,223,821
Town of Morehead City	7,827	5,171	66.1%	$829,879,490	531	6.8%	$310,380,541	90	1.1%	$118,972,096	5,792	74%	$1,259,232,128
Town of Newport	4,085	3,592	87.9%	$345,493,866	327	8%	$95,307,009	98	2.4%	$69,857,639	4,017	98.3%	$510,658,514
Town of Peletier	529	472	89.2%	$48,245,812	49	9.3%	$23,967,126	8	1.5%	$6,390,822	529	100%	$78,603,760
Town of Pine Knoll Shores	1,757	1,530	87.1%	$492,197,909	69	3.9%	$34,042,113	31	1.8%	$21,225,257	1,630	92.8%	$547,465,279
Subtotal Carteret	**45,526**	**28,027**	**61.6%**	**$3,800,978,208**	**2,144**	**4.7%**	**$1,001,039,216**	**512**	**1.1%**	**$483,903,443**	**30,683**	**67.4%**	**$5,285,920,870**

Jurisdiction	All Buildings	Residential Buildings at Risk			Commercial Buildings at Risk			Public Buildings at Risk			Total Buildings at Risk		
	Num	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages	Num	% of Total	Estimated Damages
Craven													
Craven County (Unincorporated Area)	23,133	12,022	52%	$1,275,360,345	985	4.3%	$440,794,624	151	0.7%	$234,657,366	13,158	56.9%	$1,950,812,334
City of Havelock	5,366	3,213	59.9%	$376,025,156	161	3%	$200,592,867	35	0.7%	$135,801,925	3,409	63.5%	$712,419,948
City of New Bern	12,738	3,559	27.9%	$587,669,221	181	1.4%	$366,824,083	57	0.4%	$194,022,068	3,797	29.8%	$1,148,515,372
Town of Bridgeton	317	101	31.9%	$8,056,725	46	14.5%	$18,120,971	8	2.5%	$2,849,210	155	48.9%	$29,026,905
Town of Cove City	274	40	14.6%	$3,291,878	0	0%	$0	0	0%	$0	40	14.6%	$3,291,878
Town of Dover	281	3	1.1%	$256,345	1	0.4%	$218,943	0	0%	$0	4	1.4%	$475,288
Town of River Bend	1,545	1,063	68.8%	$142,477,017	21	1.4%	$76,085,471	6	0.4%	$3,368,076	1,090	70.6%	$221,930,565
Town of Trent Woods	1,910	803	42%	$141,310,462	6	0.3%	$5,057,195	11	0.6%	$25,378,060	820	42.9%	$171,745,717
Town of Vanceboro	467	341	73%	$40,194,956	59	12.6%	$25,221,898	29	6.2%	$30,573,010	429	91.9%	$95,989,864
Subtotal Craven	**46,031**	**21,145**	**45.9%**	**$2,574,642,105**	**1,460**	**3.2%**	**$1,132,916,052**	**297**	**0.6%**	**$626,649,715**	**22,902**	**49.8%**	**$4,334,207,871**
Pamlico													
Pamlico County (Unincorporated Area)	6,385	4,909	76.9%	$441,086,799	399	6.2%	$64,240,548	65	1%	$29,409,098	5,373	84.2%	$534,736,445
Town of Alliance	575	447	77.7%	$36,539,086	80	13.9%	$23,465,322	13	2.3%	$4,270,716	540	93.9%	$64,275,124
Town of Arapahoe	428	386	90.2%	$30,720,175	26	6.1%	$5,490,754	16	3.7%	$12,182,485	428	100%	$48,393,414
Town of Bayboro	514	399	77.6%	$31,771,403	72	14%	$15,602,687	32	6.2%	$31,809,210	503	97.9%	$79,183,300
Town of Grantsboro	581	516	88.8%	$34,143,386	31	5.3%	$14,846,880	17	2.9%	$16,030,596	564	97.1%	$65,020,863
Town of Mesic	185	145	78.4%	$12,950,100	9	4.9%	$552,737	4	2.2%	$944,505	158	85.4%	$14,447,343
Town of Minnesott Beach	401	243	60.6%	$34,851,747	7	1.7%	$17,306,755	2	0.5%	$993,060	252	62.8%	$53,151,562
Town of Oriental	1,377	1,025	74.4%	$127,187,743	94	6.8%	$23,418,729	13	0.9%	$5,921,274	1,132	82.2%	$156,527,746
Town of Stonewall	226	199	88.1%	$15,518,966	20	8.8%	$3,632,797	6	2.7%	$5,564,311	225	99.6%	$24,716,074
Town of Vandemere	190	163	85.8%	$14,770,356	4	2.1%	$1,115,718	14	7.4%	$3,415,315	181	95.3%	$19,301,389
Subtotal Pamlico	**10,862**	**8,432**	**77.6%**	**$779,539,761**	**742**	**6.8%**	**$169,672,927**	**182**	**1.7%**	**$110,540,570**	**9,356**	**86.1%**	**$1,059,753,260**
Region Total	**130,220**	**73,112**	**56.1%**	**$9,297,453,016**	**5,826**	**4.5%**	**$3,175,139,094**	**1,359**	**1%**	**$1,662,696,521**	**80,297**	**61.7%**	**$14,135,288,635**

Source: NCEM Risk Management Tool

The sectors facing the greatest risk to wildfire in the Pamlico Sound Region are commercial facilities, government facilities, and critical manufacturing.

Table 4.104 – Critical Facilities at Risk to Wildfire

Sector	Number of Buildings at Risk	Estimated Damages
Banking and Finance	63	$43,306,531
Chemical	2	$282,015
Commercial Facilities	3,375	$2,225,875,109
Communications	14	$40,311,908
Critical Manufacturing	888	$808,790,312
Defense Industrial Base	4	$9,911,985
Emergency Services	58	$54,784,434
Energy	43	$308,063,903
Food and Agriculture	1,628	$109,445,858
Government Facilities	466	$836,990,410
Healthcare and Public Health	263	$354,514,119
National Monuments and Icons	1	$471,030
Nuclear Reactors, Materials and Waste	4	$2,663,875
Postal and Shipping	8	$6,102,110
Transportation Systems	609	$498,467,303
Water	54	$501,061,939
Total	**7,480**	**$5,801,042,841**

Source: NCEM Risk Management Tool

Environment

Wildfires have the potential to destroy forest and forage resources and damage natural habitats. Wildfire can also damage agricultural crops on private land. Wildfire is part of a natural process, however, and the environment will return to its original state in time.

Consequence Analysis

Table 4.105 summarizes the potential detrimental consequences of wildfire.

Table 4.105 – Consequence Analysis - Wildfire

Category	Consequences
Public	In addition to the potential for fatalities, wildfire and the resulting diminished air quality pose health risks. Exposure to wildfire smoke can cause serious health problems within a community, including asthma attacks and pneumonia, and can worsen chronic heart and lung diseases. Vulnerable populations include children, the elderly, people with respiratory problems or with heart disease. Even healthy citizens may experience minor symptoms, such as sore throats and itchy eyes.
Responders	Public and firefighter safety is the first priority in all wildland fire management activities. Wildfires are a real threat to the health and safety of the emergency services. Most fire-fighters in rural areas are 'retained'. This means that they are part-time and can be called away from their normal work to attend to fires.
Continuity of Operations (including Continued Delivery of Services)	Wildfire events can result in a loss of power which may impact operations. Downed trees, power lines and damaged road conditions may prevent access to critical facilities and/or emergency equipment.
Property, Facilities and Infrastructure	Wildfires frequently damage community infrastructure, including roadways, communication networks and facilities, power lines, and water distribution systems.

Category	Consequences
	Restoring basic services is critical and a top priority. Efforts to restore roadways include the costs of maintenance and damage assessment teams, field data collection, and replacement or repair costs. Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground distribution lines, and soil erosion or debris deposits into waterways after the fire. Utilities and communications repairs are also necessary for equipment damaged by a fire. This includes power lines, transformers, cell phone towers, and phone lines.
Environment	Wildfires cause damage to the natural environment, killing vegetation and animals. The risk of floods and debris flows increases after wildfires due to the exposure of bare ground and the loss of vegetation. In addition, the secondary effects of wildfires, including erosion, landslides, introduction of invasive species, and changes in water quality, are often more disastrous than the fire itself.
Economic Condition of the Jurisdiction	Wildfires can have significant short-term and long-term effects on the local economy. Wildfires, and extreme fire danger, may reduce recreation and tourism in and near the fires. If aesthetics are impaired, local property values can decline. Extensive fire damage to trees can significantly alter the timber supply, both through a short-term surplus from timber salvage and a longer-term decline while the trees regrow. Water supplies can be degraded by post-fire erosion and stream sedimentation. Wildfires can also have positive effects on local economies. Positive effects come from economic activity generated in the community during fire suppression and post-fire rebuilding. These may include forestry support work, such as building fire lines and performing other defenses, or providing firefighting teams with food, ice, and amenities such as temporary shelters and washing machines.
Public Confidence in the Jurisdiction's Governance	Wildfire events may cause issues with public confidence because they have very visible impacts on the community. Public confidence in the jurisdiction's governance may be influenced by actions taken pre-disaster to mitigate and prepare for impacts, including the amount of public education provided; efforts to provide warning to residents; response efforts; and recovery.

Hazard Summary by Jurisdiction

The following table summarizes wildfire hazard risk by jurisdiction. Wildfire warning time and duration do not vary by jurisdiction. Spatial extent ratings were based on the proportion of area within the WUI. Impact ratings were based on fire intensity data from SWRA. Jurisdictions with significant clusters of moderate to high fire intensity were assigned a rating of 3; all others were assigned a rating of 2. Probability ratings were determined based on burn probability data from SWRA. Jurisdictions with clusters of moderate burn probability were assigned a rating of 3; all others were assigned a probability of 2.

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Beaufort County	3	3	2	4	3	2.9	H
City of Washington	2	2	3	4	3	2.5	H
Town of Aurora	3	3	3	4	3	3.1	H
Town of Bath	2	3	3	4	3	2.8	H
Town of Belhaven	3	2	3	4	3	2.8	H
Town of Chocowinity	2	3	3	4	3	2.8	H
Town of Pantego	2	2	3	4	3	2.5	H
Town of Washington Park	2	2	3	4	3	2.5	H
Carteret County	3	2	3	4	3	2.8	H
Town of Atlantic Beach	2	3	3	4	3	2.8	H
Town of Beaufort	2	2	3	4	3	2.5	H
Town of Bogue	2	2	3	4	3	2.5	H

Jurisdiction	Probability	Impact	Spatial Extent	Warning Time	Duration	Score	Priority
Town of Cape Carteret	3	3	3	4	3	3.1	H
Town of Cedar Point	2	2	3	4	3	2.5	H
Town of Emerald Isle	2	2	3	4	3	2.5	H
Town of Indian Beach	2	2	3	4	3	2.5	H
Town of Morehead City	2	2	3	4	3	2.5	H
Town of Newport	3	2	3	4	3	2.8	H
Town of Peletier	2	3	3	4	3	2.8	H
Town of Pine Knoll Shores	2	2	3	4	3	2.5	H
Craven County	3	2	3	4	3	2.8	H
City of Havelock	3	2	3	4	3	2.8	H
City of New Bern	3	2	3	4	3	2.8	H
Town of Bridgeton	2	2	3	4	3	2.5	H
Town of Cove City	2	2	3	4	3	2.5	H
Town of Dover	3	2	3	4	3	2.8	H
Town of River Bend	2	2	3	4	3	2.5	H
Town of Trent Woods	2	2	3	4	3	2.5	H
Town of Vanceboro	2	2	3	4	3	2.5	H
Pamlico County	3	3	3	4	3	3.1	H
Town of Alliance	2	2	3	4	3	2.5	H
Town of Arapahoe	2	3	3	4	3	2.8	H
Town of Bayboro	2	2	3	4	3	2.5	H
Town of Grantsboro	3	3	3	4	3	3.1	H
Town of Mesic	3	3	3	4	3	3.1	H
Town of Minnesott Beach	3	3	3	4	3	3.1	H
Town of Oriental	3	2	3	4	3	2.8	H
Town of Stonewall	2	2	3	4	3	2.5	H
Town of Vandemere	2	3	3	4	3	2.8	H

4.6 CONCLUSIONS ON HAZARD RISK

Priority Risk Index

As discussed in Section 4.3 Risk Assessment Methodology and Assumptions, the Priority Risk Index was used to rate each hazard on a set of risk criteria and determine an overall standardized score for each hazard. The conclusions drawn from this process are summarized below.

Table 4.106 summarizes the degree of risk assigned to each identified hazard using the PRI method.

Table 4.106 – Summary of PRI Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal Hazards (Erosion & Rip Current)	Highly Likely	Limited	Negligible	More than 24 hrs	Less than 6 hrs	2.2
Dam & Levee Failure	Unlikely	Critical	Negligible	Less than 6 hrs	Less than 1 week	2.1
Drought	Likely	Minor	Large	More than 24 hrs	More than 1 week	2.5
Earthquake	Unlikely	Minor	Large	Less than 6 hrs	Less than 6 hrs	1.9
Extreme Heat	Highly Likely	Critical	Large	More than 24 hrs	Less than 24 hrs	3.2
Flood	Possible	Critical	Moderate	6 to 12 hours	Less than 1 week	2.7
Hurricane & Tropical Storm	Likely	Catastrophic	Large	More than 24 hrs	Less than 1 week	3.3
Severe Weather: Hail[1]	Highly Likely	Minor	Small	Less than 6 hrs	Less than 6 hrs	2.4
Severe Weather: Lightning[1]	Highly Likely	Minor	Negligible	Less than 6 hrs	Less than 6 hrs	2.2
Severe Weather: Thunderstorm Winds[1]	Highly Likely	Limited	Large	Less than 6 hrs	Less than 6 hrs	3.1
Severe Winter Storm	Highly Likely	Limited	Large	More than 24 hrs	Less than 1 week	3.0
Tornado	Likely	Critical	Small	Less than 6 hrs	Less than 6 hrs	2.7
Wildfire	Likely	Limited	Moderate	Less than 6 hrs	Less than 1 week	2.8

[1]Note: Severe Weather hazards average to a score of 2.6 and are therefore considered together as a high risk hazard.

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 4.107:

- **High Risk** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread.
- **Moderate Risk** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **Low Risk** – Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal. This is not a priority hazard.

Table 4.107 – Summary of Hazard Risk Classification

High Risk (> 2.4)	Hurricane & Tropical Storm Extreme Heat Severe Winter Storm Wildfire Flood Tornado Severe Weather Drought
Moderate Risk (2.0 – 2.4)	Dam & Levee Failure Coastal Hazards
Low Risk (< 2.0)	Earthquake

5 Capability Assessment

This section discusses the capability of the Pamlico Sound region to implement hazard mitigation activities. It consists of the following four subsections:

5.1 OVERVIEW

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects. As in any planning process, it is important to try to establish which goals, objectives, and actions are feasible, based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical and likely to be implemented over time given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, and programs already in place; and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. The capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the Pamlico Sound region serves as a critical planning step toward developing an effective mitigation strategy. Coupled with the risk assessment, the capability assessment helps identify and target effective goals, objectives, and mitigation actions that are realistically achievable under given local conditions.

5.2 CONDUCTING THE CAPABILITY ASSESSMENT

To facilitate the inventory and analysis of local government capabilities within the planning area, a detailed Local Capability Self-Assessment worksheet was distributed to members of the HMPC after the first planning committee meeting. The survey questionnaire requested information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region's ability to implement hazard mitigation actions. Other indicators included information related to the region's fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes, and existing education and outreach programs that can be used to promote mitigation. Communities were also asked to comment on the current political climate with respect to hazard mitigation, an important consideration for any local planning or decision-making process.

At a minimum, the survey results provide an extensive and consolidated inventory of existing local plans, ordinances, programs, and resources in place or under development. With this information, inferences can be made about the overall effect on hazard loss reduction in each community. In completing the

survey, local officials were also asked to rate their jurisdiction's specific capabilities. The survey instrument thereby not only helps accurately assess the degree of local capability, but it also serves as a good source of introspection for counties and local jurisdictions that want to improve their capabilities. Identified gaps, weaknesses, or conflicts can be recast as opportunities for specific actions to be proposed as part of the mitigation strategy.

The information provided in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on the jurisdiction's self-assessment of their own planning and regulatory capability, administrative and technical capability, fiscal capability, education and outreach capability, and political capability.

Using this scoring methodology, a total score and an overall capability rating of "High," "Moderate," or "Limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. In combination with the narrative responses provided by local officials, the results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

5.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this plan to provide insight into the relevant capacity of the Pamlico Sound Planning Area to implement hazard mitigation activities. All information is based upon the input provided by local government officials through the Local Capability Self-Assessment.

5.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner, while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning. Regulatory capability also includes the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built, as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision-making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools or programs in place or under development for the Pamlico Sound region, along with their potential effect on loss reduction. This information will help identify opportunities to address gaps, weaknesses, or conflicts with other initiatives and integrate the implementation of this plan with existing planning mechanisms where appropriate.

Table 5.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the Pamlico Sound region. A checkmark (√) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. A plus sign (+) indicates that a jurisdiction is covered for that item under a county-implemented version. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Hazard Mitigation Plan.

Table 5.1 – Relevant Plans, Ordinances, and Programs

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redev. Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Beaufort County	√	√				√	√	√	√	√					√	√	√	√	√			√	√		√	
Town of Aurora	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	
Town of Bath	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	
Town of Belhaven	√	√	√	√		√	+	+	+	+		√	+		√	√	√	√	√	√		√	√		√	√
Town of Chocowinity	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	
Town of Pantego	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	
City of Washington	√	√	√	√	√	+	+	+	+	+		√	√	√	√	√	√	√	√	√		√	√		√	√
Town of Washington Park	√	√	√	√	√	+	+	+	+	+					√	√	√	√	√			√	√		√	√
Carteret County	√	√				√	√	√	√	√		√	√		√	√	√	√	√	√		√	√		√	√
Town of Atlantic Beach	√	√		√	√	+	+	+	+	+		√			√	√	√	√	√	√		√	√		√	√
Town of Beaufort	√	√		√		+	+	+	+	+		√			√	√	√	√	√	√		√	√		√	√
Town of Bogue	√	+				+	+	+	+	+					+	√	√	√	√			+	√		√	
Town of Cape Carteret	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	√
Town of Cedar Point	√	√				+	+	+	+	+					√	√	√	√	√			√	√		√	√

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redev. Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Town of Emerald Isle	√	√	√	√	√	+	+	+	+	+		√	+		√	√	√	√	√	√		√	√		√	√
Town of Indian Beach	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
Town of Morehead City	√	√	√		*	+	+	+	√	+		√	+		√	√	√	√	√	√		√	√		√	√
Town of Newport	√	√		√		+	+	+	+	+					√	√	√	√	√			√	√		√	√
Town of Peletier	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
Town of Pine Knoll Shores	√	√		√		+	+	+	+	+					√	√	√	√	√	√		√	√		√	√
Craven County	√	√				√	√	√	√	√		√	√		√	√	√	√	√			√	√		√	√
Town of Bridgeton	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
Town of Cove City	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
Town of Dover	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
City of Havelock	√	√		√	√	+	+	+	+	+		√			√	√	√	√	√	√		√	√		√	√
City of New Bern	√	√		√	√	+	+	+	+	+		√		√	√	√	√	√	√	√		√	√		√	√
Town of River Bend	√	√				+	+	+	+	+						√	√	√	√			√	√		√	√
Town of Vanceboro	√	√				+	+	+	+	+						√	√	√	√			√	√		√	
Town of Trent Woods	√	√			√	+	+	+	+	+						√	√	√	√			√	√		√	

Jurisdiction	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan	Stormwater Management Plan	Emergency Operations Plan	SARA Title III Plan	Radiological Emergency Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Transportation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Site Plan Review Requirements	Unified Development Ordinance	Post-Disaster Redev. Ordinance	Building Code	Fire Code	Community Wildfire Protection Plan	National Flood Insurance Program	Community Rating System
Pamlico County	√	√				√	√	√	√	√					√	√		√	√			√	√		√	√
Town of Alliance	√	√				+	+	+	+	+						√		√	√			√	√		√	√
Town of Arapahoe	√	√				+	+	+	+	+						√		√	√			√	√		√	
Town of Bayboro	√	√				+	+	+	+	+						√	√	√	√			√	√		√	√
Town of Grantsboro	√	√				+	+	+	+	+						√		√	√			√	√		√	
Town of Mesic	√	√				+	+	+	+	+						√	√	√	√			√	√		√	√
Town of Minnesott Beach	√	√				+	+	+	+	+						√	√	√	√			√	√		√	√
Town of Oriental	√	√		√		√	+	+	+	+	√	√				√	√	√	√	√		√	√		√	√
Town of Stonewall	√	√				+	+	+	+	+						√		√	√			√	√		√	√
Town of Vandemere	√	√		√		+	+	+	+	+					+	√	√	√	√			√	√		√	√

A more detailed discussion on the region's planning and regulatory capability follows, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

5.3.1.1 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management, as is shown in Figure 5.1. In reality, mitigation is interconnected with all other phases and is an essential component of effective preparedness, response, and recovery. Opportunities to reduce potential losses through mitigation practices are most often implemented before a disaster event, such as through the elevation of flood-prone structures or by regular enforcement of policies that regulate development. However, mitigation opportunities can also be identified during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane. Furthermore, incorporating mitigation during the long-term recovery and redevelopment process following a disaster event is what enables a community to become more resilient.

Figure 5.1 – The Four Phases of Emergency Management

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As such, the Local Capability Self-Assessment asked several questions across a range of emergency management plans to assess the region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan

A hazard mitigation plan is a community's blueprint for how it intends to reduce the impact of natural, and in some cases human-caused, hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- All participating jurisdictions in this regional planning effort have previously been covered by the Pamlico Sound Regional Hazard Mitigation Plan.

Disaster Recovery Plan

A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster event. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on

opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- 1 of the 39 participating jurisdictions has a disaster recovery plan in place.

Emergency Operations Plan

An emergency operations plan outlines responsibilities and how resources will be deployed during and following an emergency or disaster.

- All participating jurisdictions have an emergency operations plan either in place or are covered under a county plan (5 jurisdictions have one in place; 34 jurisdictions covered under a county plan).

Continuity of Operations Plan

A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event.

- All of the participating jurisdictions have a continuity of operations plan either in place or are covered under a county plan (5 jurisdictions have one in place; 34 jurisdictions covered under a county plan.

5.3.1.2 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they may not be designed as such. The Local Capability Self-Assessment asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other ongoing planning efforts in the region.

Comprehensive/General Plan

A comprehensive land use plan, or general plan, establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- All participating jurisdictions have a comprehensive land use plan in place (38 jurisdictions have one in place; 1 jurisdiction covered under a county plan).

Capital Improvements Plan

A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- 11 of the 39 participating jurisdictions have a capital improvements plan in place or under development.

Historic Preservation Plan

A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards, and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

- 2 of the 39 participating jurisdictions have an historic preservation plan in place or under development.

Zoning Ordinance

Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- 34 of the 39 participating jurisdictions have a zoning ordinance in place or under development.

Subdivision Ordinance

A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- All participating jurisdictions have a subdivision ordinance in place or under development.

Building Codes, Permitting, and Inspections

Building codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- All participating jurisdictions have building codes in place.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program, developed by the Insurance Services Office, Inc. (ISO). In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes, with special emphasis on mitigation of losses from natural hazards. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The expectation is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses, and as a result should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education, as well as number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with a BCEGS grade of 1 representing exemplary commitment to building code enforcement, and a grade of 10 indicating less than minimum recognized protection.

5.3.1.3 Floodplain Management

Flooding represents the greatest natural hazard facing the nation, yet the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the NFIP contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this capability assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings be protected from damage by a 100-year flood event, and that new development in the floodplain not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 5.2 provides NFIP policy and claim information for each participating jurisdiction in the Pamlico Sound region.

All jurisdictions in the region participate in the NFIP and will continue to comply with all required provisions of the program. Floodplain management is managed through zoning ordinances, building code restrictions, and the county building inspection program. The jurisdictions will coordinate with NCEM and FEMA to develop maps and regulations related to Special Flood Hazard Areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property.

Community Rating System

An additional indicator of floodplain management capability is active participation in the Community Rating System (CRS). The CRS is an incentive-based program that encourages communities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP. Each of the CRS mitigation activities is assigned a point value. As a community earns points and reaches identified thresholds, they can apply for an improved CRS class. Class ratings, which range from 10 to 1 and increase on 500-point increments, are tied to flood insurance premium reductions. Every class improvement earns an additional 5 percent discount for NFIP policyholders, with a starting discount of 5 percent for Class 9 communities and a maximum possible discount of 45 percent for Class 1 communities.

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years, based on community comments intended to make the CRS more user friendly, and extensive technical assistance available for communities who request it.

- 24 of the 39 participating jurisdictions participate in the Community Rating System. Each community's CRS Class is shown in the table below.

Table 5.2 – NFIP Policy and Claim Information

Jurisdiction	Date Joined NFIP	Current CRS Class	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Written Premium in Force	Closed Losses	Total Payments
Beaufort County	07/22/77	-	07/07/14	2,265	$472,720,500	$1,720,598	4,014	$69,427,322
City of Washington	02/20/73	7	07/07/14	1,232	$210,648,500	$1,123,426	987	$13,335,556
Town of Aurora	05/03/74	-	01/02/04	36	$7,209,000	$25,875	28	$796,499
Town of Bath	07/08/77	-	01/02/04	82	$19,718,100	$44,515	25	$315,813
Town of Belhaven	04/13/73	7	01/02/04	434	$66,687,600	$368,129	1,659	$19,285,049
Town of Chocowinity	05/15/03	-	01/02/04	2	$510,000	$1,277	4	$99,791
Town of Pantego	09/06/74	-	01/02/04	13	$2,330,400	$17,641	8	$71,415
Town of Washington Park	02/09/73	8	01/02/04	133	$26,206,800	$183,958	262	$3,636,964
Carteret County	02/14/75	7	07/16/03	3,815	$873,366,100	$2,782,701	2,537	$41,067,494
Town of Atlantic Beach	06/28/74	8	07/16/03	2,971	$511,124,200	$2,128,691	487	$6,135,084
Town of Beaufort	12/01/72	7	07/16/03	828	$214,587,500	$653,108	73	$787,982
Town of Bogue	02/14/75	-	07/16/03	26	$7,677,700	$17,647	0	0
Town of Cape Carteret	05/24/74	8	07/16/03	162	$45,314,800	$141,440	71	$937,442
Town of Cedar Point	02/14/75	9	07/16/03	306	$62,599,900	$215,518	51	$529,249
Town of Emerald Isle	06/07/74	7	07/16/03	2,694	$683,061,600	$2,536,528	618	$7,929,318
Town of Indian Beach	03/04/85	-	07/16/03	475	$106,612,300	$204,754	13	$140,992
Town of Morehead City	02/22/74	7	07/16/03	1,454	$400,632,300	$945,692	157	$1,588,929
Town of Newport	03/01/74	8	07/16/03	110	$26,769,300	$66,554	14	$165,150
Town of Peletier	07/16/03	-	07/16/03	10	$2,512,500	$4,457	0	0
Town of Pine Knoll Shores	07/11/75	6	07/16/03	1,340	$317,724,700	$822,782	97	$1,218,180
Craven County	12/20/74	8	04/16/13	2,183	$534,741,000	$1,211,127	1,263	$19,699,558
City of Havelock	09/13/74	8	04/16/13	168	$41,718,400	$77,656	68	$1,587,850
City of New Bern	02/22/74	10	04/16/13	1,334	$298,386,600	$981,218	807	$9,464,390
Town of Bridgeton	12/20/74	-	04/16/13	76	$15,157,600	$63,852	42	$483,526
Town of Cove City	07/02/04	-	04/16/13	1	$210,000	$320	0	0
Town of Dover	07/02/04	-	04/16/13	0	0	0	0	0
Town of River Bend	05/14/82	8	04/16/13	443	$101,114,900	$347,112	378	$4,203,994

Jurisdiction	Date Joined NFIP	Current CRS Class	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Written Premium in Force	Closed Losses	Total Payments
Town of Trent Woods	05/04/87	-	04/16/13	250	$72,296,300	$173,815	90	$1,018,378
Town of Vanceboro	12/20/74	-	04/16/13	3	$1,028,500	$1,480	3	$15,959
Pamlico County	01/31/75	8	07/02/04	1,143	$265,497,700	$661,360	1,624	$39,181,252
Town of Alliance	07/14/78	9	07/02/04	8	$1,318,200	$3,048	2	$15,591
Town of Arapahoe	07/02/04	-	07/02/04	0	0	0	0	0
Town of Bayboro	07/30/76	9	07/02/04	40	$8,398,600	$30,860	38	$882,957
Town of Grantsboro	06/16/78	-	07/02/04	0	0	0	0	0
Town of Mesic	07/30/76	9	07/02/04	35	$4,524,600	$26,453	10	$452,884
Town of Minnesott Beach	03/02/79	9	07/02/04	18	$5,653,800	$11,078	6	$51,733
Town of Oriental	01/31/75	9	07/02/04	685	$176,027,700	$444,253	877	$18,493,074
Town of Stonewall	01/31/75	9	07/02/04	21	$3,954,700	$21,829	19	$382,493
Town of Vandemere	01/31/75	9	07/02/04	60	$11,733,000	$55,312	142	$4,692,028
TOTAL PLAN	**-**	**-**	**-**	**24,856**	**$5,599,775,400**	**$18,116,064**	**16,474**	**$268,093,896**

Source: FEMA NFIP Policy Statistics

Floodplain Management Plan

A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- 5 of the 39 participating jurisdictions have a floodplain management plan in place.

Open Space Management Plan

An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state, and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- 12 of the 39 participating jurisdictions have an open space management plan in place or under development.

Stormwater Management Plan

A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- 8 of the 39 participating jurisdictions have a stormwater management plan in place or under development.

5.3.2 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using geographic information systems (GIS) to analyze and assess community hazard vulnerability. The Local Capability Self-Assessment was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 5.3 provides a summary of the Local Capability Self-Assessment results for the region with regard to relevant staff and personnel resources. A checkmark indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

Table 5.3 – Relevant Staff/Personnel Resources

Jurisdiction	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Building Official	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS	Resource development staff or grant writers	Maintenance programs to reduce risk	Warning systems/services	Mutual Aid Agreements
Beaufort County	√	√	√	√	√	√			√	√	√	√	√	√
Town of Aurora									√				√	
Town of Bath									√				√	
Town of Belhaven	√	√	√	√		√			√	√	√	√	√	√
Town of Chocowinity									√				√	
Town of Pantego									√				√	
City of Washington	√	√	√	√		√			√	√	√	√	√	√
Town of Washington Park									√				√	
Carteret County	√	√	√	√	√	√		√	√	√	√	√	√	√
Town of Atlantic Beach	√	√	√	√	√	√			√	√	√	√	√	√
Town of Beaufort	√	√	√	√		√			√	√	√	√	√	√
Town of Bogue	√	√	√	√	√	√	√		√	√	√		√	√
Town of Cape Carteret	√	√	√	√		√			√		√	√	√	
Town of Cedar Point	√	√	√	√		√			√		√	√	√	
Town of Emerald Isle	√	√	√	√		√			√	√	√	√	√	√
Town of Indian Beach													√	
Town of Morehead City	√	√	√	√		√			√	√	√	√	√	√
Town of Newport	√	√	√	√		√			√	√	√	√	√	√
Town of Peletier													√	
Town of Pine Knoll Shores	√	√	√	√		√			√	√	√	√	√	√

Jurisdiction	Planners with knowledge of land development and land management practices	Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Planners or engineers with an understanding of natural and/or human-caused hazards	Building Official	Emergency manager	Floodplain manager	Land surveyors	Scientist familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS	Resource development staff or grant writers	Maintenance programs to reduce risk	Warning systems/services	Mutual Aid Agreements
Craven County	√	√	√	√	√	√			√	√	√	√	√	√
Town of Bridgeton						√			√			√	√	
Town of Cove City						√			√			√	√	
Town of Dover						√			√			√	√	
City of Havelock	√	√	√	√		√			√	√	√	√	√	√
City of New Bern	√	√	√	√		√			√	√	√	√	√	√
Town of River Bend		√		√		√			√			√	√	√
Town of Trent Woods		√		√		√			√		√	√	√	√
Town of Vanceboro						√			√			√	√	
Pamlico County	√	√	√	√	√	√			√	√	√	√	√	√
Town of Alliance													√	
Town of Arapahoe													√	
Town of Bayboro									√				√	
Town of Grantsboro													√	
Town of Mesic									√				√	
Town of Minnesott Beach									√				√	
Town of Oriental	√		√				√	√	√		√	√	√	√
Town of Stonewall													√	
Town of Vandemere	√	√	√						√	√	√	√	√	√

Source: Local Capability Assessment Survey

5.3.3 Fiscal Capability

The ability of a local government to implement mitigation actions is often dependent on the amount of money available. This may take the form of outside grant funding awards or locally based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project such as the acquisition of flood-prone houses, which can require a substantial commitment from local, state, and federal funding sources.

The Local Capability Self-Assessment was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 5.4 provides a summary of the results for the region with regard to relevant fiscal resources. A checkmark indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds).

Table 5.4 – Relevant Fiscal Resources

Jurisdiction	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Revenue Bonds	Special Tax Bonds	Other
Beaufort County					√						
Town of Aurora											
Town of Bath											
Town of Belhaven	√	√		√	√						
Town of Chocowinity											
Town of Pantego											
City of Washington	√			√	√						
Town of Washington Park											
Carteret County	√	√			√						
Town of Atlantic Beach						√					
Town of Beaufort	√										
Town of Bogue											
Town of Cape Carteret											
Town of Cedar Point											
Town of Emerald Isle	√										
Town of Indian Beach											
Town of Morehead City	√				√						
Town of Newport	√				√		√				

Jurisdiction	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation Bonds	Revenue Bonds	Special Tax Bonds	Other
Town of Peletier											
Town of Pine Knoll Shores					√						
Craven County	√	√	√		√						
Town of Bridgeton											
Town of Cove City											
Town of Dover											
City of Havelock	√			√	√						
City of New Bern	√	√		√	√	√					
Town of River Bend		√	√		√	√	√	√	√		
Town of Trent Woods											
Town of Vanceboro											
Pamlico County					√						
Town of Alliance											
Town of Arapahoe											
Town of Bayboro											
Town of Grantsboro											
Town of Mesic											
Town of Minnesott Beach											
Town of Oriental	√				√						
Town of Stonewall											
Town of Vandemere	√	√	√				√				

Source: Local Capability Assessment Survey

5.3.4 Education and Outreach Capability

This type of local capability refers to education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Examples include natural disaster or safety related school programs; participation in community programs such as Firewise or StormReady; and activities conducted as part of hazard awareness campaigns such as a Tornado Awareness Month.

Table 5.5 provides a summary of the results for the region with regard to relevant education and outreach resources. A checkmark (√) indicates that the given resource is locally available for hazard mitigation purposes. An asterisk (*) indicates that a given resource is currently in the process of being obtained. A plus sign (+) indicates that a jurisdiction is covered for that item by a county program.

Table 5.5 – Education and Outreach Resources

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise Communities certification	Public-private partnership initiatives addressing disaster-related issues	Other
Beaufort County	√	√	√			√	
Town of Aurora							
Town of Bath							
Town of Belhaven	√	√	√			√	
Town of Chocowinity							
Town of Pantego							
City of Washington	√	√	√				
Town of Washington Park							
Carteret County	√	√	√	√		√	
Town of Atlantic Beach	√	√					
Town of Beaufort	√	√					
Town of Bogue							
Town of Cape Carteret							
Town of Cedar Point							
Town of Emerald Isle	√	√	√				
Town of Indian Beach							
Town of Morehead City	√	√					
Town of Newport	√	√					
Town of Peletier							
Town of Pine Knoll Shores	√	√					

Jurisdiction	Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Natural disaster or safety related school programs	StormReady certification	Firewise Communities certification	Public-private partnership initiatives addressing disaster-related issues	Other
Craven County	√	√	√	√		√	
Town of Bridgeton							
Town of Cove City							
Town of Dover							
City of Havelock	√	√				√	
City of New Bern	√	√				√	
Town of River Bend	√	√					
Town of Trent Woods		√					
Town of Vanceboro							
Pamlico County	√	√	√	√			
Town of Alliance							
Town of Arapahoe							
Town of Bayboro							
Town of Grantsboro							
Town of Mesic							
Town of Minnesott Beach							
Town of Oriental	√	√		*		√	
Town of Stonewall							
Town of Vandemere	√	√	+			√	

Source: Local Capability Assessment Survey

5.3.5 Mitigation Capability

This type of local capability refers to the mitigation strategies and actions that are developed by the communities in this plan.

Table 5.6 provides a summary of the results for the planning area with regard to relevant mitigation resources. A checkmark (√) indicates that the given resource is locally available for hazard mitigation purposes.

Table 5.6 – Mitigation Resources

Jurisdiction	Do you apply for mitigation grant funding?	Do you perform reconstruction projects?	Do you perform building elevations?	Do you perform acquisitions?
Beaufort County	√	√	√	√
Town of Aurora	√	√	√	√
Town of Bath	√	√	√	√
Town of Belhaven	√	√	√	√
Town of Chocowinity	√	√	√	√
Town of Pantego	√	√	√	√
City of Washington	√	√	√	√
Town of Washington Park	√	√	√	√
Carteret County	√	√	√	
Town of Atlantic Beach	√	√	√	√
Town of Beaufort	√	√	√	√
Town of Bogue	√	√	√	√
Town of Cape Carteret	√	√	√	√
Town of Cedar Point	√	√	√	√
Town of Emerald Isle	√	√	√	√
Town of Indian Beach	√	√	√	√
Town of Morehead City	√	√	√	√
Town of Newport	√			
Town of Peletier	√	√	√	√
Town of Pine Knoll Shores	√	√	√	√
Craven County	√	√	√	√
Town of Bridgeton	√	√	√	√
Town of Cove City	√	√	√	√
Town of Dover	√	√	√	√
City of Havelock	√	√	√	√
City of New Bern	√	√	√	√
Town of River Bend	√	√	√	√
Town of Trent Woods	√	√	√	√
Town of Vanceboro	√	√	√	√

Jurisdiction	Do you apply for mitigation grant funding?	Do you perform reconstruction projects?	Do you perform building elevations?	Do you perform acquisitions?
Pamlico County	√	√	√	√
Town of Alliance	√	√	√	√
Town of Arapahoe	√	√	√	√
Town of Bayboro	√	√	√	√
Town of Grantsboro	√	√	√	√
Town of Mesic	√	√	√	√
Town of Minnesott Beach	√	√	√	√
Town of Oriental	√	√	√	√
Town of Stonewall	√	√	√	√
Town of Vandemere	√	√	√	√

5.3.6 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority, or it may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Local Capability Self-Assessment was used to capture information on political capability of the region. Survey respondents were asked to rate political support as they perceive it and identify general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management, etc.). The comments provided by the participating jurisdictions are listed below:

HMPC representatives from all participating jurisdictions responded that political leaders are at least potentially willing to implement mitigation measures. Additionally, many of the participating jurisdictions have some local standards that exceed state requirements. For example, Washington, Washington Park, Atlantic Beach, Beaufort, Cedar Point, Morehead City, Newport, Pine Knoll Shores, and Havelock have a one-foot freeboard requirement; Craven County, Pamlico County, Cape Carteret, Emerald Isle, New Bern, River Bend, Vanceboro, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, and Vandemere require a two-foot freeboard.

5.3.7 Local Self-Assessment Rating

In addition to the inventory and analysis of specific local capabilities, the Local Capability Self-Assessment asked counties and local jurisdictions within the Pamlico Sound region to assign a rating of their perceived capability across each of the capability categories and overall as either “limited,” “moderate,” or “high.”

Table 5.7 summarizes the results of the self-assessment ratings for each community in the Pamlico Sound Region.

Table 5.7 – Self-Assessment of Capability

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	OVERALL CAPABILITY
Beaufort County	High	High	High	High	High	High	High
Town of Aurora	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Bath	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Belhaven	High	High	High	High	High	High	High
Town of Chocowinity	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Pantego	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Washington	High	High	High	High	High	High	High
Town of Washington Park	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Carteret County	High	High	High	High	High	High	High
Town of Atlantic Beach	High	High	High	High	High	High	High
Town of Beaufort	High	High	High	High	High	High	High
Town of Bogue	Moderate	Moderate	Limited	Limited	Moderate	Limited	Moderate
Town of Cape Carteret	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Cedar Point	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Emerald Isle	High	High	High	High	High	High	High
Town of Indian Beach	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Morehead City	High	High	High	High	High	High	High
Town of Newport	High	High	High	High	High	High	High
Town of Peletier	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Pine Knoll Shores	High	High	High	High	High	High	High
Craven County	High	High	High	High	High	High	High
Town of Bridgeton	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Cove City	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Town of Dover	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
City of Havelock	High	High	High	High	High	High	High
City of New Bern	High	High	High	High	High	High	High
Town of River Bend	Moderate	Moderate	Moderate	Limited	Moderate	Moderate	Moderate
Town of Trent Woods	High	High	High	High	High	High	High
Town of Vanceboro	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Pamlico County	High	High	High	High	High	High	High
Town of Alliance	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Arapahoe	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Bayboro	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Grantsboro	Limited	Limited	Limited	Limited	Limited	Limited	Limited

Jurisdiction	Plans, Ordinances, Codes and Programs	Administrative and Technical Capability	Fiscal Capability	Education and Outreach Capability	Mitigation Capability	Political Capability	OVERALL CAPABILITY
Town of Mesic	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Minnesott Beach	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Oriental	High	High	High	High	High	High	High
Town of Stonewall	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Town of Vandemere	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

Source: Local Capability Assessment Survey

5.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Local Capability Assessment Survey. This methodology attempts to assess the overall level of capability of the Pamlico Sound region to implement hazard mitigation actions.

Table 5.8 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information provided by local officials in response to the Local Capability Self-Assessment. According to the assessment, the average local capability score for all responding jurisdictions is 73, which falls into the Moderate capability ranking.

Table 5.8 – Capability Assessment Results

Jurisdiction	Overall Capability Score	Overall Capability Rating
Beaufort County	87	Moderate
Town of Aurora	60	Low
Town of Bath	60	Low
Town of Belhaven	100	Moderate
Town of Chocowinity	60	Low
Town of Pantego	60	Low
City of Washington	106	High
Town of Washington Park	72	Moderate
Carteret County	102	High
Town of Atlantic Beach	95	Moderate
Town of Beaufort	91	Moderate
Town of Bogue	64	Low
Town of Cape Carteret	70	Low
Town of Cedar Point	70	Low
Town of Emerald Isle	100	Moderate
Town of Indian Beach	56	Low
Town of Morehead City	96	Moderate

Jurisdiction	Overall Capability Score	Overall Capability Rating
Town of Newport	84	Moderate
Town of Peletier	49	Low
Town of Pine Knoll Shores	88	Moderate
Craven County	100	Moderate
Town of Bridgeton	59	Low
Town of Cove City	59	Low
Town of Dover	59	Low
City of Havelock	97	Moderate
City of New Bern	99	Moderate
Town of River Bend	73	Moderate
Town of Trent Woods	74	Moderate
Town of Vanceboro	59	Low
Pamlico County	87	Moderate
Town of Alliance	49	Low
Town of Arapahoe	46	Low
Town of Bayboro	53	Low
Town of Grantsboro	46	Low
Town of Mesic	53	Low
Town of Minnesott Beach	53	Low
Town of Oriental	92	Moderate
Town of Stonewall	49	Low
Town of Vandemere	80	Moderate

Source: Local Capability Assessment Survey, NCEM Risk Management Tool

As previously discussed, one of the reasons for conducting a capability assessment is to examine local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified, for each jurisdiction, in the tables found throughout this section. The participating jurisdictions used the capability assessment as part of the basis for the mitigation actions that are identified in Section 7; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their mitigation actions.

6 Mitigation Strategy

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

This section describes the process for developing the mitigation strategy for the Pamlico Sound Regional Hazard Mitigation Plan. It describes how the Region met the requirements for Planning Step 6 (Set Goals), Planning Step 7 (Review Possible Activities), and Planning Step 8 (Draft an Action Plan). This section includes the following sub-sections:

- 6.1 Goals and Objectives
- 6.2 Identification & Analysis of Mitigation Activities

6.1 GOALS AND OBJECTIVES

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

Goal setting builds upon the findings of Section 4, which documents the hazards and associated risks that threaten the Pamlico Sound planning area, and Section 5, which evaluates the capacity of the Region to reduce the impact of those hazards. The intent of Goal Setting is to identify areas where improvements to existing capabilities can be made so that community vulnerability is reduced. Goals are also necessary to guide the review of possible mitigation measures. This plan needs to make sure that recommended actions are consistent with what is appropriate for the Region. Mitigation goals need to reflect community priorities and should be consistent with other local plans.

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad-based policy type statements, long term and represent global visions. Goals help define the benefits that the plan is trying to achieve.
- **Objectives** are short term aims that, when combined, form a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

6.1.1 Coordination with Other Planning Efforts

The goals of this plan need to be consistent with and complement the goals of other local planning efforts. The primary planning documents that the goals of this plan should complement and be consistent with are the counties' and participating jurisdictions' comprehensive plans. Comprehensive plans are important because they are developed and designed to guide future growth within their communities. Keeping the Hazard Mitigation Plan and Comprehensive Plans consistent ensures that land development is done with awareness and understanding of hazard risk and that mitigation projects complement rather than contradict community development objectives.

6.1.2 Goal Setting

At the second planning meeting, held on February 28, 2019, the HMPC reviewed and discussed the goals from the 2015 plan. The goals of the 2015 Pamlico Sound Regional Hazard Mitigation Plan were as follows:

#1	Reduce the risk of loss of life and personal injury from natural hazards.

#2	Reduce the risk and impact of future natural disasters by regulating development in known high hazard areas.
#3	Maintain critical facilities in functional order.
#4	Protect infrastructure from damage.
#5	Ensure that hazard mitigation is considered when redevelopment occurs after a natural disaster.
#6	Provide education to citizens that empowers them to protect themselves and their families from natural hazards.
#7	Fulfill Federal and State requirements for receipt of future disaster recovery and hazard mitigation assistance.
#8	Improve interjurisdictional cooperation and coordination, especially regarding the reduction of natural hazard impacts.

The HMPC largely approved of the existing goals, but proposed changes to consolidate them into fewer, stronger goals. Goals 6, 7, and 8 were largely maintained, and the sentiment of goals 1 through 5 was combined into one new goal.

During the third planning meeting, held on June 20, 2019, the HMPC discussed objectives within each goal in order to better facilitate the development of clearly defined mitigation actions.

The revised goals and the new objectives of this plan update are detailed below in Section 6.1.3.

6.1.3 Resulting Goals and Objectives

The HMPC agreed upon seven general goals for this planning effort and included specific objectives in support of each goal. The refined goals and objectives are as follows:

Goal 1 – Reduce the risk of loss of life and personal injury from natural hazards through local land development regulations, capital improvements, planning/investment, and proactive long-range planning regarding land use and post-disaster redevelopment.

Objective 1.1: Reduce the length of time that local infrastructure systems are deemed inoperable due to the impacts of natural hazards.

Objective 1.2: Preserve open space in floodplain areas.

Objective 1.3: Reduce flooding and erosion vulnerability through land development initiatives, maintenance, and improvement of storm drainage.

Goal 2 – Provide education and notification to citizens that empowers them to protect themselves and their families from natural hazards.

Objective 2.1: Ensure adequate warning and notification relating to hazards including efforts to establish well publicized, accessible shelter facilities that meet national standards for safety and supply.

Objective 2.2: Improve the public awareness and understanding of local vulnerability to hazards and improve disaster warning/post-disaster information efforts.

Goal 3 – Fulfill Federal and State requirements for receipt of future disaster recovery and hazard mitigation assistance.

Objective 3.1: Improve all participating jurisdictions' general hazard mitigation capability.

Objective 3.2: Work toward compliance with all State and Federal planning and regulatory requirements including standards for Local Emergency Operations Plans, Flood Damage Prevention Ordinances, Continuity of Operations Plans, and the Community Rating System.

Goal 4 – Improve interjurisdictional/interagency cooperation and coordination, especially regarding the reduction of natural hazard impacts.

Objective 4.1: Reduce the risk of damage from wildfires (including under fires) to existing and future development.

Objective 4.2: Ensure effective local/interagency communication and response during disaster events.

6.2 IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIVITIES

Requirement §201.6(c)(3)(ii): [The mitigation strategy section shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

To identify and select mitigation projects that support the mitigation goals, each hazard identified in Section 4 Hazard Identification was evaluated. The following were determined based on the Priority Risk Index scores to be high and medium priority hazards:

- Coastal Hazards
- Dam & Levee Failure
- Drought
- Extreme Heat
- Flood
- Hurricane & Tropical Storm
- Severe Weather (Thunderstorm Wind, Lightning, & Hail)
- Severe Winter Storm
- Tornado
- Wildfire

Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process but are also applicable to multi-hazard mitigation. Acronyms used in the Mitigation Action Plans to identify each action's category are listed in parentheses.

- Prevention (P)
- Property Protection (PP)
- Natural Resource Protection (NRP)
- Emergency Services (ES)
- Structural Projects (SP)
- Public Information and Outreach (PIO)

The HMPC was also provided with examples of potential mitigation actions for each of the above categories. The HMPC was instructed to consider both future and existing buildings in evaluating possible mitigation actions. Facilitated discussions took place to examine and analyze the options. The HMPC also

considered which actions from the previous plan that were not already completed should be continued in this action plan.

6.2.1 Prioritization Process

In the process of identifying continuing and new mitigation actions, the HMPC was provided with a set of prioritization criteria to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. The prioritization criteria were grouped into three categories: Suitability, Risk Reduction, and Cost. The criteria for the prioritization process included the following:

- **Suitability**
  - Appropriateness of Action
  - Community Acceptance
  - Technical and Administrative Feasibility
  - Environmental Impact
  - Legal Conformance
  - Consistency with Existing Plans and Other Community Goals
- **Risk Reduction**
  - Scope of Benefits
  - Potential to Save Lives
  - Importance of Benefits
  - Level of Inconvenience or Unintended Consequence
  - Losses Avoided
  - Number of People to Benefit
- **Cost**
  - Estimate of Upfront Cost
  - Estimate of Ongoing Cost
  - Benefit to Cost Ratio
  - Financing Availability
  - Affordability
  - Elimination of Repetitive Damages

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority, as reflected in the prioritization criteria above. For each action, the HMPC considered the benefit-cost analysis in terms of:

- Ability of the action to address the problem
- Contribution of the action to save life or property
- Available technical and administrative resources for implementation
- Availability of funding and perceived cost-effectiveness

The consideration of these criteria helped to prioritize and refine mitigation actions but did not constitute a full benefit-cost analysis. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Using these prioritization criteria, the HMPC assigned each action a ranking of High, Medium, or Low priority. The prioritization ranking for each mitigation action considered by the HMPC is provided in Section 7 Mitigation Action Plans.

7 Mitigation Action Plans

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

This section provides the mitigation action plan for each participating jurisdiction, grouped by county. To improve regional coordination and increase capability to implement projects, many actions are multi-jurisdictional but will be led by the respective county.

The following acronyms are used to identify potential funding sources for each action:

- ARC – American Red Cross
- FEMA – Federal Emergency Management Agency
- GF – General Fund
- HMGP – Hazard Mitigation Grant Program
- NCDEQ – North Carolina Department of Environmental Quality
- NCDOT – North Carolina Department of Transportation
- NCDPS – North Carolina Department of Public Safety
- PDM – Pre-Disaster Mitigation
- UHMA – Unified Hazard Mitigation Assistance
- USDA – United States Department of Agriculture

Table 7.1 – Mitigation Action Plan, Beaufort County

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B1	Continue to coordinate all development/planning decisions with review of appropriate CAMA LUP's including stated redevelopment policies and actions.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	1	1.3	PP	• **Beaufort County Planning** • Municipal Administrations	To Be Determined	GF, NCDEQ	Other – as opportunities arise	Carry Forward – Not Started	All jurisdictions currently utilize their respective CAMA Land Use Plan when making decisions regarding development proposals.
B2	Maintain reciprocal mutual aid agreements with surrounding communities for fire protection and emergency response.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	4	4.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.
B3	Annually evaluate adequacy of existing local early warning and emergency response communications equipment and prepare annual capital improvements plans to improve early warning and communication effectiveness before, during, and following disaster events.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.1	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services reviews its emergency notification system annually in coordination with tabletop exercises associated with the EOP.
B4	Develop standard protocols for training/ certification of volunteer staff for shelter management, traffic control, first aid, etc., to improve volunteer response capability during and following disaster events, including coordination with American Red Cross personnel on an annual basis	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	Carry Forward – Not Started	Beaufort County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
B5	Complete an annual evaluation of each designated emergency shelter, including structural inspection, resource inventory, staffing plan, and vulnerability assessment, including coordination with American Red Cross personnel.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	In Progress – Carry Forward	Beaufort County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
B6	Provide citizens and visitors with maps of evacuation routes which will facilitate the evacuation of the county in case of a hazardous event. This effort will involve the production of hard copy maps for distribution.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.2	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	Carry Forward – Not Started	Evacuation maps are currently available on the County website or through the Emergency Services Department. These maps will be updated as necessary; however, hard copy maps are not available.
B7	Continue to monitor and establish programs to maintain continuity of government operations through annual review and update of the Continuity of Operations Plan (COOP).	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	4	4.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County COOP is reviewed annually and updated as necessary.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B8	Continue to support and participate in the directives of the County Emergency Operations Plan (EOP). The EOP includes evacuation procedures and response to hazards not addressed in this plan such as hazardous materials, petroleum products, hazardous waste, nuclear threat/attack, and civil disorder. The County will review and update the EOP annually to ensure that it coordinates with the most recent NCEM and NCOEMS directives.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	3	3.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In-Progress – Carry Forward	Beaufort County Emergency Services works closely with all participating municipalities to review and update the Emergency Operations Plan (EOP) on an annual basis.
B9	Continue to apply for grant funds, allocate local funding, and work with local electric service providers to procure and maintain back-up generators/transfer switches for all critical public facilities, with an emphasis on emergency services facilities, critical water/sewer facilities, and shelter facilities. Evaluate the equipment on a regular basis to assure it continues to meet the needs of the operations occurring at each facility. Back-up generators are still needed at the following facilities: Southside High School, S.W. Snowden Elementary School, and John Cotten Tayloe Elementary School.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	1	1.1	PP	• **Beaufort County Emergency Services** • Independent Facility Operators • Town Public Utilities	To Be Determined	GF, NCDPS, NCDOT, HMGP	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services will continue to work towards establishing permanent pad mount generators at all critical facilities. This effort will initially focus on primary and backup shelter facilities.
B10	Hold an annual public hazard mitigation meeting, attended by the HMPC and participating jurisdictions, to educate the public and elected officials and receive comments about the location of high risk facilities/development, the jurisdictions' overall vulnerability to natural and man-made hazards, and the jurisdictions' hazards mitigation efforts.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.2	PIO	• **Beaufort County Emergency Services** • Beaufort County Planning • Municipal Administrations	Staff Time	GF	1 Year	In Progress – Carry Forward	Beaufort County Emergency Services holds a public officials conference at least annually to educate decision makers on the vulnerability to hazards and mitigation efforts.
B11	Maintain the Hazard Mitigation Planning Committee (HMPC) and hold annual HMPC meetings to continue relationship-building and communicate about mitigation measures taking place throughout the community.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	3	3.1	P	• **Pamlico Sound HMPC** • Beaufort County Administration • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	The HMPC will be maintained to ensure implementation and update the PSRHMP.
B12	Maintain continual contact/working relationship with electric service providers in the county to address the following: 1) Disaster preparedness techniques (e.g., tree trimming, vegetation planting requirements, pole replacement); 2) Identification of critical electrical facilities needing retrofit or upgrade and map with elevation reference marks; 3) Identification of problem areas and potential solutions; and 4) Communication with county officials during and immediately after a natural hazard event that results in loss of electrical power.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Weather, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	1	1.1	P	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, Electric Service Providers	Other – meet annually	In Progress – Carry Forward	Beaufort County Emergency Services continues to meet annually with all electric service providers operating in the county.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B13	Monitor trees and vegetation on publicly owned property to assure that no property or utility damage will occur as a result of diseased or dying trees or other vegetation. This strategy only applies to the municipal jurisdictions.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Flood, Hurricane and Tropical Storm, Severe Weather, Severe Winter Storm, Tornado	Med	1	1.1	ES	• **Beaufort County Public Works** • Municipal Administrations	Staff Time	GF	Ongoing – over the next five years	In Progress – Carry Forward	Beaufort County, as well as municipal, public works departments will maintain trees on public property and in right of ways to minimize the impact of falling limbs and trees in the event of a natural disaster.
B14	Continue to maintain all property acquired with public mitigation funds within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to pro-actively establish open space within the floodplain and floodway as grant funds become available to carry out this initiative.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.2	PP	• **Beaufort County Administration** • Municipal Administrations	To Be Determined	GF, NCDPS	Ongoing – in process	In Progress – Carry Forward	All jurisdictions actively maintain these sites and promote reuse that is permitted under FEMA guidelines.
B15	Integrate new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with all local certified CAMA Land Use Plans).	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.2	SP	• **Beaufort County Parks and Recreation** • Beaufort County Planning	To Be Determined	GF, NCDENR	Other – as opportunities arise	In Progress – Carry Forward	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.
B16	Annually review local floodplain ordinances to provide improved flood protection standards and require freeboard for retrofitting and new construction as required by NC State Building Code. The County will consider establishing a freeboard requirement.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	3	3.2	PP	• **Beaufort County Administration** • Municipal NFIP participants	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	All jurisdictions will review and amend their respective Flood Damage Prevention Ordinances. All jurisdictions will consider establishing a freeboard requirement, except for Washington and Washington Park who already have a 2-foot freeboard established.
B17	Maintain current listings of Severe Repetitive Loss properties and conduct annual outreach activities to encourage homeowners to participate in FEMA-sponsored residential acquisition and elevation programs; continue to apply for HMGP/HMA funding for residential acquisition and elevation.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Beaufort County in coordination with all participating municipal jurisdictions will utilize annual as well as post-disaster funding to treat repetitive loss properties through elevation or acquisition/ demolition.
B18	Encourage County Commissioners and elected officials of non-CRS communities to participate in the Community Rating System.	Beaufort County, Aurora, Bath, Chocowinity, Pantego	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.3	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Non-CRS communities will consider joining the program through implementation of this plan. Belhaven, Washington and Washington Park will continue to implement their program annually.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B19	Continue to work with local real estate agencies and manufactured home vendors to ensure that agents are informing clients when property for sale is located within an SFHA. The county will provide these agencies with brochures documenting the concerns relating to development located within the flood prone areas and ways that homeowners may make their home more disaster resistant to strong winds, lightning, and heavy rains.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
B20	Make information regarding hazards and development regulations within floodplains available through the following: 1) Ensure that local libraries maintain information relating to flooding and flood protection, 2) Provide a link on the municipal website to FEMA resources addressing flooding and flood protection, evacuation procedures, disaster preparedness, and post-disaster recovery, and 3) Provide website links to relevant hazard mitigation measures.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
B21	Promote national "awareness" weeks (i.e., hurricane preparedness, severe weather preparedness, etc.) through local media. ("Awareness" weeks are listed on the National Weather Service website at http://www.nws.noaa.gov/os/severeweather/severewxcal.shtml)	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.2	PIO	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County will continue to implement this strategy for the benefit of all Citizens, including all participating jurisdictions.
B22	Educate the general public to the importance of weather alert radios and systems that can operate on alternative power and can provide up-to-the-moment information regarding locations of severe storms and possible tornadoes.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Hurricane & Tropical Storm, Flood, Dam & Levee Failure, Severe Winter Storm, Earthquake, Severe Weather, Tornado	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This program was initiated following the last plan update and is still in place.
B23	Maintain a Hazardous Material Action Plan that addresses the proper containment of spills, etc. This effort will be coordinated with the county LEPC.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Hurricane & Tropical Storm, Flood	Med	4	4.2	ES	• **Beaufort County Local Emergency Planning Committee** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County will continue to facilitate the meeting of the County LEPC.
B24	Monitor natural and man-made drainage structures to ensure they are clear and functioning properly; prioritize needed drainage projects and review funding alternatives annually.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.3	SP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, NCDOT	Ongoing – next 5 years	In Progress – Carry Forward	The County will continue to monitor drainage conditions to identify flooding hot spots and system deficiencies. Once identified engineered solutions will be established.
B25	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Wildfire	High	4	4.1	PP	• **Beaufort County Emergency Services** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B26	Maintain Debris Removal and Monitoring Services Contracts for post-disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Flood, Hurricane and Tropical Storm, Coastal Hazards, Tornados, Severe Winter Storm, Severe Weather, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	1	1.1	ES	• **Beaufort County Emergency Services** • Beaufort County Board of Commissioners • Municipal Administrations	To Be Determined	GF, NCDPS, FEMA	Ongoing – As needed	New	N/A
B27	Work to implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	3	3.1	P	• **Beaufort County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS, FEMA, NCDCM, USDA, NCDEQ, NCDOT	Ongoing – next 5 years	New	N/A

Table 7.2 – Mitigation Action Plan, Carteret County

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA1	Address the sheltering needs of County residents. Continue to work on improving the preparedness of all existing shelter facilities, including the installation of on-site generators at all shelter locations. Maintain updated information regarding all shelters on the County website. Continue support of the NC Coastal Region Evacuation and Sheltering (CRES) plan aimed at providing inland sheltering resources for coastal counties and preparation and adoption of a county sheltering plan.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.1	ES	• **Carteret County Emergency Services** • Carteret County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	In Progress – Carry Forward	Carteret County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
CA2	Provide information regarding evacuation procedures and routes through County and municipal websites, as well as other means when feasible. These efforts will involve assisting the Towns of Atlantic Beach, Cape Carteret, Indian Beach, Morehead City, and Pine Knoll Shores with efforts relating to bridge closures and re-entry policies and procedures. As part of these efforts, the County will make handouts available for citizens and visitors outlining evacuation routes and procedures provide education and outreach for implementation of the Know Your Zone initiative.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Wildfire, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Emergency Services** • NC Highway Patrol • Atlantic Beach Administration • Cape Carteret Administration • Indian Beach Administration • Morehead City Administration • Pine Knoll Shores Administration	Staff Time	GF, NCDPS	1 year	In Progress – Carry Forward	The County maintains up to date evacuation route information on the County website and is working to develop educational materials for the Know Your Zone initiative and coordination of re-entry procedures.
CA3	Annually review and maintain the County's Continuity of Operations Plan in an effort to ensure ongoing governmental operations following a natural or man-made disaster event. The County, in conjunction with all participating municipal jurisdictions, will review this plan annually and update as deemed necessary.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Med	3	3.2	ES	• **Carteret County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	County Risk Management will work to develop and maintain a robust Continuity of Operations Plan to ensure ongoing government operations and review and update this plan annually.
CA4	Annually review and update the County's Emergency Operations Plan (EOP) to ensure compliance with all NCEM and NCOEMS procedures and policies. Through these updates, the County will work closely with all participating municipalities to ensure that all jurisdictions continue to be educated and prepared for activation of the EOP in the event of a disaster event.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Med	3	3.2	ES	• **Carteret County Emergency Services**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services works closely with all participating municipalities to review and update the Emergency Operations Plan (EOP) on an annual basis.
CA5	Maintain, and where necessary, establish backup generators at all identified critical facilities. Additionally, County Emergency Services will evaluate the equipment on a regular basis to assure it continues to meet operational demands at county facilities.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	1	1.2	PP	• **Carteret County Emergency Services** • Independent Facility Operators • Town Public Utilities	To Be Determined	GF, NCDPS, NCDOT, HMGP	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services evaluates all emergency generators on a regular basis to ensure operability.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA6	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Winter Storm, Earthquake, Wildfire, Dam & Levee Failure	Med	3	3.1	PP	• **Carteret County Governing Board** • Municipal Governing Boards	To Be Determined	GF, HMGP	Other – Reviewed Annually	In Progress – Carry Forward	Carteret County maintains a contractor for generators and storm cleanup.
CA7	Hold a public information meeting (once annually) aimed at educating the public and elected officials about the jurisdictions' overall vulnerability to natural and man-made hazards, and the jurisdictions' hazard mitigation efforts.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	2	2.2	PIO	• **Carteret County Emergency Services** • Carteret County Planning • Municipal Administrations	Staff Time	GF	1 Year	In Progress – Carry Forward	Carteret County Emergency Services holds a public officials conference at least annually to educate decision makers on the vulnerability to hazards and mitigation efforts.
CA8	Continue to maintain the County's Crisis Management System to efficiently deal with emergency situations. These efforts will involve training for officials and relevant staff regarding use of the program.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	4	4.2	ES	• **Carteret County Emergency Services** • Carteret County Planning	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services provides annual training to officials and all relevant staff on the County's Crisis Management system.
CA9	Meet annually with all electric service providers operating within the County prior to hurricane season, in preparation for the effects of severe weather, and will provide the preliminary planning steps required for effective post-disaster recovery.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Severe Winter Storm, Earthquake, Dam & Levee Failure	Med	4	4.2	P	• **Carteret County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, Electric Service Providers	Other – meet annually	In Progress – Carry Forward	Carteret County Emergency Services continues to meet annually with all electric service providers operating in the county.
CA10	Maintain all property acquired within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to proactively establish open space within the floodplain and floodway as HMGP grant funds become available to carry out this initiative.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	NRP	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County will maintain property within the SFHA acquired with FMA or HMGP funding as undisturbed open space.
CA11	Integrate, when feasible, new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with the County's certified CAMA Land Use Plans).	Carteret County, Morehead City	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	SP	• **Carteret County Parks and Recreation** • Carteret County Planning • Morehead City Parks and Recreation	To Be Determined	GF, NCDENR	Other – as opportunities arise	In Progress – Carry Forward	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.
CA12	Maintain reciprocal mutual aid agreements with all neighboring communities in an effort to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	4	4.2	ES	• **Carteret County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA13	Review and update respective Flood Damage Prevention Ordinances as deemed necessary. Once annually, all jurisdictions will conduct a review to ensure that the current FDPO is compliant with all FEMA and NCEM mandates.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.2	PP	• **Carteret County Planning** • Municipal NFIP participants	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County has had no amendments to its FDPO and it continues to be compliant with all FEMA and NCEM mandates.
CA14	Strive to maintain respective CRS ratings through implementation of a comprehensive floodplain management program.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	PP	• **Carteret County Planning** • **Municipal Administrations**	$15,000/Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – next 5 years	In Progress – Carry Forward	Staff continues to provide required CRS recertification documentation on an annual basis and to conduct credited activities to maintain its CRS Class 7 Rating.
CA15	Maintain a map information service involving the following: (1) Provide information relating to Flood Insurance Rate Maps (FIRMs) to all inquirers, including a provision of information on whether a given property is located with a flood hazard area; (2) Provide information regarding the flood insurance purchase requirement; (3) Maintain historical and current FIRMs; (4) Advertise once annually in the local newspaper the availability of FIRMs; and (5) Provide information to inquirers about local floodplain management requirements.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County continues to provide a map information service to residents/visitors/property owners/real estate agents and anyone else inquiring about FIRM information for properties located in Carteret County.
CA16	Mail a notice annually to all property owners in an effort to educate citizens about dangers associated with flooding in low-lying coastal areas.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	To Be Determined	GF, NCDPS	Other – Once Annually	In Progress – Carry Forward	Carteret County mails all property owners a flood tips brochure each year with their tax bill regardless of flood zone. 100% of property owners receive this flood tips brochure. Additionally, property owners in Repetitive Loss Areas receive annual notification on their susceptibility to flooding and grant opportunities.
CA17	Make information regarding hazards and development regulations within floodplains available through: (1) Ensure that the local library maintains information relating to flooding and flood protection; (2) Provide a link on the county website to FEMA resources addressing flooding and flood protection; (3) Provide a link on all participating municipalities' websites to FEMA resources addressing flooding and flood protection, evacuation procedures, disaster preparedness, and post-disaster recovery; and (4) Provide website links to relevant hazard mitigation websites. (5) Provide information to local real estate agents.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County maintains links to numerous FEMA resources on its website Carteret County maintains an emergency preparedness page as well as a flood information page with relevant hazard mitigation links, emergency preparedness links, flood information links, and post-disaster recovery information.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA18	Support the efforts of the Carteret County Local Emergency Planning Committee (LEPC) in their effort to address hazards associated with the storage of chemicals, noxious waste material and bulk fuel.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Hurricane & Tropical Storm, Flood	Low	4	4.2	ES	• **Carteret County LEPC**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County maintains an active LEPC and will continue to do so through the implementation of this plan.
CA19	Continue to monitor water resources to mitigate the impacts of drought conditions. These efforts will include maintaining a local water shortage ordinance. This ordinance will be activated in coordination with all utility providers as the need arises.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Drought	Med	1	1.5	NRP	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDENR	Other – As necessary	In Progress – Carry Forward	Carteret County continually monitors water resources and maintains a water shortage ordinance.
CA20	Collaborate to provide education and training to local government officials in an effort to broaden understanding of public policy relating to hazard mitigation.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Low	4	4.2	P	• **Carteret County Emergency Services** • Carteret County Administration • Municipal Administration	Staff Time	GF	Other - Annually	In Progress – Carry Forward	Staff attends meetings of the Carteret County Floodplain Administrators group and is supportive of efforts to provide training to local government officials. Staff also employs two CFMs.
CA21	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Carteret County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.1	PP	• **Carteret County Planning Department** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County continues to aggressively seek out grant funding for elevating RLPs and SRLPs and is currently administering a grant program to rehabilitate and mitigate properties during recent hurricanes. The County also maintains an up-to-date list of all RLPs in the County.
CA22	Increase the availability of skilled contractors to perform needed work post hazard by: • Developing a partnership with major national contractors in selected areas (roofing, tree trimming, etc.), such that they will deploy resources and skilled contractors to affected areas as needed. • Creating local contractor retention plan (perhaps with incentives related to permits, commitments for County/City projects, a reduction in community college tuition, etc.) to reduce the flight of local skilled labor.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Earthquake, Dam & Levee Failure	Med	2	2.2	PP	• **Carteret County Planning Department** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF	2 to 3 years	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA23	Improve awareness regarding the intensity of natural hazard events as they materialize and subside by: • Establishing an emergency radio broadcast frequency that runs a recorded message pre- and post-hazard to communicate critical-time sensitive information. It could include things like routes/ bridges that are open or closed, weather/hazard forecasts, location of emergency shelters. • More fully utilizing County/Town websites to provide pre-hazard and post-hazard recovery information (debris pick up schedule, critical dates, forms, phone numbers, housing availability, etc.).	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Earthquake, Dam & Levee Failure	High	2	2.2	ES	• **Carteret County Emergency Services** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF	2 to 3 years	New	N/A
CA24	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Wildfire	High	4	4.1	PP	• **Carteret County Emergency Services** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Table 7.3 – Mitigation Action Plan, Craven County

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR1	Review respective Comprehensive Land Use Plans annually to ensure that the Future Land Use Map adequately delineates portions of the community deemed unsuitable for development due to existing environmental conditions. This effort will also involve the identification of potential drainage easements and open space areas that will positively affect drainage conditions within areas documented as stormwater/flooding hot spots. Additionally, the County will attempt to identify portions of the County susceptible to wildfire damage.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDCM, NCDPS	2 to 3 years	Carry Forward – Not Started	Craven County, as well as participating municipal jurisdictions, will consider updating the County's Comprehensive land Use Plan over the next three fiscal years.
CR2	Review respective Flood Damage Prevention Ordinances to assess whether any revisions and/or updates have been mandated by FEMA or NCEM. Additionally, jurisdictions will consider whether regulatory options are available to provide for more effective floodplain management.	Craven County, Bridgeton, Cove City, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Other – Review annually	Ongoing – As Needed	Craven County, as well as all participating municipal jurisdictions, will review their respective Flood Damage Prevention Ordinances annually, or as directed by NCDPS.
CR3	Continue to support NCDENR in efforts to enforce the Neuse River Basinwide Water Quality Management Rules.	Craven County, Havelock, New Bern, River Bend, Trent Woods	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Low	1	1.3	NRP	• **Craven County Planning Department** • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	These rules are currently being enforced. Changes in standards will coincide with amendments established by NCDEQ.
CR4	Consider the data and recommendations outlined within this plan when preparing updates to respective Capital Improvements Plans. All recommendations regarding capital expenditures will focus on siting infrastructure and public facilities outside of the Flood Hazard Area.	Craven County, New Bern, River Bend, Havelock	All Hazards	Med	1	1.3	SP	• **Craven County Board of Commissioners** • Municipal Elected Boards	Staff Time	GF	Other – review annually with budget preparation	In Progress – Carry Forward	Craven County, New Bern, River Ben and Havelock establish capital outlay for infrastructure projects through their respective Capital Improvements Plans. This will continue to occur in line with annual budget preparation.
CR5	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Craven County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.1	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Craven County in coordination with all participating municipal jurisdictions will utilize annual as well as post disaster funding to treat repetitive loss properties through elevation or acquisition/demolition.
CR6	Continue to expand upon the County's Emergency Notification System available to all residents. Craven County Emergency Services will coordinate with all municipal jurisdictions regarding registration.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	$21,000	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County utilizes, and will continue to employ, the CODE RED Emergency Alert System to notify residents of the status of natural hazard events.
CR7	Consider all of the data, information, maps and recommendations outlined throughout this plan when siting for the development of all new critical facilities.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	PP	• **Craven County Board of Commissioners** • Municipal Elected Boards	To Be Determined	GF, NCDPS, FEMA, USDA	Ongoing – as needed	In Progress – Carry Forward	Mitigation measures will be considered any time development or relocation of any County or Municipal facility (critical) takes place.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR8	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Craven County will coordinate with NCEM, American Red Cross, local animal shelters, local care homes, etc., in making determinations related to need and capacity required in the event of a disaster.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.1	P	• **Craven County Emergency Services** • Craven County Board of Commissioners • Municipal Elected Boards	Staff Time	GF, NCDPS, American Red Cross	2 to 3 years	In Progress – Carry Forward	Craven County in coordination with all participating municipal jurisdictions, will work through this exercise annually, as well as following the effects of a natural hazard event through the corrective action planning process.
CR9	In conjunction with annual EOP updates, determine if access to all critical facilities is readily available in the event of a flooding event. Careful consideration should be given to localized flooding issues that may restrict access along limited access thoroughfares. Where access issues are identified, the County will establish a plan for alternative transportation.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
CR10	Continue to maintain the County's Continuity of Operations (COP). This effort will include an annual update addressing risk management, service retention, alternative staffing procedures and recovery checklist for each County department.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County COOP is reviewed annually and updated as necessary.
CR11	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
CR12	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Wildfire	High	4	4.1	PP	• **Craven County Emergency Services** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	This strategy will be completed through implementation of this update.
CR13	Work to expand upon the County's Special Medical Needs Registry (SMNR). The SMNR is available to all County residents. Effective participation will require close cooperation between County ES and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities. It should be noted that applicants must be approved once application is made. Application alone does not result in guaranteed emergency service.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF	Ongoing – over next five years	In Progress – Carry Forward	The County will work with participating municipal jurisdictions to advertise, maintain, and expand upon the County's special needs registry.
CR14	Continue to maintain the County's Local Emergency Planning Committee (LEPC) focused on monitoring the presence and proliferation of hazard materials throughout the County. The LEPC and County staff will continue to monitor these materials as submitted.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Hurricane & Tropical Storm, Flood	Med	4	4.2	ES	• **Craven County LEPC**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County Emergency Management will coordinate and maintain the County LEPC with representation from all participating municipalities.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR15	Maintain information on the County website relating to evacuation and sheltering. Emergency information on the website will include: evacuation routes, sheltering, delays and closures, pet sheltering options, and special needs information.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County maintains this information on the County's website and will continue to do so through the planning period.
CR16	Continue to provide detailed information regarding properties located within flood hazard areas as outlined under CRS Manual Section 322.a through 322.g.	Craven County, Havelock, New Bern, River Bend	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Craven County, Havelock, New Bern, and River Bend will continue to implement all activities defined under their respective CRS programs. Other Craven County municipalities will consider joining the program through implementation of this plan.
CR17	Continue to maintain a library of materials focused on educating citizens, builders, realtors and developers about the dangers associated with floodplain development. This information will also provide material outlining sound techniques for floodplain development and floodproofing of existing structures. The County will also maintain staff educated in these issues to work with prospective builders.	Craven County, Havelock, New Bern, River Bend	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	2	2.2	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
CR18	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	1	1.1	PP	• **Craven County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS	Other – Review Annually	New	Craven County, and all participating municipal jurisdictions, maintains a contractor for generators and storm cleanup.
CR19	Maintain reciprocal mutual aid agreements with all neighboring communities in an effort to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	4	4.2	ES	• **Craven County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	New	Craven County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.
CR20	Work to implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	P	• **Craven County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS, FEMA, NCDCM, USDA, NCDEQ, NCDOT	Ongoing – next 5 years	New	N/A
CR21	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of Craven County Schools and other critical facilities that involves general public usage during and after disaster events (such as generators, structural modifications, etc.) which would make structures more resilient during future storms and natural hazard events.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flooding, Hurricanes and Costal Hazards, Dam Failure, Levee Failure, Tsunamis	High	2	2.1	SP	• **Craven County Planning Department** • Craven County Administration • Municipal Administrations	Based on need and availability of funding	GF, FEMA, NCDPS	2 to 3 years	New	Craven County monitors and applies for grant funding as the need arises and/or funding becomes available. The County has currently applied for funding associated with Hurricane Florence and will continue to utilize funding when available to improve the resiliency of County Critical Facilities.

Table 7.4 – Mitigation Action Plan, Pamlico County

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Pamlico County and Jurisdictions													
P1	In the event of a substantial flooding event, or other natural hazard occurrence, perform damage assessments in coordination with NCEM. These assessments will assist the County in determining the extent of the damage caused by the respective disaster event. This data will be utilized as a tool for land use planning and future hazard mitigation plan updates and to gauge the effectiveness of the County's two-foot freeboard requirement.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	3	3.1	PP	• **Pamlico County Emergency Services** • Pamlico County Administration • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as necessary	In-Progress – Carry Forward	Pamlico County has carried out this process following Hurricanes Matthew and Florence since adoption of the past plan. The impacts of these storms will be factored into decisions regarding land use and development policy through implementation of this plan.
P2	Continue to monitor drainage conditions throughout the County, in particular, issues associated with drainage ditches and agricultural runoff canals situated throughout the County. Once issues are identified, the County will work with municipal jurisdictions and State agencies to identify short- and long-term solutions to these issues.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Wildfire, Dam & Levee Failure	High	1	1.3	NRP	• **Pamlico County Administration** • Pamlico County Emergency Services • Municipal Administrations	Staff Time	GF, NCDENR, NCDOT	Ongoing – In Process	In Progress – Carry Forward	Pamlico County is working on solutions for flooding associated with Hurricanes Matthew and Florence. The greatest problem has been identified in the Hurricane Matthew Resiliency Redevelopment Plan. The Town of Oriental has completed one RENA project for mitigation and are currently involved in a $3.34M shoreline restoration/hazard mitigation project to protect 1/3 of Town assets.
P3	Continue to proactively seek grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Pamlico County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	PP	• **Pamlico County Planning Department** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Pamlico County continues to aggressively seek out grant funding for elevating RLPs and SRLPs and is currently administering a grant program to rehabilitate and mitigate properties during recent hurricanes. The County also maintains an up-to-date list of all RLPs in the County.
P4	Continue to educate County residents about the linkage between flooding (standing water) and the proliferation of mosquitos. These efforts will focus on teaching property owners how to mitigate mosquito issues throughout the County.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Dam & Levee Failure	Med	2	2.2	P, PIO	• **Pamlico County Administration** • Pamlico County Emergency Services • Municipal Administrations	Staff Time	GF, NCDENR, NCDPS	Ongoing – in process	In Progress – Carry Forward	Pamlico County maintains an educational program regarding mosquito abatement and will work to improve these efforts through plan implementation.
P5	Make a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors/realtors familiar with floodproofing and elevation techniques, available through various avenues including: • Placing materials in the local library • Maintaining documents at the County Planning and Economic Development office • Disseminating information to local contractors • Distributing information to churches and other community-based organizations • Establishing a means to distribute information to schoolchildren	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Dam & Levee Failure	High	2	2.2	PP	• **Pamlico County Planning Department** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Pamlico County will continue to provide this service for all County residents, as well as participating municipalities. The Town of Oriental independently provides educational information sessions on hazard mitigation and preparedness.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
P6	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate and that all jurisdictions are adequately prepared.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	3	3.2	P	• **Pamlico County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
P7	Continue to work with the North Carolina Department of Environmental Quality to enforce standards outlined within the statewide stormwater management program. Currently, this program generally addresses stormwater management for projects disturbing an area equal to or greater than one acre. Additionally, the County will monitor localized flooding issues and, where feasible, address these issues through the installation of stormwater best management practices (BMP's).	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	P	• **Pamlico County Administration** • Municipal Administration	Staff Time	GF, NCDPS, NCDENR	Ongoing – In Process	In Progress – Carry Forward	Pamlico County provides development review services throughout the County and works with NCDEQ to enforce state stormwater regulations.
P8	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Pamlico County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc., in making determinations relating to need and capacity.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.1	P	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Elected Boards	Staff Time	GF, NCDPS, American Red Cross	2 to 3 years	In Progress – Carry Forward	Pamlico County in coordination with all participating municipal jurisdictions, will work through this exercise annually, as well as following the effects of a natural hazard event through the corrective action planning process.
P9	Ensure that there is adequate capacity for snow and ice removal in the event of a major snowstorm. The County will work with the North Carolina Department of Transportation (NCDOT) and North Carolina Emergency Management (NCEM) to ensure that all resources necessary are available to carry out this effort. Additionally, the County will work closely with the County school system, as well as other entities, to make determinations regarding closures and delays.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Severe Winter Storm	Med	1	1.1	P	• **Pamlico County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, NCDOT	Ongoing – In Process	In Progress – Carry Forward	Pamlico County continues to improve upon its capacity to address snow and ice removal. The County will continue these efforts through equipment acquisition and mutual aid agreements.
P10	Continue to maintain all development regulations, emergency and land use related plans, and applications for permits on the respective jurisdictions' website. This information will be maintained and updated as deemed necessary. If a local website does not exist, municipal jurisdictions will consider developing one through implementation of this plan.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	High	1	1.3	PP	• **Pamlico County Administration** • Municipal Administrations	Staff Time/ $3,500	GF	3 to 5 years	In Progress – Carry Forward	Pamlico County, as well as all participating municipal jurisdictions, will consider review of land development policies and regulations through implementation of this plan. The Town of Oriental enforces development regulations regarding impervious surface and other zoning/ subdivision standards that exceed Pamlico County regulations.
P11	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Wildfire	High	4	4.1	PP	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
P12	Maintain reciprocal mutual aid agreements with all neighboring communities to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	High	4	4.2	ES	• **Pamlico County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	New	N/A
P13	Maintain Debris Removal and Monitoring Services Contracts for post disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	1	1.1	PP	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Administrations	To Be Determined	GF, NCDPS, FEMA	Ongoing – As needed	New	N/A
P14	Maintain all property acquired through annual and post disaster mitigation funding as open space in perpetuity. Additionally, appropriate reuse strategies will be developed regarding this dedicated open space.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	PP	• **Pamlico County Administration** • Municipal Administrations	To Be Determined	GF, NCDPS	Ongoing – in process	New	N/A
Town of Oriental													
OR1	Annual outreach to residents for hurricane season preparations, quarterly meetings with Church reps to disseminate prep materials, instructions for before, during, and following disasters. Keep seasonal information in Town Hall and disseminate to businesses. Distribute through mailings (newsletter), social media, traditional media materials. Disseminate info on elevation for new construction, restrict building in floodplain.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	2	2.2	PIO	• **Town of Oriental Administration**	$2,000	General fund	Ongoing	New	N/A
OR2	Annual outreach to realtors to make sure most updated building restrictions in GMO are disseminated to all potential buyers.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	2	2.2	PIO	• **Town of Oriental Administration**	$100	General fund	Ongoing	New	N/A
OR3	Annual review by Planning Board and Town Board and make changes to GMO that prevent recurrent flooding and enhance drainage capacity.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	1	1.3	P	• **Town of Oriental Administration**	$500	General fund	Ongoing annually	New	Recently tightened drainage reqs by preventing covered culverts other than driveways and requiring stamped engineered drawings of alternative drainage to flow to existing open culverts associated with elevating property grade. Signed onto Pamlico County Flood Prevention Ordinance to require elevation.
OR4	Annual ditch clearing and assessment of town-maintained open and covered culverts. Annual education of residents/businesses about the flow of drainage (culverts not there to take water away, but to settle solids), Priority list established and reviewed for clearing/blockage of street culverts, education about ownership of land vs. rights-of-way, necessity of clearing residentially maintained ditches.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	1	1.3	PP	• **Town of Oriental Administration**	$16,000-$20,000 annually	General fund	Ongoing annually	New	

8 Plan Maintenance

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

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section discusses how the Mitigation Action Plans will be implemented by participating jurisdictions and outlines the method and schedule for monitoring, updating, and evaluating the plan. This section also discusses incorporating the plan into existing planning mechanisms and how the public will continue to be involved in the planning process. It consists of the following three subsections:

8.1 Implementation
8.2 Monitoring, Evaluation, and Enhancement
8.3 Continued Public Involvement

8.1 IMPLEMENTATION

Each jurisdiction participating in this plan update is responsible for implementing specific mitigation actions as prescribed in their Mitigation Action Plan (found in Section 7). In each Mitigation Action Plan, every proposed action is assigned to a specific local department or agency to ensure responsibility and accountability and increase the likelihood of subsequent implementation. This approach enables individual jurisdictions to update their own unique mitigation action list as needed without altering the broader focus of the regional plan.

In addition to the assignment of a local lead department or agency, an implementation timeline or a specific implementation date or window has been assigned to each mitigation action to help assess whether reasonable progress is being made toward implementation. The participating jurisdictions will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

An important implementation mechanism that is highly effective and low-cost is incorporation of the Hazard Mitigation Plan recommendations and their underlying principles into other plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement the Mitigation Action Plan. It will be the responsibility of the HMPC representatives from each participating jurisdiction to determine and pursue opportunities for integrating the requirements of this plan with other local planning documents and ensure that the goals and strategies of new and updated local planning documents for their jurisdictions or agencies are consistent with the goals and actions of the Hazard Mitigation Plan and will not contribute to increased hazard vulnerability in the Plan Area. Methods for integration may include:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

Table 8.1 details each jurisdiction's integration of the 2015 Pamlico Sound Regional Hazard Mitigation Plan into other local planning efforts as well as any identified opportunities for integration of this plan update.

Table 8.1 – Integration Efforts

Jurisdiction	Integration of 2015 plan	Intended integration of this plan update
Beaufort County	No integration occurred	Integration will be pursued as opportunities arise.
Aurora	No integration occurred	Integration will be pursued as opportunities arise.
Bath	No integration occurred	Integration will be pursued as opportunities arise.
Belhaven	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined in the plan update.
Chocowinity	No integration occurred	Integration will be pursued as opportunities arise.
Pantego	No integration occurred	Integration will be pursued as opportunities arise.
Washington	The City utilized the Hazard Mitigation Plan during development of the City's Parks and Recreation Master Plan.	Continued integration will be pursued as opportunities arise.
Washington Park	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined in the plan update.
Carteret County	Strategies defined within the plan were utilized in the implementation of the County's Community Rating System Program.	Carteret County plans to utilize this Regional Hazard Mitigation Plan Update during the development of the County's Comprehensive Plan update. This planning process should be initiated during Fiscal Year 2020.
Atlantic Beach	The mitigation plan was referenced during the development of the Causeway Corridor Conceptual Master Plan developed during FY18/19.	The Town will continue to utilize this plan to assist with implementation of the Town's Community Rating System.
Beaufort	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Bogue	No integration occurred	Integration will be pursued as opportunities arise.
Cape Carteret	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Cedar Point	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Emerald Isle	The HMP was referenced during development of the Town's Comprehensive Plan Update completed in FY2018.	The Town will continue to utilize this plan to assist with implementation of the Town's Community Rating System.
Indian Beach	No integration occurred	Integration will be pursued as opportunities arise.
Morehead City	The current Mitigation Plan was utilized during the development of the City's current Comprehensive Pedestrian Plan.	Continued integration will be pursued as opportunities arise.
Newport	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.

Jurisdiction	Integration of 2015 plan	Intended integration of this plan update
Peletier	No integration occurred	Integration will be pursued as opportunities arise.
Pine Knoll Shores	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Craven County	Strategies defined within the plan were utilized in the implementation of the County's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Bridgeton	No integration occurred	Integration will be pursued as opportunities arise.
Cove City	No integration occurred	Integration will be pursued as opportunities arise.
Dover	No integration occurred	Integration will be pursued as opportunities arise.
Havelock	The HMP was referenced and integrated into the City's 2015 Comprehensive Land Use Plan.	The HMP will continue to be referenced when land use policy is made with reference to development within flood hazard areas.
New Bern	No integration occurred	New Bern will utilize the strategies defined within this plan in an effort to re-establish the community as a participant in the Community Rating System.
River Bend	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Trent Woods	No integration occurred	Integration will be pursued as opportunities arise.
Vanceboro	No integration occurred	Integration will be pursued as opportunities arise.
Pamlico County	Strategies defined within the plan were utilized in the implementation of the County's Community Rating System Program.	The County will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Alliance	No integration occurred	Integration will be pursued as opportunities arise.
Arapahoe	No integration occurred	Integration will be pursued as opportunities arise.
Bayboro	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Grantsboro	No integration occurred	Integration will be pursued as opportunities arise.
Mesic	No integration occurred	Integration will be pursued as opportunities arise.
Minnesott Beach	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Oriental	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.
Stonewall	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.

Jurisdiction	Integration of 2015 plan	Intended integration of this plan update
Vandemere	Strategies defined within the plan were utilized in the implementation of the Town's Community Rating System Program.	The community will continue to utilize the plan in this manner, as well as for guidance regarding capital expenditures that will involve projects outlined within this plan.

Opportunities to integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the HMPC and through the five-year review process described herein. Although it is recognized that there are many possible benefits to integrating components of this plan into other local planning mechanisms, the development and maintenance of this stand-alone Hazard Mitigation Plan is deemed by the HMPC to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

8.2 MONITORING, EVALUATION, AND ENHANCEMENT

8.2.1 Role of HMPC in Implementation, Monitoring and Maintenance

With adoption of this plan, each jurisdiction will be responsible for the implementation and maintenance of their mitigation actions. The County Managers or Planning Directors will take the lead in all plan monitoring and update procedures. As such, the County Managers/Planning Directors agree to continue their relationship with the HMPC and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for community decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the communities implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended revisions to their County Boards of Commissioners;
- Support local jurisdictions in reporting on plan progress and recommended revisions to their local governing bodies; and
- Inform and solicit input from the public.

The HMPC's primary duty moving forward is to see the plan successfully carried out and report to the individual County Boards of Commissioners, Town and City Councils, NCEM, FEMA, and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about flood mitigation, passing concerns on to appropriate entities, and providing relevant information for posting on each County and local community websites (and others as appropriate).

Simultaneous to these efforts, it will be important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the costlier recommended actions. This task will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the Region, individual counties, and participating jurisdictions will be positioned to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal earmarked funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

8.2.2 Maintenance Schedule

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

Managers/Planning Directors will reconvene the HMPC quarterly for regular reviews and plan maintenance. These meetings may be held in-person or via conference call or webinar. The HMPC will also convene to review the plan after significant hazard events. If determined appropriate or as requested, an annual report on the plan will be developed and presented to local governing bodies of participating jurisdictions to report on implementation progress and recommended changes.

The five-year written update to this plan will be submitted to the NCEM and FEMA Region IV, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be adopted and fully approved by 2020, the next plan update for the Pamlico Sound Region will be completed by 2025.

8.2.3 Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Updates to this plan will:

- Consider changes in vulnerability due to project implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to Regional inventories; and
- Incorporate new project recommendations or changes in project prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the HMPC will follow the following process:

- The HMPC representatives from each jurisdiction will be responsible for tracking and reporting on their mitigation actions. Jurisdictional representatives should provide input on whether the action as implemented met the defined objectives and/or is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional representatives will determine what additional measures may be implemented and will make any required modifications to the plan.
- All monitoring and implementation information will be reported to the full HMPC, led by the County Emergency Management/Planning Directors, during quarterly meetings. An annual plan maintenance report may be drafted as deemed necessary.

Changes will be made to the plan as needed to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the mitigation action plans will be by written changes and submissions, as is appropriate and necessary, and as approved by the appropriate jurisdiction's local governing body.

Following a disaster declaration, the plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the County Managers/Planning Directors to reconvene the HMPC and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Criteria for Quarterly Reviews in Preparation for 5-Year Update

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, quarterly reviews will monitor changes to the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Hazard Mitigation Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

8.3 CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is imperative to the overall success of the plan's implementation. The quarterly review process will provide an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. Efforts to involve the public in the maintenance, evaluation, and revision process may include:

- Advertising HMPC meetings in the local newspaper, public bulletin boards and/or City and County office buildings;
- Designating willing citizens and private sector representatives as official members of the HMPC;
- Utilizing local media to update the public of any maintenance and/or review activities;
- Utilizing City and County websites to advertise any maintenance and/or review activities;
- Maintaining copies of the plan in public libraries or other appropriate venues;
- Posting annual progress reports on the Plan to County, City, and Town websites;
- Heavy publicity of the plan and potential ways for the public to be involved after significant hazard events, tailored to the event that has just happened;
- Keeping websites, social media outlets, etc. updated;
- Drafting articles for the local community newspapers/newsletters;

- Utilizing social media accounts (e.g. Twitter, Facebook).

Public Involvement for Five-year Update

When the HMPC reconvenes for the five-year update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC will be responsible for coordinating the activities necessary to involve the greater public, including disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held, and public comments will be solicited on the plan update draft.

9 Plan Adoption

Requirement §201.6(c)(5): [The plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 (Adopt the Plan) of the 10-step planning process, in accordance with the requirements of DMA 2000. FEMA Approval Letters and community adoption resolutions are provided below.

Annex A Beaufort County

A.1 COMMUNITY PROFILE

This section contains a summary of maps and statistics for current conditions and characteristics of Beaufort County, including information on population, asset exposure, housing, and economy. Throughout the section, information will be reported at the jurisdictional level. In some cases, information will only be reported for communities participating in the National Flood Insurance Program (NFIP) Community Rating System (CRS).

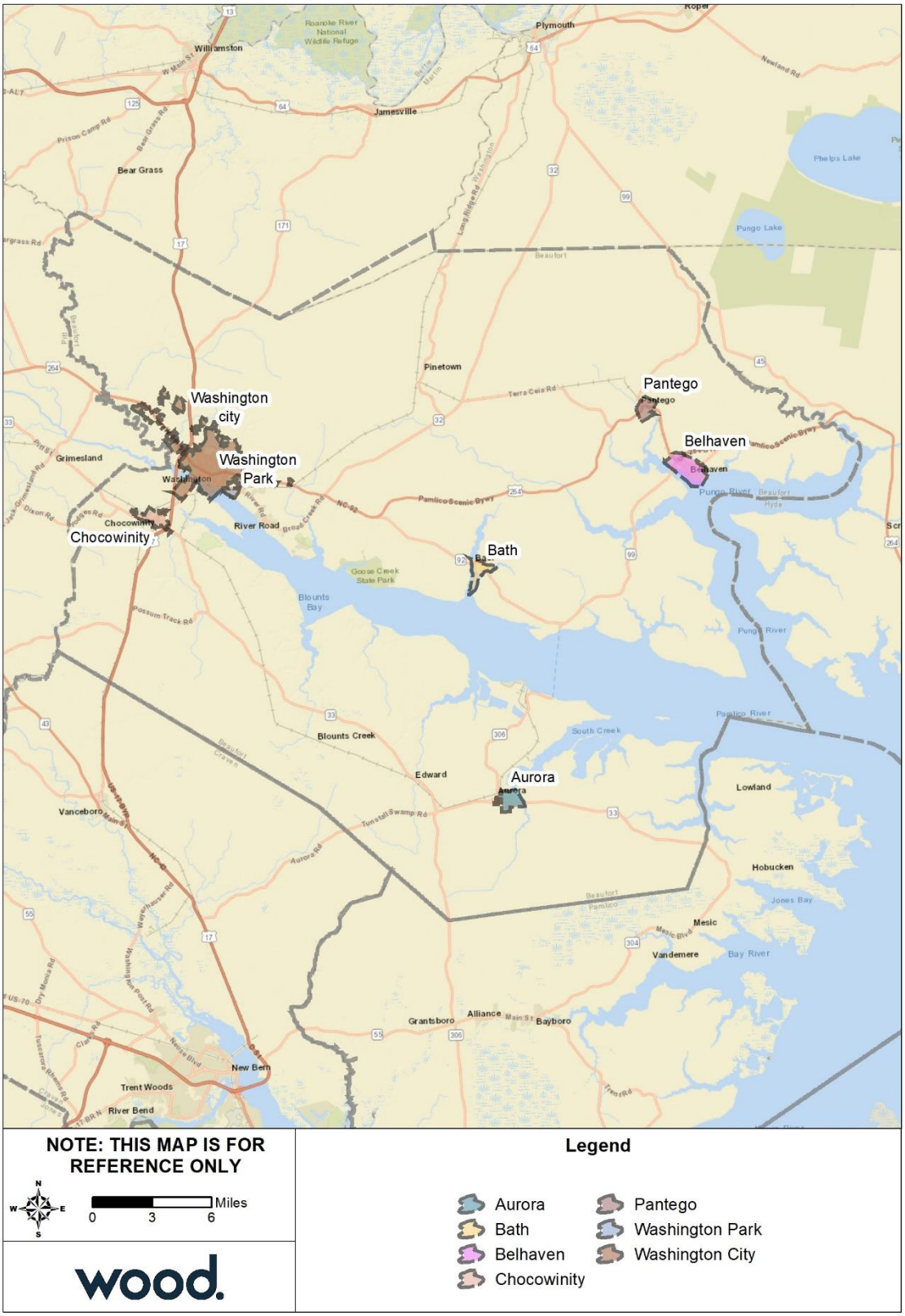
Table A.1 – CRS Participation by Jurisdiction, Beaufort County

Jurisdiction	CRS Participant
Unincorporated Beaufort County	No
City of Washington	Yes
Town of Aurora	No
Town of Bath	No
Town of Belhaven	Yes
Town of Chocowinity	No
Town of Pantego	No
Town of Washington Park	Yes

Geography

Figure A.1 shows a base map of Beaufort County and participating jurisdictions.

Figure A.1 – Jurisdictional Locations, Beaufort County



Population and Demographics

Table A.2 provides population counts and growth estimates for Beaufort County and participating jurisdictions as compared to the Region overall. Table A.3 provides demographic information for the County.

Table A.2 – Population Counts, Beaufort County, 2000-2017

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Unincorporated Areas	31,170	34,375	33,010	10.3%	-4.0%	5.9%
City of Washington	9,619	9,477	9,721	-1.5%	2.6%	1.1%
Town of Aurora	583	520	591	-10.8%	13.7%	1.4%
Town of Bath	275	249	251	-9.5%	0.8%	-8.7%
Town of Belhaven	1,968	1,688	1,997	-14.2%	18.3%	1.5%
Town of Chocowinity	733	820	867	11.9%	5.7%	18.3%
Town of Pantego	170	179	311	5.3%	73.7%	82.9%
Town of Washington Park	440	451	432	2.5%	-4.2%	-1.8%
Jurisdictions Total	**13,788**	**13,384**	**14,170**	**-2.9%**	**6.9%**	**2.8%**
Beaufort County Total	**44,958**	**47,759**	**47,316**	**6.2%**	**-0.9%**	**5.2%**
Region Total	**208,861**	**223,935**	**232,192**	**7.2%**	**3.7%**	**11.2%**

Source: US Census Bureau American Community Survey.

Table A.3 – Racial Demographics, Beaufort County, 2017

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
City of Washington	53.0%	43.3%	0.4%	1.6%	1.7%	12.0%
Town of Aurora	40.6%	56.7%	0.0%	0.0%	2.7%	0.5%
Town of Bath	99.2%	0.0%	0.0%	0.0%	0.8%	0.0%
Town of Belhaven	52.5%	46.5%	0.0%	0.0%	0.1%	9.6%
Town of Chocowinity	62.3%	29.5%	0.0%	2.0%	6.2%	7.6%
Town of Pantego	79.7%	18.6%	0.0%	1.0%	0.6%	11.9%
Town of Washington Park	97.4%	0.2%	0.4%	2.1%	0.0%	9.3%
Beaufort County	**71.2%**	**26.5%**	**0.2%**	**0.7%**	**1.4%**	**7.6%**

*Other races include American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Future Growth and Development

This section provides an explanation of anticipated development trends for jurisdictions in Beaufort County that are participants in the CRS. Evaluating future growth and development decisions in relation to known hazard areas can lead to better growth management and more effective risk reduction strategies.

Each County and respective municipality have handled their planning processes in different fashions. Some communities have consolidated plans, while others conducted their planning process independently. This information provided reflects this fact and portrays the plan for future growth throughout these communities. Each of these plans were developed under varying conditions, some involving specific guidance, such as that dictated by the NC Division of Coastal Management.

Beaufort County

All communities throughout Beaufort County maintain a current Land Use Plan; however, unincorporated Beaufort County does not maintain zoning regulations. Due to this fact, there is a much higher likelihood that incompatible land uses may be developed adjacent to one another. The County's future land use map provides some guidance regarding future development, but this will only impact land use in a regulatory manner within areas defined as an "Area of Environmental Concern" by the NC Division of Coastal Management.

Growth and development have been slow to materialize throughout unincorporated Beaufort County. A majority of development that has taken place involves residential subdivision construction generally located on properties on or adjacent to the County's abundant shoreline areas. Non-residential development has occurred through modest industrial and commercial expansion. A majority of this growth has been focused on properties fronting major transportation thoroughfares including US Highways 17 and 264, as well as NC Highways 32 and 33. These development trends are expected to continue throughout the planning period.

All municipalities within Beaufort County maintain zoning regulations that provide for better control of land use and development. All municipalities, with the exception of the City of Washington, fall under the Beaufort County CAMA Land Use Plan. This land use plan provides for general parameters focused on limiting the potential for inappropriate/incompatible land uses; however, this plan has not been updated in over ten years. The plan still serves these communities and provides the basis for the location of each communities defined zoning districts. Development within Aurora, Bath, Belhaven, Chocowinity, and Pantego is predominantly characterized by commercial land use centered around the downtown district and medium density residential development toward the edges of their respective corporate limits. The Town of Washington Park is a quiet single-family residential community located adjacent to the City of Washington.

The City of Washington maintains a more robust Planning and Development department than the remainder of Beaufort County. The City has developed both short- and long-range plans intended to promote organized development and enhance economic development. These efforts focus on the development/redevelopment of the City's downtown historic/central business district, while also addressing the issue of adequate market rate and affordable housing. The City of Washington also addresses the issue of development throughout its extensive flood hazard area through their planning efforts. These efforts have been two-fold through both structural mitigation to existing structures and regulation of new development through the City's Flood Damage Prevention Ordinance.

Beaufort County Joint CAMA Land Use Plan (Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington Park)

The Beaufort County Joint CAMA Land Use Plan was adopted by the Beaufort County Board of Commissioners in October of 2009. The plan included Unincorporated Beaufort County, as well as the CRS communities of Belhaven and Washington Park. The plan defines seven future land use districts including:

- Conservation I
- Conservation II Overlay Classification
- Towns and Community Centers
- Transition Classification
- Transition – Water Oriented Development
- Transition – US 17/264 Sector Development

- Agriculture-Forestry-Rural Housing
- These districts are defined in detail under Part III(C) (page III-37) of the Beaufort County Joint CAMA Land Use Plan available through the following URL:

These districts are defined in detail under Part III(C) (page III-37) of the Beaufort County Joint CAMA Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/Beaufort%20Co%20%20LUP10%201%2009.pdf

Figure A.2 and Figure A.3 provide the delineation of each Future Land Use District for the County, as well as the Towns of Washington Park & Belhaven.

Figure A.2 – Beaufort County Joint CAMA LUP 2006 Update

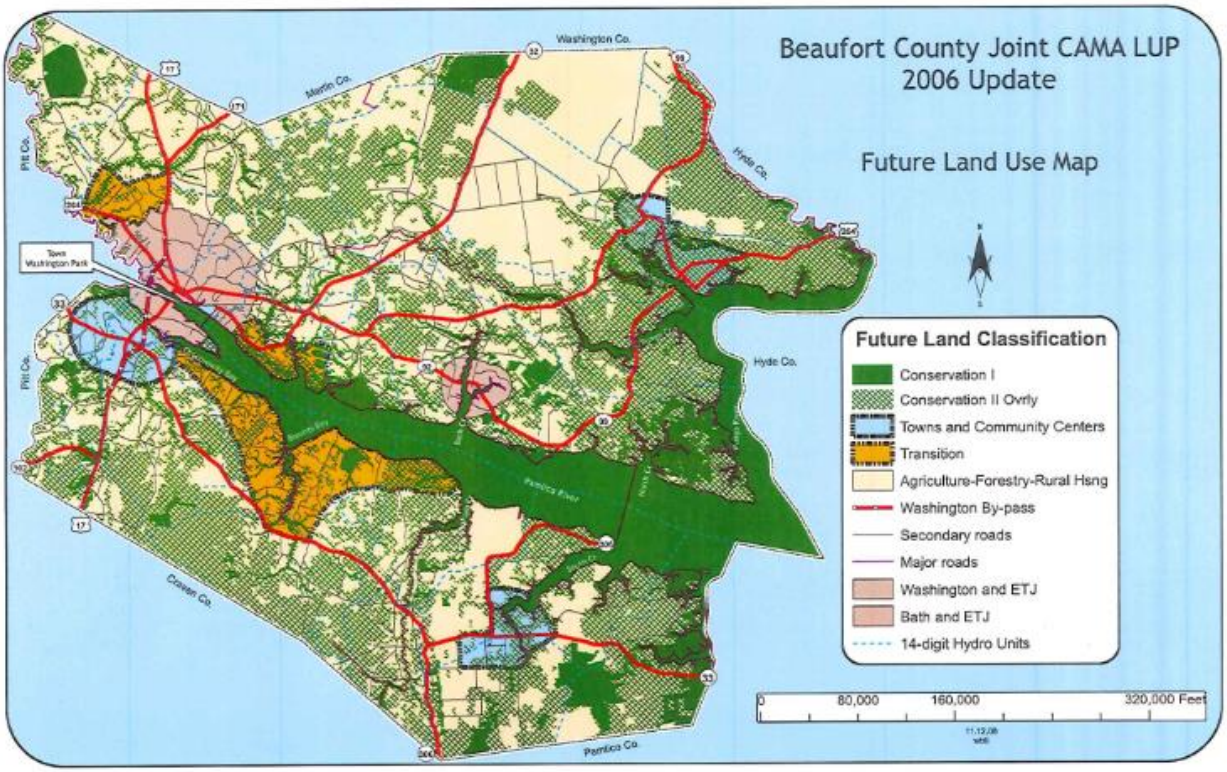
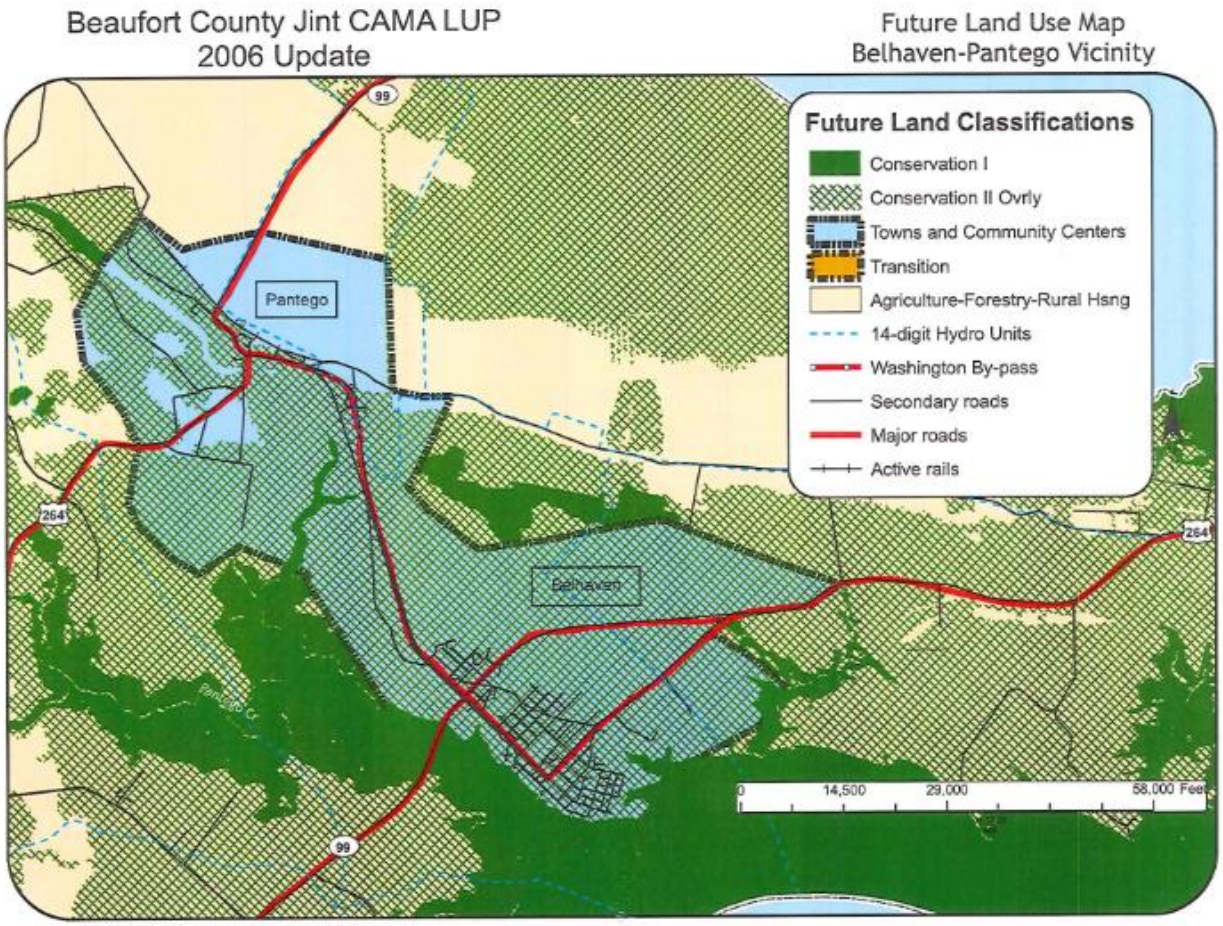


Figure A.3 – Future Land Use Map, Belhaven-Pantego Vicinity



City of Washington CAMA Core Land Use Plan

The City of Washington CAMA Core Land Use Plan was adopted by the Washington City Council in August of 2007. The Land Use Plan defines eleven primary Future Land Use Districts including:

- Airport
- Commercial
- Conservation
- High Density Residential
- Heavy Industrial
- Low Density Residential
- Light Industrial
- Medium Density Residential
- Mixed Use
- Office and Institutional
- Washington Park

These districts are defined in detail under Section 6 (page 221) of the City of Washington CAMA Core Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/City%20of%20Washington%20LUP%20-%2030Nov2007.pdf

The maps in Figure A.4 and Figure A.5 reflect the delineation of each Future Land Use District.

Figure A.4 – City of Washington Future Land Use

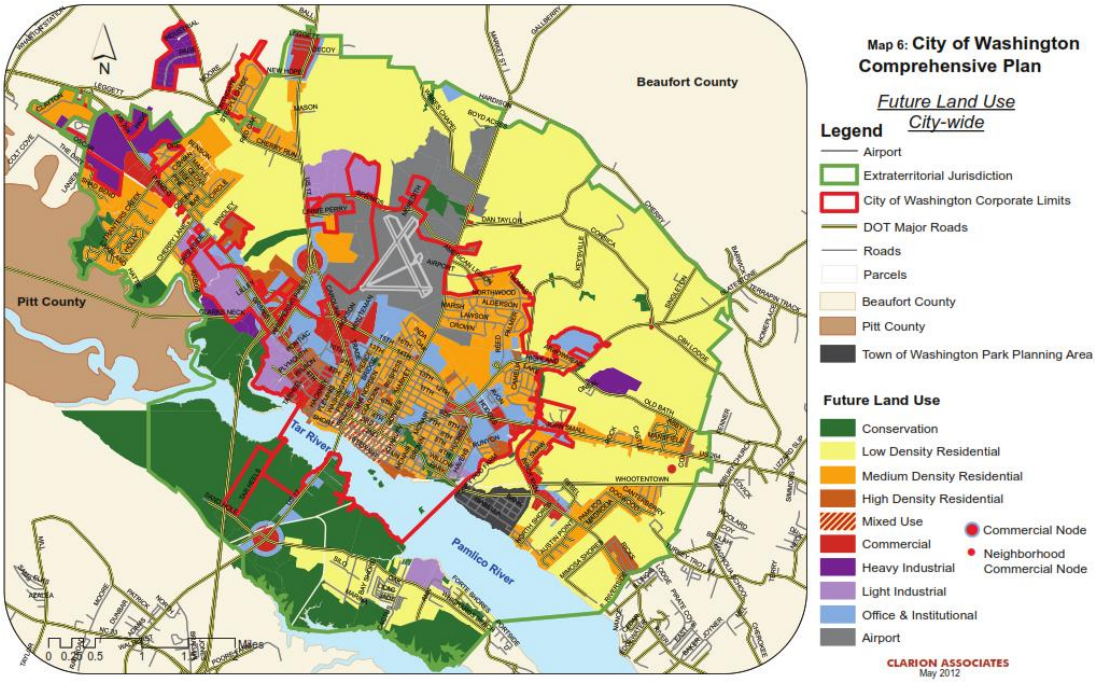
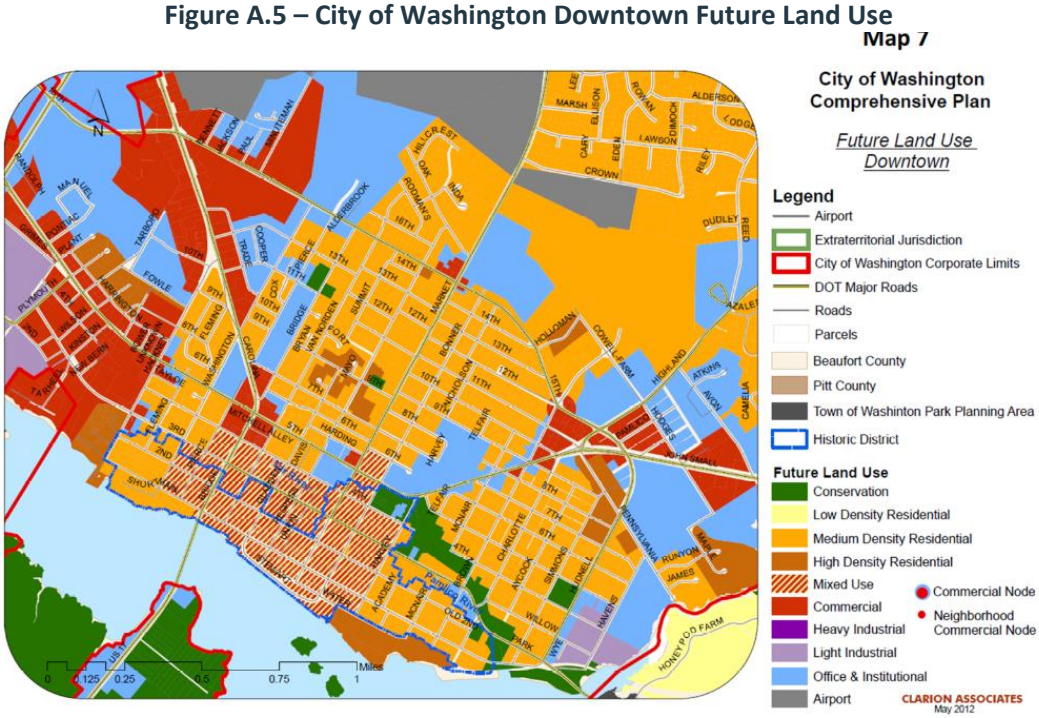


Figure A.5 – City of Washington Downtown Future Land Use



Asset Inventory

The following tables summarize the asset inventory for Beaufort County unincorporated areas and incorporated jurisdictions in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure A.6 through Figure A.12. Note, if there is no map for the jurisdiction, data was unavailable in iRisk. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table A.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense Industrial Base	Government Facilities	Healthcare	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Beaufort County	1,175	3	1	607	0	344	0	81	21	0	0	2	104	1	5	2	2,346
City of Washington	12	30	1	483	3	114	0	100	76	0	1	3	107	1	3	3	937
Town of Aurora	29	2	0	53	0	8	0	16	6	0	0	1	4	0	1	0	120
Town of Bath	18	0	0	31	0	10	0	21	0	0	0	0	4	0	0	0	84
Town of Belhaven	8	1	0	95	0	8	0	9	5	0	1	1	14	1	0	1	144
Town of Chocowinity	0	0	0	27	0	10	0	14	5	0	0	0	12	0	1	1	70
Town of Pantego	4	0	0	11	0	3	0	7	0	0	0	0	2	0	0	0	27
Town of Washington Park	0	0	0	8	0	1	0	0	1	0	0	0	3	0	0	0	13
Beaufort County Total	**1,246**	**36**	**2**	**1,315**	**3**	**498**	**0**	**248**	**114**	**0**	**2**	**7**	**250**	**3**	**10**	**7**	**3,741**

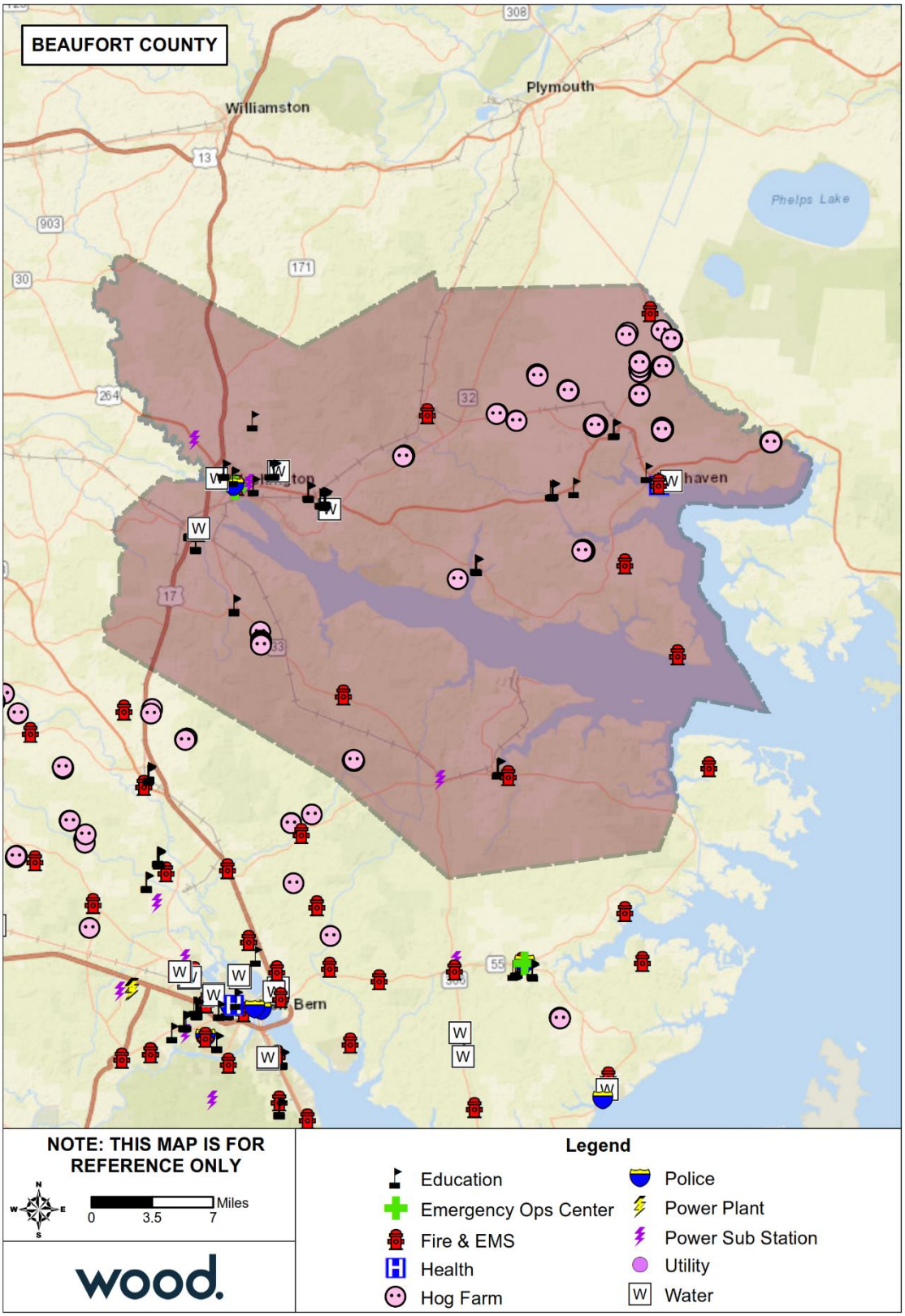
Source: NCEM Risk Management Tool

Table A.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Beaufort County	0	7	8	18	0	8	3	44
City of Washington	1	42	8	17	0	12	2	82
Town of Aurora	0	0	0	2	0	0	0	2
Town of Bath	0	0	0	4	0	0	0	4
Town of Belhaven	3	5	0	0	0	2	0	10
Town of Chocowinity	0	1	1	3	0	0	0	5
Town of Pantego	-	-	-	-	-	-	-	-
Town of Washington Park	-	-	-	-	-	-	-	-
Beaufort County Total	**4**	**55**	**17**	**44**	**0**	**22**	**5**	**147**

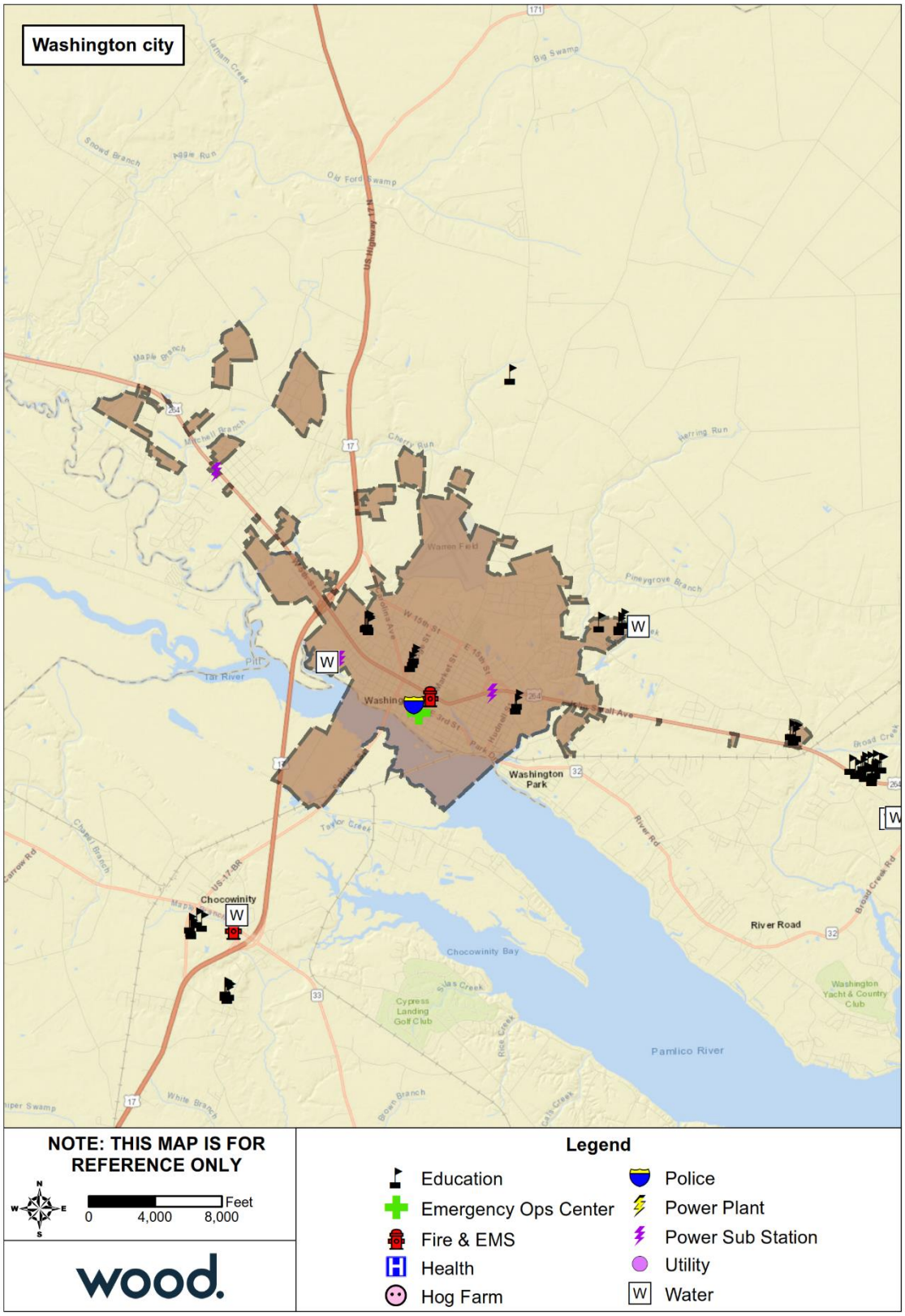
Source: NCEM Risk Management Tool
Note: A dash (-) indicates that no high potential loss facilities were reported in RMT.

Figure A.6 – Critical Facilities, Beaufort County



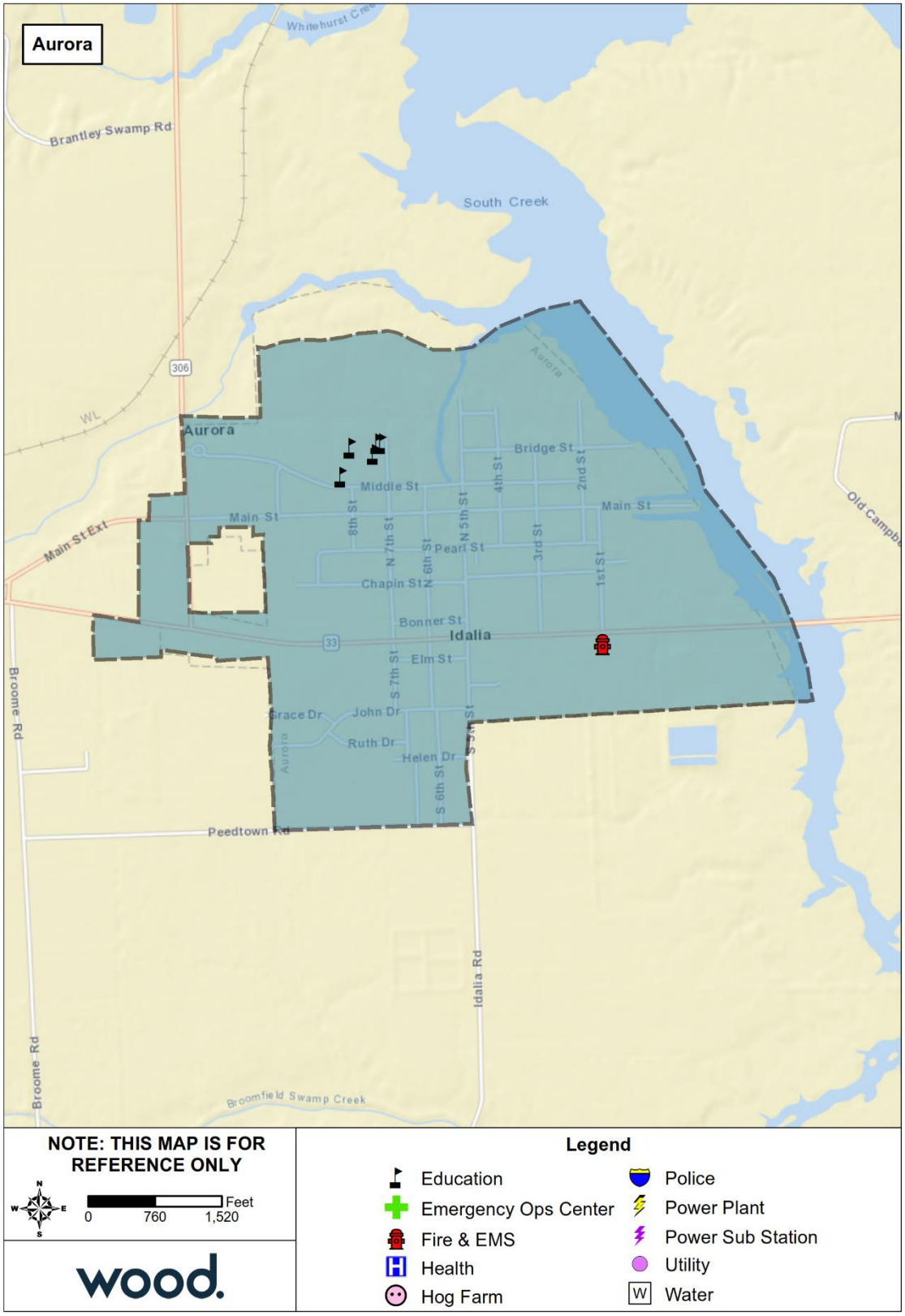
Source: NCEM IRISK Database, GIS Analysis

Figure A.7 – Critical Facilities, City of Washington



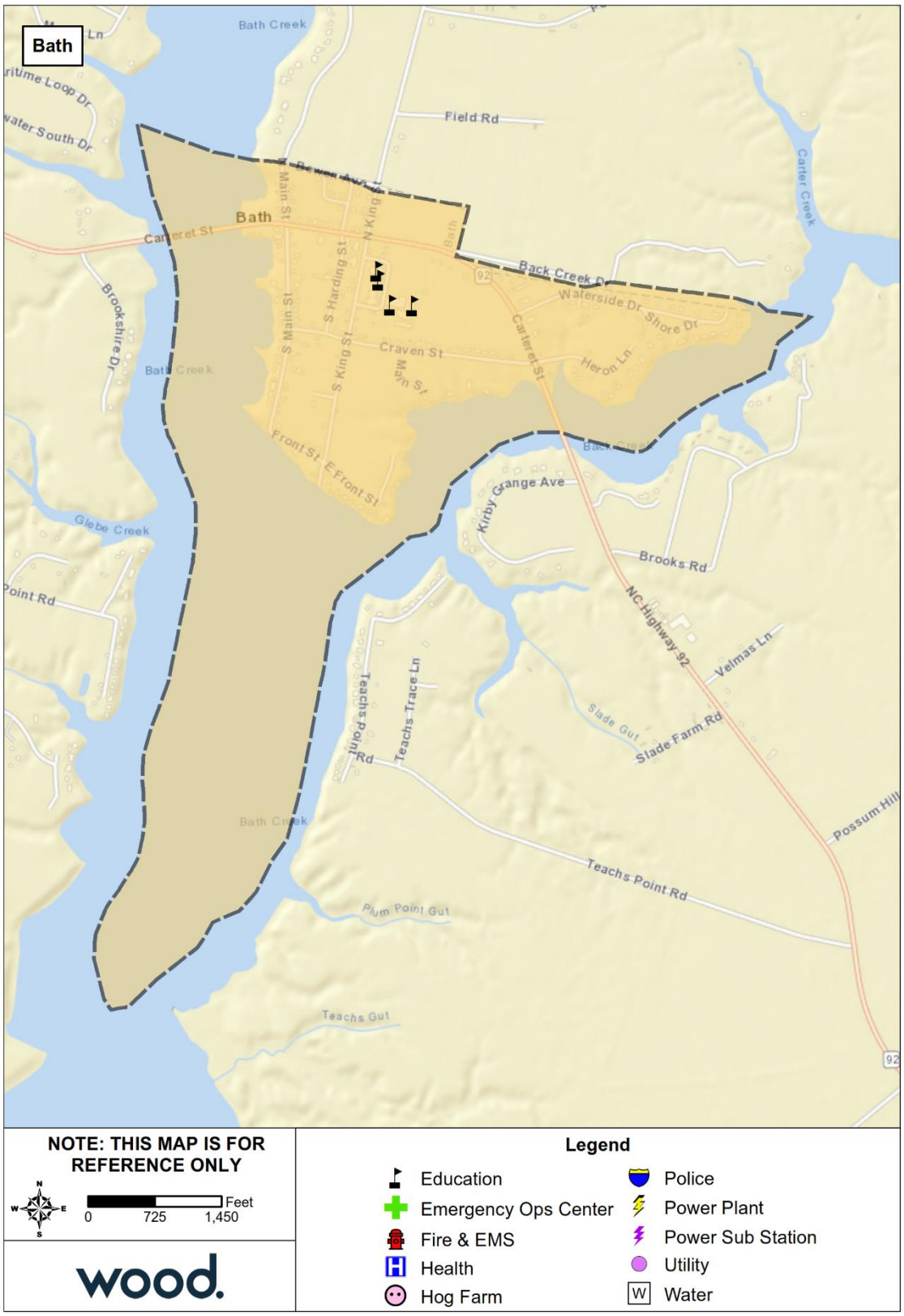
Source: NCEM IRISK Database, GIS Analysis

Figure A.8 – Critical Facilities, Town of Aurora



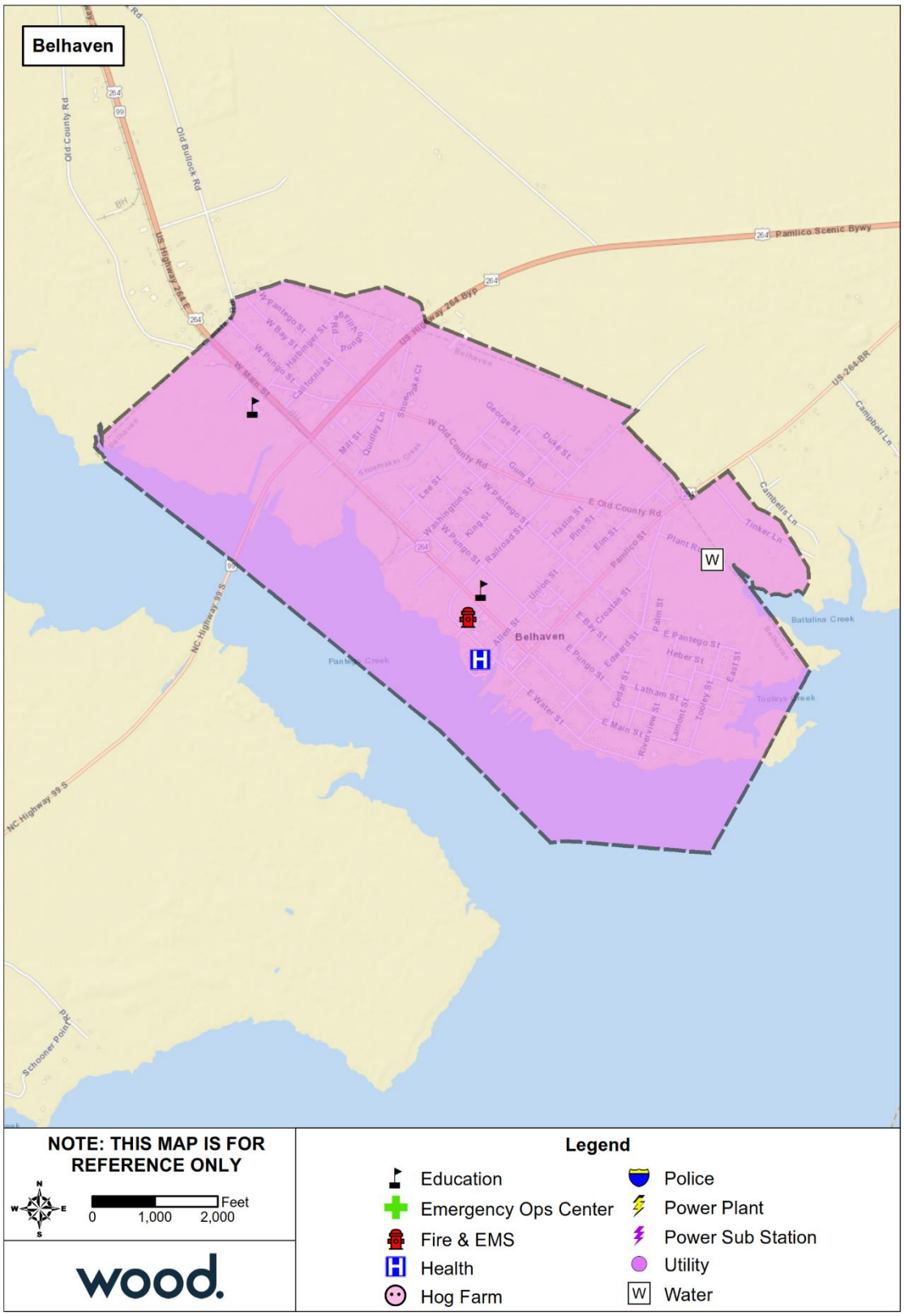
Source: NCEM IRISK Database, GIS Analysis

Figure A.9 – Critical Facilities, Town of Bath



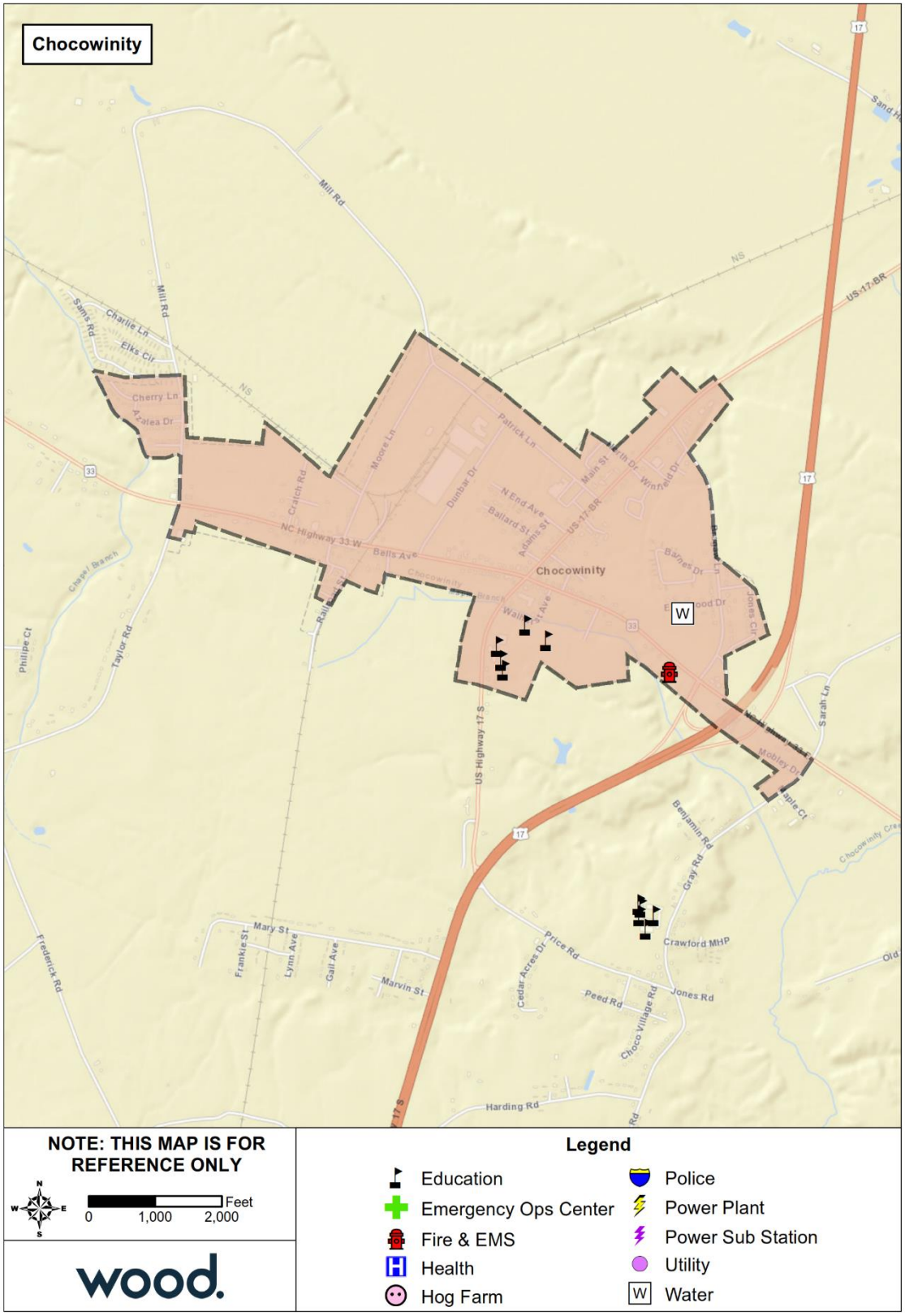
Source: NCEM IRISK Database, GIS Analysis

Figure A.10 – Critical Facilities, Town of Belhaven



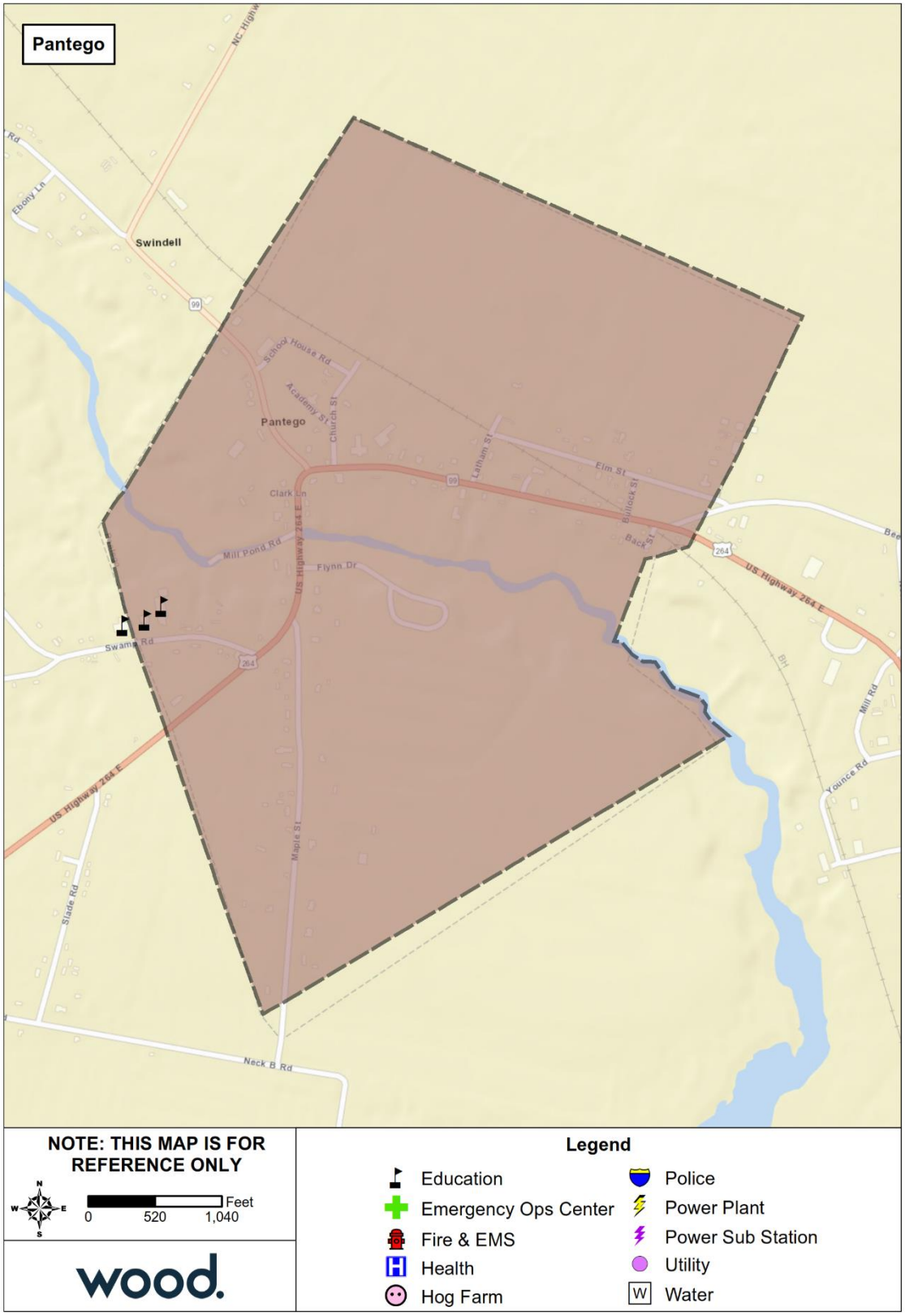
Source: NCEM IRISK Database, GIS Analysis

Figure A.11 – Critical Facilities, Town of Chocowinity



Source: NCEM IRISK Database, GIS Analysis

Figure A.12 – Critical Facilities, Town of Pantego



Source: NCEM IRISK Database, GIS Analysis

Housing

The table below details key housing statistics for Beaufort County. As a percent of growth from 2010 housing, Beaufort County's housing stock has grown by 4.4%.

Table A.6 – Housing Statistics, Beaufort County, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Aurora	315	354	12.4%	67.2%	32.8%
Bath	176	190	7.9%	90.4%	9.6%
Belhaven	940	1,134	20.6%	56.2%	43.8%
Chocowinity	393	482	22.6%	52.8%	47.2%
Pantego	88	141	60.3%	77.5%	22.5%
Washington	4,754	4,811	1.2%	47.2%	52.8%
Washington Park	220	279	26.8%	84.2%	15.8%
Beaufort County	**24,688**	**25,773**	**4.4%**	**70.8%**	**29.2%**

Source: US Census Bureau American Community Survey.

Economy

The following tables present key economic statistics for Beaufort County.

Table A.7 – Economic Indicators, Beaufort County, 2017

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Aurora	196	32.5%	7.1%	60.5%	17.9%
Bath	99	41.6%	0.0%	58.4%	0.0%
Belhaven	799	43.0%	5.3%	51.7%	11.0%
Chocowinity	396	52.6%	2.9%	44.5%	5.3%
Pantego	153	62.8%	3.5%	33.8%	5.2%
Washington	4,095	45.9%	8.5%	45.6%	15.6%
Washington Park	311	62.2%	1.6%	36.1%	2.6%
Beaufort County	**20,945**	**49.3%**	**4.9%**	**45.8%**	**9.0%**

Source: US Census Bureau American Community Survey.

Table A.8 – Employment by Industry, Beaufort County, 2017

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Aurora	22.4%	18.6%	29.2%	19.3%	10.6%
Bath	42.4%	17.2%	29.3%	2.0%	9.1%
Belhaven	24.9%	17.0%	23.3%	13.8%	21.0%
Chocowinity	20.8%	18.9%	34.4%	8.5%	50.0%
Pantego	39.3%	10.3%	16.6%	20.0%	13.8%
Washington	33.9%	25.9%	18.0%	8.4%	13.9%
Washington Park	44.2%	11.2%	28.1%	9.9%	6.6%
Beaufort County	**31.5%**	**17.4%**	**20.8%**	**14.1%**	**16.1%**

Source: US Census Bureau American Community Survey.

A.2 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority by jurisdiction in Beaufort County than for the Pamlico Sound Region as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are flood and wildfire.

A.2.1 Flood

Table A.9 details the acreage of Beaufort County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at 100 percent, the Town of Belhaven has the largest portion of its land area within the mapped 1%-annual-chance floodplain, followed by Chocowinity. Bath and the unincorporated areas of the county have the lowest portion of land in the 1%-annual-chance floodplain, at 22 percent and 35 percent, respectively. Overall, 35 percent of the county's total land area falls within this floodplain.

Table A.9 – Flood Zone Acreage by Jurisdiction, Beaufort County

Flood Zone	Acreage	Percent of Total (%)
Aurora		
Zone AE	273.53	41.2
Zone X (500-year)	70.33	10.7
Zone X Unshaded	313.10	47.7
Total	**656.96**	--
Bath		
Zone AE	434.37	74.1
Zone X (500-year)	21.11	3.6
Zone X Unshaded	130.91	22.3
Total	**586.39**	--
Belhaven		
Zone AE	1,336.29	100
Total	**1,336.26**	--
Chocowinity		
Zone AE	4.78	0.7
Zone X (500-year)	3.43	0.5
Zone X (unshaded)	636.22	98.7
Total	**644.43**	--
Pantego		
Zone AE	287.07	55.9
Zone X (500-year)	96.25	18.7
Zone X (unshaded)	130.29	25.4
Total	**513.62**	--
Washington		
Zone AE	2,442.27	42.3
Zone X (500-year)	563.06	9.8
Zone X (unshaded)	2,769.12	48.0
Total	**5,774.45**	--
Washington Park		
Zone AE	151.34	89.6
Zone X (500-year)	3.84	2.3
Zone X (unshaded)	13.80	8.2

Flood Zone	Acreage	Percent of Total (%)
Total	**168.98**	--
Beaufort County		
Zone A	1.34	0.0
Zone AE	206,786.30	34.5
Zone VE	3,560.22	0.6
Zone X (500-year)	15,298.82	2.6
Zone X (unshaded)	373,090.17	62.3
County Total	**598,736.86**	--

Source: FEMA Effective DFIRM; U.S. Census Bureau

Figure A.13 through Figure A.20 reflect the effective mapped flood hazard zones for all jurisdictions in Beaufort County, and Figure A.21 through Figure A.28 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table A.10 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and event in Beaufort County and incorporated jurisdictions. Table A.11 provides building counts and estimated damages for High Potential Loss Structures in the 1%-annual-chance floodplain.

Table A.10 – Critical Facilities Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Beaufort County Unincorporated Areas			
Banking and Finance	100 Year	1	$507
Commercial Facilities	100 Year	50	$901,597
Critical Manufacturing	100 Year	19	$99,273
Emergency Services	100 Year	1	$4,371
Food and Agriculture	100 Year	46	$130,683
	Floodway	17	$52,255
Government Facilities	100 Year	3	$91,954
Transportation Systems	100 Year	9	$136,240
	Floodway	1	$1,494
All Categories	**100 Year**	**129**	**$1,364,625**
	Floodway	**18**	**$53,749**
City of Washington			
Banking and Finance	100 Year	3	$27,876
Commercial Facilities	100 Year	100	$2,975,131
	Floodway	12	$221,298
Critical Manufacturing	100 Year	16	$333,982
Emergency Services	100 Year	1	$83,255
Government Facilities	100 Year	5	$241,566
Healthcare and Public Health	100 Year	9	$201,895
	Floodway	1	$152,398
Transportation Systems	100 Year	17	$190,657
	Floodway	1	$17,072
All Categories	**100 Year**	**151**	**$4,054,362**
	Floodway	**14**	**$390,768**
Town of Aurora			
Commercial Facilities	100 Year	2	$23,127

Critical Manufacturing	100 Year	1	$440
Food and Agriculture	100 Year	2	$17,714
Government Facilities	100 Year	1	$24,353
All Categories	**100 Year**	**6**	**$65,634**
Town of Bath			
Commercial Facilities	100 Year	1	$203
All Categories	**100 Year**	**1**	**$203**
Town of Belhaven			
Commercial Facilities	100 Year	80	$2,390,452
Critical Manufacturing	100 Year	8	$205,207
Energy	100 Year	1	$5,807
Food and Agriculture	100 Year	8	$17,622
Government Facilities	100 Year	8	$260,388
Healthcare and Public Health	100 Year	4	$79,601
Nuclear Reactors, Materials and Waste	100 Year	1	$60,907
Transportation system	100 Year	14	$397,198
Water	100 Year	1	$20,574
All Categories	**100 Year**	**125**	**$3,437,756**
Town of Pantego			
Commercial Facilities	100 Year	3	$131,384
Government Facilities	100 Year	2	$21,775
	Floodway	1	$9,316
All Categories	**100 Year**	**5**	**$153,159**
	Floodway	**1**	**$9,316**
Town of Washington Park			
Commercial Facilities	100 Year	4	$41,388
Healthcare and Public Health	100 Year	1	$2,114
Transportation system	100 Year	1	$14,454
All Categories	**100 Year**	**6**	**$57,956**

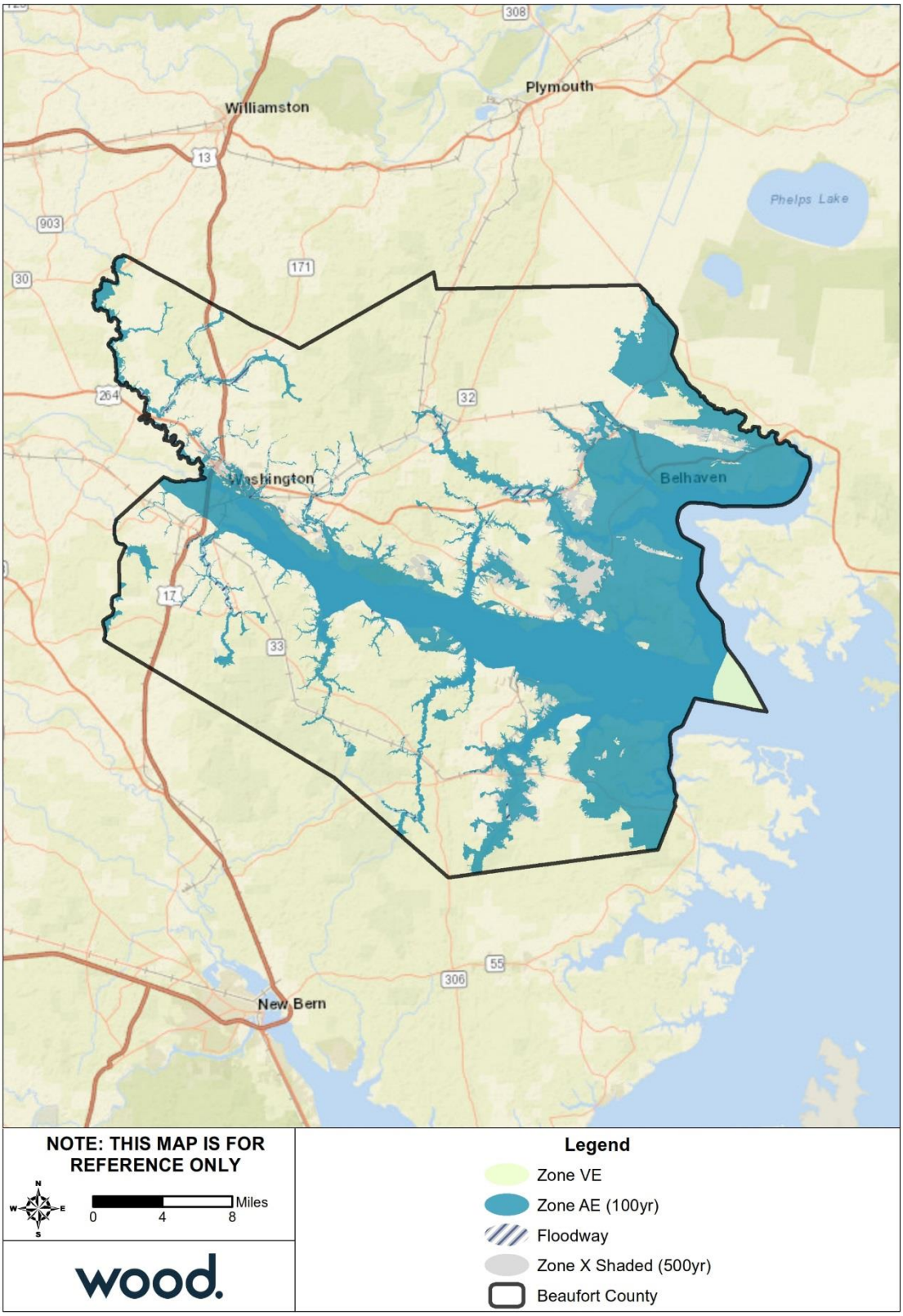
Source: NCEM Risk Management Tool

Table A.11 – High Potential Loss Properties Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Beaufort County Unincorporated Areas			
Commercial	100 Year	1	$112,885
All Categories	**100 Year**	**1**	**$112,885**
City of Washington			
Commercial	100 Year	1	$59,621
Religious	100 Year	2	$132,282
All Categories	**100 Year**	**3**	**$191,903**
Town of Belhaven			
Commercial	100 Year	2	$397,710
Religious	100 Year	1	$51,676
Residential	100 Year	3	$504,212
All Categories	**100 Year**	**6**	**$953,598**

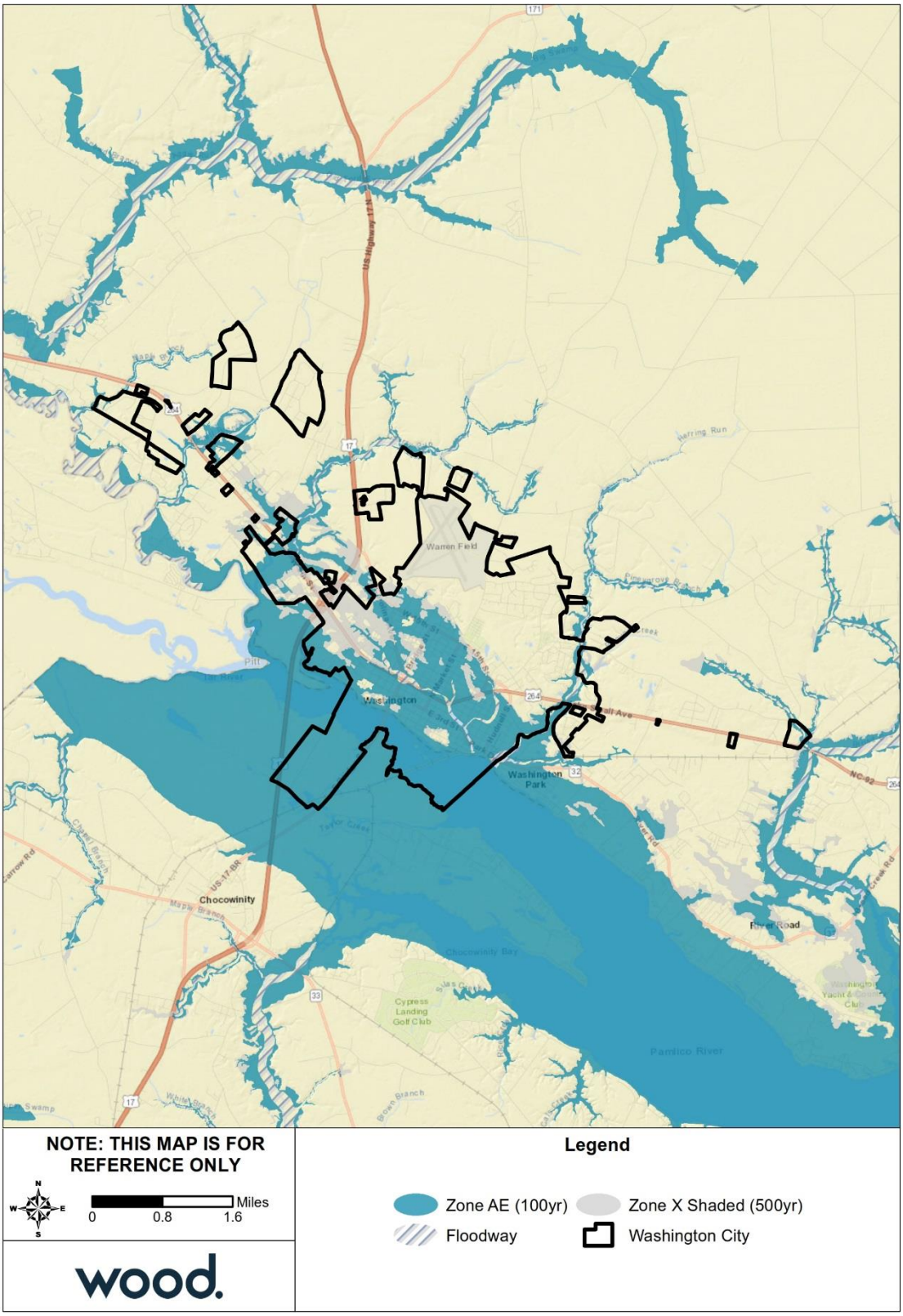
Source: NCEM Risk Management Tool

Figure A.13 – FEMA Flood Hazard Areas, Unincorporated Beaufort County



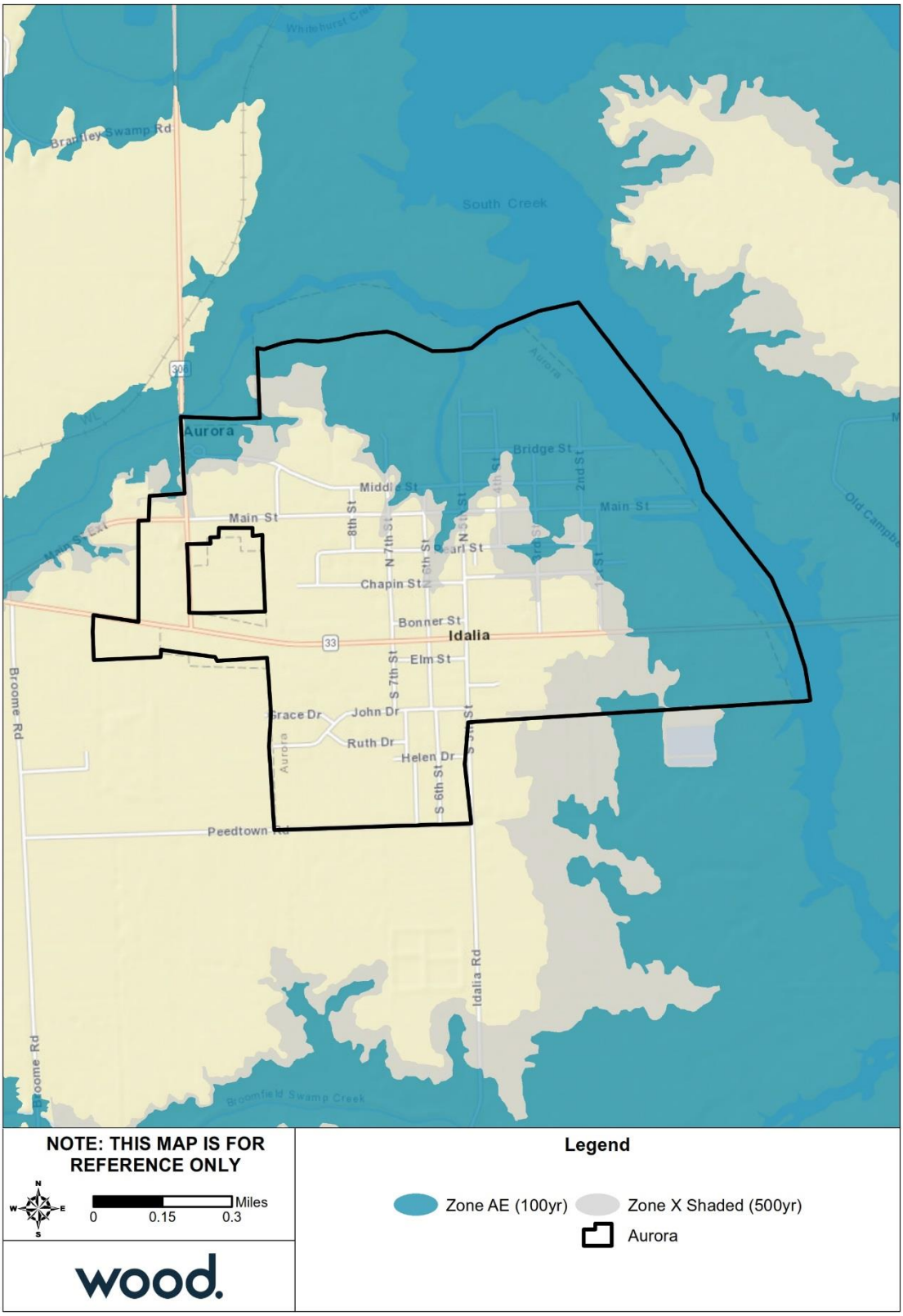
Source: FEMA Effective DFIRM

Figure A.14 – FEMA Flood Hazard Areas, City of Washington



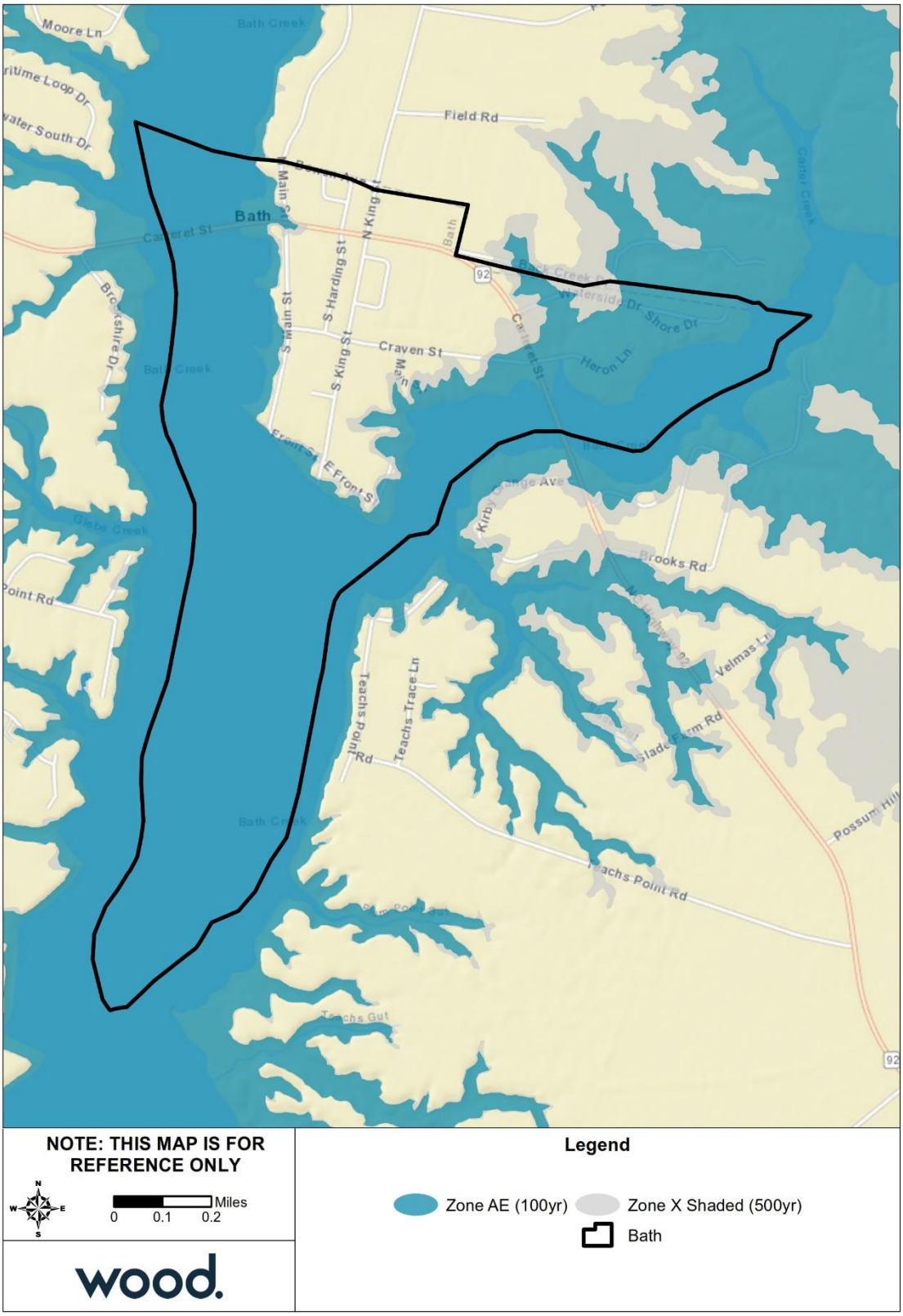
Source: FEMA Effective DFIRM

Figure A.15 – FEMA Flood Hazard Areas, Town of Aurora



Source: FEMA Effective DFIRM

Figure A.16 – FEMA Flood Hazard Areas, Town of Bath

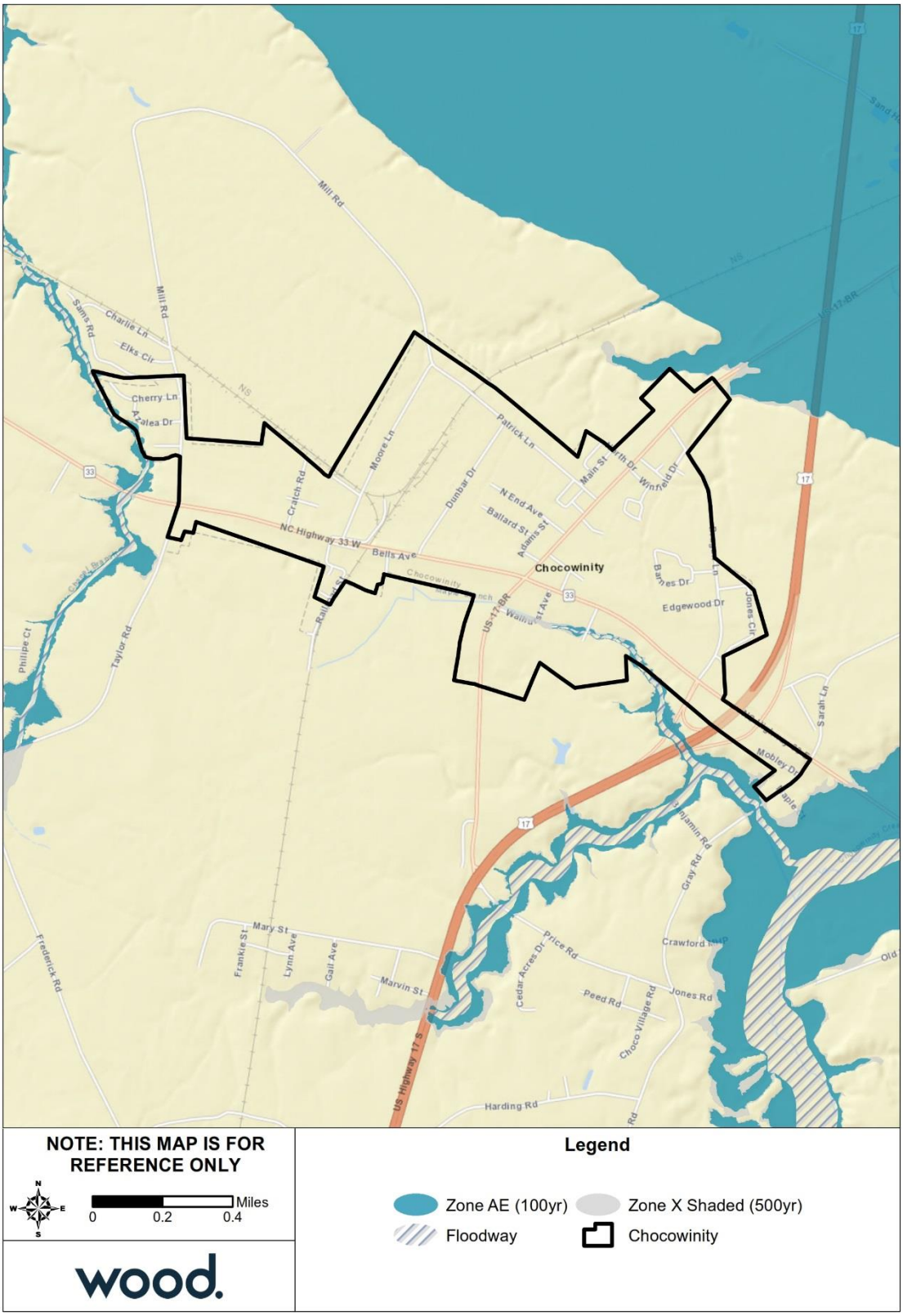


Source: FEMA Effective DFIRM

Figure A.17 – FEMA Flood Hazard Areas, Town of Belhaven

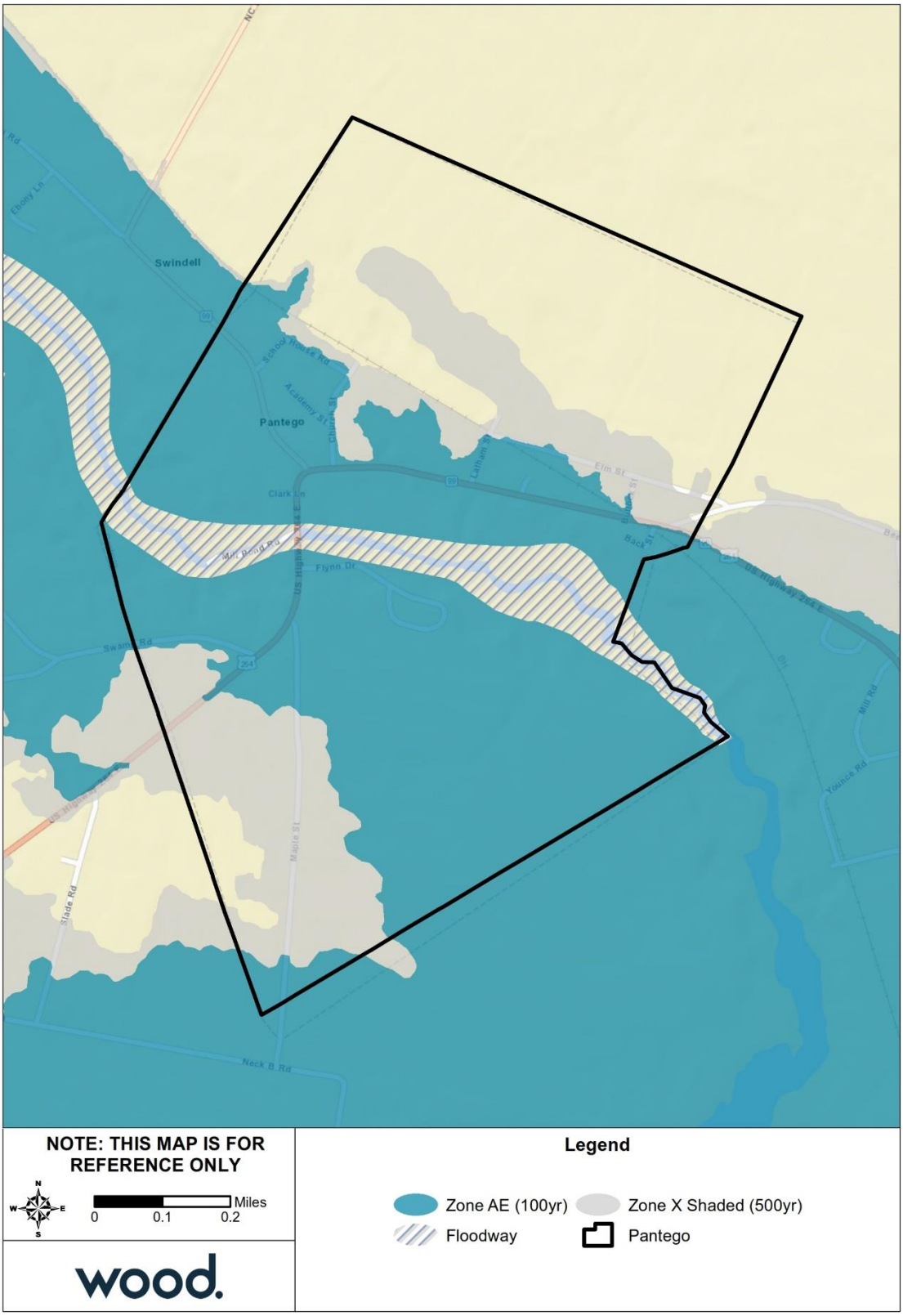
Source: FEMA Effective DFIRM

Figure A.18 – FEMA Flood Hazard Areas, Town of Chocowinity



Source: FEMA Effective DFIRM

Figure A.19 – FEMA Flood Hazard Areas, Town of Pantego

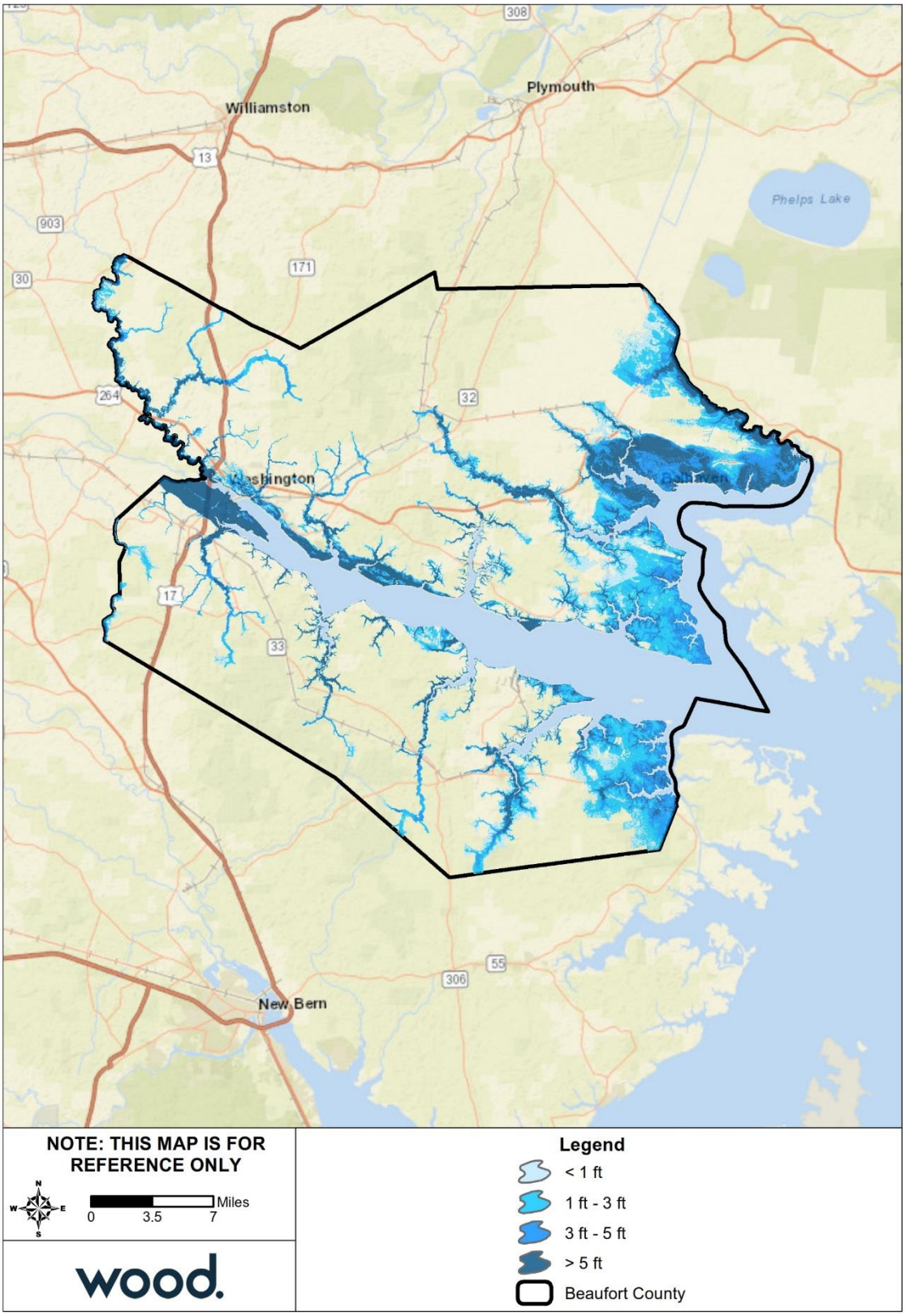


Source: FEMA Effective DFIRM

Figure A.20 – FEMA Flood Hazard Areas, Town of Washington Park

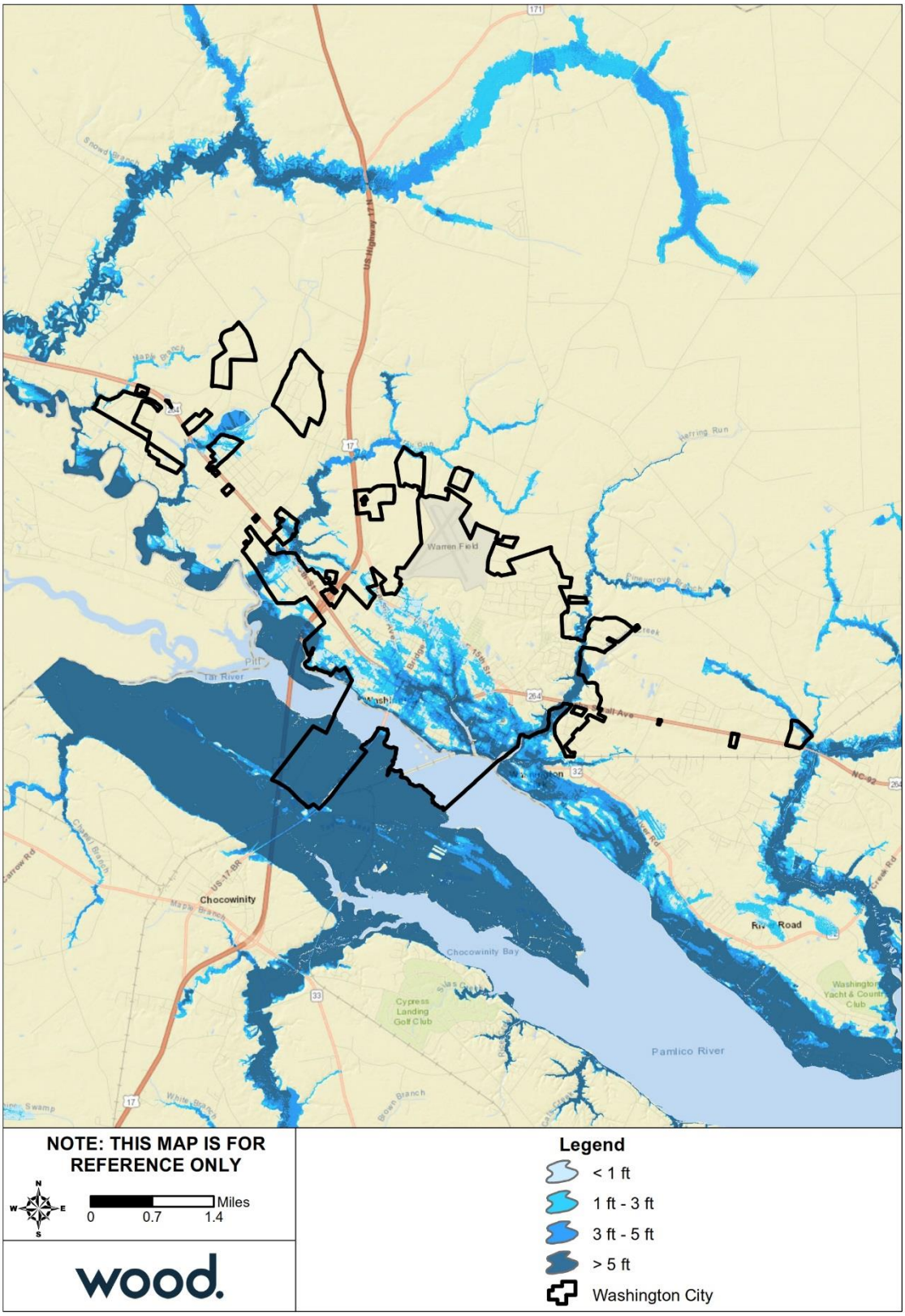
Source: FEMA Effective DFIRM

Figure A.21 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Beaufort County



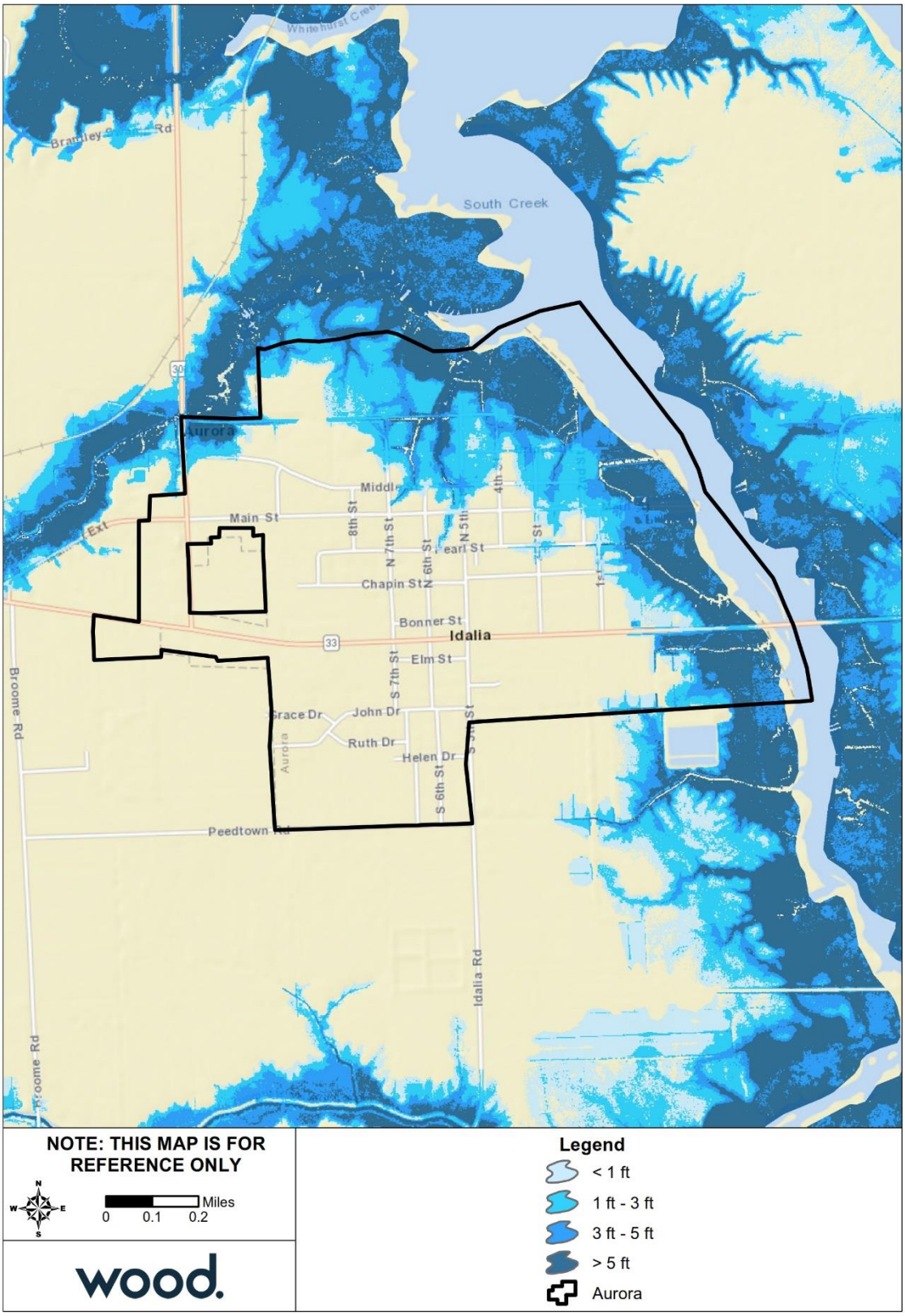
Source: FEMA Effective DFIRM

Figure A.22 – Flood Depth, 1%-Annual-Chance Floodplain, City of Washington



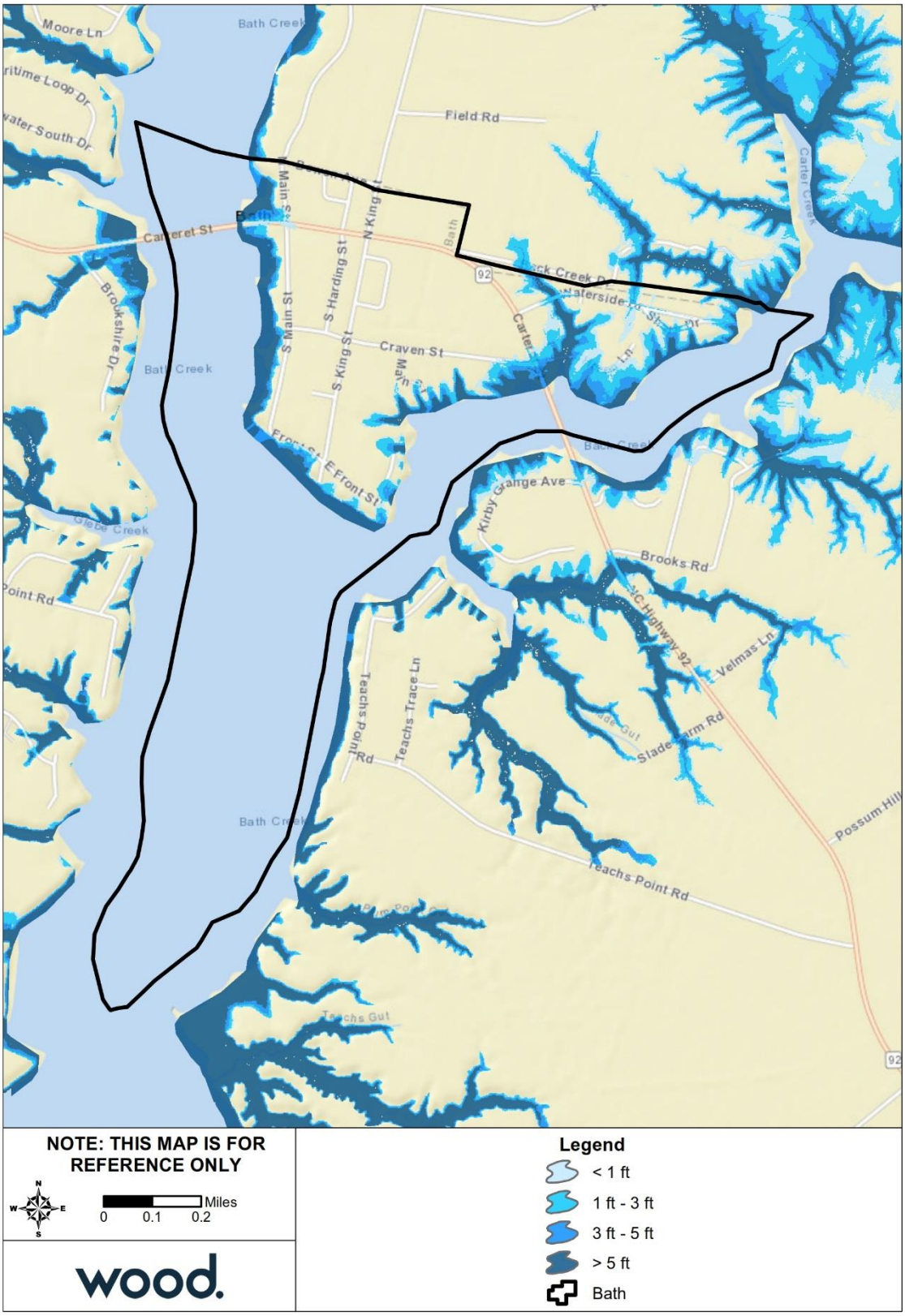
Source: FEMA Effective DFIRM

Figure A.23 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Aurora



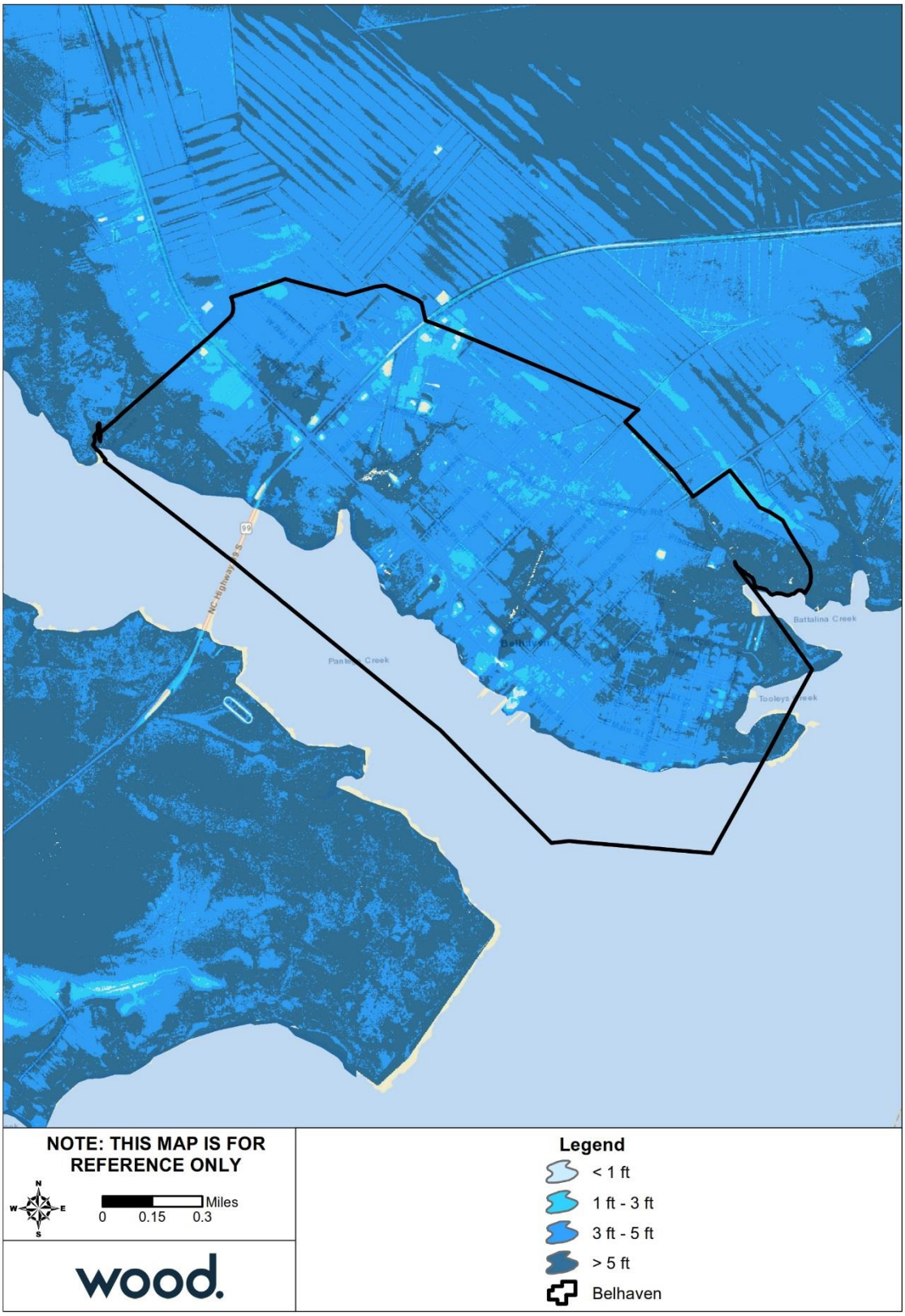
Source: FEMA Effective DFIRM

Figure A.24 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Bath



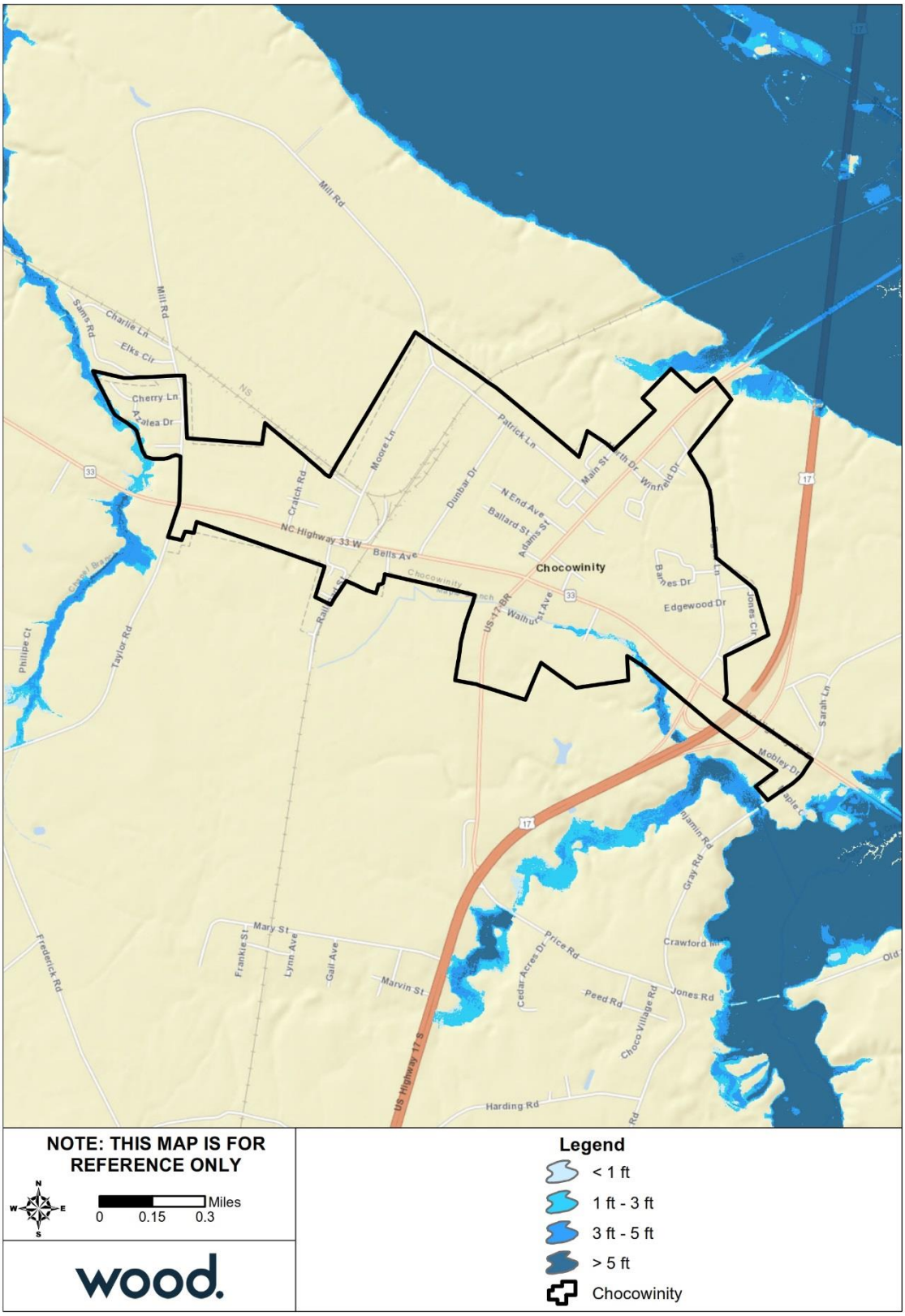
Source: FEMA Effective DFIRM

Figure A.25 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Belhaven



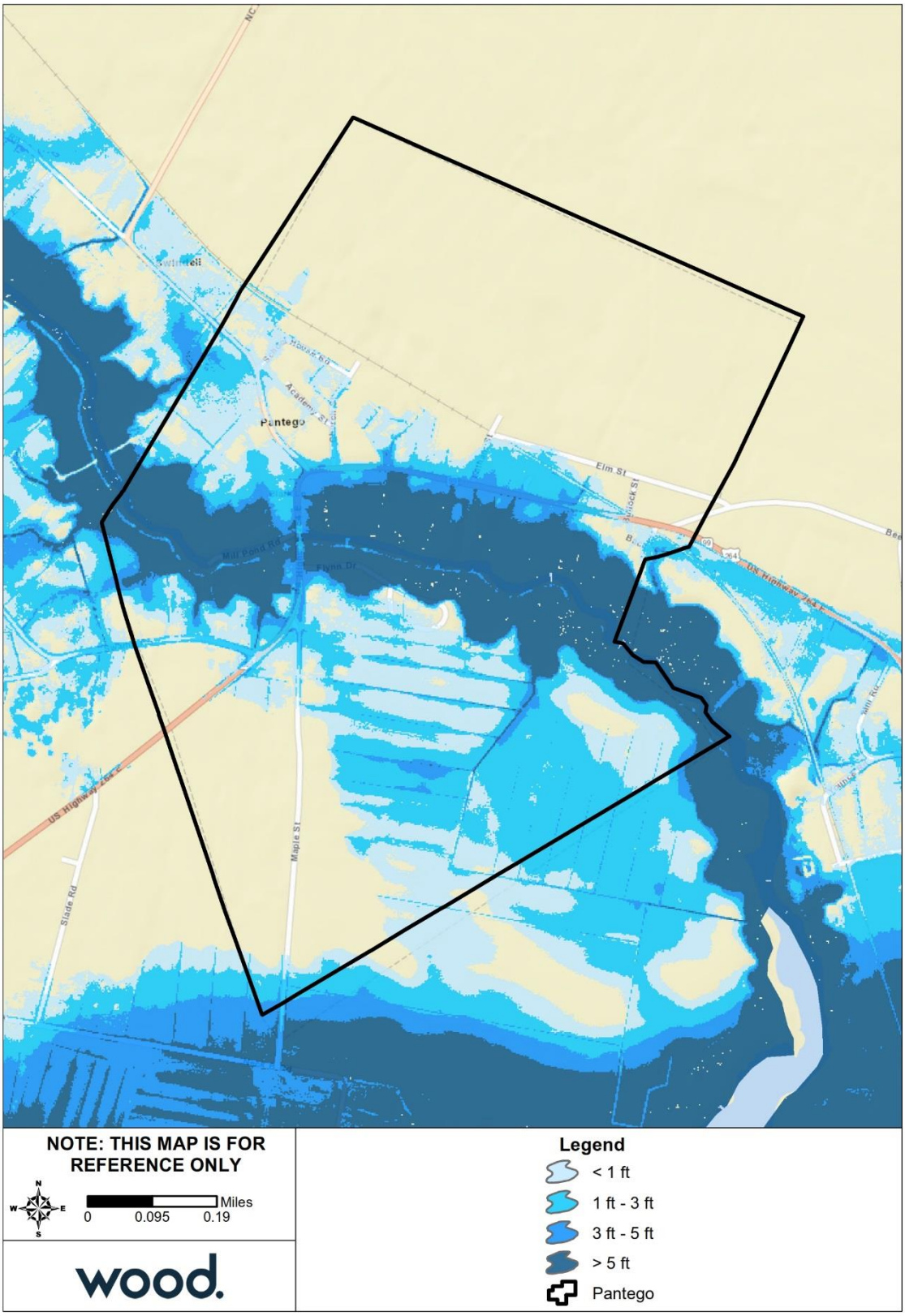
Source: FEMA Effective DFIRM

Figure A.26 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Chocowinity



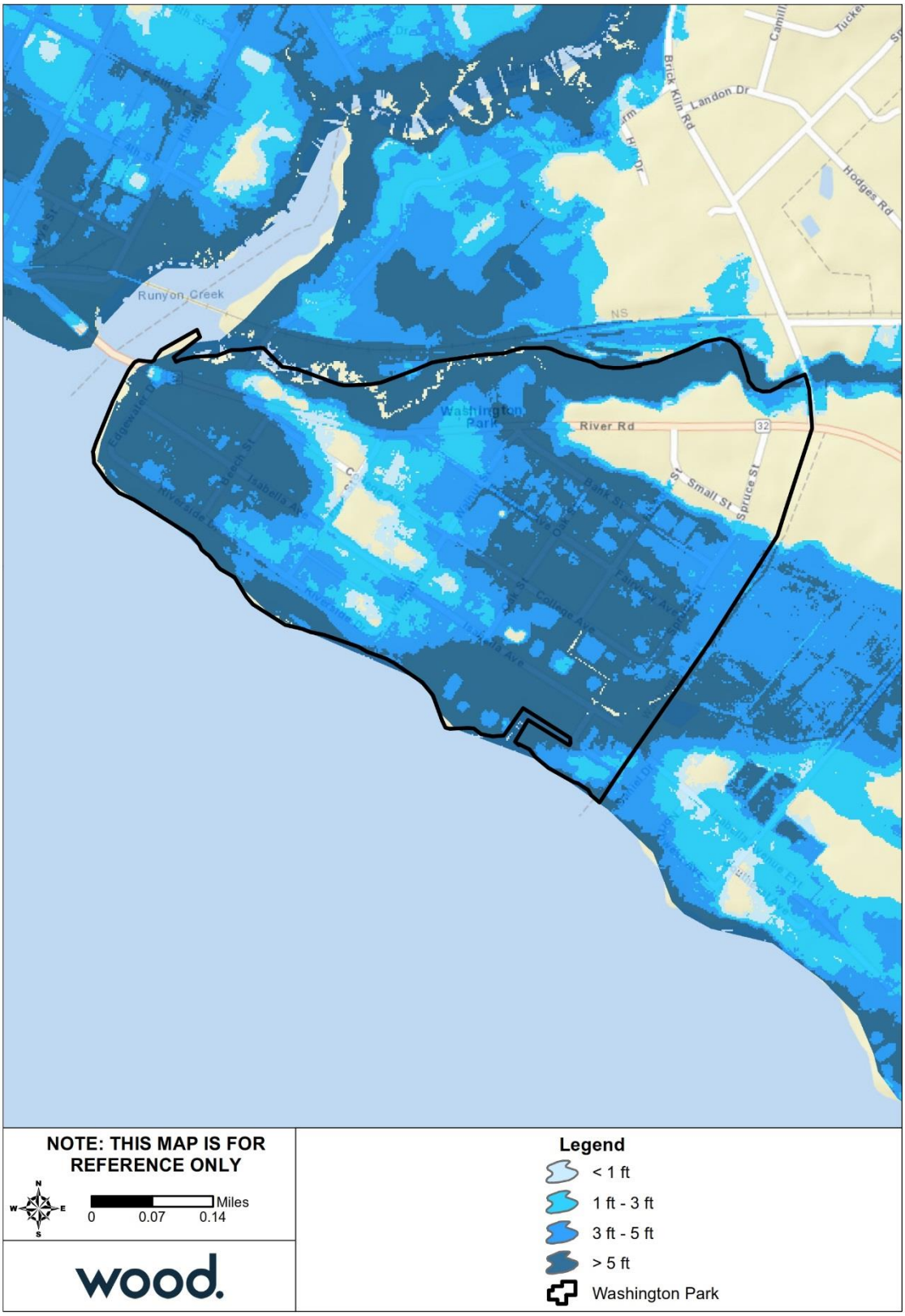
Source: FEMA Effective DFIRM

Figure A.27 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Pantego



Source: FEMA Effective DFIRM

Figure A.28 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Washington Park



Source: FEMA Effective DFIRM

A.2.2 Wildfire

Table A.12 summarizes the acreage in Beaufort County that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Approximately 70 percent of Beaufort County is not included in the WUI.

Table A.12 – Wildland Urban Interface Acreage, Beaufort County

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*429,131.4*	70.0%
	LT 1hs/40ac	67,066.6	10.9%
	1hs/40ac to 1hs/20ac	38,578.9	6.3%
	1hs/20ac to 1hs/10ac	31,744.8	5.2%
	1hs/10ac to 1hs/5ac	20,901.6	3.4%
	1hs/5ac to 1hs/2ac	16,134.8	2.6%
	1hs/2ac to 3hs/1ac	9,280.8	1.5%
	GT 3hs/1ac	102.9	0.0%
	Total	**612,941.7**	

Source: Southern Wildfire Risk Assessment

Figure A.29 depicts the WUI for Beaufort County and all participating jurisdictions. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure A.30 through Figure A.32 detail the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure A.33 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in the unincorporated areas of Beaufort County, particularly south of the Pamlico River and on the northwest edge of the county. Burn probability is highest in the southeastern corner of the county. In much of unincorporated areas, it is moderate, and in most incorporated areas it is quite low. While the unincorporated area east of Aurora has both high potential fire intensity and a high burn probability, much of this area is located outside of the WUI, so a fire here might not pose as high a risk to human settlement and the built environment.

Table A.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard in Beaufort County and participating jurisdictions. Table A.14 provides counts and estimated damages for High Potential Loss Properties in these areas.

Table A.13 – Critical Facilities Exposed to Wildfire by Jurisdiction, Beaufort County

Sector	Number of Buildings at Risk	Estimated Damages
Beaufort County Unincorporated Area		
Banking and Finance	3	$1,075,106
Commercial Facilities	409	$295,921,247
Critical Manufacturing	153	$89,156,496
Emergency Services	3	$3,928,695
Energy	1	$10,000,000
Food and Agriculture	536	$40,945,747
Government Facilities	51	$104,986,347

Sector	Number of Buildings at Risk	Estimated Damages
Healthcare and Public Health	16	$16,515,870
Postal and Shipping	2	$830,000
Transportation Systems	69	$67,070,123
Water	1	$2,903,183
All Categories	**1,244**	**$633,332,814**
City of Washington		
Banking and Finance	8	$7,242,099
Chemical	1	$238,907
Commercial Facilities	176	$199,301,378
Communications	1	$863,966
Critical Manufacturing	58	$151,185,551
Emergency Services	1	$2,074,020
Food and Agriculture	8	$622,016
Government Facilities	29	$58,107,210
Healthcare and Public Health	46	$95,105,090
Nuclear Reactors, Materials, and Waste	1	$1,129,533
Postal and Shipping	3	$2,400,000
Transportation Systems	41	$29,832,604
Water	2	$143,941
All Categories	**375**	**$548,246,315**
Town of Aurora		
Banking and Finance	2	$1,229,602
Commercial Facilities	49	$28,149,821
Critical Manufacturing	7	$1,179,566
Emergency Services	1	$1,951,202
Food and Agriculture	24	$1,365,121
Government Facilities	15	$10,921,434
Healthcare and Public Health	6	$4,686,343
Postal and Shipping	1	$800,000
Transportation Systems	4	$1,438,028
All Categories	**109**	**$51,721,117**
Town of Bath		
Commercial Facilities	20	$7,235,550
Critical Manufacturing	9	$2,334,834
Food and Agriculture	7	$379,534
Government Facilities	8	$6,987,428
Transportation Systems	2	$1,840,881
All Categories	**46**	**$18,778,227**
Town of Belhaven		
Commercial Facilities	9	$12,533,461
Critical Manufacturing	1	$171,970
Food and Agriculture	5	$156,578
Transportation Systems	2	$1,470,441
All Categories	**17**	**$14,332,450**
Town of Chocowinity		
Commercial Facilities	20	$14,882,650
Critical Manufacturing	5	$20,313,109
Emergency Services	1	$5,927,606
Government Facilities	12	$7,684,027

Sector	Number of Buildings at Risk	Estimated Damages
Healthcare and Public Health	3	$3,433,405
Transportation Systems	5	$3,336,841
Water	1	$185,456
All Categories	**47**	**$55,763,094**
Town of Pantego		
Commercial Facilities	3	$2,201,787
Critical Manufacturing	3	$347,563
Government Facilities	2	$1,305,101
Transportation Systems	2	$880,001
All Categories	**10**	**$4,734,452**
Town of Washington Park		
Commercial Facilities	8	$2,286,109
Healthcare and Public Health	1	$310,828
Transportation Systems	3	$848,513
All Categories	**12**	**$3,445,450**

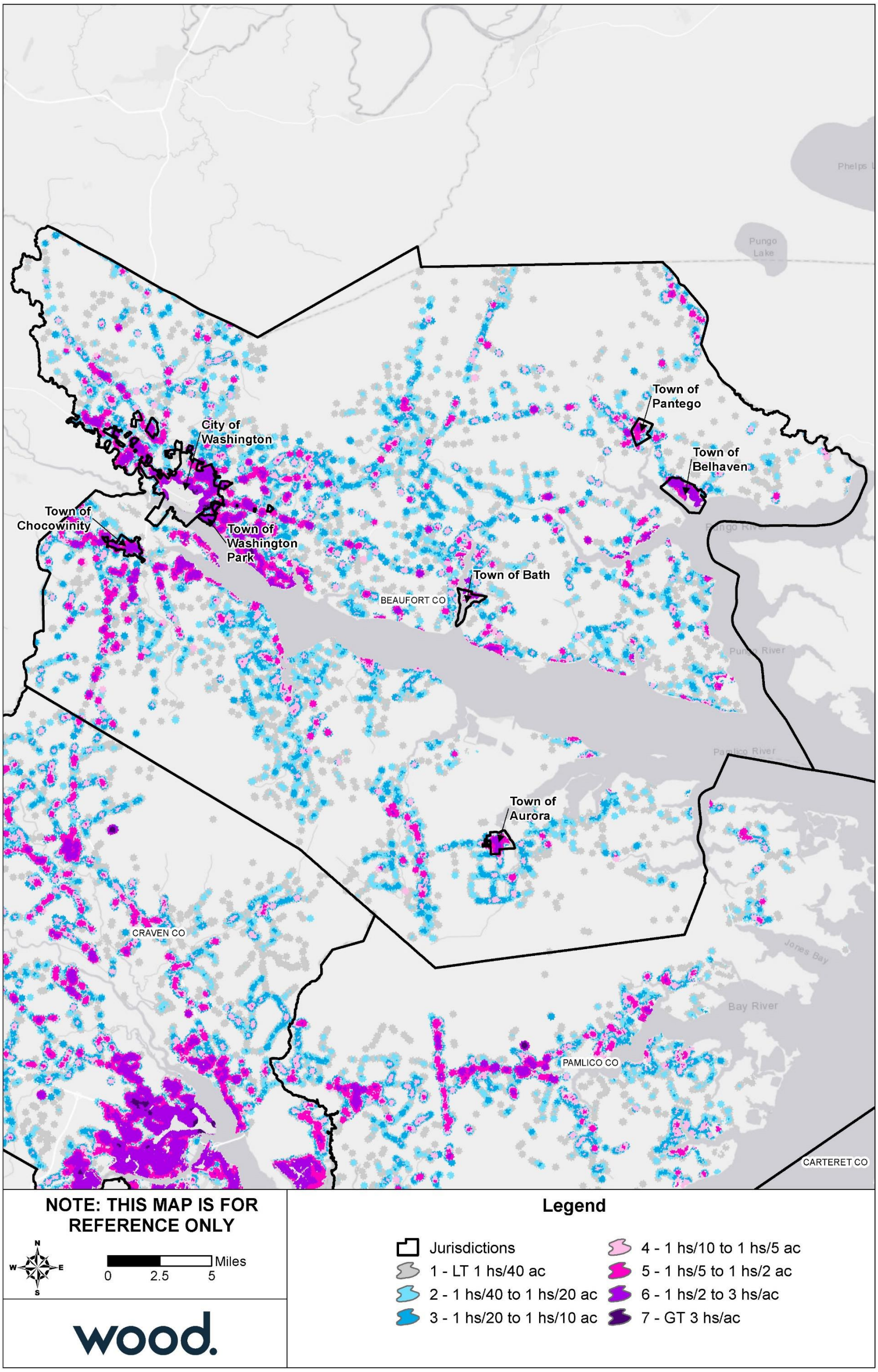
Source: NCEM Risk Management Tool

Table A.14 – High Potential Loss Properties Exposed to Wildfire by Jurisdiction, Beaufort County

Category	Number of Buildings at Risk	Estimated Damages
Beaufort County Unincorporated Area		
Commercial	6	$13,992,331
Government	11	$86,761,213
Industrial	3	$6,610,023
Religious	6	$20,520,219
Utilities	3	$14,903,183
All Categories	**29**	**$142,786,969**
City of Washington		
Commercial	26	$182,359,053
Government	11	$52,355,153
Industrial	6	$64,044,284
Religious	4	$10,789,450
Residential	1	$4,639,798
Utilities	1	$2,000,000
All Categories	**49**	**$316,187,738**
Town of Aurora		
Government	2	$6,556,072
All Categories	**2**	**$6,556,072**
Town of Bath		
Government	1	$3,582,729
All Categories	**1**	**$3,582,729**
Town of Belhaven		
Religious	1	$4,811,799
All Categories	**1**	**$4,811,799**
Town of Chocowinity		
Government	3	$10,492,153
Industrial	1	$16,515,731
All Categories	**4**	**$27,007,884**

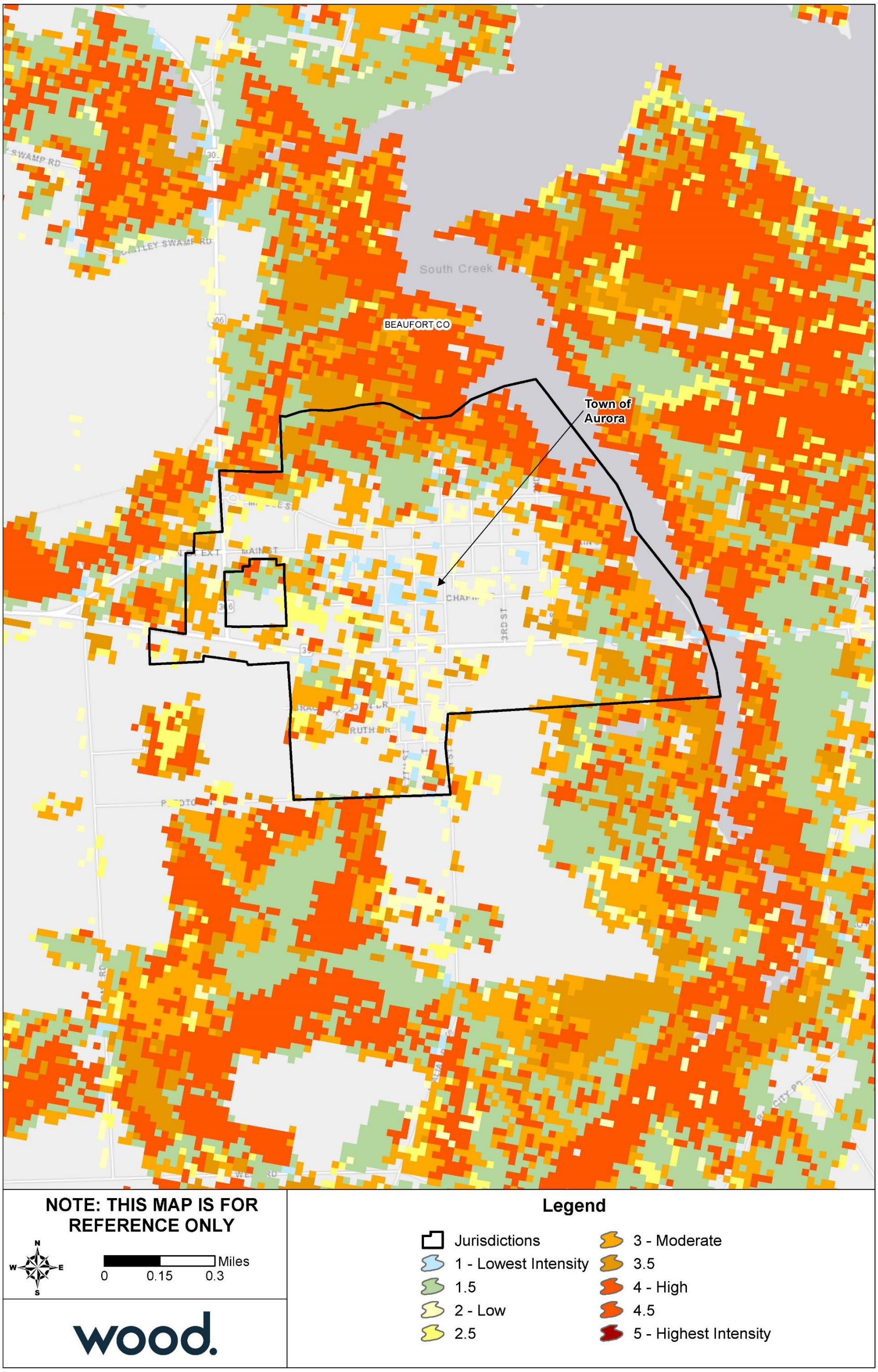
Source: NCEM Risk Management Tool

Figure A.29 – Wildland Urban Interface, Beaufort County



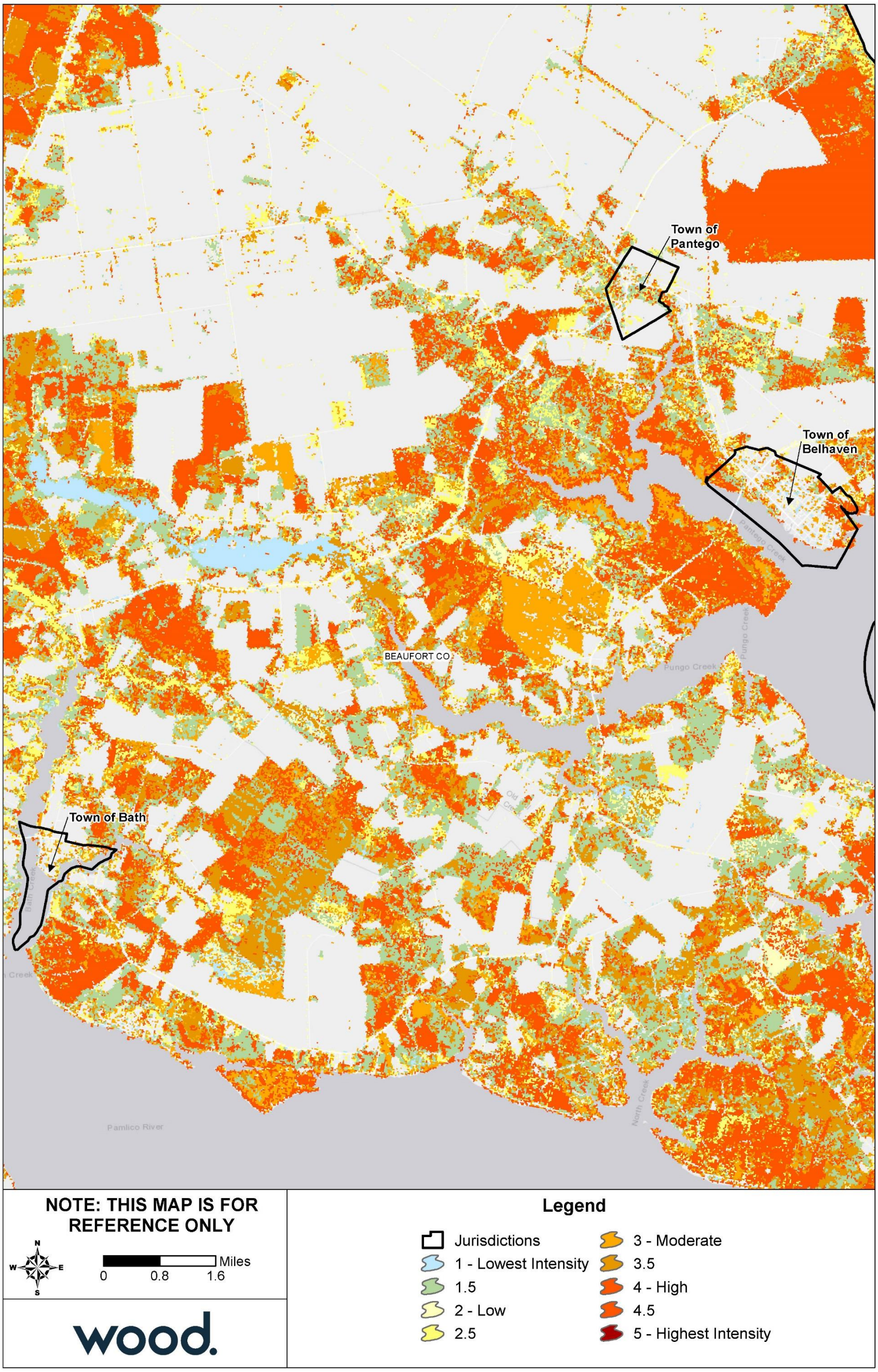
Source: Southern Wildfire Risk Assessment

Figure A.30 – Fire Intensity Scale, Beaufort County (Detail 1)



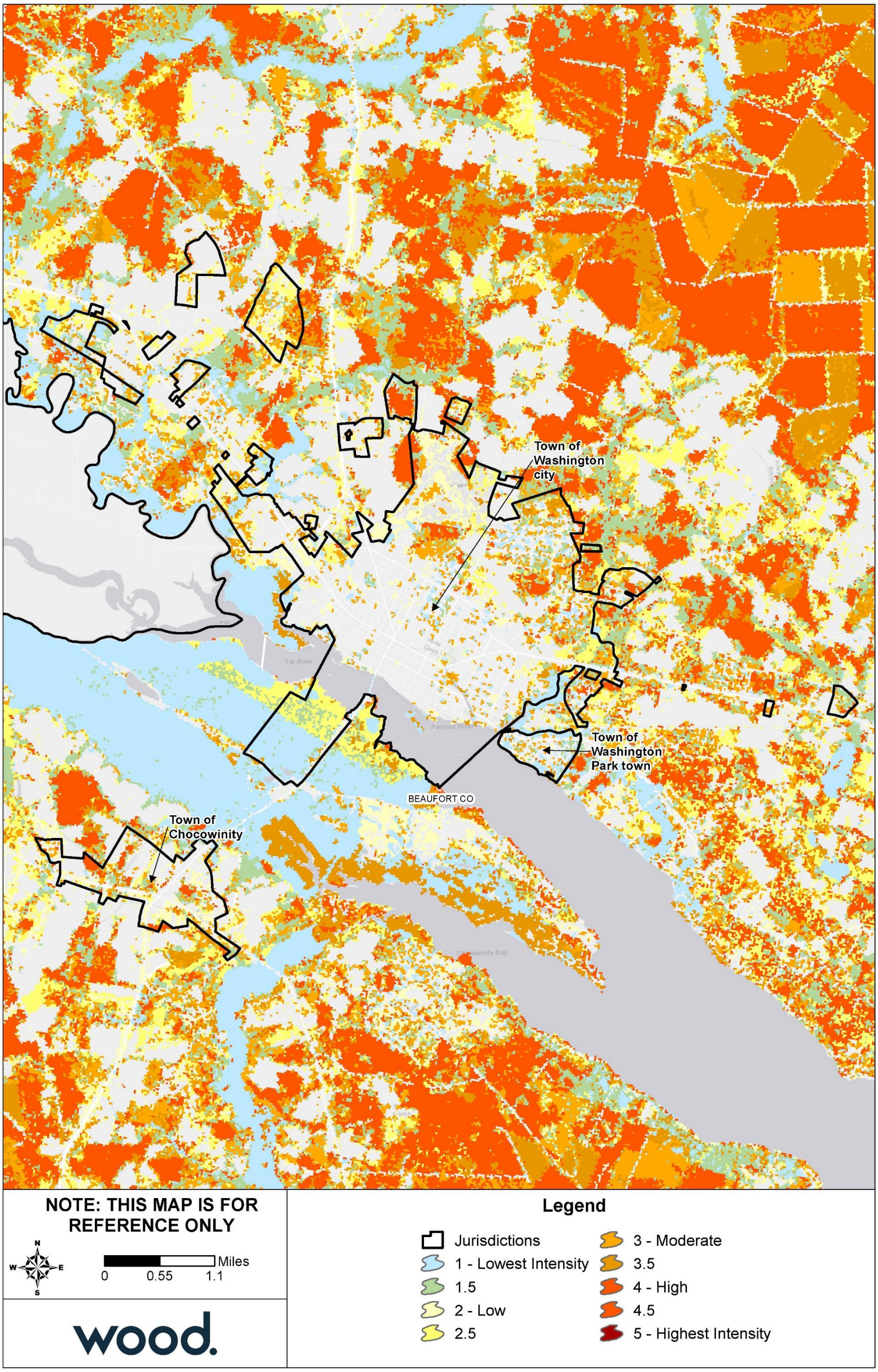
Source: Southern Wildfire Risk Assessment

Figure A.31 – Fire Intensity Scale, Beaufort County (Detail 2)



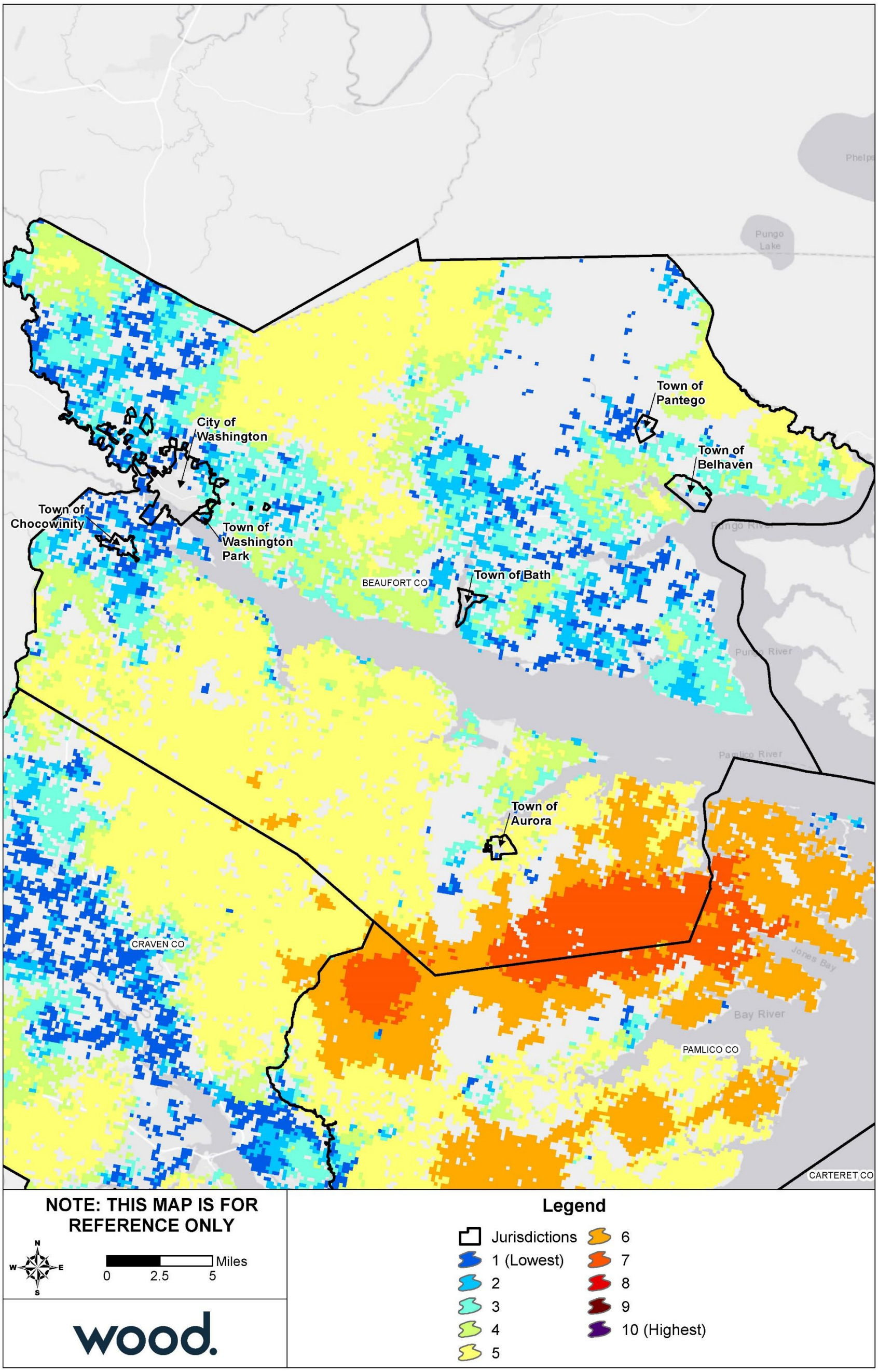
Source: Southern Wildfire Risk Assessment

Figure A.32 – Fire Intensity Scale, Beaufort County (Detail 3)



Source: Southern Wildfire Risk Assessment

Figure A.33 – Burn Probability, Beaufort County



Source: Southern Wildfire Risk Assessment

A.3 CAPABILITY ASSESSMENT

A.3.1 Overall Capability

Details on the tools and resources in place and available to Beaufort County were provided by the County's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Beaufort County has an overall capability rating of Moderate, however the County self-assessed its overall capability as High. Beaufort County provides many resources for its incorporated jurisdictions and many of the mitigation projects in this plan are regional in nature, with the County serving as the project lead; therefore, the County's capability is also an indicator for its incorporated areas. The County's Self-Assessment of key capability areas is summarized in Table A.15 below.

Table A.15 – Capability Self-Assessment, Beaufort County

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

A.3.2 Floodplain Management

The following tables reflect NFIP entry dates as well as policy and claims data for Beaufort County and incorporated categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table A.16 – NFIP Program Entry Dates

Community	Regular Program Entry
Beaufort County (Unincorporated Area)	February 4, 1987
City of Washington	February 2, 1977
Town of Aurora	January 3, 1986
Town of Bath	April 8, 1987
Town of Belhaven	May 16, 1977
Town of Chocowinity	June 30, 1997
Town of Pantego	August 5, 1985
Town of Washington Park	November 22, 1976

Table A.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Beaufort County Unincorporated Area					
Single Family	2,214	$1,659,623	$478,974,400	4,513	$72,084,723.41
2-4 Family	8	$6,650	$1,590,200	16	$227,817.61
All Other Residential	12	$5,717	$1,996,700	10	$160,912.16
Non-Residential	50	$113,329	$14,153,300	100	$3,302,776.68
Total	**2,284**	**$1,785,319**	**$496,714,600**	**4,639**	**$75,776,229.86**

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
City of Washington					
Single Family	125	$166,439	$25,252,900	321	$5,237,164.76
2-4 Family	1	$1,023	$92,000	2	$56,696.02
Non-Residential	1	$967	$71,000	1	$23,217.63
Total	**127**	**$168,429**	**$25,415,900**	**324**	**$5,317,078.41**
Town of Aurora					
Single Family	30	$16,616	$5,242,100	29	$707,188.91
2-4 Family	5	$9,245	$879,900	0	$0.00
Non-Residential	7	$29,755	$1,431,600	3	$47,695.98
Total	**42**	**$55,616**	**$7,553,600**	**32**	**$754,884.89**
Town of Bath					
Single Family	98	$56,489	$24,263,900	22	$327,343.34
2-4 Family	1	$507	$217,500	1	$18,218.52
Non-Residential	3	$813	$61,000	6	$52,152.62
Total	**102**	**$57,809**	**$24,542,400**	**29**	**$397,714.48**
Town of Belhaven					
Single Family	302	$203,793	$39,157,200	1,448	$13,719,143.77
2-4 Family	18	$17,126	$4,482,100	4	$11,913.48
All Other Residential	48	$31,843	$10,189,400	19	$212,348.13
Non-Residential	79	$170,968	$14,107,600	376	$8,836,104.59
Total	**447**	**$423,730**	**$67,936,300**	**1,847**	**$22,779,509.97**
Town of Chocowinity					
Single Family	1	$234	$70,000	5	$101,058.79
Non-Residential	1	$1,295	$300,000	0	$0.00
Total	**2**	**$1,529**	**$370,000**	**5**	**$101,058.79**
Town of Pantego					
Single Family	14	$14,126	$1,520,100	12	$139,907.26
Non-Residential	4	$10,216	$1,399,900	1	$9,672.44
Total	**18**	**$24,342**	**$2,920,000**	**13**	**$149,579.70**
Town of Washington Park					
Single Family	125	$166,439	$25,252,900	321	$5,237,164.76
2-4 Family	1	$1,023	$92,000	2	$56,696.02
Non-Residential	1	$967	$71,000	1	$23,217.63
Total	**127**	**$168,429**	**$25,415,900**	**324**	**$5,317,078.41**

Source: FEMA Community Information System, accessed September 2019

Table A.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Beaufort County Unincorporated Area					
A01-30 & AE Zones	2,074	$1,678,629	$441,280,500	4,085	$67,223,571.44
A Zones	4	$2,982	$453,900	239	$4,216,716.21
B, C & X Zone					
Standard	24	$25,922	$4,404,000	79	$1,652,654.41
Preferred	174	$72,986	$50,297,000	50	$1,223,327.19
Total	2,276	$1,780,519	$496,435,400	4,453	$74,316,269.25
City of Washington					

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	125	$166,822	$24,815,900	316	$5,269,523.02
B, C & X Zone					
Standard	1	$1,206	$250,000	2	$18,303.19
Preferred	1	$401	$350,000	1	$1,541.41
Total	**127**	**$168,429**	**$25,415,900**	**319**	**$5,289,367.62**
Town of Aurora					
A01-30 & AE Zones	23	$48,526	$4,488,600	30	$694,947.58
B, C & X Zone					
Standard	4	$718	$48,400	0	$0.00
Preferred	11	$3,972	$2,877,000	2	$59,937.31
Total	**38**	**$53,216**	**$7,414,000**	**32**	**$754,884.89**
Town of Bath					
A01-30 & AE Zones	79	$47,315	$18,233,400	25	$339,181.93
B, C & X Zone					
Standard	2	$2,647	$359,000	1	$4,061.39
Preferred	21	$7,847	$5,950,000	3	$54,471.16
Total	**102**	**$57,809**	**$24,542,400**	**29**	**$397,714.48**
Town of Belhaven					
A01-30 & AE Zones	433	$414,381	$67,032,600	1,756	$22,098,401.96
B, C & X Zone					
Standard	0	$0	$0	6	$118,154.22
Preferred	1	$1,549	$450,000	0	$0.00
Total	**434**	**$415,930**	**$67,482,600**	**1,762**	**$22,216,556.18**
Town of Chocowinity					
A01-30 & AE Zones	0	$0	$0	3	$73,858.79
B, C & X Zone					
Preferred	2	$1,529	$370,000	0	$0.00
Total	**2**	**$1,529**	**$370,000**	**3**	**$73,858.79**
Town of Pantego					
A01-30 & AE Zones	17	$17,462	$1,924,700	13	$149,579.70
B, C & X Zone					
Standard	1	$6,880	$995,300	0	$0.00
Total	**18**	**$24,342**	**$2,920,000**	**13**	**$149,579.70**
Town of Washington Park					
A01-30 & AE Zones	125	$166,822	$24,815,900	316	$5,269,523.02
B, C & X Zone					
Standard	1	$1,206	$250,000	2	$18,303.19
Preferred	1	$401	$350,000	1	$1,541.41
Total	**127**	**$168,429**	**$25,415,900**	**319**	**$5,289,367.62**

Source: FEMA Community Information System, accessed September 2019

Table A.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Beaufort County Unincorporated Area					
A01-30 & AE Zones	812	$986,166	$147,313,600	3,075	$55,672,420.56
A Zones	4	$2,982	$453,900	221	$3,549,984.62

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
B, C & X Zone	80	$38,805	$19,403,400	95	$2,110,632.80
Standard	13	$11,999	$1,727,400	70	$1,517,218.33
Preferred	67	$26,806	$17,676,000	25	$593,414.47
Total	896	$1,027,953	$167,170,900	3,391	$61,333,037.98
City of Washington					
A01-30 & AE Zones	103	$149,956	$20,577,000	289	$5,098,781.61
B, C & X Zone	2	$1,607	$600,000	3	$19,844.60
Standard	1	$1,206	$250,000	2	$18,303.19
Preferred	1	$401	$350,000	1	$1,541.41
Total	**105**	**$151,563**	**$21,177,000**	**292**	**$5,118,626.21**
Town of Aurora					
A01-30 & AE Zones	16	$43,094	$2,774,100	22	$624,574.85
B, C & X Zone	13	$3,985	$2,435,400	1	$55,667.52
Standard	4	$718	$48,400	0	$0.00
Preferred	9	$3,267	$2,387,000	1	$55,667.52
Total	**29**	**$47,079**	**$5,209,500**	**23**	**$680,242.37**
Town of Bath					
A01-30 & AE Zones	28	$21,903	$5,546,700	17	$285,279.70
B, C & X Zone	16	$7,758	$4,244,000	4	$58,532.55
Standard	2	$2,647	$359,000	1	$4,061.39
Preferred	14	$5,111	$3,885,000	3	$54,471.16
Total	**44**	**$29,661**	**$9,790,700**	**21**	**$343,812.25**
Town of Belhaven					
A01-30 & AE Zones	232	$259,026	$29,598,700	1,497	$20,678,472.90
Total	**232**	**$259,026**	**$29,598,700**	**1,503**	**$20,796,627.12**
Town of Chocowinity					
A01-30 & AE Zones	0	$0	$0	2	$72,591.53
B, C & X Zone	1	$234	$70,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	1	$234	$70,000	0	$0.00
Total	**1**	**$234**	**$70,000**	**2**	**$72,591.53**
Town of Pantego					
A01-30 & AE Zones	15	$16,818	$1,769,700	12	$140,953.02
B, C & X Zone	1	$6,880	$995,300	0	$0.00
Standard	1	$6,880	$995,300	0	$0.00
Preferred	0	$0	$0	0	$0.00
Total	**16**	**$23,698**	**$2,765,000**	**12**	**$140,953.02**
Town of Washington Park					
A01-30 & AE Zones	103	$149,956	$20,577,000	289	$5,098,781.61
B, C & X Zone	2	$1,607	$600,000	3	$19,844.60
Standard	1	$1,206	$250,000	2	$18,303.19
Preferred	1	$401	$350,000	1	$1,541.41
Total	**105**	**$151,563**	**$21,177,000**	**292**	**$5,118,626.21**

Source: FEMA Community Information System, accessed September 2019

Table A.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Beaufort County Unincorporated Area					
A01-30 & AE Zones	1,262	$692,463	$293,966,900	1,008	$11,539,297.56
B, C & X Zone	118	$60,103	$35,297,600	34	$765,348.80
Standard	11	$13,923	$2,676,600	9	$135,436.08
Preferred	107	$46,180	$32,621,000	25	$629,912.72
Total	1,380	$752,566	$329,264,500	1,060	$12,971,377.95
City of Washington					
A01-30 & AE Zones	22	$16,866	$4,238,900	27	$170,741.41
Total	**22**	**$16,866**	**$4,238,900**	**27**	**$170,741.41**
Town of Aurora					
A01-30 & AE Zones	7	$5,432	$1,714,500	8	$70,372.73
B, C & X Zone	2	$705	$490,000	1	$4,269.79
Standard	0	$0	$0	0	$0.00
Preferred	2	$705	$490,000	1	$4,269.79
Total	**9**	**$6,137**	**$2,204,500**	**9**	**$74,642.52**
Town of Bath					
A01-30 & AE Zones	51	$25,412	$12,686,700	8	$53,902.23
B, C & X Zone	7	$2,736	$2,065,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	7	$2,736	$2,065,000	0	$0.00
Total	**58**	**$28,148**	**$14,751,700**	**8**	**$53,902.23**
Town of Belhaven					
A01-30 & AE Zones	201	$155,355	$37,433,900	259	$1,419,929.06
B, C, & X Zone	1	$1,549	$450,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	1	$1,549	$450,000	0	$0.00
Total	**202**	**$156,904**	**$37,883,900**	**259**	**$1,416,929.06**
Town of Chocowinity					
A01-30 & AE Zones	0	$0	$0	1	$1,267.26
B, C & X Zone	1	$1,295	$300,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	1	$1,295	$300,000	0	$0.00
Total	**1**	**$1,295**	**$300,000**	**1**	**$1,267.26**
Town of Pantego					
A01-30 & AE Zones	2	$644	$155,000	1	$8,626.68
Total	**2**	**$644**	**$155,000**	**1**	**$8,626.68**
Town of Washington Park					
A01-30 & AE Zones	22	$16,866	$4,238,900	27	$170,741.41
Total	**22**	**$16,866**	**$4,238,900**	**27**	**$170,741.41**

Source: FEMA Community Information System, accessed September 2019

A.4 MITIGATION STRATEGY

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B1	Continue to coordinate all development/planning decisions with review of appropriate CAMA LUP's including stated redevelopment policies and actions.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	1	1.3	PP	• **Beaufort County Planning** • Municipal Administrations	To Be Determined	GF, NCDEQ	Other – as opportunities arise	Carry Forward – Not Started	All jurisdictions currently utilize their respective CAMA Land Use Plan when making decisions regarding development proposals.
B2	Maintain reciprocal mutual aid agreements with surrounding communities for fire protection and emergency response.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	4	4.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.
B3	Annually evaluate adequacy of existing local early warning and emergency response communications equipment and prepare annual capital improvements plans to improve early warning and communication effectiveness before, during, and following disaster events.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.1	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services reviews its emergency notification system annually in coordination with tabletop exercises associated with the EOP.
B4	Develop standard protocols for training/ certification of volunteer staff for shelter management, traffic control, first aid, etc., to improve volunteer response capability during and following disaster events, including coordination with American Red Cross personnel on an annual basis	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	Carry Forward – Not Started	Beaufort County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
B5	Complete an annual evaluation of each designated emergency shelter, including structural inspection, resource inventory, staffing plan, and vulnerability assessment, including coordination with American Red Cross personnel.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	In Progress – Carry Forward	Beaufort County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
B6	Provide citizens and visitors with maps of evacuation routes which will facilitate the evacuation of the county in case of a hazardous event. This effort will involve the production of hard copy maps for distribution.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.2	ES	• **Beaufort County Emergency Services** • Beaufort County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	Carry Forward – Not Started	Evacuation maps are currently available on the County website or through the Emergency Services Department. These maps will be updated as necessary; however, hard copy maps are not available.
B7	Continue to monitor and establish programs to maintain continuity of government operations through annual review and update of the Continuity of Operations Plan (COOP).	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	4	4.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County COOP is reviewed annually and updated as necessary.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B8	Continue to support and participate in the directives of the County Emergency Operations Plan (EOP). The EOP includes evacuation procedures and response to hazards not addressed in this plan such as hazardous materials, petroleum products, hazardous waste, nuclear threat/attack, and civil disorder. The County will review and update the EOP annually to ensure that it coordinates with the most recent NCEM and NCOEMS directives.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	Med	3	3.2	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In-Progress – Carry Forward	Beaufort County Emergency Services works closely with all participating municipalities to review and update the Emergency Operations Plan (EOP) on an annual basis.
B9	Continue to apply for grant funds, allocate local funding, and work with local electric service providers to procure and maintain back-up generators/transfer switches for all critical public facilities, with an emphasis on emergency services facilities, critical water/sewer facilities, and shelter facilities. Evaluate the equipment on a regular basis to assure it continues to meet the needs of the operations occurring at each facility. Back-up generators are still needed at the following facilities: Southside High School, S.W. Snowden Elementary School, and John Cotten Tayloe Elementary School.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	1	1.1	PP	• **Beaufort County Emergency Services** • Independent Facility Operators • Town Public Utilities	To Be Determined	GF, NCDPS, NCDOT, HMGP	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County Emergency Services will continue to work towards establishing permanent pad mount generators at all critical facilities. This effort will initially focus on primary and backup shelter facilities.
B10	Hold an annual public hazard mitigation meeting, attended by the HMPC and participating jurisdictions, to educate the public and elected officials and receive comments about the location of high risk facilities/development, the jurisdictions' overall vulnerability to natural and man-made hazards, and the jurisdictions' hazards mitigation efforts.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.2	PIO	• **Beaufort County Emergency Services** • Beaufort County Planning • Municipal Administrations	Staff Time	GF	1 Year	In Progress – Carry Forward	Beaufort County Emergency Services holds a public officials conference at least annually to educate decision makers on the vulnerability to hazards and mitigation efforts.
B11	Maintain the Hazard Mitigation Planning Committee (HMPC) and hold annual HMPC meetings to continue relationship-building and communicate about mitigation measures taking place throughout the community.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	3	3.1	P	• **Pamlico Sound HMPC** • Beaufort County Administration • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	The HMPC will be maintained to ensure implementation and update the PSRHMP.
B12	Maintain continual contact/working relationship with electric service providers in the county to address the following: 1) Disaster preparedness techniques (e.g., tree trimming, vegetation planting requirements, pole replacement); 2) Identification of critical electrical facilities needing retrofit or upgrade and map with elevation reference marks; 3) Identification of problem areas and potential solutions; and 4) Communication with county officials during and immediately after a natural hazard event that results in loss of electrical power.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Severe Weather, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	1	1.1	P	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, Electric Service Providers	Other – meet annually	In Progress – Carry Forward	Beaufort County Emergency Services continues to meet annually with all electric service providers operating in the county.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B13	Monitor trees and vegetation on publicly owned property to assure that no property or utility damage will occur as a result of diseased or dying trees or other vegetation. This strategy only applies to the municipal jurisdictions.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Flood, Hurricane and Tropical Storm, Severe Weather, Severe Winter Storm, Tornado	Med	1	1.1	ES	• **Beaufort County Public Works** • Municipal Administrations	Staff Time	GF	Ongoing – over the next five years	In Progress – Carry Forward	Beaufort County, as well as municipal, public works departments will maintain trees on public property and in right of ways to minimize the impact of falling limbs and trees in the event of a natural disaster.
B14	Continue to maintain all property acquired with public mitigation funds within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to pro-actively establish open space within the floodplain and floodway as grant funds become available to carry out this initiative.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.2	PP	• **Beaufort County Administration** • Municipal Administrations	To Be Determined	GF, NCDPS	Ongoing – in process	In Progress – Carry Forward	All jurisdictions actively maintain these sites and promote reuse that is permitted under FEMA guidelines.
B15	Integrate new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with all local certified CAMA Land Use Plans).	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.2	SP	• **Beaufort County Parks and Recreation** • Beaufort County Planning	To Be Determined	GF, NCDENR	Other – as opportunities arise	In Progress – Carry Forward	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.
B16	Annually review local floodplain ordinances to provide improved flood protection standards and require freeboard for retrofitting and new construction as required by NC State Building Code. The County will consider establishing a freeboard requirement.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	3	3.2	PP	• **Beaufort County Administration** • Municipal NFIP participants	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	All jurisdictions will review and amend their respective Flood Damage Prevention Ordinances. All jurisdictions will consider establishing a freeboard requirement, except for Washington and Washington Park who already have a 2-foot freeboard established.
B17	Maintain current listings of Severe Repetitive Loss properties and conduct annual outreach activities to encourage homeowners to participate in FEMA-sponsored residential acquisition and elevation programs; continue to apply for HMGP/HMA funding for residential acquisition and elevation.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Beaufort County in coordination with all participating municipal jurisdictions will utilize annual as well as post-disaster funding to treat repetitive loss properties through elevation or acquisition/ demolition.
B18	Encourage County Commissioners and elected officials of non-CRS communities to participate in the Community Rating System.	Beaufort County, Aurora, Bath, Chocowinity, Pantego	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.3	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Non-CRS communities will consider joining the program through implementation of this plan. Belhaven, Washington and Washington Park will continue to implement their program annually.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B19	Continue to work with local real estate agencies and manufactured home vendors to ensure that agents are informing clients when property for sale is located within an SFHA. The county will provide these agencies with brochures documenting the concerns relating to development located within the flood prone areas and ways that homeowners may make their home more disaster resistant to strong winds, lightning, and heavy rains.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
B20	Make information regarding hazards and development regulations within floodplains available through the following: 1) Ensure that local libraries maintain information relating to flooding and flood protection, 2) Provide a link on the municipal website to FEMA resources addressing flooding and flood protection, evacuation procedures, disaster preparedness, and post-disaster recovery, and 3) Provide website links to relevant hazard mitigation measures.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	2	2.2	PP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
B21	Promote national "awareness" weeks (i.e., hurricane preparedness, severe weather preparedness, etc.) through local media. ("Awareness" weeks are listed on the National Weather Service website at http://www.nws.noaa.gov/os/severeweather/severewxcal.shtml)	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	All Hazards	High	2	2.2	PIO	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County will continue to implement this strategy for the benefit of all Citizens, including all participating jurisdictions.
B22	Educate the general public to the importance of weather alert radios and systems that can operate on alternative power and can provide up-to-the-moment information regarding locations of severe storms and possible tornadoes.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Hurricane & Tropical Storm, Flood, Dam & Levee Failure, Severe Winter Storm, Earthquake, Severe Weather, Tornado	Med	2	2.1	ES	• **Beaufort County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	This program was initiated following the last plan update and is still in place.
B23	Maintain a Hazardous Material Action Plan that addresses the proper containment of spills, etc. This effort will be coordinated with the county LEPC.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Hurricane & Tropical Storm, Flood	Med	4	4.2	ES	• **Beaufort County Local Emergency Planning Committee** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Beaufort County will continue to facilitate the meeting of the County LEPC.
B24	Monitor natural and man-made drainage structures to ensure they are clear and functioning properly; prioritize needed drainage projects and review funding alternatives annually.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	High	1	1.3	SP	• **Beaufort County Administration** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, NCDOT	Ongoing – next 5 years	In Progress – Carry Forward	The County will continue to monitor drainage conditions to identify flooding hot spots and system deficiencies. Once identified engineered solutions will be established.
B25	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Wildfire	High	4	4.1	PP	• **Beaufort County Emergency Services** • Beaufort County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
B26	Maintain Debris Removal and Monitoring Services Contracts for post-disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Flood, Hurricane and Tropical Storm, Coastal Hazards, Tornados, Severe Winter Storm, Severe Weather, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	1	1.1	ES	• **Beaufort County Emergency Services** • Beaufort County Board of Commissioners • Municipal Administrations	To Be Determined	GF, NCDPS, FEMA	Ongoing – As needed	New	N/A
B27	Work to implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	Beaufort County, Aurora, Bath, Belhaven, Chocowinity, Pantego, Washington, Washington Park	Coastal Hazards, Hurricane & Tropical Storm, Flood, Dam & Levee Failure	Med	3	3.1	P	• **Beaufort County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS, FEMA, NCDCM, USDA, NCDEQ, NCDOT	Ongoing – next 5 years	New	N/A

Annex B Carteret County

B.1 COMMUNITY PROFILE

This section contains a summary of maps and statistics for current conditions and characteristics of Carteret County, including information on population, asset exposure, housing, and economy. Throughout the section, information will be reported at the jurisdictional level. In some cases, information will only be reported for communities participating in the Community Rating System (CRS).

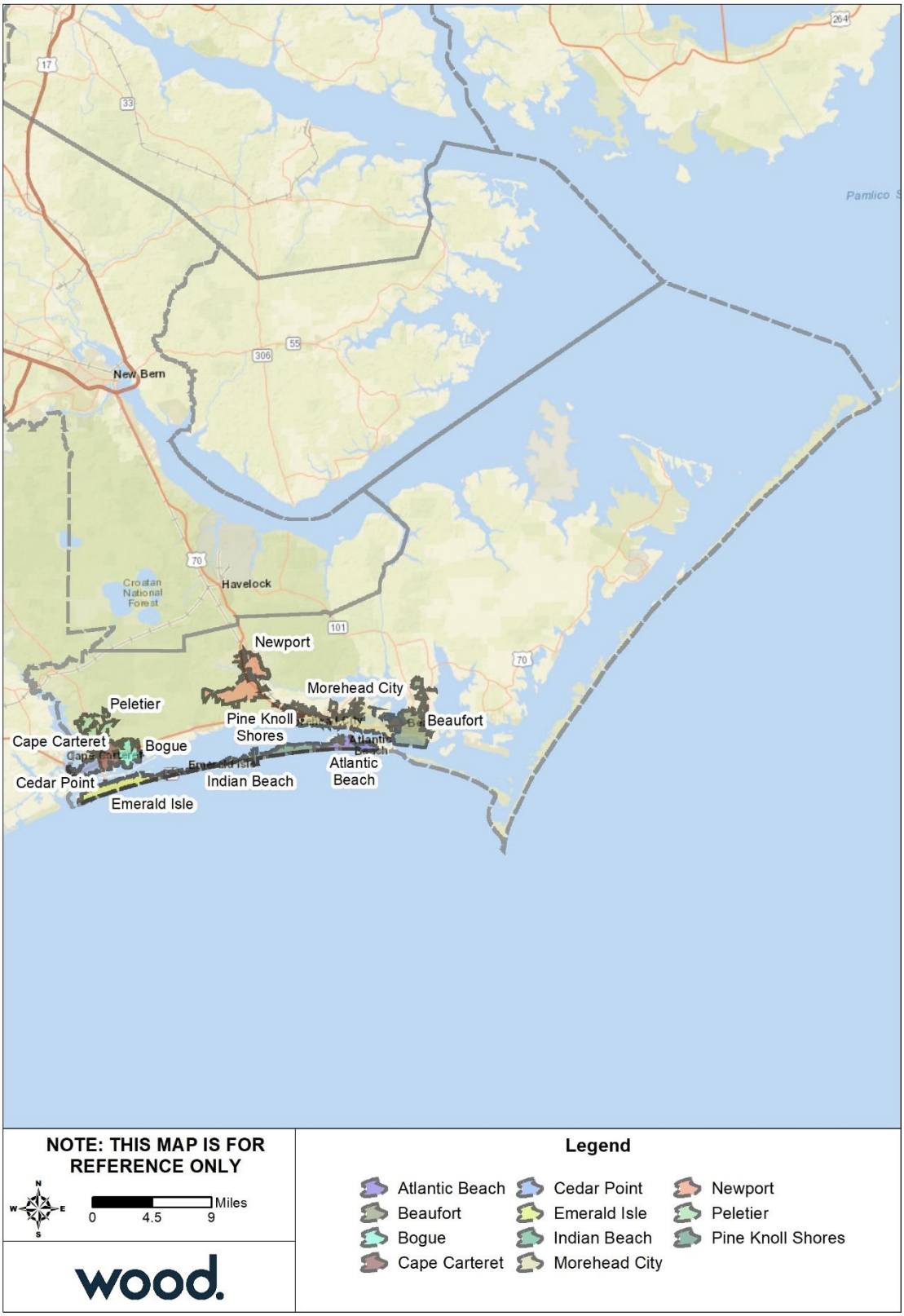
Table B.1 – CRS Participation by Jurisdiction, Carteret County

Jurisdiction	CRS Participant
Unincorporated Carteret County	Yes
Town of Atlantic Beach	Yes
Town of Beaufort	Yes
Town of Bogue	No
Town of Cape Carteret	Yes
Town of Cedar Point	Yes
Town of Emerald Isle	Yes
Town of Indian Beach	No
Town of Morehead City	Yes
Town of Newport	Yes
Town of Peletier	No
Town of Pine Knoll Shores	Yes

Geography

Figure B.1 shows a base map of Carteret County and participating jurisdictions.

Figure B.1 – Jurisdictional Locations, Carteret County



Population and Demographics

Table B.2 provides population counts and growth estimates for Carteret County and participating jurisdictions as compared to the Region overall. Table B.3 provides demographic information for the County.

Table B.2 – Population Counts, Carteret County, 2000-2017

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Unincorporated Areas	34,464	38,494	38,145	11.7%	-0.9%	10.7%
Town of Atlantic Beach	1,781	1,495	1,763	-16.1%	17.9%	-1.0%
Town of Beaufort	3,771	4,039	4,170	7.1%	3.2%	10.6%
Town of Bogue	590	684	668	15.9%	-2.3%	13.2%
Town of Cape Carteret	1,214	1,917	2,217	57.9%	15.6%	82.6%
Town of Cedar Point	929	1,279	1,735	37.7%	35.7%	86.8%
Town of Emerald Isle	3,488	3,655	3,705	4.8%	1.4%	6.2%
Town of Indian Beach	95	112	233	17.9%	108.0%	145.3%
Town of Morehead City	7,691	8,661	9,200	12.6%	6.2%	19.6%
Town of Newport	3,349	4,150	4,631	23.9%	11.6%	38.3%
Town of Peletier	487	644	823	32.2%	27.8%	69.0%
Town of Pine Knoll Shores	1,524	1,339	1,409	-12.1%	5.2%	-7.5%
Jurisdictions	**24,919**	**27,975**	**30,554**	**12.3%**	**9.2%**	**22.6%**
Carteret County Total	**59,383**	**66,469**	**68,699**	**11.9%**	**3.4%**	**15.7%**
Pamlico Sound Region Total	**208,861**	**223,935**	**232,192**	**7.2%**	**3.7%**	**11.2%**

Source: US Census Bureau American Community Survey.

Table B.3 – Racial Demographics, Carteret County, 2017

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Atlantic Beach	96.9%	0.5%	0.5%	1.2%	1.0%	1.4%
Beaufort	83.1%	12.2%	0.5%	0.4%	3.8%	2.1%
Bogue	98.2%	0.9%	0.3%	0.0%	0.6%	4.8%
Cape Carteret	97.1%	0.9%	0.3%	0.8%	0.8%	5.2%
Cedar Point	84.8%	2.6%	1.8%	1.0%	9.7%	1.5%
Emerald Isle	95.1%	0.3%	0.2%	1.6%	2.8%	2.0%
Indian Beach	98.7%	1.3%	0.0%	0.0%	0.0%	0.0%
Morehead City	83.0%	10.7%	2.3%	1.1%	2.9%	8.3%
Newport	85.0%	8.2%	2.5%	0.8%	3.5%	5.3%
Peletier	95.4%	1.3%	0.0%	0.9%	2.4%	6.0%
Pine Knoll Shores	97.9%	0.9%	0.0%	0.0%	1.3%	0.9%
Carteret County	**89.3%**	**5.7%**	**1.1%**	**1.3%**	**2.6%**	**4.2%**

*Other races include American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.

**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.

Source: US Census Bureau American Community Survey.

Future Growth and Development

This section provides an explanation of anticipated development trends for jurisdictions in Carteret County that are participants in the CRS. Evaluating future growth and development decisions in relation to known hazard areas can lead to better growth management and more effective risk reduction strategies.

Each County and respective municipality have handled their planning processes in different fashions. Some communities have consolidated plans, while others conducted their planning process independently. This information provided reflects this fact and portrays the plan for future growth throughout these communities. Each of these plans were developed under varying conditions, some involving specific guidance, such as that dictated by the NC Division of Coastal Management.

Carteret County

Future development throughout Carteret County is characterized by each community's respective Future Land Use Map. Development trends vary widely depending on which portion of the County is being considered, as well as whether a specific property is located within one of the County's many incorporated areas. Within unincorporated portions of Carteret County, the 2005 CAMA Land Use Plan defines development policy. The Future Land Use map in these areas is further regulated by County zoning; however, the County only maintains zoning regulations along the NC Highway 24 corridor between the Town of Morehead City and the Town of Bogue and along NC Highway 10 north of the Town of Beaufort. A majority of residential and non-residential development is expected to occur within these portions of the County. The County will initiate efforts to develop an updated Comprehensive Plan that will address evolving land use and development issues through implementation of this plan update.

Future development within incorporated portions of the County for those towns located along Bogue Banks will generally occur as infill growth. Municipal infrastructure services limit development potential within these areas and non-residential development is generally relegated to properties fronting NC Highway 58, which connects Emerald Isle to Atlantic Beach. These opportunities for greenfield development are limited throughout Bogue Banks communities due to a lack of available land. Additionally, high density condo development is generally not possible due to a lack of central sewer service throughout Bogue Banks, with the exception of those properties served by package treatment systems. The most substantial package treatment system on the island is located within the Town of Atlantic Beach and serves development associated with the Grove located around the Circle in the center of Town.

Growth and development within the County's mainland incorporated areas is expected to take place in a more traditional manner. Development and redevelopment of non-residential uses is expected to occur within and adjacent to each respective community's commercial core. Mixed use opportunities will also exist within these areas, while additional commercial/office type development will also occur adjacent to key thoroughfares leading out to unincorporated portions of the County. The Towns of Morehead City, Beaufort, and Newport also have portions of their corporate limits that will support light industrial growth without generating adverse impacts on adjoining properties.

Carteret County 2005 Land Use Plan Update

The Carteret County Land Use Plan was adopted by the Carteret County Board of Commissioners in April of 2009. The plan included Unincorporated Carteret County, as well as the communities of Bogue and Peletier. The plan defines seven future land use districts including:

- Developed
- Limited Transition

- Community
- Rural
- Rural with Services
- Protected Lands
- Conservation

These districts are defined in detail under Section 8 (page 89) of the Carteret County CAMA Land Use Plan available through the following URL:

https://www.carteretcountync.gov/DocumentCenter/View/142/2005-CAMA-Land-Use-Plan

The maps in Figure B.2 and Figure B.3 illustrate the delineation of each Future Land Use District.

Figure B.2 – Carteret County Future Land Use (A)

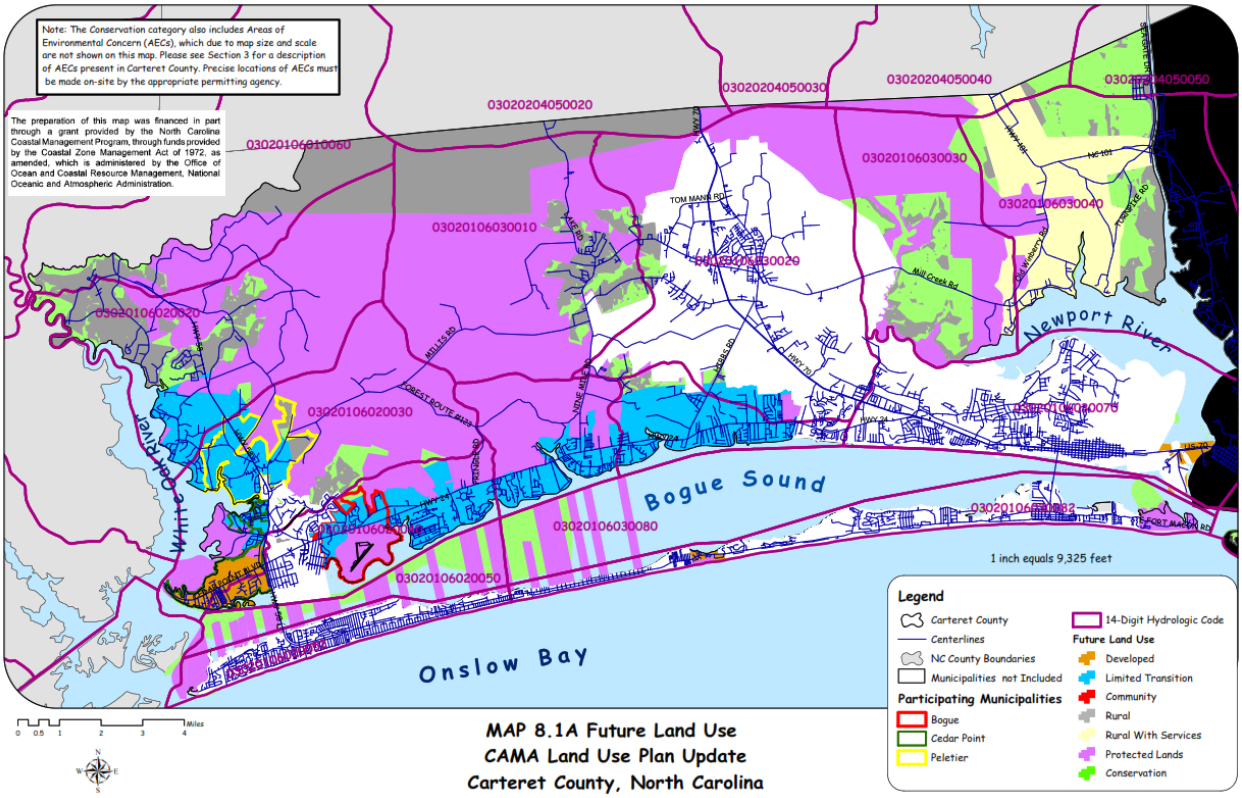
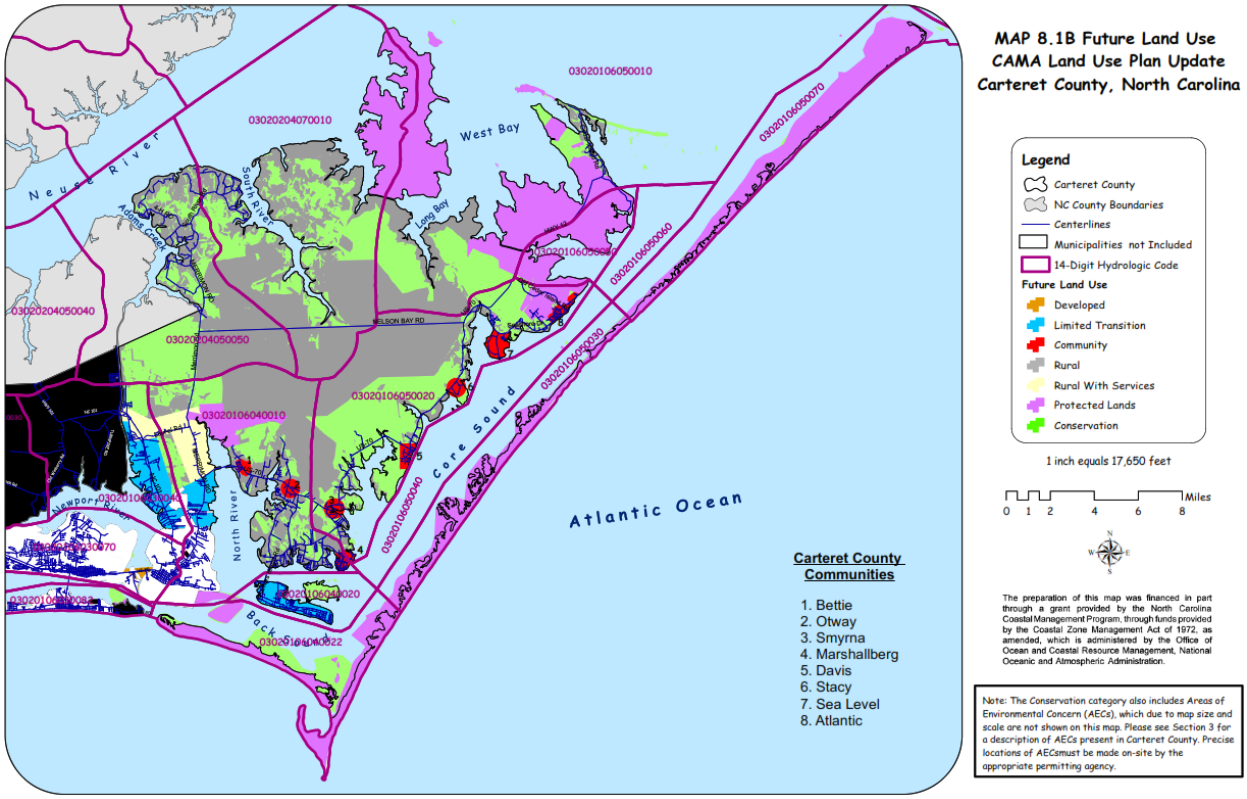


Figure B.3 – Carteret County Future Land Use (B)



Town of Atlantic Beach Core Land Use Plan

The Town of Atlantic Beach Core Land Use Plan was adopted by the Atlantic Beach Town Council in April of 2008. The Land Use Plan defines six primary Future Land Use Districts and five overlay districts including:

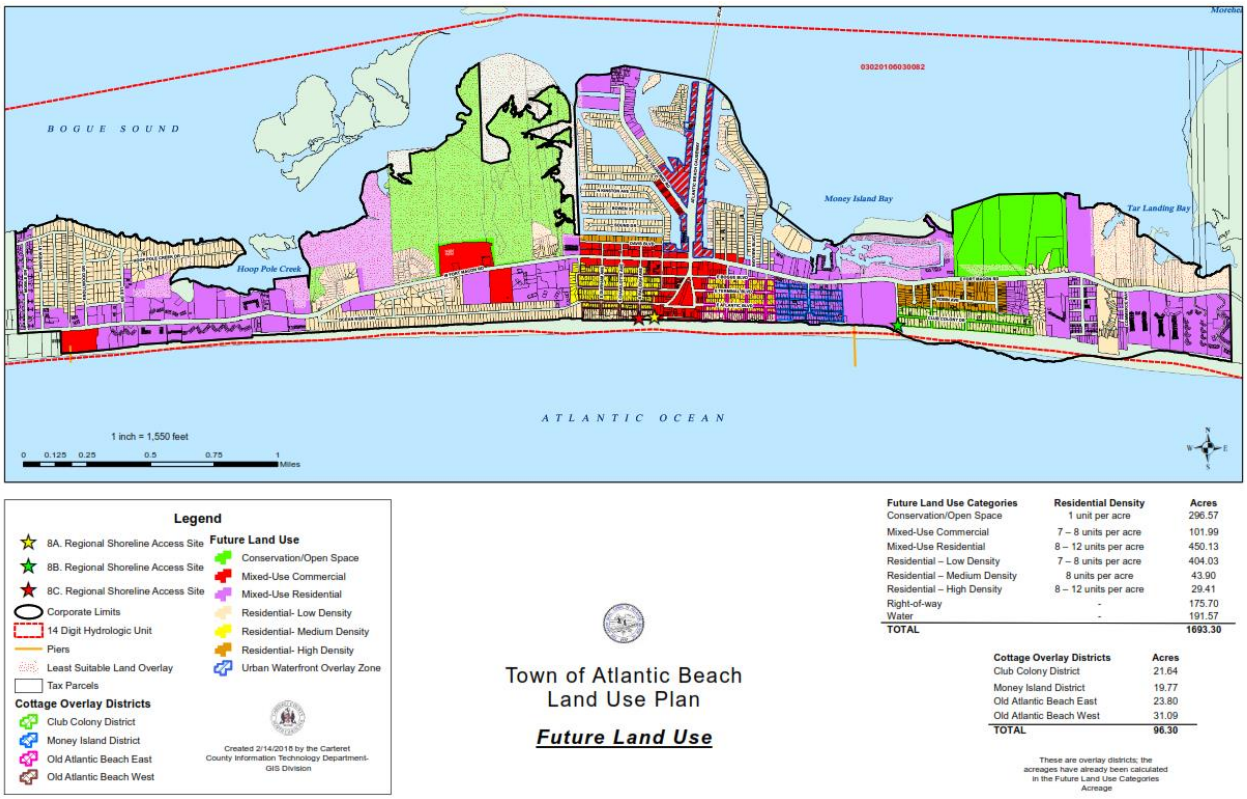
- Conservation/Open Space
- Mixed-Use Commercial
- Mixed Use Residential
- Residential – Low Density
- Residential – Medium Density
- Residential – High Density
- Urban Waterfront Overlay Zone
- Cottage Overlay Districts
    - Club Colony District
    - Money Island District
    - Old Atlantic Beach East
    - Old Atlantic Beach West

These districts are defined in detail under Section 6 (page 198) of the Atlantic Beach CAMA Land Use Plan available through the following URL:

http://atlanticbeach-nc.com/wp-content/uploads/2015/07/CAMA-Core-Land-Use-Plan-3-25-2010.pdf

Figure B.4 illustrates the delineation of each Future land Use District.

Figure B.4 – Town of Atlantic Beach Future Land Use



Town of Beaufort Core Land Use Plan

The Town of Beaufort Core Land Use Plan was adopted by the Town of Beaufort Board of Commissioners in December of 2006. The Land Use Plan defines six Future Land Use Districts:

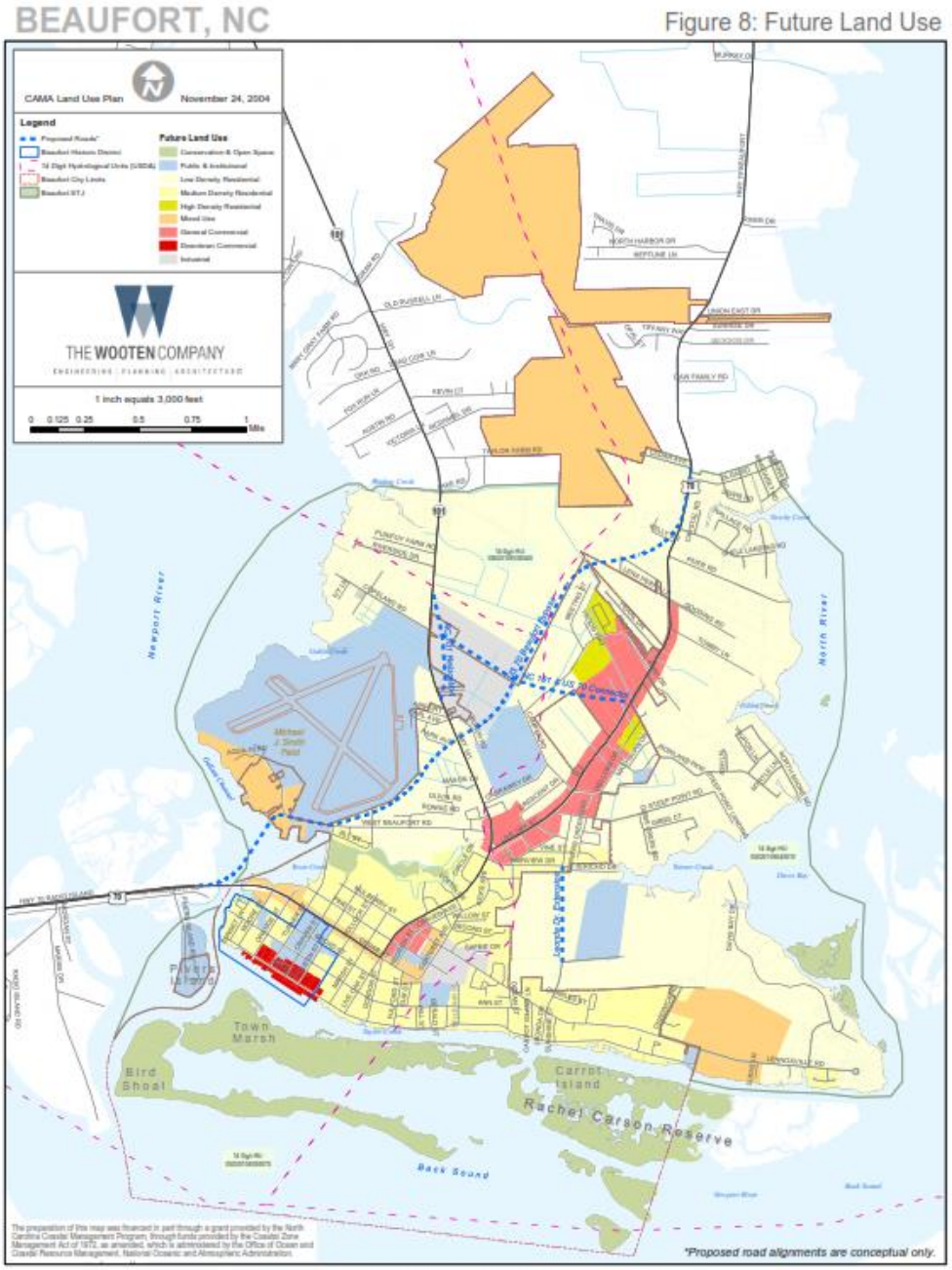
- Residential
- Commercial
- Mixed Use
- Public and Institutional
- Industrial
- Conservation/Open Space

These districts are defined in detail under Section IV (page 89) of the Town of Beaufort CAMA Land Use Plan available through the following URL:

https://www.beaufortnc.org/sites/default/files/fileattachments/planning_and_inspections/page/1071/landuseplandec2006.pdf

Figure B.5 provides the delineation of each Future land Use District.

Figure B.5 – Town of Beaufort Future Land Use



Town of Cape Carteret Core Land Use Plan

The Town of Cape Carteret Core Land Use Plan was adopted by the Cape Carteret Town Board in February of 2007. The Land Use Plan defines seven Future Land Use Districts:

- Low-Density Single Family Residential
- Medium Density Single Family Residential
- Medium Density Multi-Family Residential
- Commercial
- Public, Institutional, and Recreational
- Conservation/Open Space

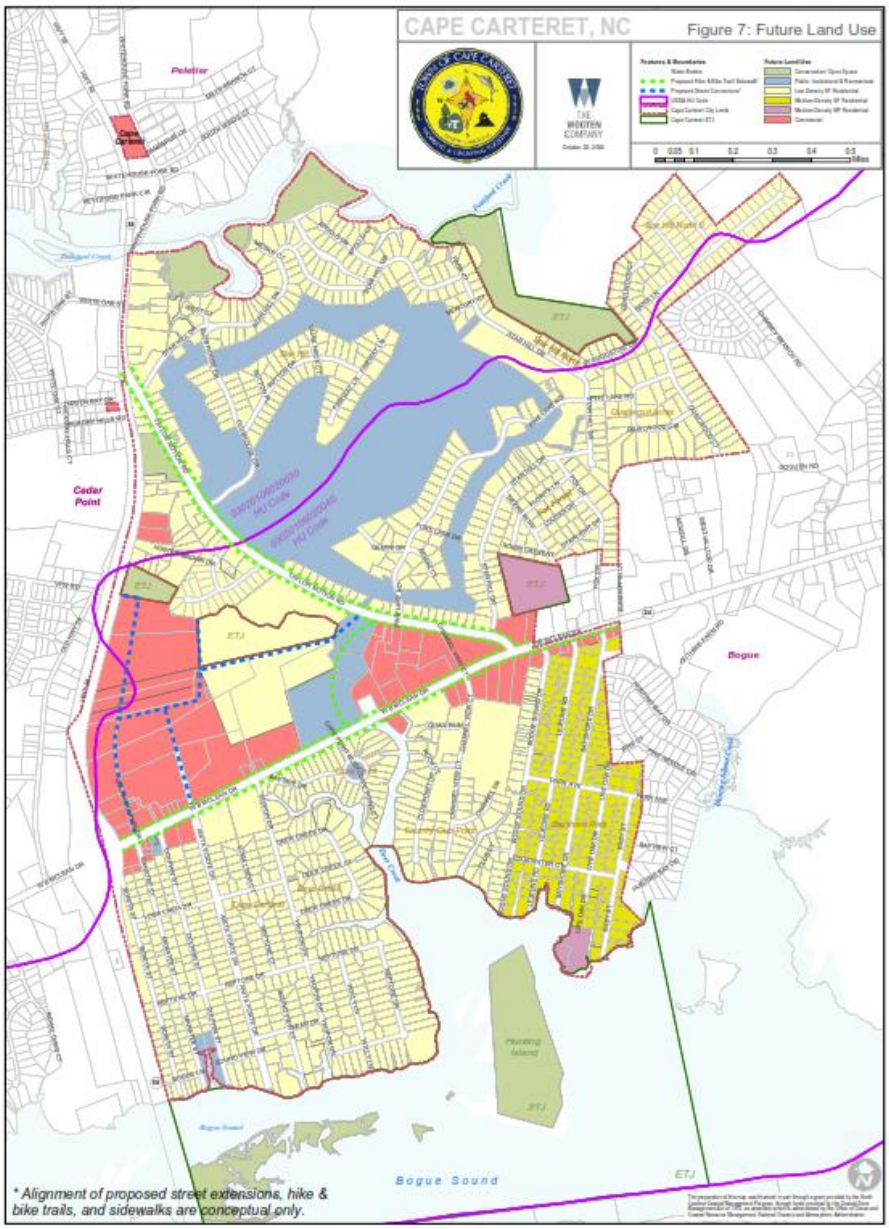
- Infill, Preservation, and Redevelopment Areas

These districts are defined in detail under Section IV (page 86) of the Cape Carteret CAMA Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/Land%20Use%20Plan%202-19-2007.pdf

Figure B.6 provides the delineation of each Future Land Use District.

Figure B.6 – Town of Cape Carteret Future Land Use



Town of Cedar Point Comprehensive Plan

The Town of Cedar Point Comprehensive Plan was adopted by the Cedar Point Board of Commissioners in November of 2012. The Comprehensive Plan defines four primary Land Use Classifications and two Special Districts including:

- Conservation and Open Space
- Existing Core Areas
- Community Growth Areas
- Suburban Neighborhoods
- Central Business Overlay District
- Business Corridor

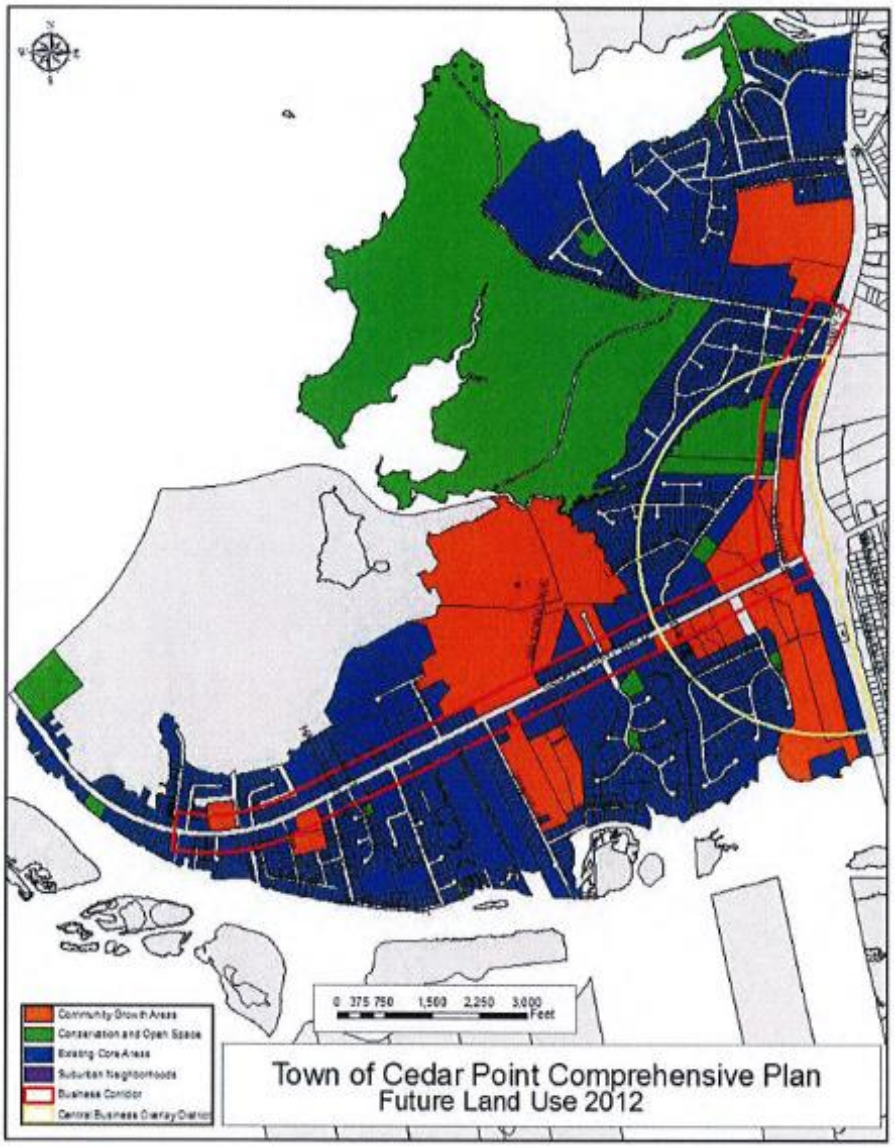
These districts are defined in detail under Future Land Use section (page 37) of the Cedar Point Comprehensive Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/CedarPointLUP_cert7FEB2013.pdf

Figure B.7 provides the delineation of each Future Land Use District.

Figure B.7 – Town of Cedar Point Future Land Use

Future Land Use Map



Town of Emerald Isle Comprehensive Land Use Plan

The Town of Emerald Isle Comprehensive Land Use Plan was adopted by the Emerald Isle Board of Commissioners in November of 2017. The Comprehensive Land Use Plan defines six Land Use Classifications including:

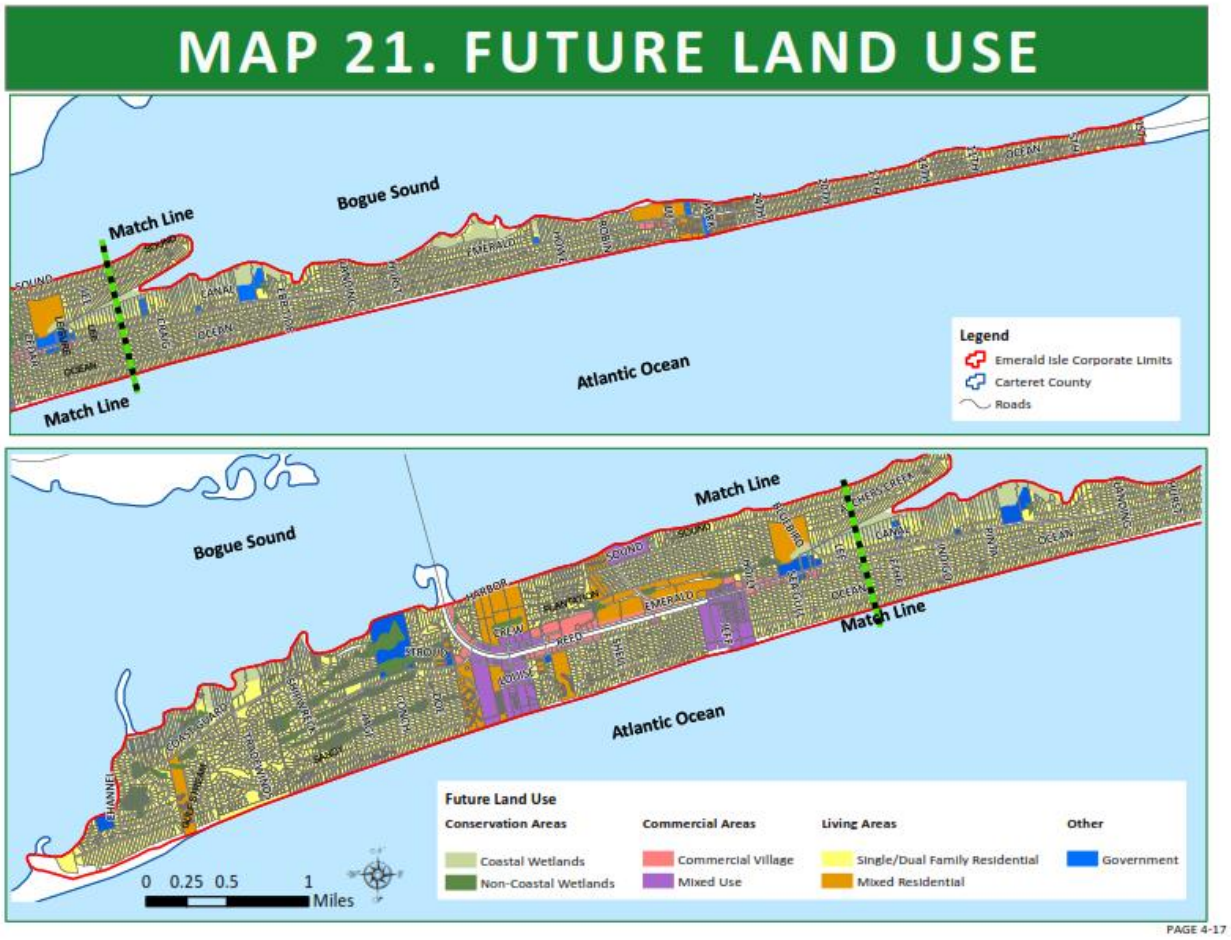
- Single/Dual Family Residential
- Mixed Residential
- Mixed Use
- Commercial Village
- Government
- Wetlands

These districts are defined in detail under Section 4 (page 4-11) of the Emerald Isle Comprehensive Land Use Plan available through the following URL:

https://www.emeraldisle-nc.org/Data/Sites/1/media/pdfs/draft-emerald-isle-comp-plan_7-11-2017-1-small.pdf

Figure B.8 provides the delineation of each Future Land Use District.

Figure B.8 – Town of Emerald Isle Future Land Use



Town of Morehead City Core Land Use Plan

The Town of Morehead City Core Land Use Plan was adopted by the Morehead City Town Council in August of 2007 and was amended in 2018. The Core Land Use Plan defines nine Land Use Classifications including:

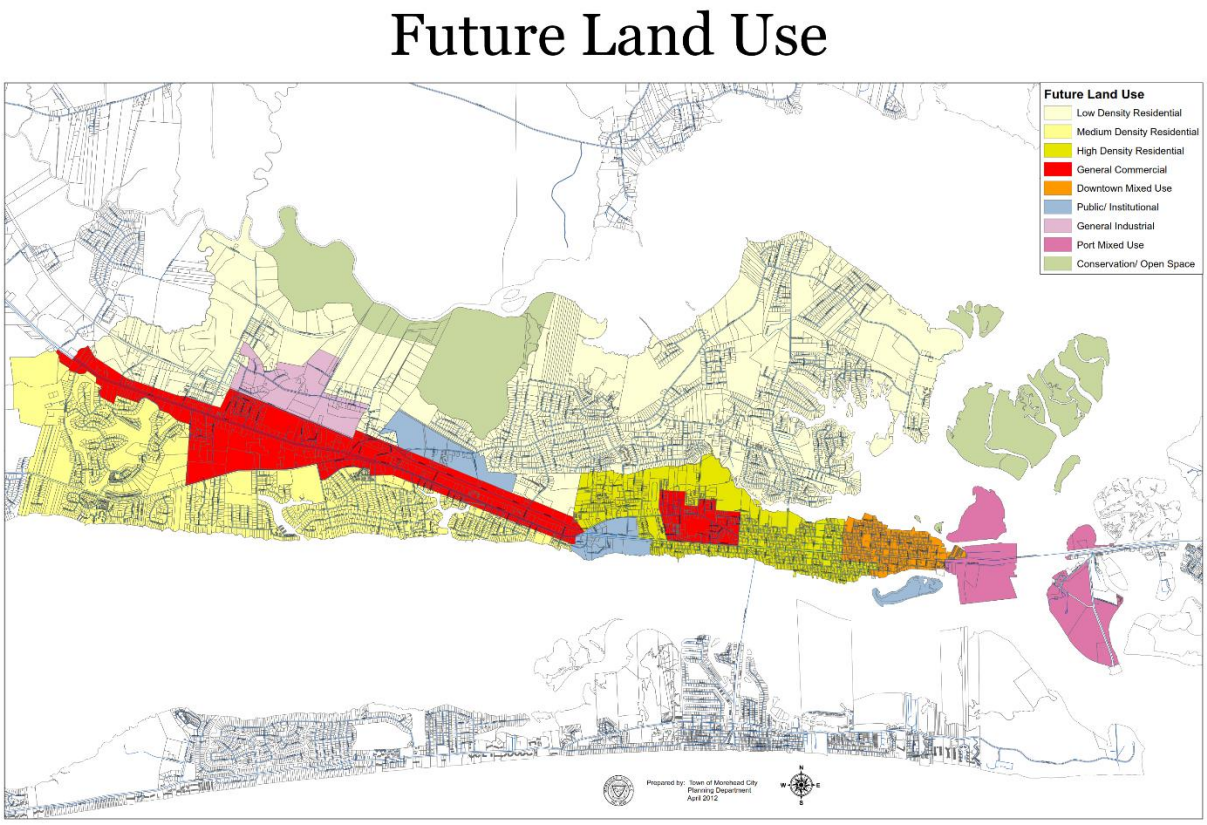
- Low Density Residential
- Medium Density Residential
- High Density Residential
- General Commercial
- Downtown Mixed Use
- Public and Institutional
- General Industrial
- Port Mixed Use
- Conservation/Open Space

These districts are defined in detail under Section 4.5 (page 103) of the Emerald Isle Comprehensive Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/MoreheadCityCAMALUP_Cert28SEPT2007_Amend21MAY2018.pdf

Figure B.9 provides the delineation of each Future Land Use District.

Figure B.9 – Town of Morehead City Future Land Use



Town of Newport Core Land Use Plan

The Town of Newport Core Land Use Plan was adopted by the Newport Town Council in September of 2006. The Core Land Use Plan defines eight Land Use Classifications including:

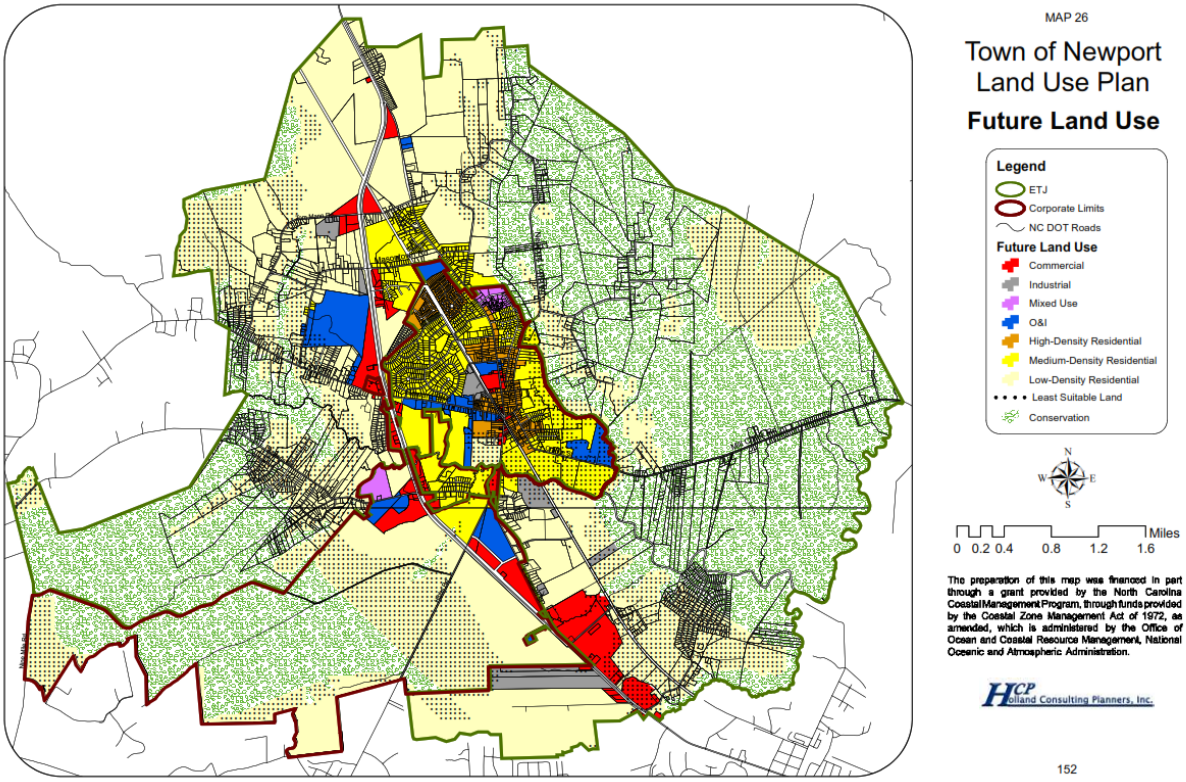
- Commercial
- Conservation
- Industrial
- Low-Density Residential
- Medium Density Residential
- High-Density Residential
- Mixed Use
- Office & Institutional

These districts are defined in detail under Section 6 (page 153) of the Town of Newport Core Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/LUB/05Sections%206-8.pdf

Figure B.10 provides the delineation of each Future Land Use District.

Figure B.10 – Town of Newport Future Land Use



Town of Pine Knoll Shores CAMA Core Land Use Plan

The Town of Pine Knoll Shores CAMA Core Land Use Plan was adopted by the Pine Knoll Shores Board of Commissioners in August of 2015. The CAMA Core Land Use Plan defines fourteen Future Land Use Classifications including:

- Conservation
- Government
- Hotel/Condotel
- Marina
- Multi-Family
- Office & Institutional
- Parking
- Private Beach Access
- Private Recreation
- Public Access
- Recreation
- Single Family Residential
- Utility
- Study Areas

These districts are defined in detail under Section VI (page 125) of the Town of Pine Knoll Shores CAMA Core Land Use Plan available through the following URL:

https://ncdenr.s3.amazonaws.com/s3fs-public/Coastal%20Management/documents/PDF/Land%20Use%20Plans/PKS%20LUP%202015%20Draft.pdf

Figure B.11 provides the delineation of each Future Land Use District.

Figure B.11 – Town of Pine Knoll Shores Future Land Use

Asset Inventory

The following tables summarize the asset inventory for Carteret County unincorporated areas and incorporated jurisdictions in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure B.12 through Figure B.20. Note, if there is no map for the jurisdiction, data was unavailable in iRisk. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table B.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense Industrial Base	Government Facilities	Healthcare	National Monuments and Icons	Nuclear Reactors, Materials and Waste	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Carteret County	277	8	1	530	0	208	1	74	17	0	0	0	145	9	13	5	1,288
Atlantic Beach	1	6	0	139	0	5	0	2	0	1	0	0	15	1	1	9	180
Beaufort	2	11	0	216	0	24	0	47	14	0	1	1	57	2	2	5	382
Bogue	11	0	0	19	0	4	0	4	0	0	0	0	2	0	0	0	40
Cape Carteret	1	5	0	60	0	14	0	20	3	0	0	0	15	0	0	0	118
Cedar Point	15	0	0	49	0	26	0	3	8	0	0	0	10	1	1	0	113
Emerald Isle	0	1	0	93	0	27	0	7	4	0	0	0	41	4	3	7	187
Indian Beach	0	0	0	19	0	0	0	5	1	0	0	0	5	4	1	0	35
Morehead City	16	29	0	564	4	142	0	122	76	0	1	0	142	9	5	20	1,130
Newport	96	3	0	171	3	76	0	38	21	0	1	1	36	6	2	1	455
Peletier	17	0	0	30	0	13	0	0	0	0	0	0	3	0	0	0	63
Pine Knoll Shores	0	0	0	83	0	4	0	4	2	0	1	0	10	2	1	2	109
Carteret County Total	**436**	**63**	**1**	**1,973**	**7**	**543**	**1**	**326**	**146**	**1**	**4**	**2**	**481**	**38**	**29**	**49**	**4,100**

Source: NCEM Risk Management Tool

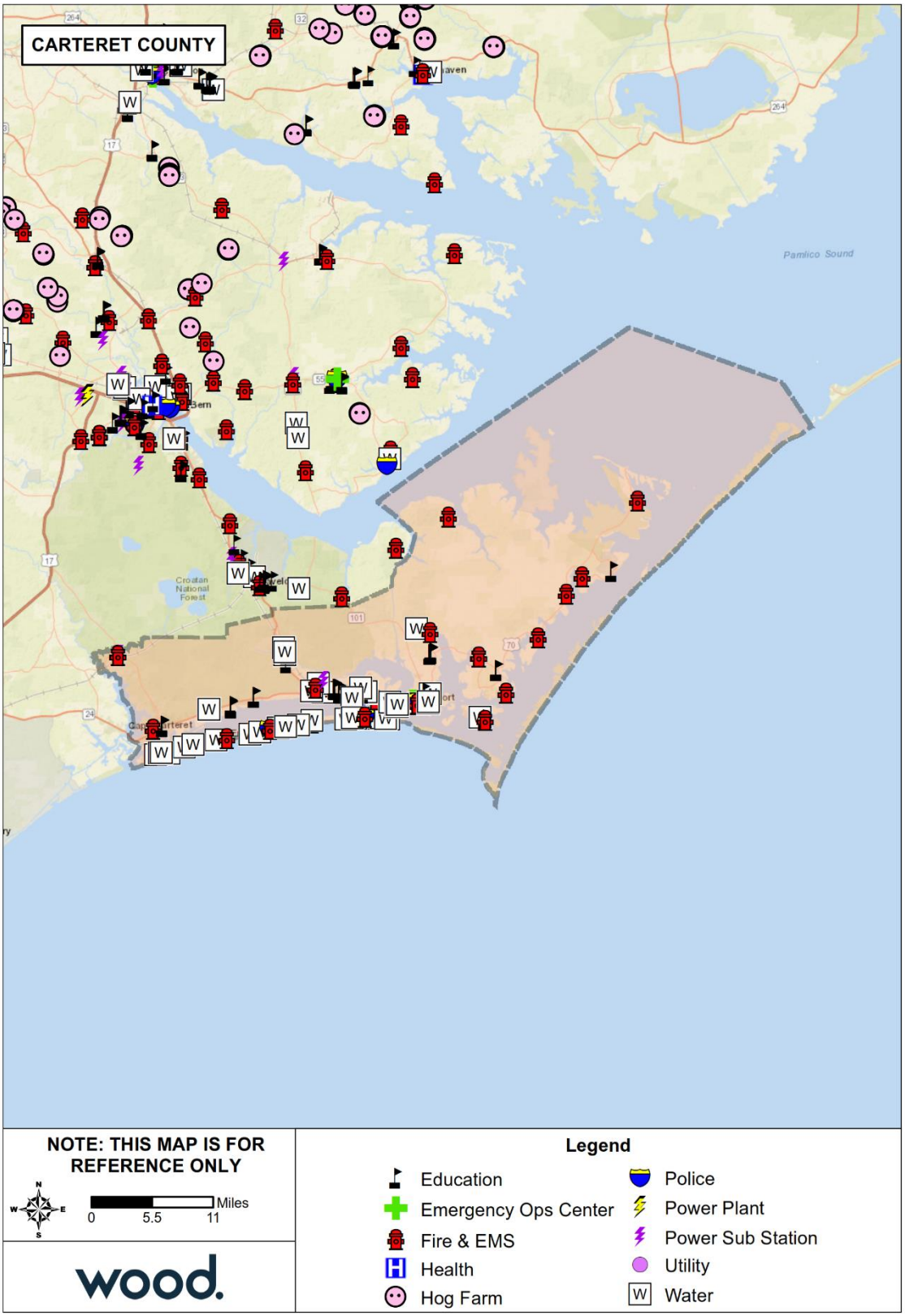
Table B.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Carteret County	3	9	0	12	0	6	10	40
Atlantic Beach	5	7	0	0	0	1	7	20
Beaufort	5	8	0	9	0	5	4	31
Bogue	-	-	-	-	-	-	-	-
Cape Carteret	1	1	0	1	0	1	0	4
Cedar Point	0	1	0	0	0	1	0	2

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Emerald Isle	19	1	0	0	0	0	5	25
Indian Beach	9	1	0	0	0	0	4	14
Morehead City	11	32	1	34	0	10	13	101
Newport	0	7	0	4	0	2	3	16
Peletier	0	0	0	0	0	1	0	1
Pine Knoll Shores	11	2	0	2	0	1	2	18
Carteret County Total	**64**	**69**	**1**	**62**	**0**	**28**	**48**	**272**

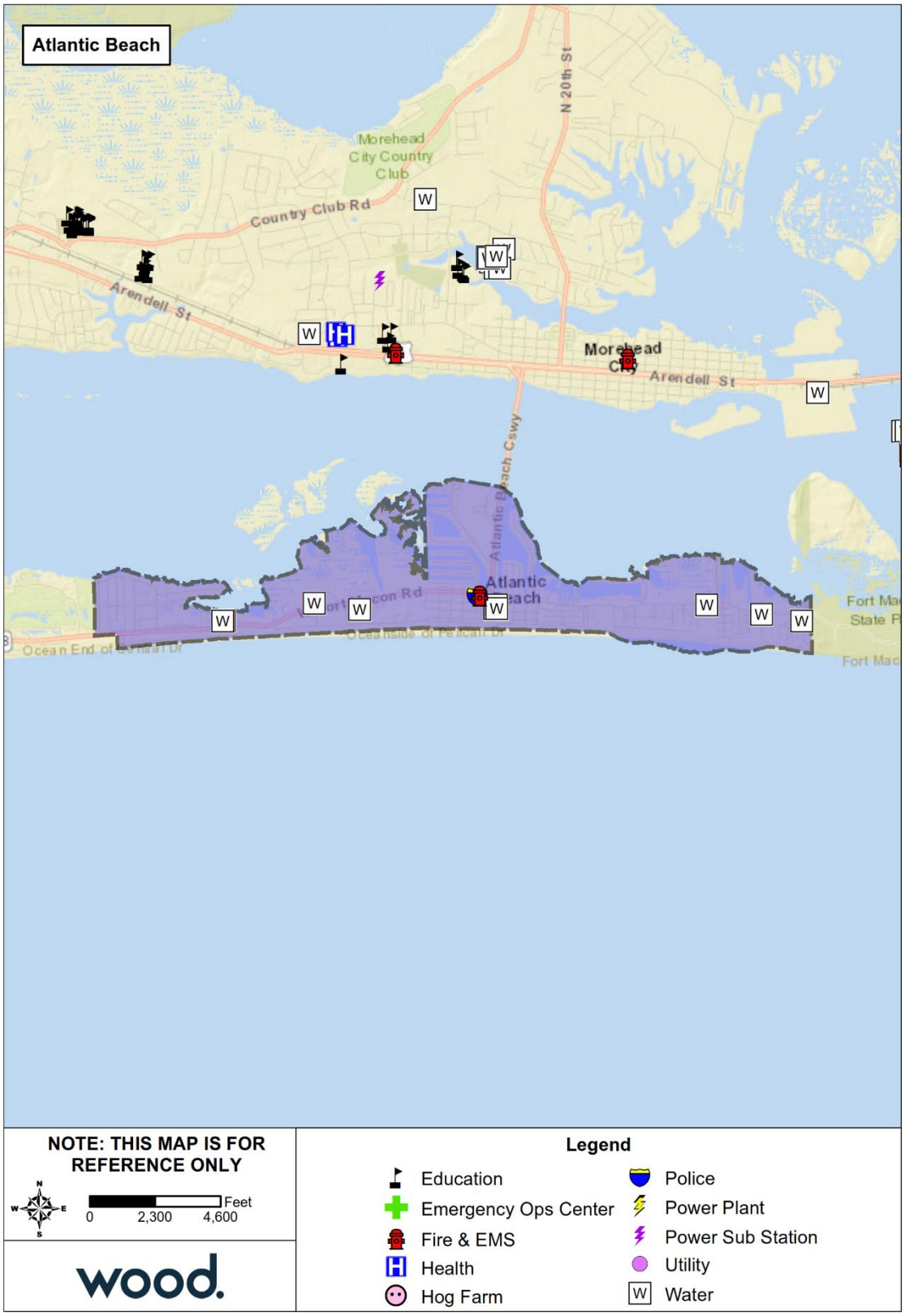
Source: NCEM Risk Management Tool
Note: A dash (-) indicates that no high potential loss facilities were reported in RMT.

Figure B.12 – Critical Facilities, Carteret County



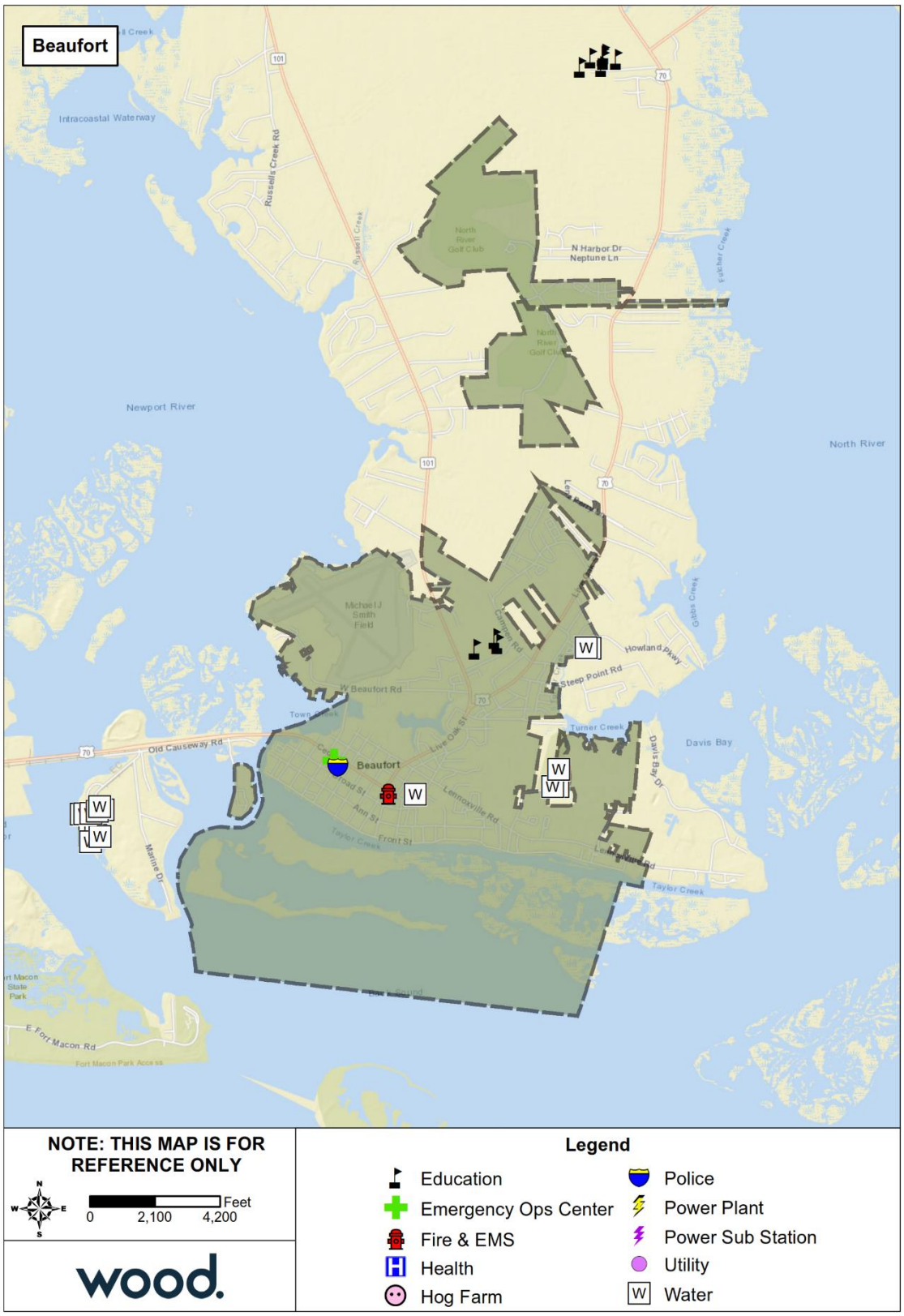
Source: NCEM IRISK Database, GIS Analysis

Figure B.13 – Critical Facilities, Town of Atlantic Beach



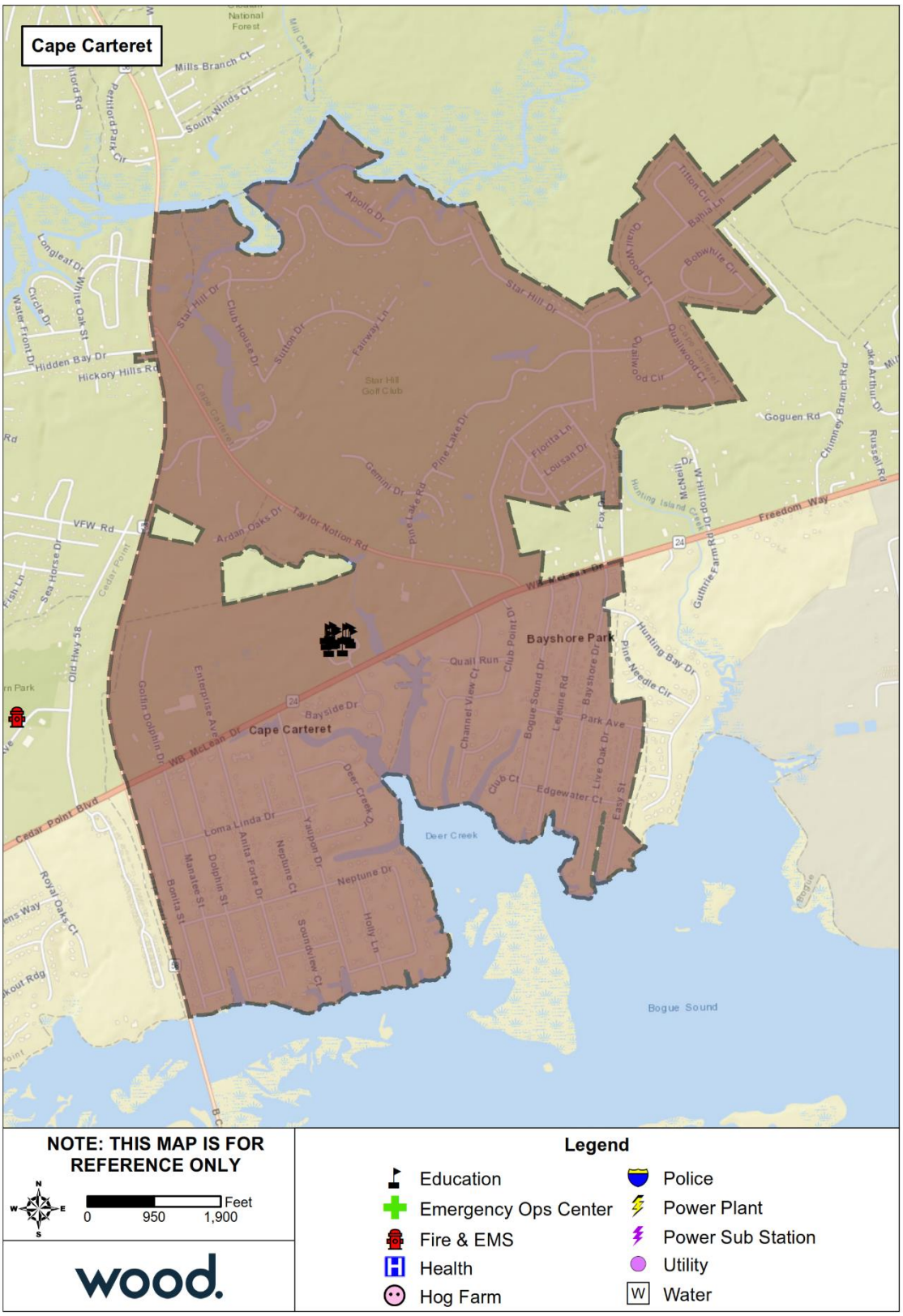
Source: NCEM IRISK Database, GIS Analysis

Figure B.14 – Critical Facilities, Town of Beaufort



Source: NCEM IRISK Database, GIS Analysis

Figure B.15 – Critical Facilities, Town of Cape Carteret

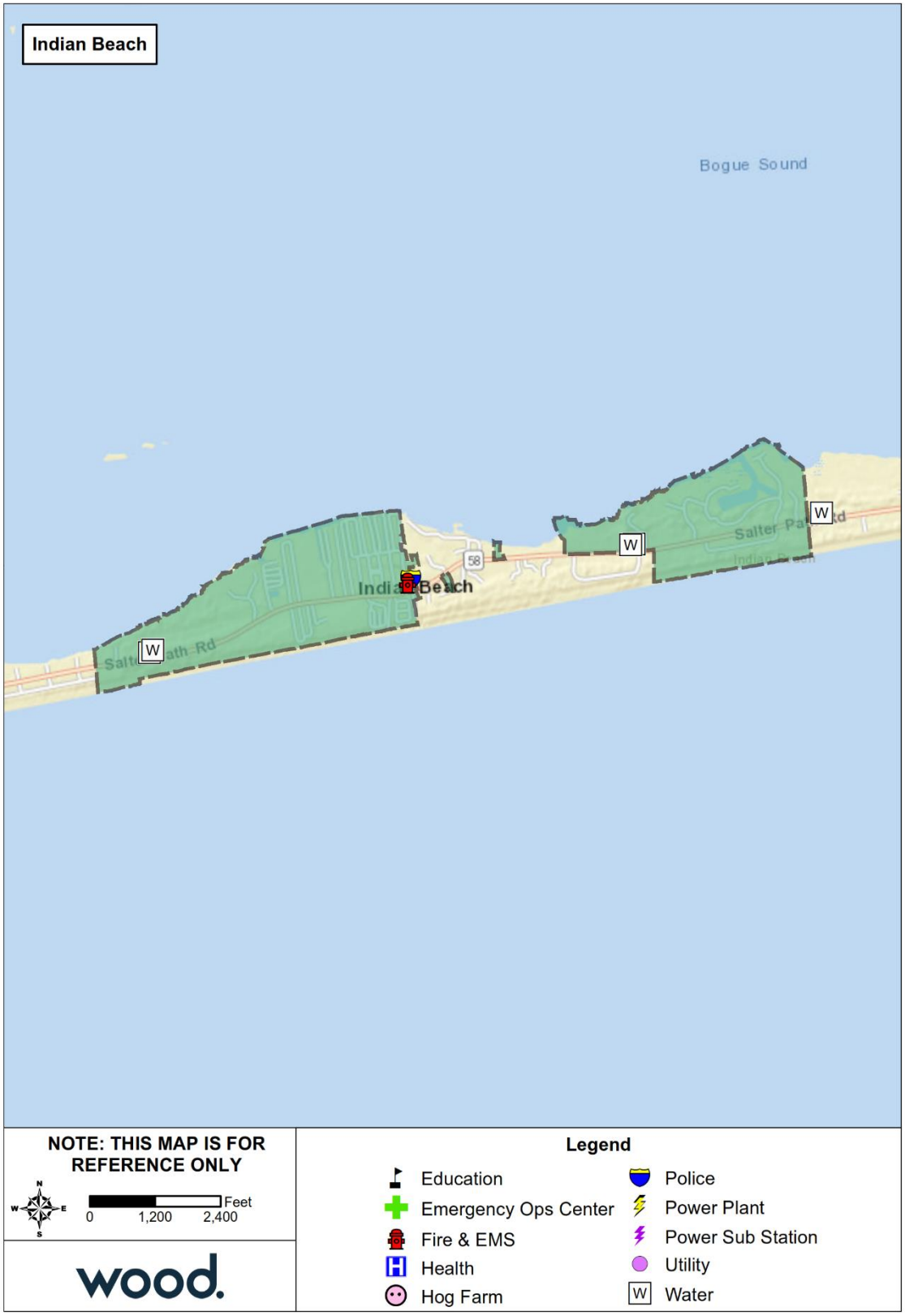


Source: NCEM IRISK Database, GIS Analysis

Figure B.16 – Critical Facilities, Town of Emerald Isle

Source: NCEM IRISK Database, GIS Analysis

Figure B.17 – Critical Facilities, Town of Indian Beach

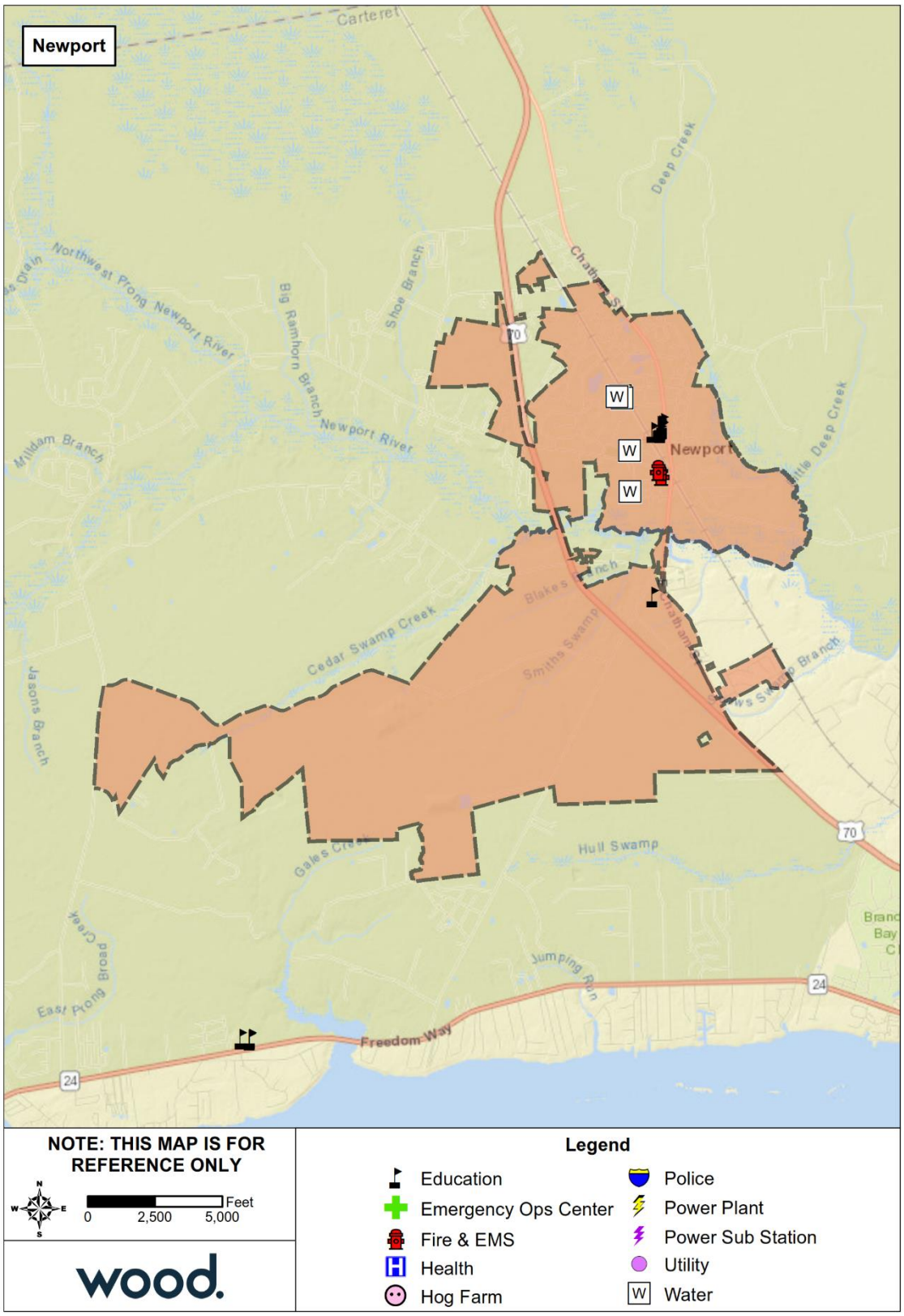


Source: NCEM IRISK Database, GIS Analysis

Figure B.18 – Critical Facilities, Town of Morehead City

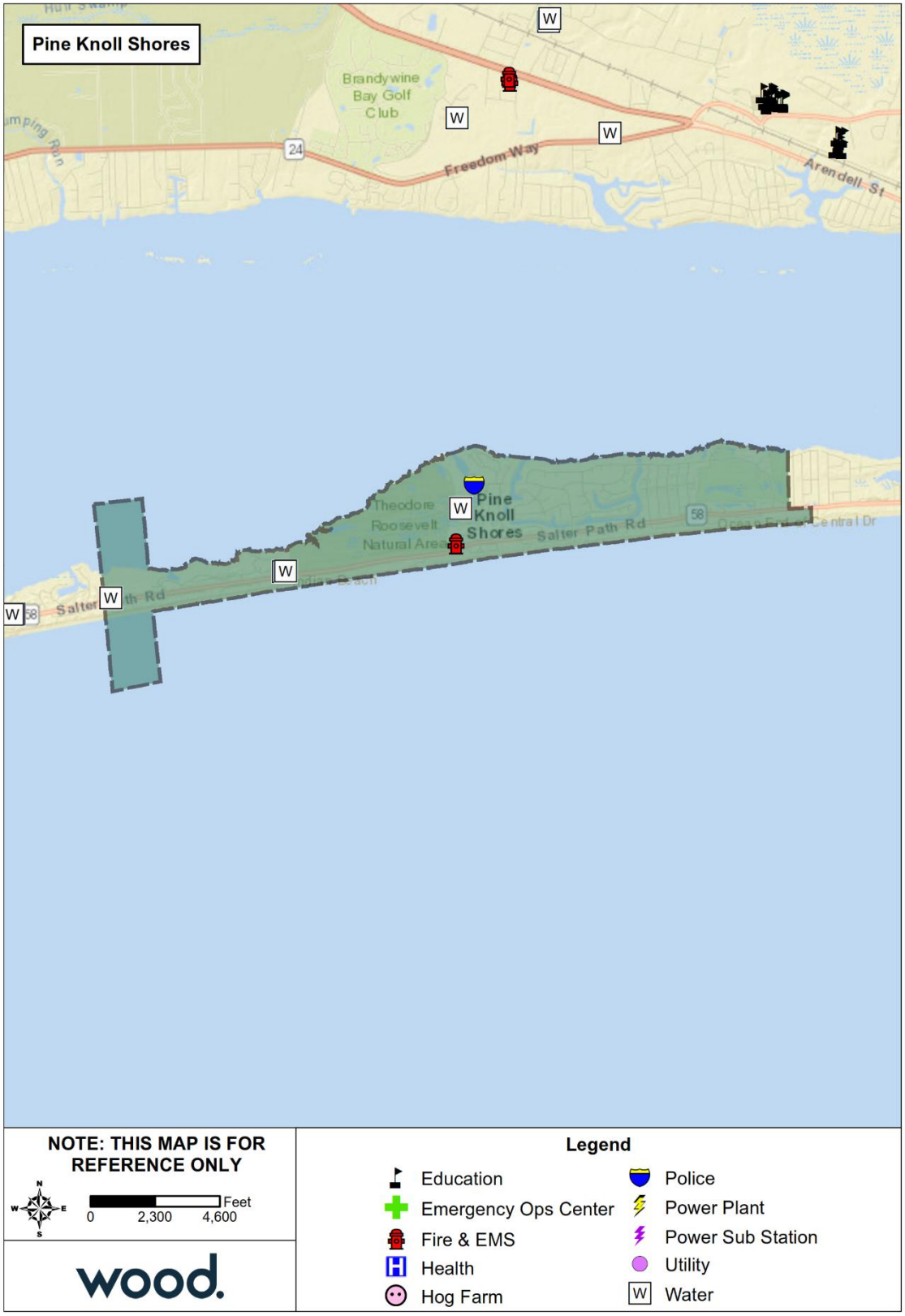
Source: NCEM IRISK Database, GIS Analysis

Figure B.19 – Critical Facilities, Town of Newport



Source: NCEM IRISK Database, GIS Analysis

Figure B.20 – Critical Facilities, Town of Pine Knoll Shores



Source: NCEM IRISK Database, GIS Analysis

Housing

The table below details key housing statistics for Carteret County. As a percent of growth from 2010 housing, Carteret County's housing stock has grown by 4.5%.

Table B.6 – Housing Statistics, Carteret County, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Atlantic Beach	4,935	5,041	2.1%	59.8%	81.4%
Beaufort	2,745	2,849	3.8%	52.5%	24.8%
Bogue	296	307	3.7%	78.9%	10.4%
Cape Carteret	1,027	1,119	9.0%	84.7%	19.7%
Cedar Point	955	1,082	13.3%	78.3%	36.4%
Emerald Isle	6,735	6,804	1.0%	73.0%	73.1%
Indian Beach	1,565	1,682	7.5%	85.6%	92.8%
Morehead City	5,383	5,546	3.0%	49.7%	21.4%
Newport	1,697	2,231	31.5%	73.8%	10.8%
Peletier	393	465	18.3%	69.7%	28.4%
Pine Knoll Shores	2,049	2,096	2.3%	88.7%	68.0%
Carteret County	**47,459**	**49,580**	**4.5%**	**72.7%**	**39.5%**

Source: US Census Bureau American Community Survey.

Economy

The following tables present key economic statistics for Carteret County.

Table B.7 – Economic Indicators, Carteret County, 2017

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Atlantic Beach	62.7%	53.7%	7.8%	37.3%	12.7%
Beaufort	56.0%	49.6%	5.4%	44.0%	9.8%
Bogue	66.9%	60.1%	3.3%	33.1%	5.2%
Cape Carteret	56.6%	48.5%	4.1%	43.4%	7.8%
Cedar Point	64.2%	54.2%	1.3%	35.8%	2.3%
Emerald Isle	51.3%	47.0%	3.3%	48.7%	6.5%
Indian Beach	40.5%	39.1%	1.4%	59.5%	3.4%
Morehead City	61.8%	56.0%	4.2%	38.2%	6.9%
Newport	57.1%	51.3%	4.3%	42.9%	7.8%
Peletier	65.9%	50.7%	14.0%	34.1%	21.6%
Pine Knoll Shores	43.5%	41.5%	1.6%	56.5%	3.8%
Carteret County	**58.2%**	**52.2%**	**4.5%**	**41.8%**	**8.0%**

Source: US Census Bureau American Community Survey.

Table B.8 – Employment by Industry, Carteret County, 2017

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Atlantic Beach	53.3%	10.7%	20.6%	9.0%	6.3%
Beaufort	33.2%	27.8%	19.9%	10.9%	8.2%

Bogue	30.4%	28.0%	17.9%	16.4%	7.3%
Cape Carteret	41.6%	15.2%	24.3%	13.7%	5.2%
Cedar Point	46.7%	17.4%	18.2%	10.5%	7.2%
Emerald Isle	50.9%	16.5%	24.2%	5.9%	2.5%
Indian Beach	66.7%	9.5%	21.4%	0.0%	2.4%
Morehead City	34.2%	20.7%	23.2%	9.8%	12.1%
Newport	33.1%	23.3%	23.9%	11.5%	8.3%
Peletier	17.5%	23.6%	24.2%	28.8%	5.8%
Pine Knoll Shores	57.3%	7.7%	26.1%	3.6%	5.3%
Carteret County	35.1%	20.3%	22.7%	12.9%	9.0%

Source: US Census Bureau American Community Survey.

B.2 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority by jurisdiction in Carteret County than for the Pamlico Sound Region as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are flood and wildfire.

B.2.1 Flood

Table B.9 details the acreage of Carteret County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at over 74 percent, the Town of Atlantic Beach has the largest portion of its land area within the mapped 1%-annual-chance floodplain. At least 50 percent of the total land area in Morehead City, Indian Beach, and Beaufort all fall within the Special Flood Hazard Area. Peletier and Newport, at 12.8 and 12 percent, respectively, have the smallest portion of land within the floodplain. Overall, 66 percent of the county's total land area falls within this floodplain.

Table B.9 – Flood Zone Acreage by Jurisdiction, Carteret County

Flood Zone	Acreage	Percent of Total (%)
Atlantic Beach		
Zone AE	1,066.30	64.4
Zone VE	178.99	10.8
Zone X (500-year)	339.49	20.5
Zone X Unshaded	69.88	4.2
Total	**1,654.67**	--
Beaufort		
Zone AE	1,230.60	28.1
Zone VE	1,095.78	25.0
Zone X (500-year)	782.03	17.8
Zone X Unshaded	1,273.55	29.1
Total	**4,381.96**	--
Bogue		
Zone AE	344.86	19.5
Zone VE	35.43	2.0
Zone X (500-year)	81.35	4.6
Zone X Unshaded	1,309.16	73.9
Total	**1,770.80**	--
Cape Carteret		

Flood Zone	Acreage	Percent of Total (%)
Zone AE	285.62	17.1
Zone VE	19.23	1.2
Zone X (500-year)	79.68	4.8
Zone X (unshaded)	1,287.19	77.0
Total	**1,671.71**	--
Cedar Point		
Zone AE	384.81	26.2
Zone VE	69.10	4.7
Zone X (500-year)	98.03	6.7
Zone X (unshaded)	915.20	62.4
Total	**1,467.13**	--
Emerald Isle		
Zone AE	829.57	25.9
Zone VE	431.01	13.4
Zone X (500-year)	577.58	18.0
Zone X (unshaded)	1,366.71	42.6
Total	**3,204.87**	--
Indian Beach		
Zone AE	112.30	29.6
Zone VE	109.44	28.9
Zone X (500-year)	139.41	36.8
Zone X (unshaded)	17.85	4.7
Total	**379.00**	--
Morehead City		
Zone AE	3,147.48	48.0
Zone VE	156.82	2.4
Zone X (500-year)	336.05	5.1
Zone X (unshaded)	2,915.49	44.5
Total	**6,555.85**	--
Newport		
Zone A	539.46	11.0
Zone X (500-year)	49.23	1.0
Zone X (unshaded)	4,321.83	88.0
Total	**4,910.52**	--
Peletier		
Zone AE	244.79	10.4
Zone X (500-year)	56.33	2.4
Zone X (unshaded)	2,050.65	87.20
Total	**2,351.76**	--
Pine Knoll Shores		
Zone AE	544.21	34.9
Zone VE	191.59	12.3
Zone X (500-year)	644.88	41.3
Zone X (unshaded)	180.62	11.6
Total	**4,561.30**	--
Carteret County		
Zone AE	375,639.64	56.61

Flood Zone	Acreage	Percent of Total (%)
Zone AO	1,165.53	0.18
Zone VE	65,014.65	9.80
Zone X (500-year)	34,046.50	5.13
Zone X (unshaded)	116,927.22	17.62
Open Water	70,717.89	10.66
County Total	**663,511.42**	--

Source: FEMA Effective DFIRM

Figure B.21 through Figure B.32 reflect the effective mapped flood hazard zones for all jurisdictions in Carteret County, and Figure B.33 through Figure B.44 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table B.10 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and event in Carteret County and incorporated jurisdictions. Table B.11 provides building counts and estimated damages for High Potential Loss Structures in the 1%-annual-chance floodplain.

Table B.10 – Critical Facilities Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Carteret County Unincorporated Areas			
Banking and Finance	100 Year	2	$37,387
Commercial Facilities	100 Year	151	$3,116,328
Critical Manufacturing	100 Year	51	$790,763
Emergency Services	100 Year	5	$231,328
Food and Agriculture	100 Year	48	$126,506
Government Facilities	100 Year	18	$1,031,930
Healthcare and Public Health	100 Year	2	$44,355
Transportation Systems	100 Year	32	$745,547
All Categories	**100 Year**	**309**	**$6,124,144**
Town of Atlantic Beach			
Banking and Finance	100 Year	4	$34,954
Commercial Facilities	100 Year	43	$1,236,206
Critical Manufacturing	100 Year	3	$73,564
Transportation Systems	100 Year	6	$39,552
All Categories	**100 Year**	**56**	**$1,384,276**
Town of Beaufort			
Banking and Finance	100 Year	1	$72,007
Commercial Facilities	100 Year	36	$596,985
Critical Manufacturing	100 Year	1	$41,232
Government Facilities	100 Year	1	$12,257
Healthcare and Public Health	100 Year	3	$77,385
Transportation Systems	100 Year	7	$69,683
All Categories	**100 Year**	**49**	**$869,549**
Town of Bogue			
Commercial Facilities	100 Year	1	$25,463
Transportation Systems	100 Year	1	$55,286
All Categories	**100 Year**	**2**	**$80,749**

Town of Cape Carteret			
Commercial Facilities	100 Year	4	$139,472
Transportation Systems	100 Year	2	$43,138
All Categories	**100 Year**	**6**	**$182,610**
Town of Cedar Point			
Commercial Facilities	100 Year	12	$292,246
Healthcare and Public Health	100 Year	2	$11,981
Transportation Systems	100 Year	1	$153,873
All Categories	**100 Year**	**15**	**$458,100**
Town of Emerald Isle			
Commercial Facilities	100 Year	6	$77,944
Transportation Systems	100 Year	2	$48,360
All Categories	**100 Year**	**8**	**$126,304**
Town of Indian Beach			
Commercial Facilities	100 Year	1	$13,359
Town of Morehead City			
Banking and Finance	100 Year	1	$32,529
Commercial Facilities	100 Year	49	$1,074,342
Critical Manufacturing	100 Year	7	$110,821
Food and Agriculture	100 Year	12	$9,928
Government Facilities	100 Year	1	$53,106
Healthcare and Public Health	100 Year	2	$385,787
Transportation Systems	100 Year	9	$344,970
All Categories	**100 Year**	**81**	**$2,011,483**
Town of Newport			
Commercial Facilities	100 Year	1	$5,783
Critical Manufacturing	100 Year	1	$1,111
All Categories	**100 Year**	**2**	**$6,894**
Town of Pine Knoll Shores			
Commercial Facilities	100 Year	1	$3,207

Source: NCEM Risk Management Tool

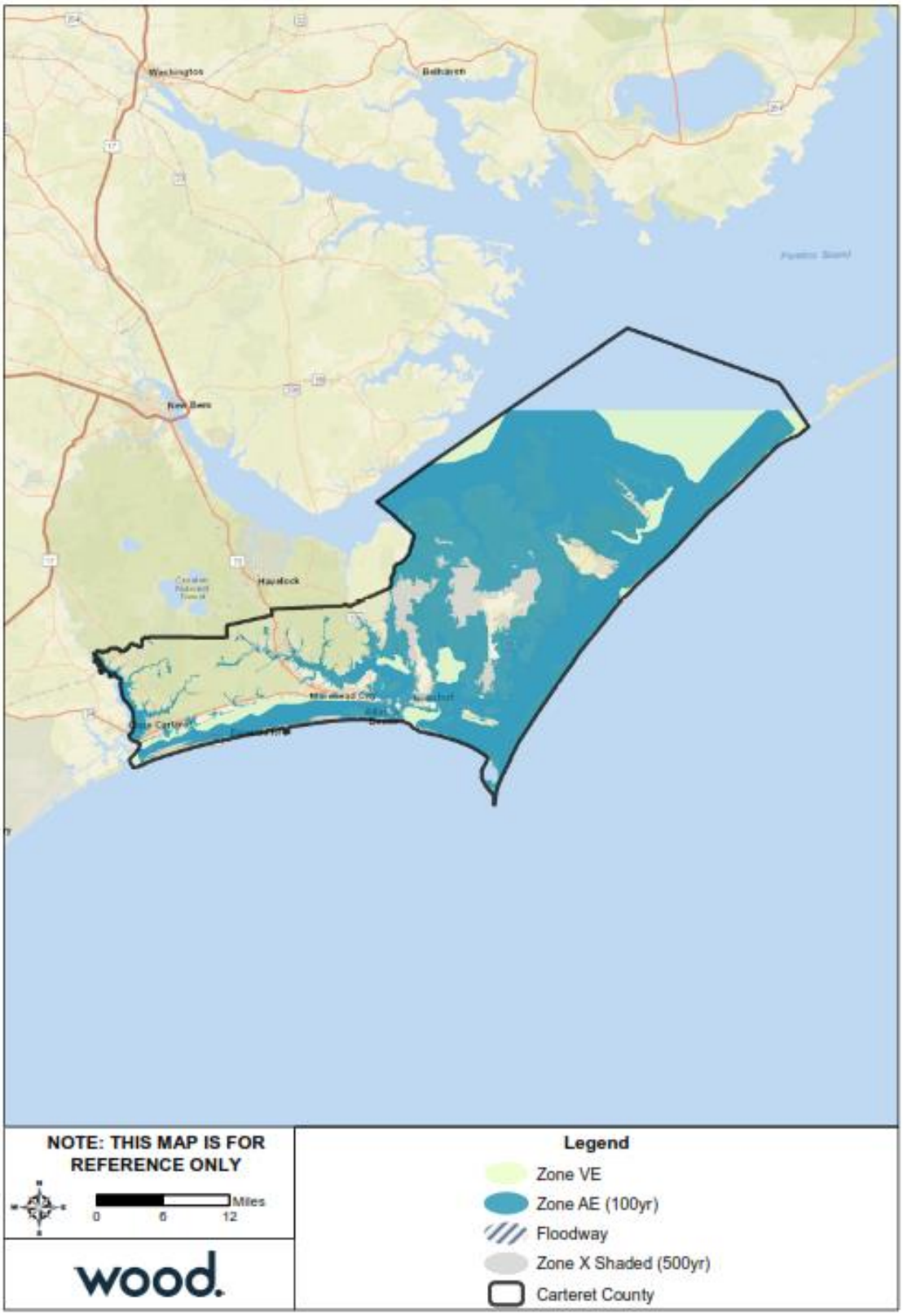
Table B.11 – High Potential Loss Properties Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Carteret County Unincorporated Areas			
Commercial	100 Year	1	$92,510
Government	100 Year	2	$771,817
Residential	100 Year	1	$109,438
All Categories	**100 Year**	**4**	**$973,765**
Town of Atlantic Beach			
Commercial	100 Year	1	$40,089
Town of Beaufort			
Commercial	100 Year	1	$49,213
Residential	100 Year	1	$580,500
All Categories	**100 Year**	**2**	**$629,713**
Town of Cape Carteret			
Residential	100 Year	1	$411,798

Town of Emerald Isle			
Residential	100 Year	5	$852,889
Town of Morehead City			
Commercial	100 Year	4	$418,547
Residential	100 Year	3	$801,931
All Categories	**100 Year**	**7**	**$1,220,478**
Town of Pine Knoll Shores			
Residential	100 Year	1	$107,691

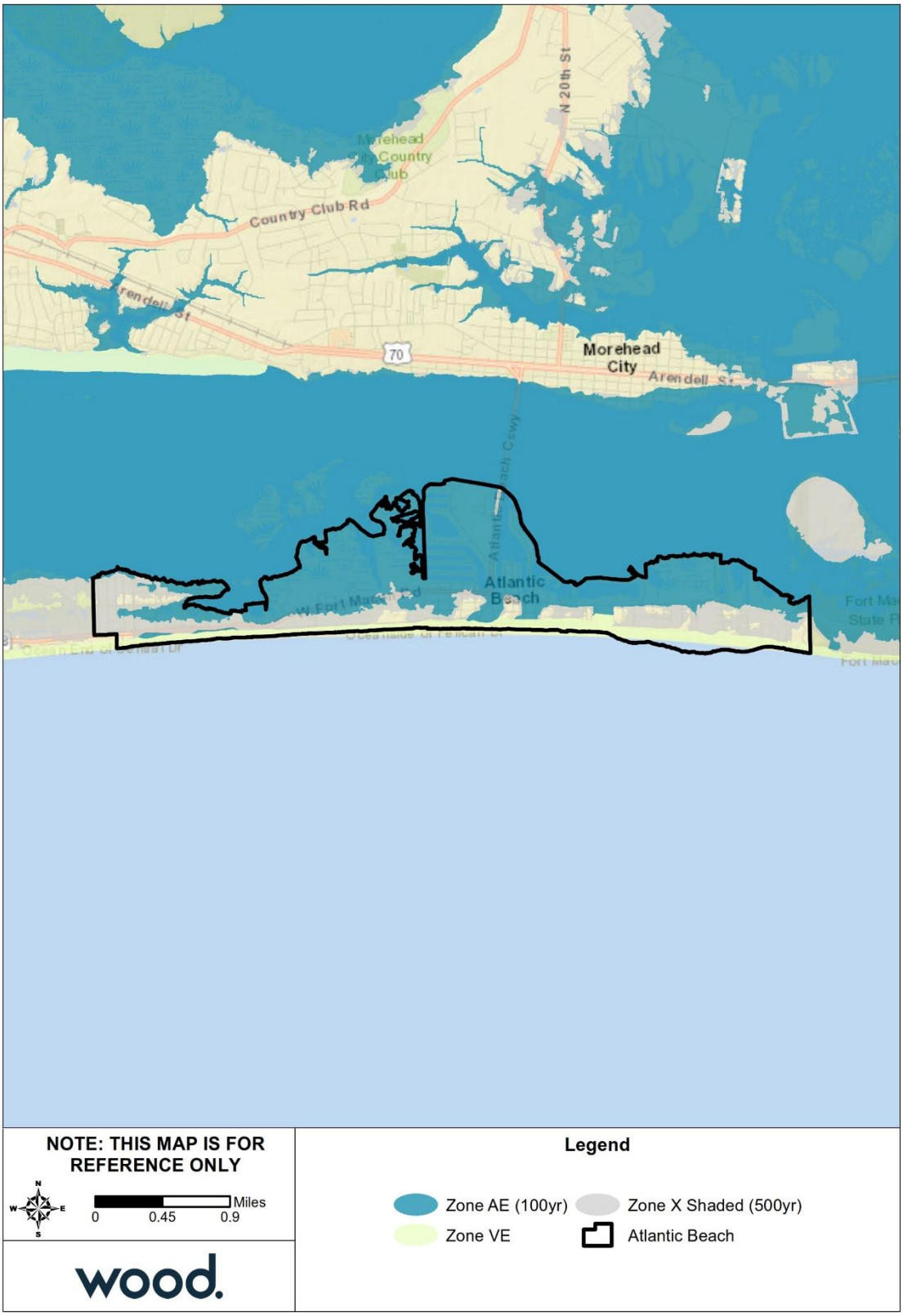
Source: NCEM Risk Management Tool

Figure B.21 – FEMA Flood Hazard Areas, Unincorporated Carteret County



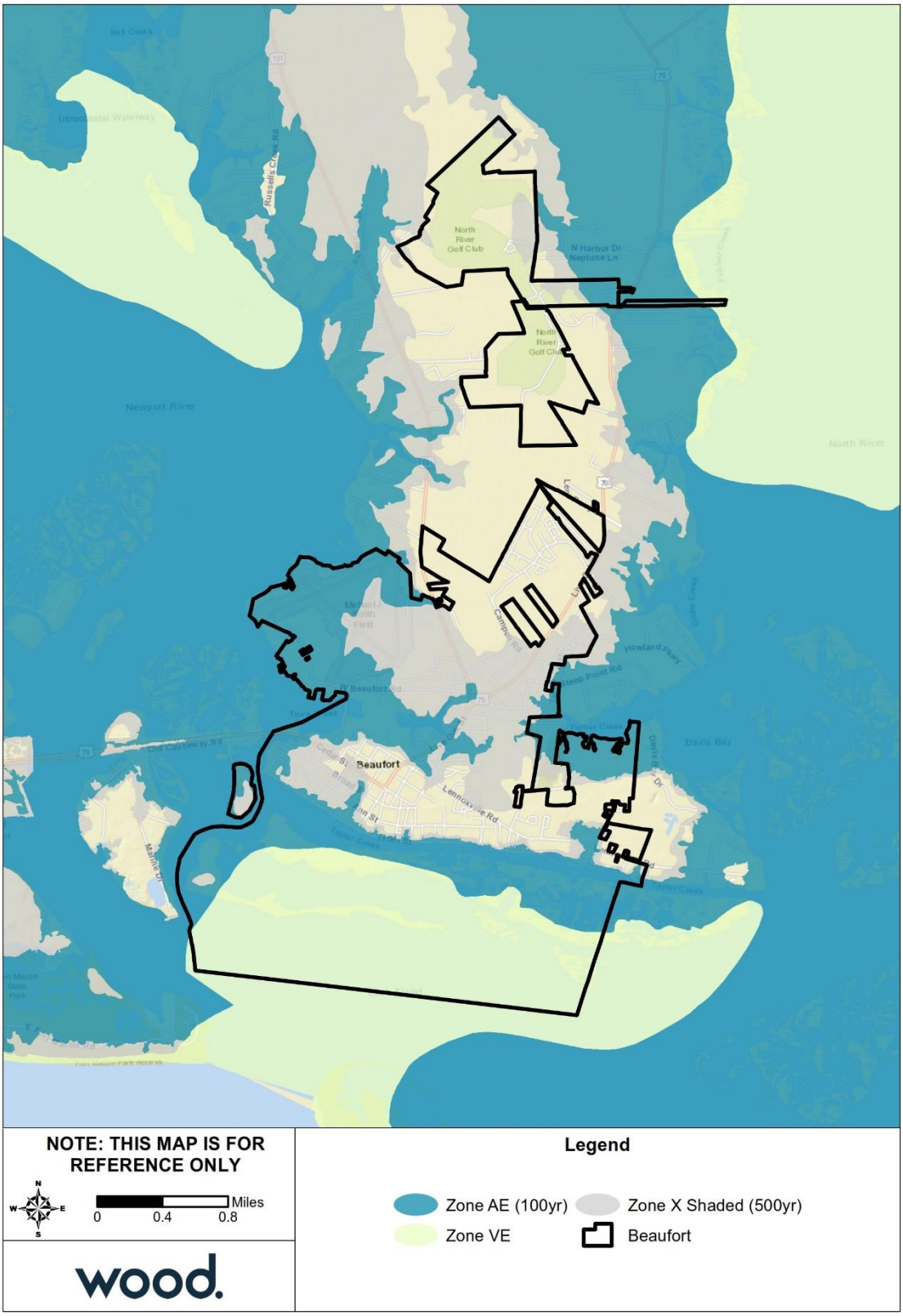
Source: FEMA Effective DFIRM

Figure B.22 – FEMA Flood Hazard Areas, Town of Atlantic Beach



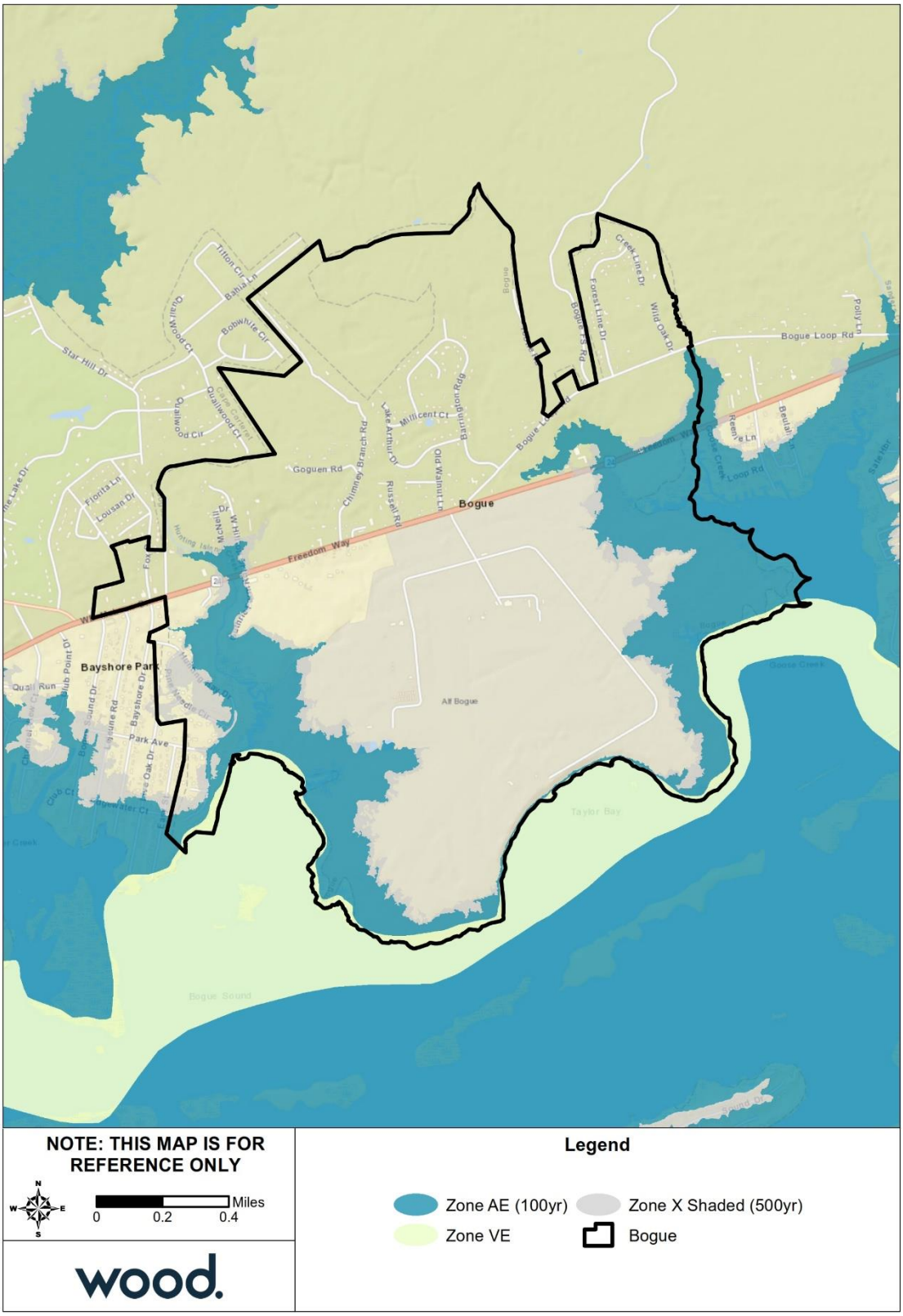
Source: FEMA Effective DFIRM

Figure B.23 – FEMA Flood Hazard Areas, Town of Beaufort



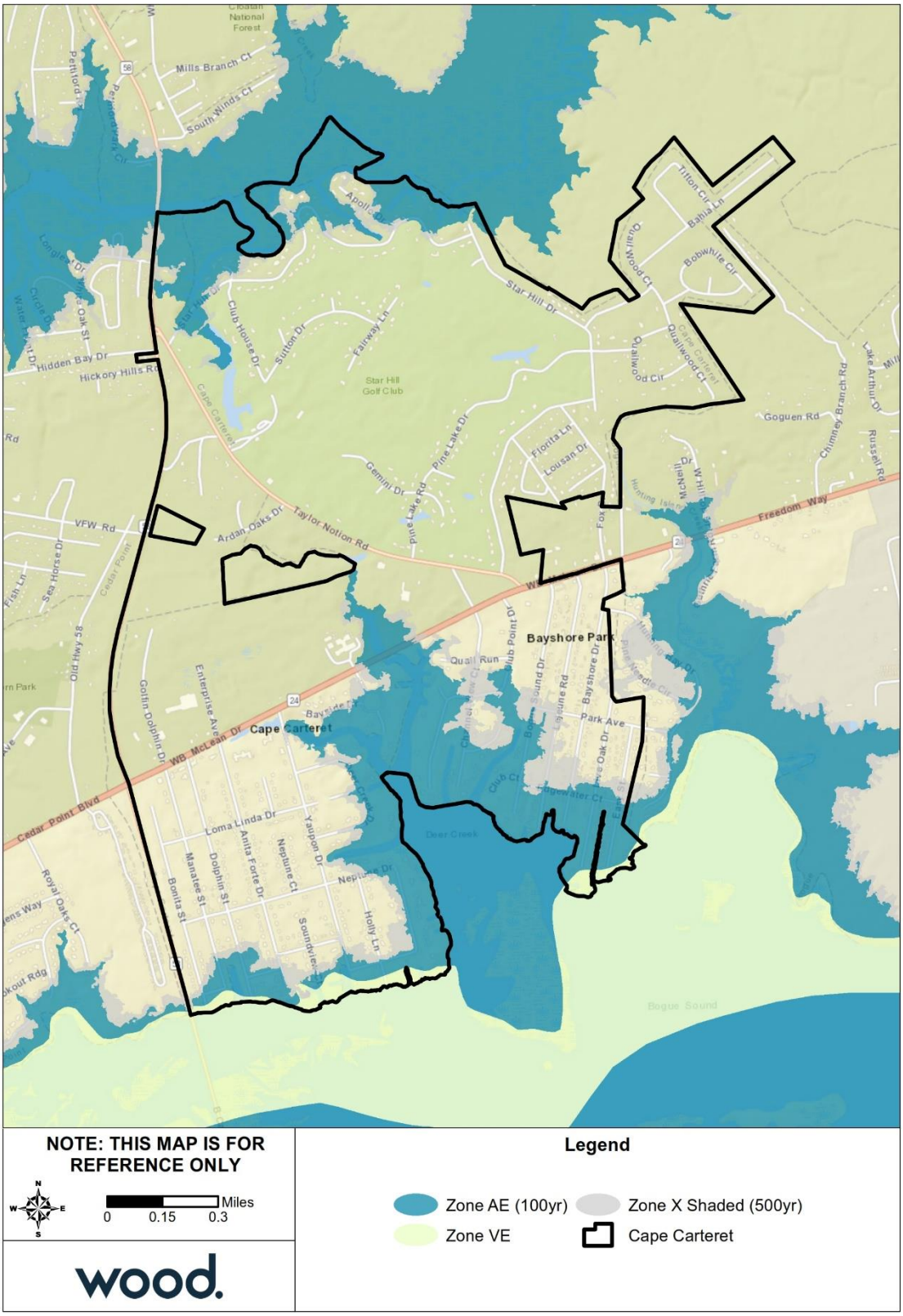
Source: FEMA Effective DFIRM

Figure B.24 – FEMA Flood Hazard Areas, Town of Bogue



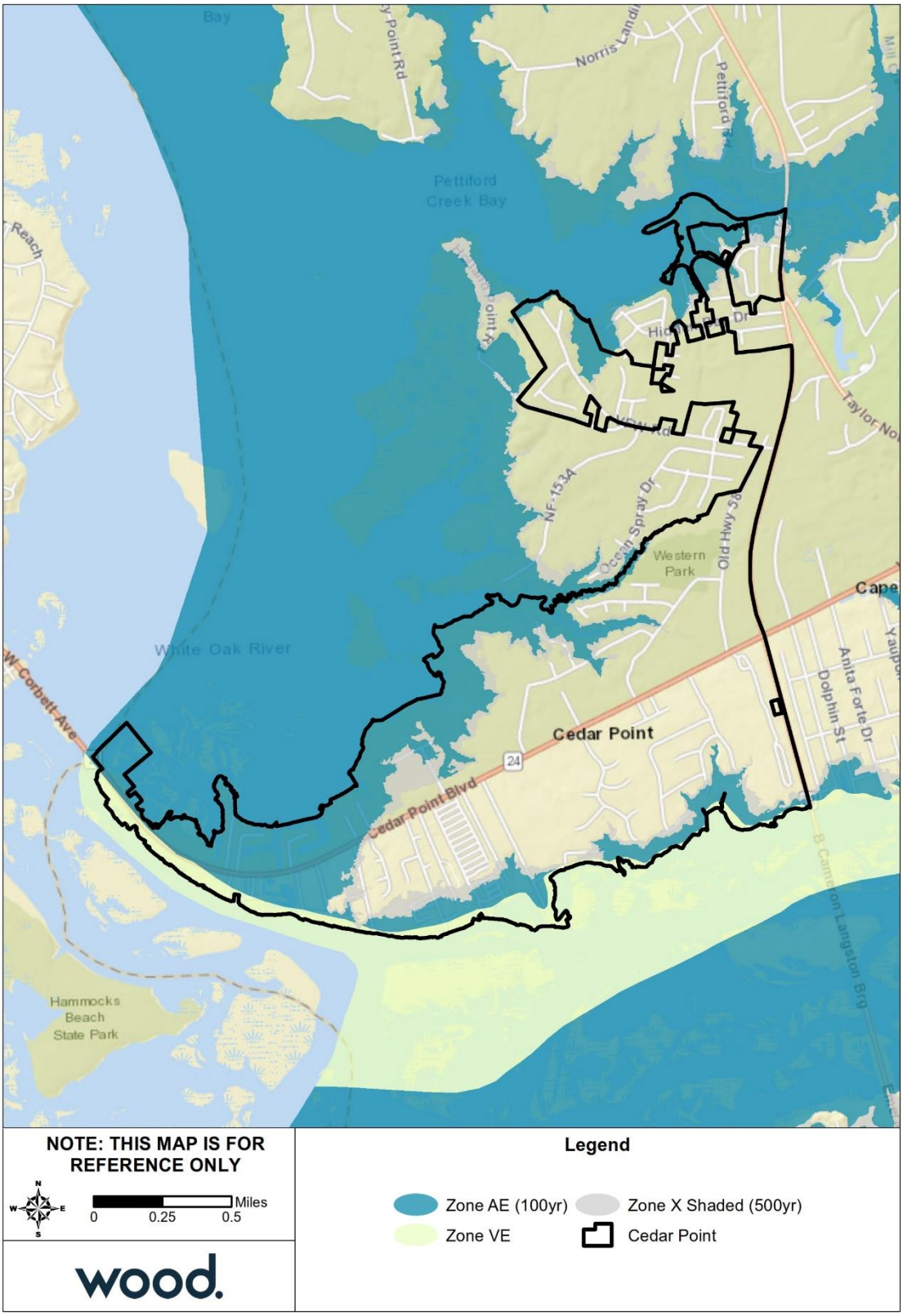
Source: FEMA Effective DFIRM

Figure B.25 – FEMA Flood Hazard Areas, Town of Cape Carteret



Source: FEMA Effective DFIRM

Figure B.26 – FEMA Flood Hazard Areas, Town of Cedar Point



Source: FEMA Effective DFIRM

Figure B.27 – FEMA Flood Hazard Areas, Town of Emerald Isle

Source: FEMA Effective DFIRM

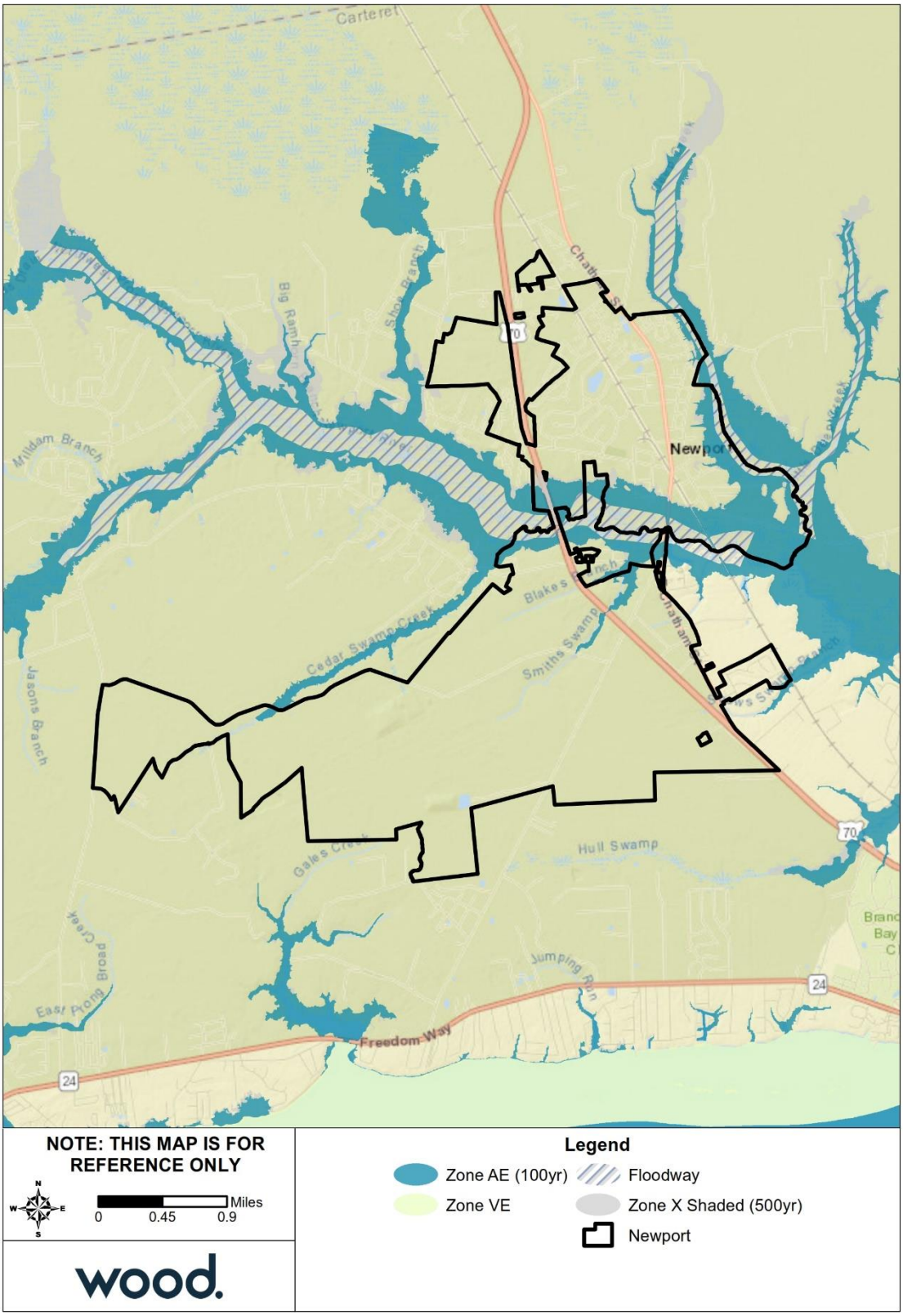
Figure B.28 – FEMA Flood Hazard Areas, Town of Indian Beach

Source: FEMA Effective DFIRM

Figure B.29 – FEMA Flood Hazard Areas, Town of Morehead City

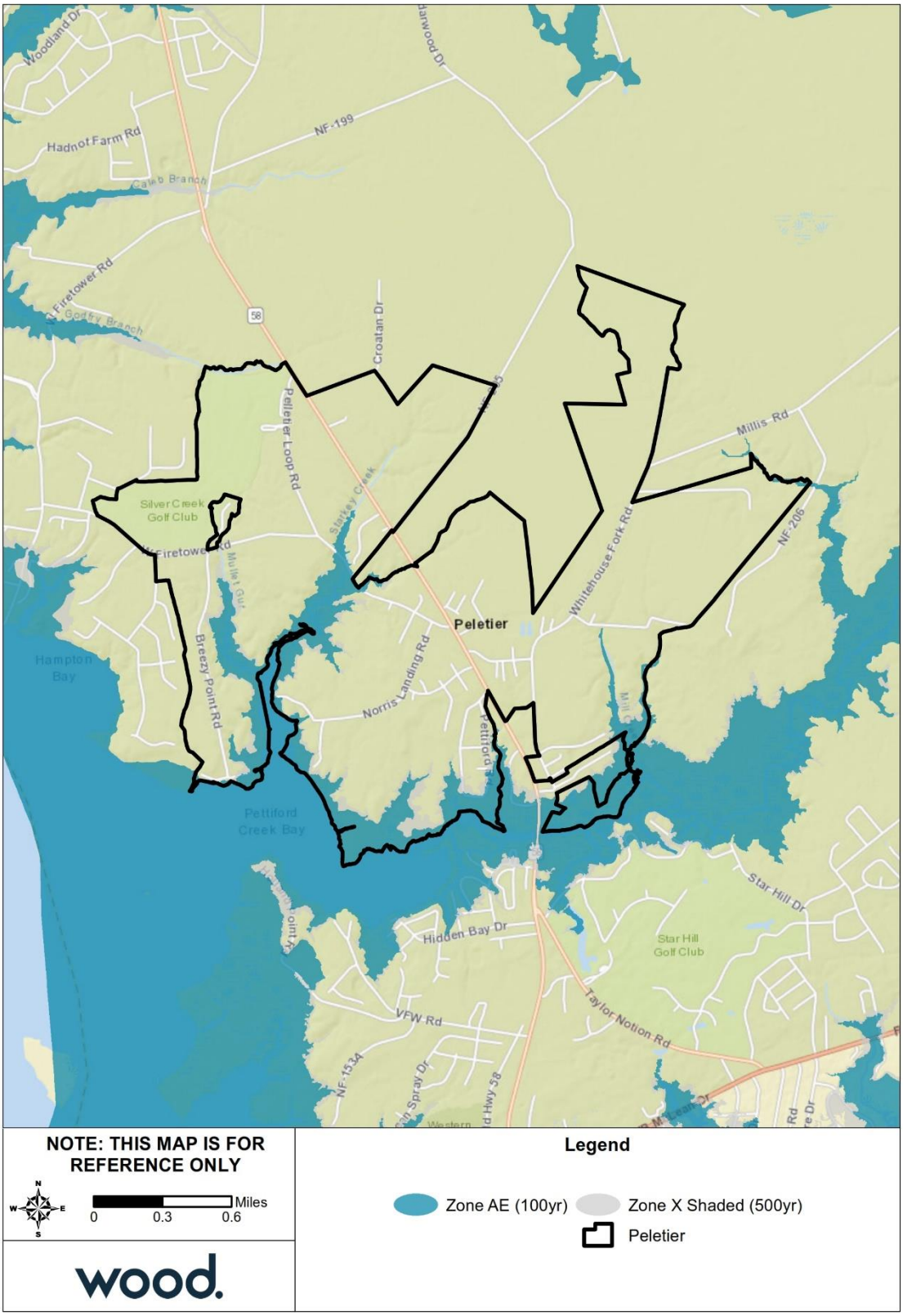
Source: FEMA Effective DFIRM

Figure B.30 – FEMA Flood Hazard Areas, Town of Newport



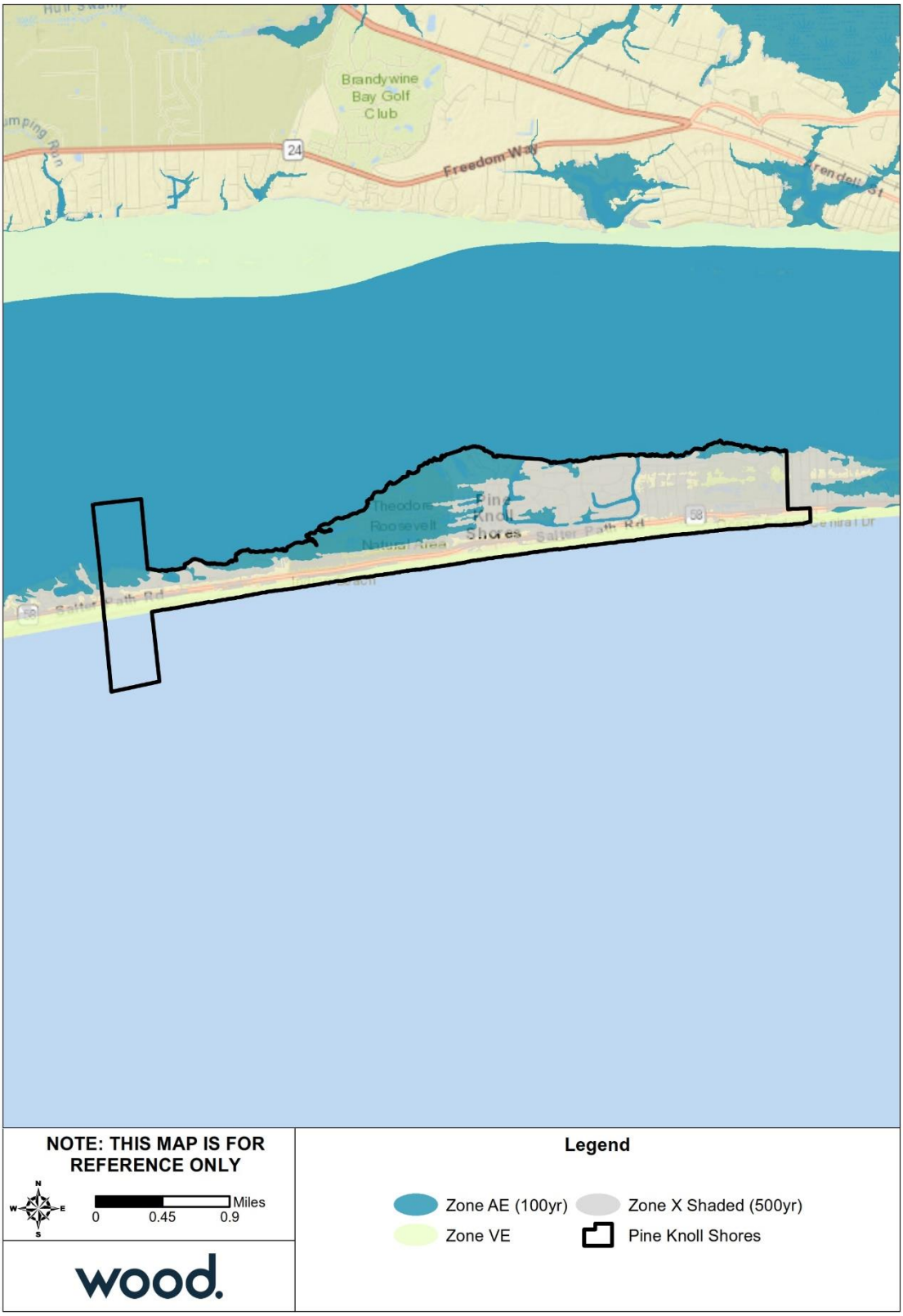
Source: FEMA Effective DFIRM

Figure B.31 – FEMA Flood Hazard Areas, Town of Peletier



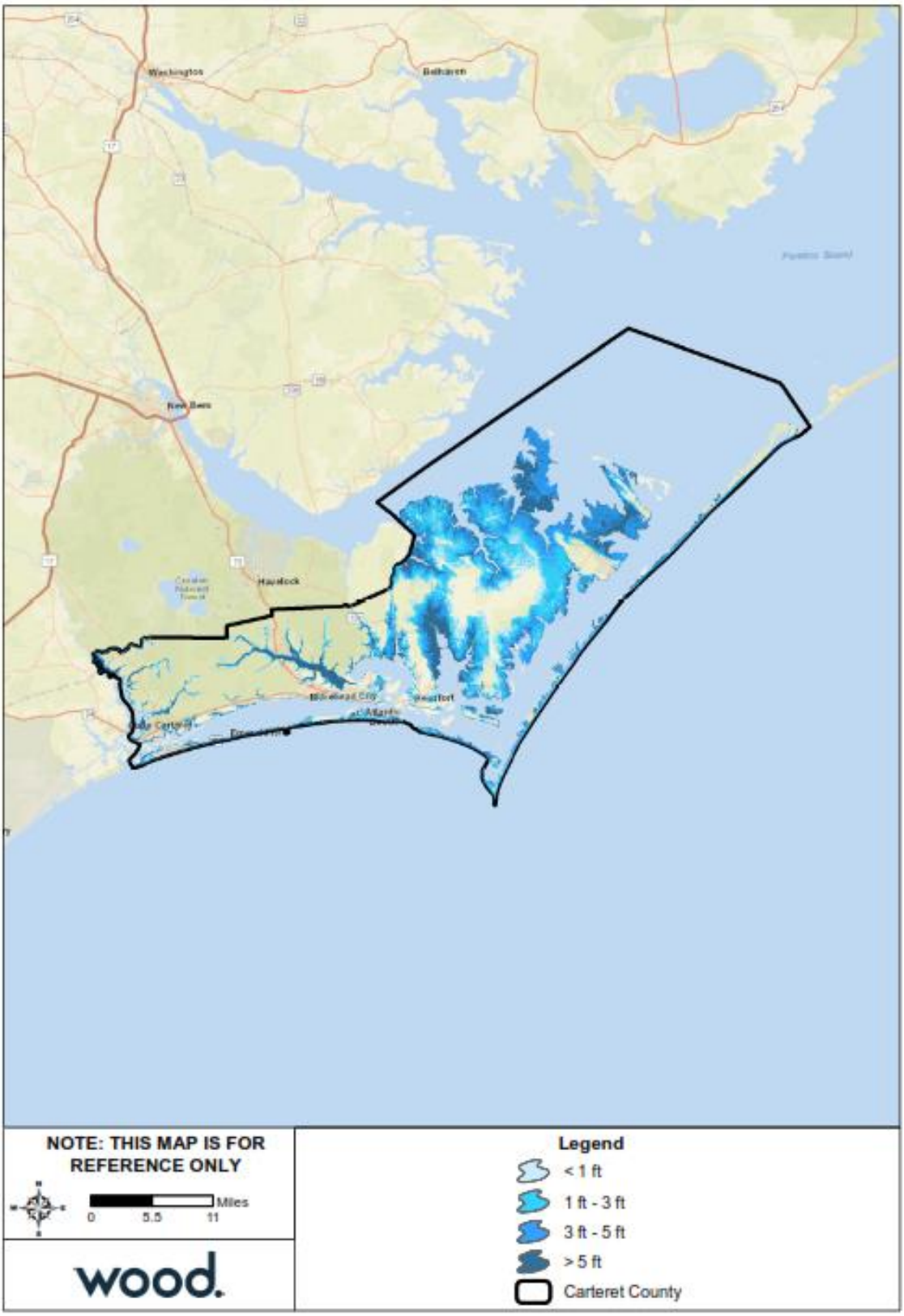
Source: FEMA Effective DFIRM

Figure B.32 – FEMA Flood Hazard Areas, Town of Pine Knoll Shores



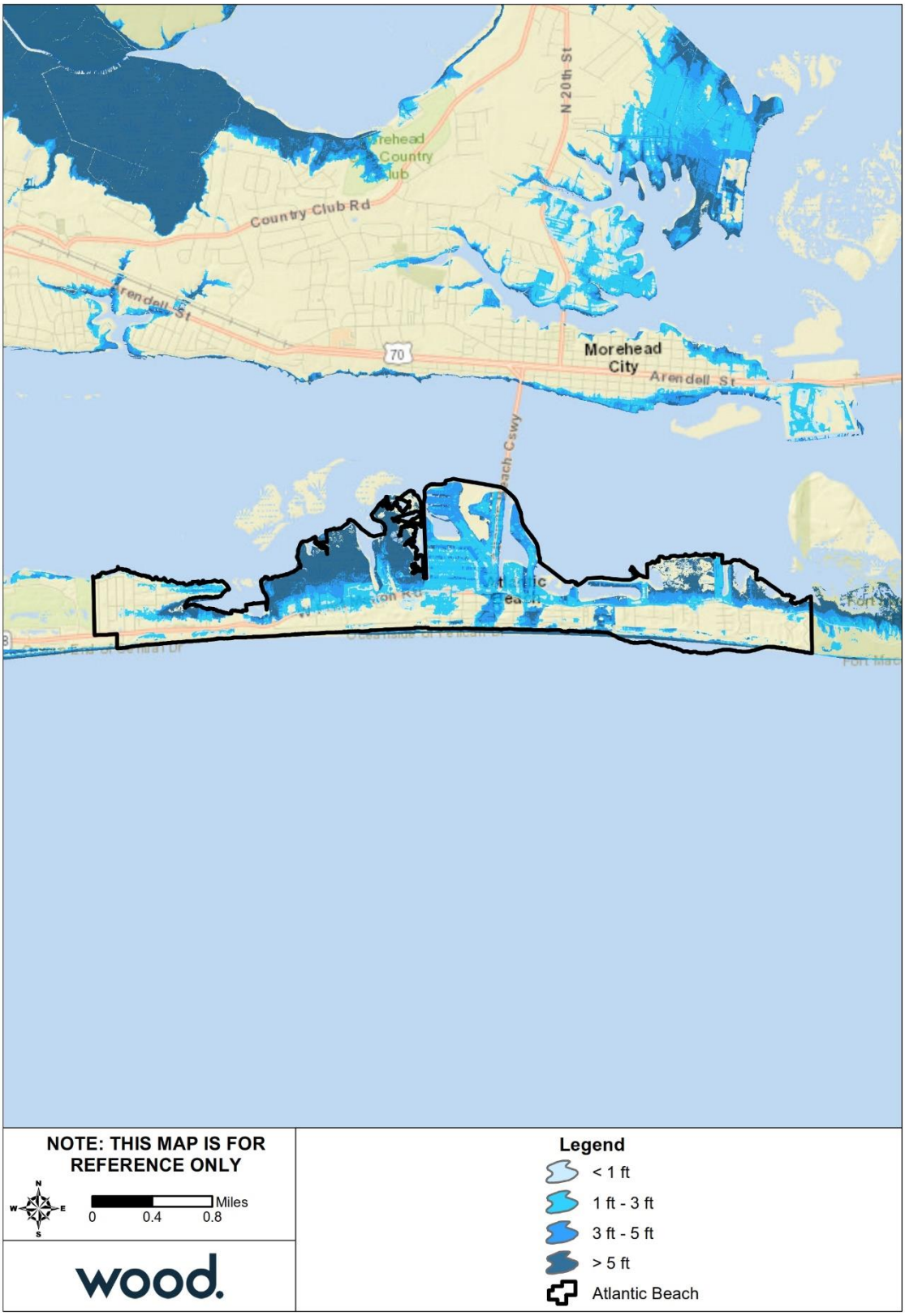
Source: FEMA Effective DFIRM

Figure B.33 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Carteret County



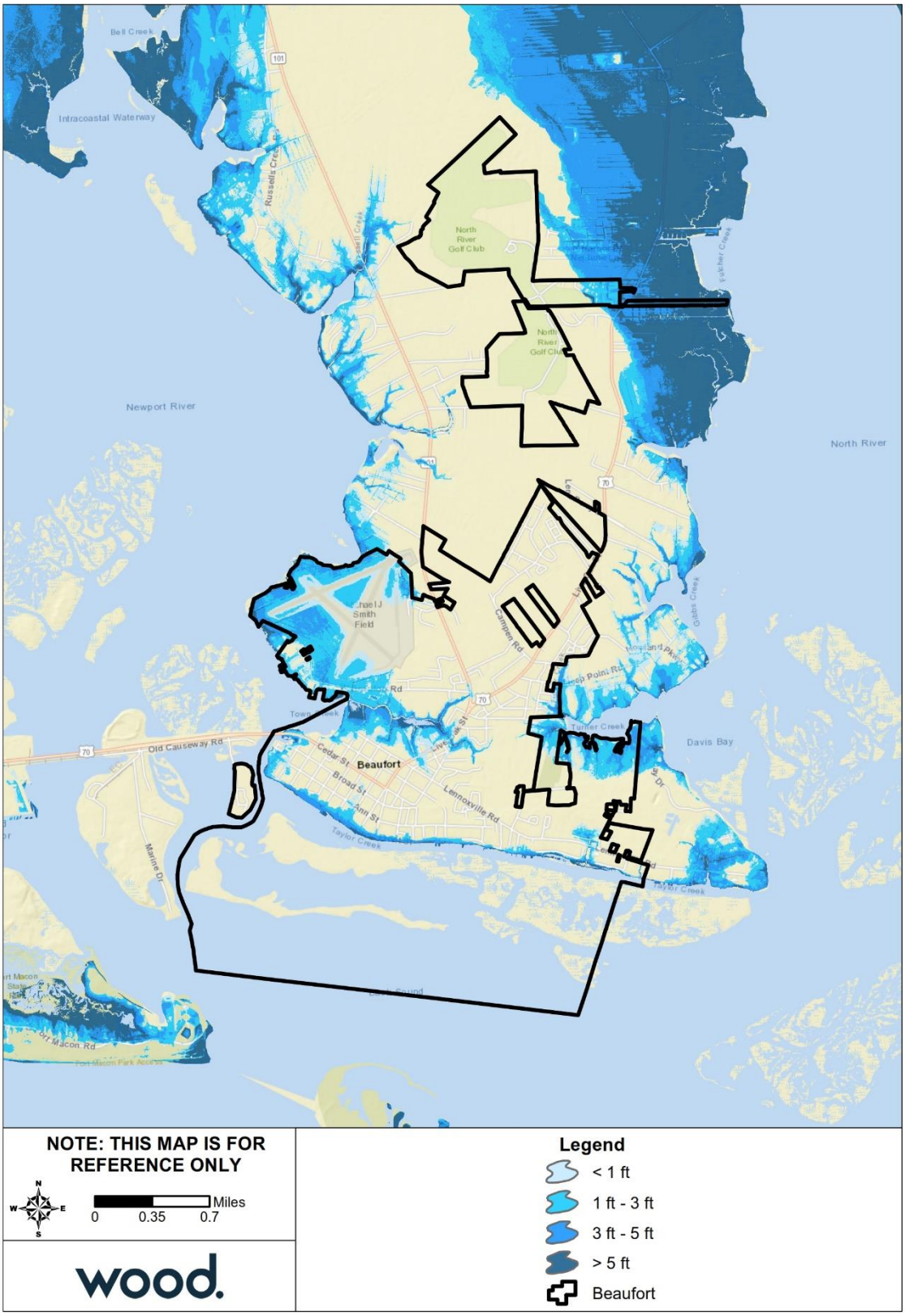
Source: FEMA Effective DFIRM

Figure B.34 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Atlantic Beach



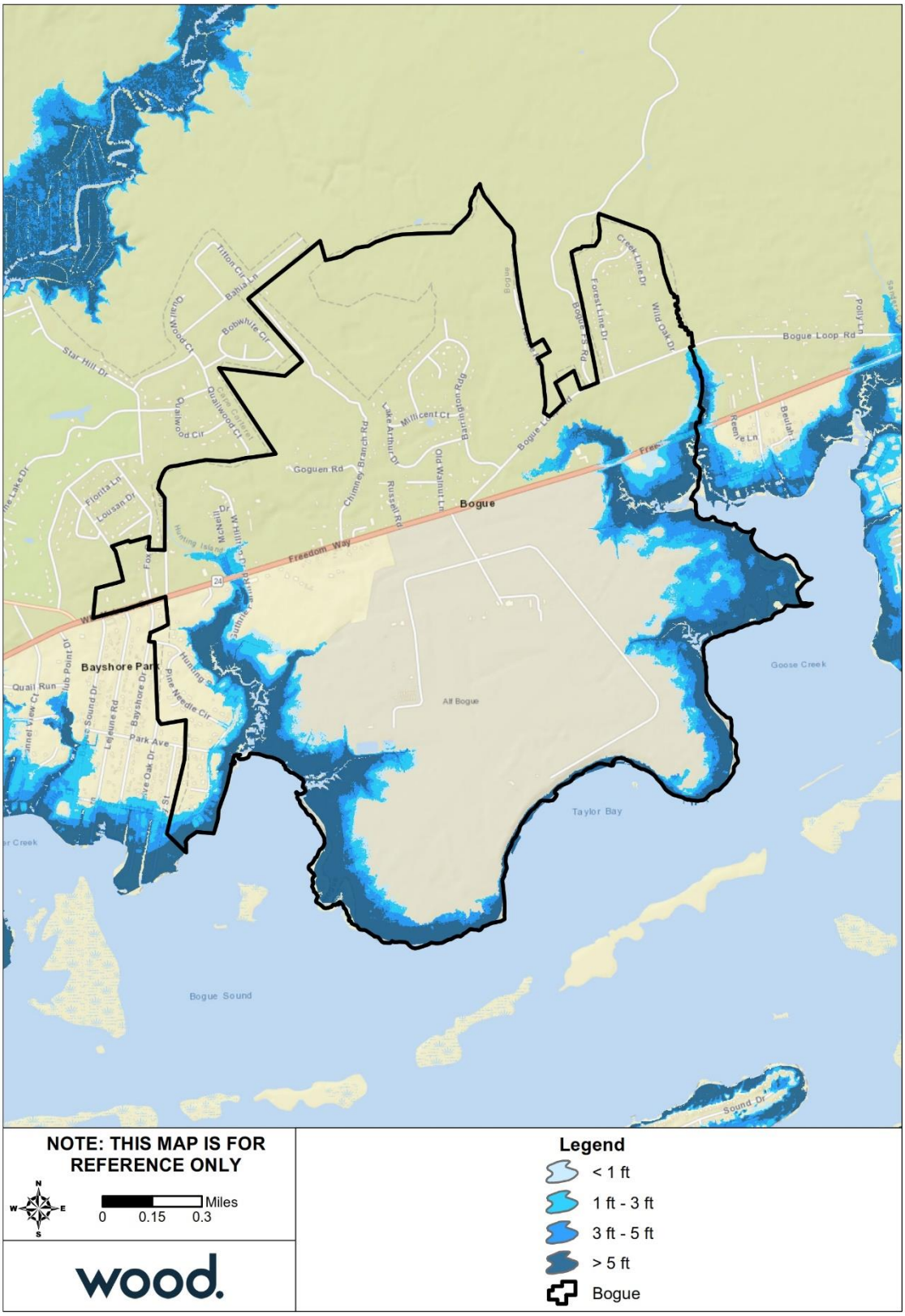
Source: FEMA Effective DFIRM

Figure B.35 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Beaufort



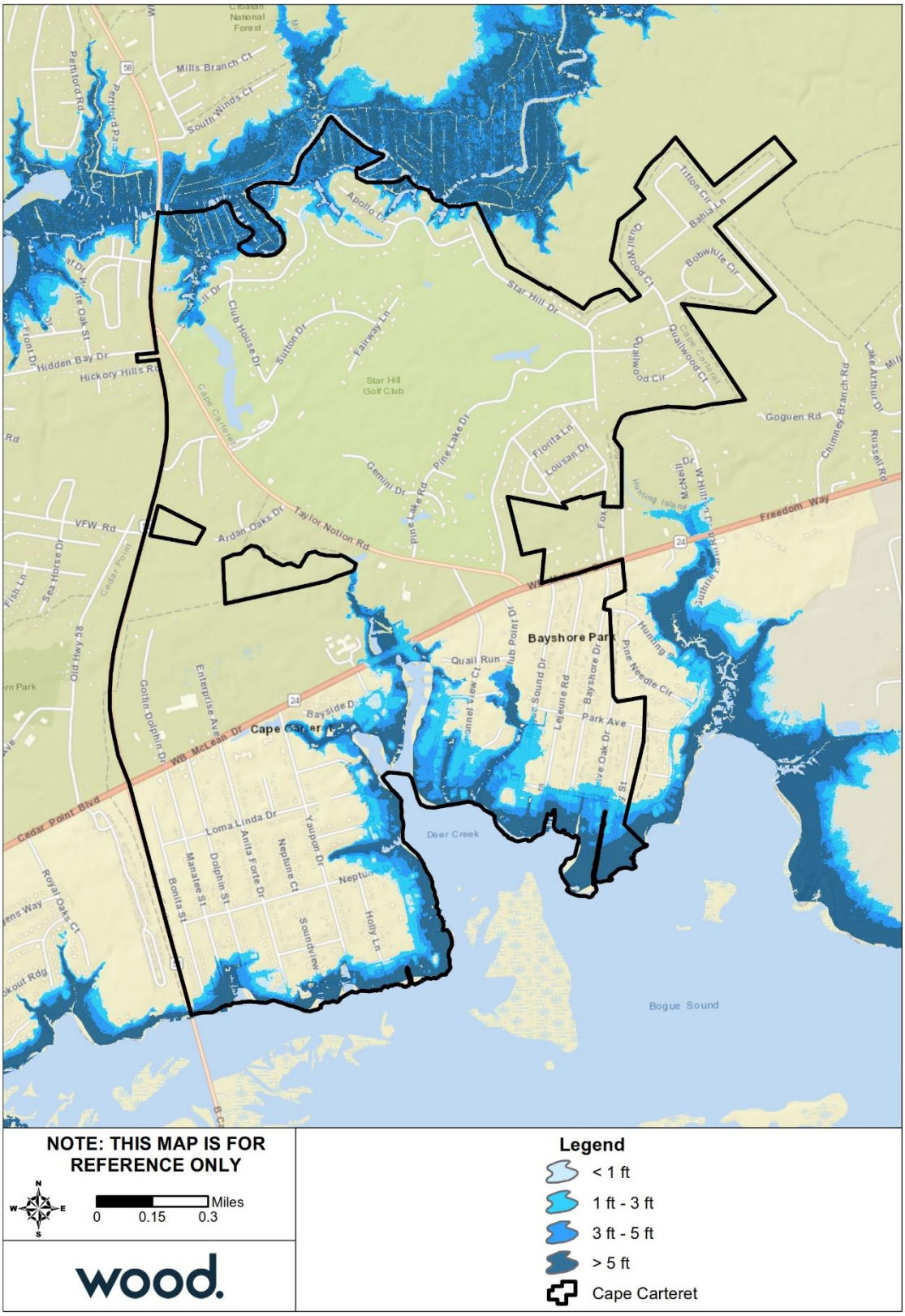
Source: FEMA Effective DFIRM

Figure B.36 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Bogue



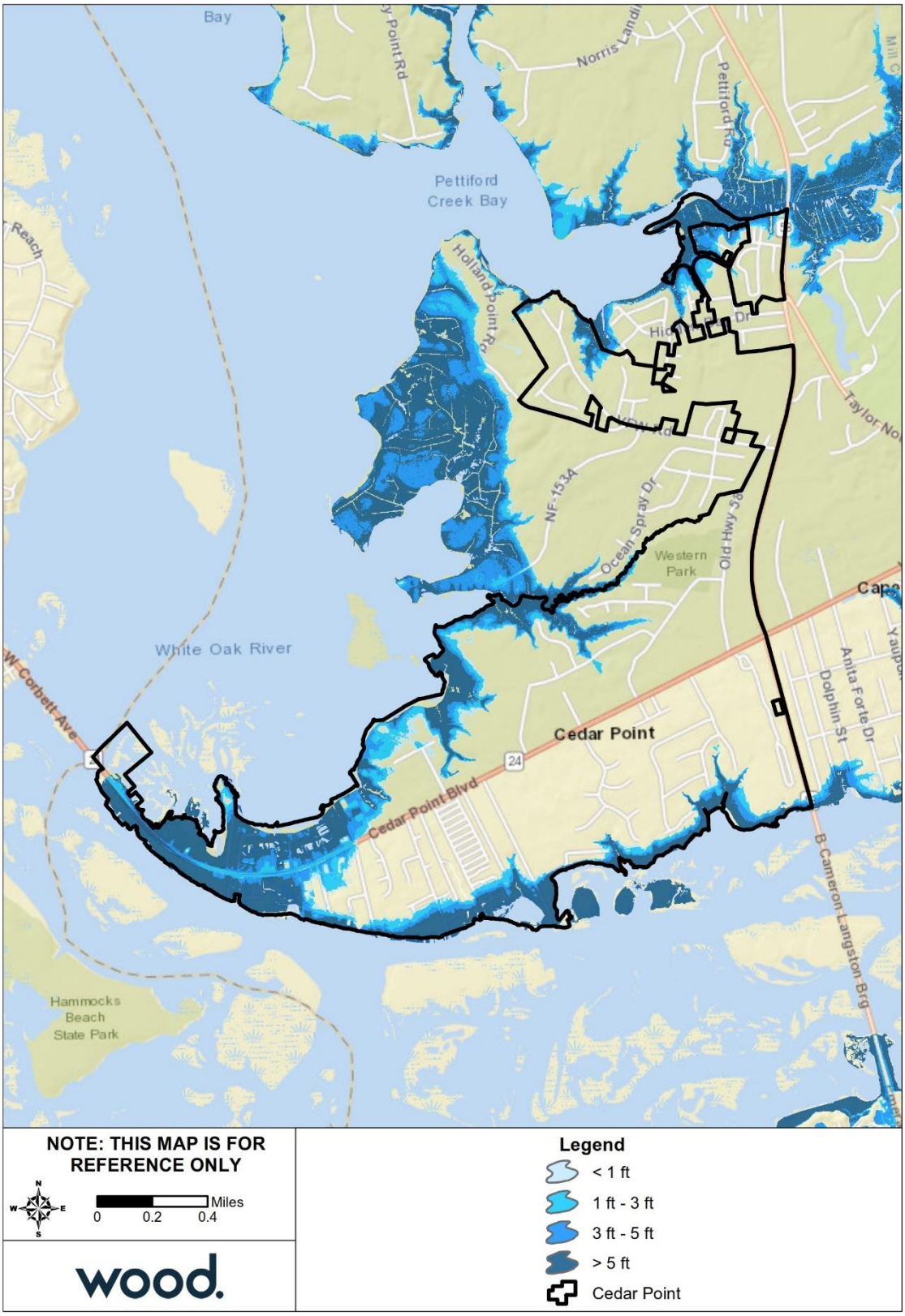
Source: FEMA Effective DFIRM

Figure B.37 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Cape Carteret



Source: FEMA Effective DFIRM

Figure B.38 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Cedar Point

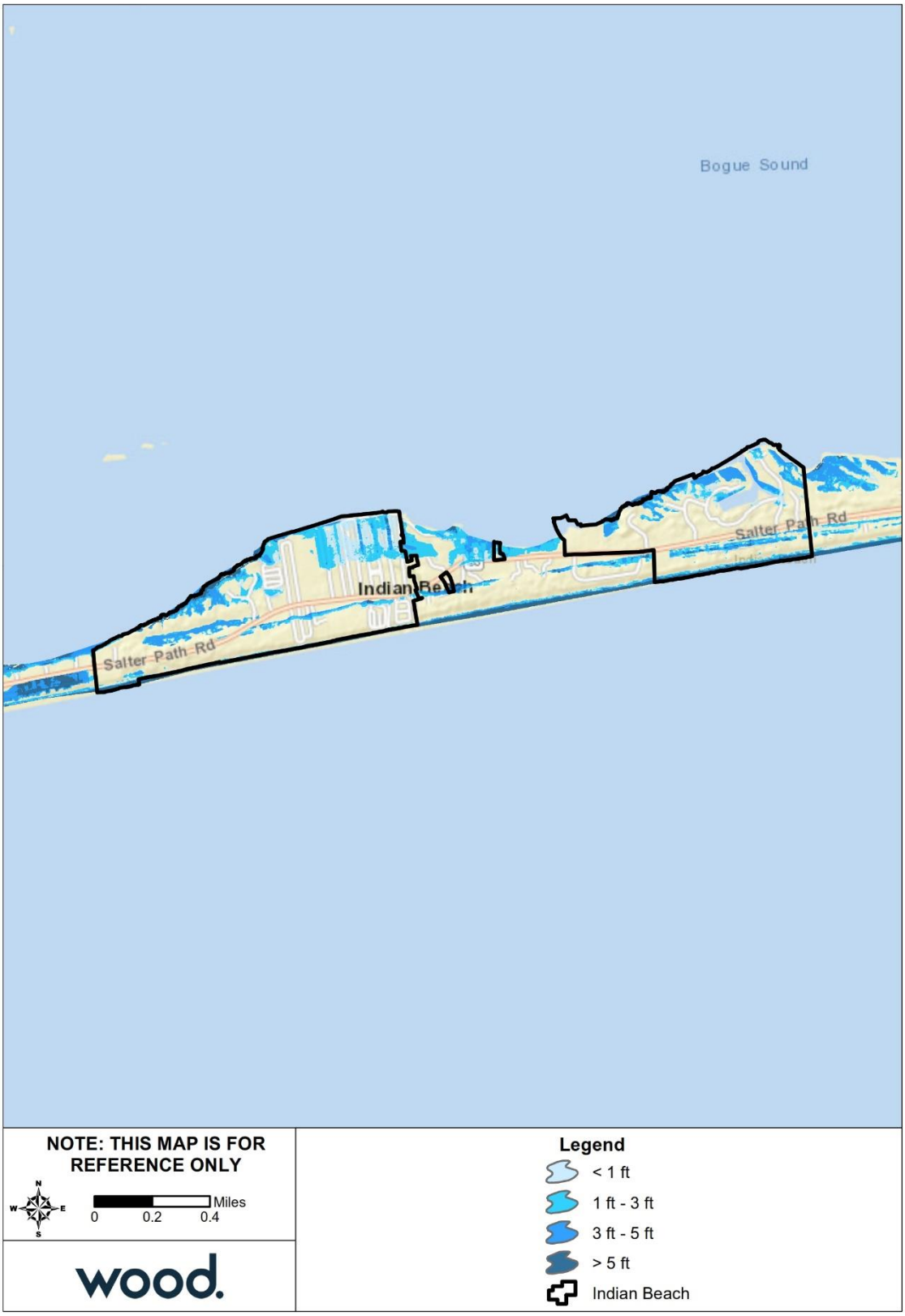


Source: FEMA Effective DFIRM

Figure B.39 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Emerald Isle

Source: FEMA Effective DFIRM

Figure B.40 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Indian Beach

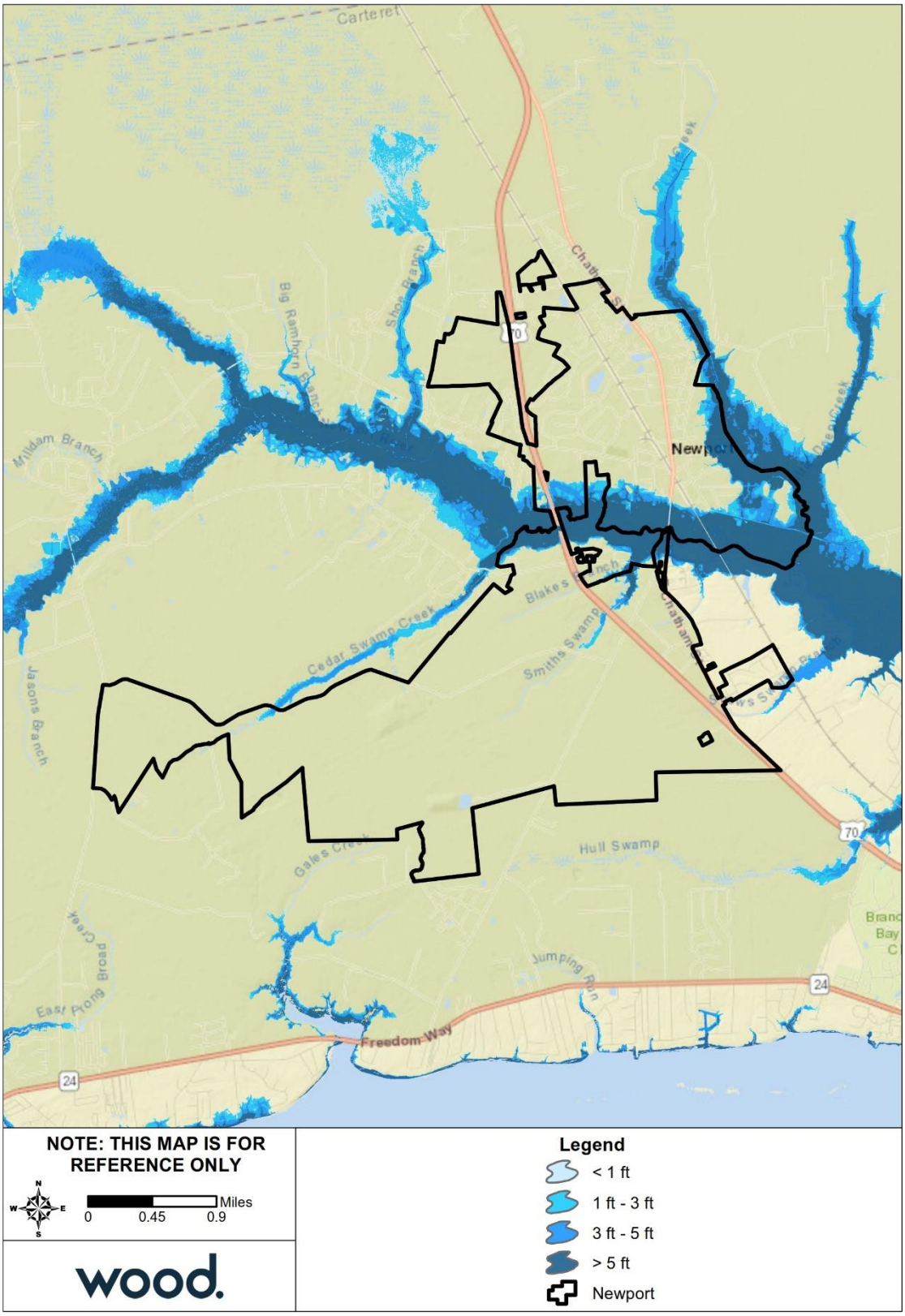


Source: FEMA Effective DFIRM

Figure B.41 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Morehead City

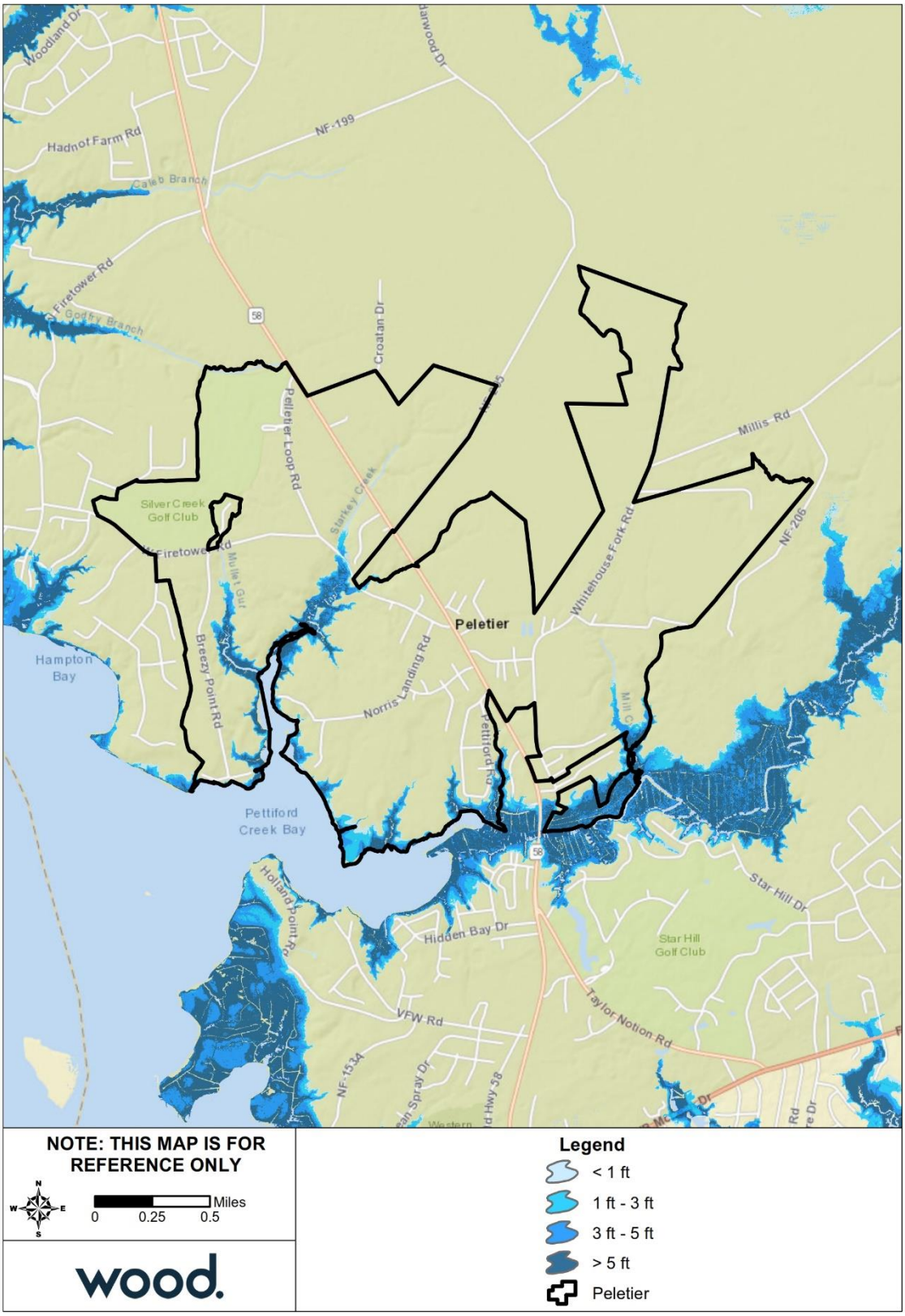
Source: FEMA Effective DFIRM

Figure B.42 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Newport



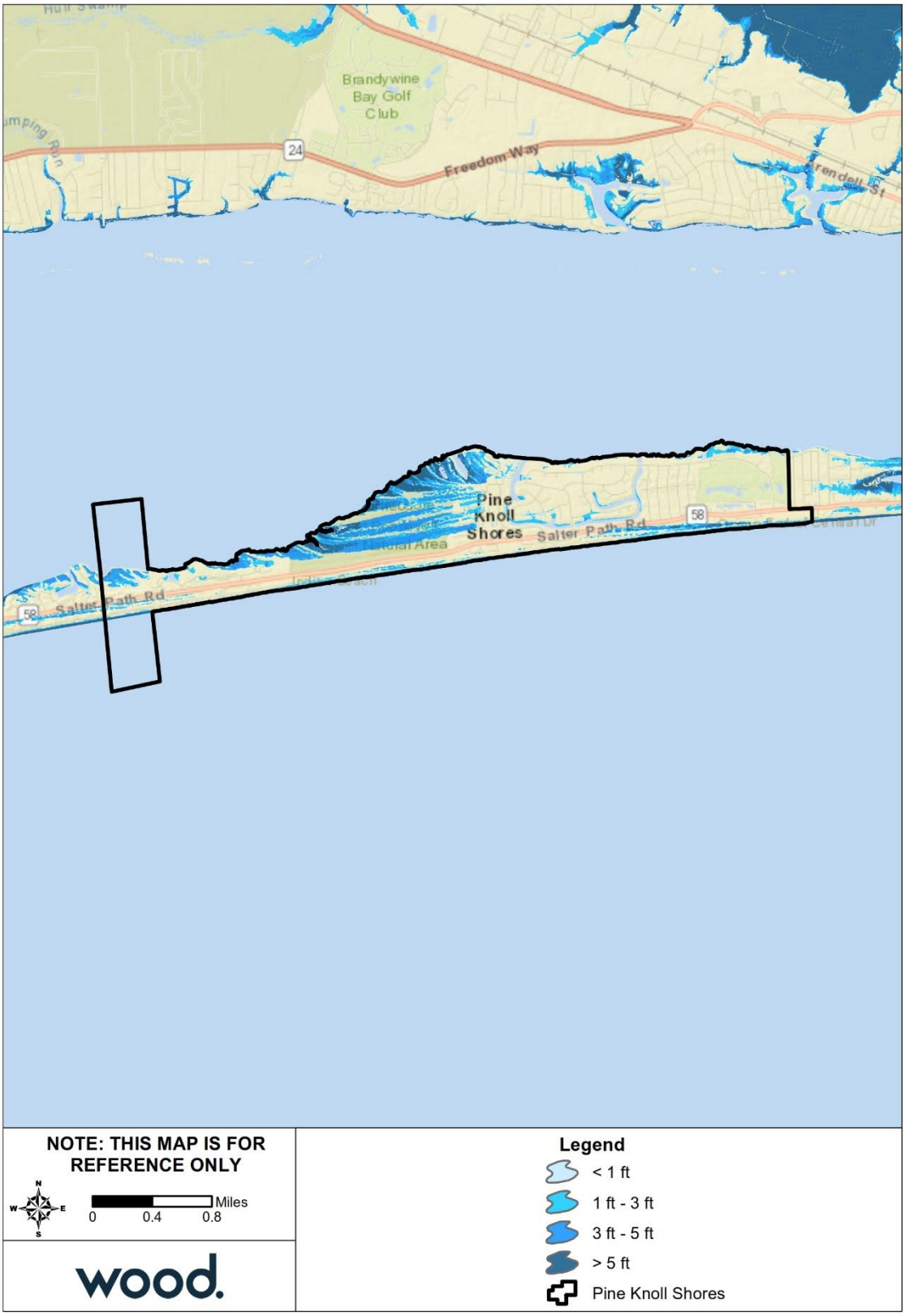
Source: FEMA Effective DFIRM

Figure B.43 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Peletier



Source: FEMA Effective DFIRM

Figure B.44 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Pine Knoll Shores



Source: FEMA Effective DFIRM

B.2.2 Wildfire

Table B.12 summarizes the acreage in Carteret County that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 86 percent of Carteret County is not included in the WUI.

Table B.12 – Wildland Urban Interface Acreage, Carteret County

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*573,721.3*	86.3%
	LT 1hs/40ac	19,662.7	3.0%
	1hs/40ac to 1hs/20ac	8,862.7	1.3%
	1hs/20ac to 1hs/10ac	9,475.5	1.4%
	1hs/10ac to 1hs/5ac	10,119.6	1.5%
	1hs/5ac to 1hs/2ac	14,827.3	2.2%
	1hs/2ac to 3hs/1ac	26,740.7	4.0%
	GT 3hs/1ac	1,302.3	0.2%
	Total	**664,712.1**	

Source: Southern Wildfire Risk Assessment

Figure B.45 depicts the WUI for Carteret County's participating jurisdictions. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure B.46 details the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure B.47 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in the unincorporated areas of Carteret County, particularly along the northwest border with Craven County and the eastern barrier islands. Burn probability is highest on the northwest border with Craven County but is low along the barrier islands and inlets. While the area around the northwestern border with Craven County has high burn probability and fire intensity but is outside the WUI, therefore impacts to buildings and people would be minimal.

Table B.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard in Carteret County and participating jurisdictions. Table B.14 provides counts and estimated damages for High Potential Loss Properties in these areas.

Table B.13 – Critical Facilities Exposed to Wildfire by Jurisdiction, Carteret County

Sector	Number of Buildings at Risk	Estimated Damages
Carteret County Unincorporated Area		
Banking and Finance	7	$1,963,260
Chemical	1	$43,108
Commercial Facilities	463	$196,121,011
Critical Manufacturing	194	$92,465,741
Defense Industrial Base	1	$229,774
Emergency Services	10	$6,451,587
Energy	9	$94,111,184
Food and Agriculture	217	$11,680,288

Sector	Number of Buildings at Risk	Estimated Damages
Government Facilities	63	$107,673,587
Healthcare and Public Health	17	$29,904,638
Transportation Systems	133	$61,668,395
Water	4	$44,615,668
All Categories	**1,119**	**$646,928,241**
Town of Atlantic Beach		
Commercial Facilities	33	$26,212,759
Critical Manufacturing	3	$1,066,579
Energy	1	$300,000
Government Facilities	1	$979,199
National Monuments and Icons	1	$471,030
Transportation Systems	5	$1,495,153
Water	5	$113,650,724
All Categories	**49**	**$144,175,444**
Town of Beaufort		
Banking and Finance	6	$1,808,772
Commercial Facilities	64	$55,314,341
Critical Manufacturing	9	$47,657,429
Government Facilities	18	$37,480,047
Healthcare and Public Health	8	$4,633,162
Postal and Shipping	1	$681,771
Transportation Systems	16	$77,326,886
Water	5	$101,767,289
All Categories	**127**	**$326,669,697**
Town of Bogue		
Commercial Facilities	19	$7,227,052
Critical Manufacturing	4	$1,594,508
Food and Agriculture	11	$317,392
Government Facilities	4	$3,569,879
Transportation Systems	2	$1,337,195
All Categories	**40**	**$14,046,026**
Town of Cape Carteret		
Banking and Finance	1	$209,990
Commercial Facilities	38	$21,169,915
Critical Manufacturing	5	$822,728
Food and Agriculture	1	$829,968
Government Facilities	18	$7,936,895
Healthcare and Public Health	2	$1,671,125
Transportation Systems	7	$1,573,547
All Categories	**72**	**$34,214,168**
Town of Cedar Point		
Commercial Facilities	44	$28,969,148
Critical Manufacturing	26	$8,588,560

Sector	Number of Buildings at Risk	Estimated Damages
Emergency Services	1	$1,879,516
Energy	1	$95,580
Food and Agriculture	15	$635,993
Government Facilities	3	$2,300,699
Healthcare and Public Health	7	$2,774,532
Transportation Systems	9	$3,308,647
All Categories	**106**	**$48,552,675**
Town of Emerald Isle		
Commercial Facilities	8	$2,158,875
Critical Manufacturing	1	$217,526
Emergency Services	1	$129,062
Healthcare and Public Health	1	$141,803
Transportation Systems	1	$226,792
Water	2	$60,300,000
All Categories	**14**	**$63,174,058**
Town of Indian Beach		
Commercial Facilities	13	$5,884,982
Emergency Services	1	$145,954
Energy	2	$60,000,000
Government Facilities	4	$1,469,054
Transportation Systems	5	$2,293,497
All Categories	**25**	**$69,793,487**
Town of Morehead City		
Banking and Finance	16	$8,454,324
Commercial Facilities	346	$200,143,224
Communications	2	$387,239
Critical Manufacturing	110	$35,040,699
Emergency Services	2	$2,604,215
Energy	8	$28,248,126
Food and Agriculture	14	$2,022,023
Government Facilities	31	$73,095,474
Healthcare and Public Health	44	$34,072,795
Transportation Systems	98	$77,019,098
Water	10	$51,566,662
All Categories	**681**	**$512,653,879**
Town of Newport		
Banking and Finance	3	$1,598,586
Commercial Facilities	170	$71,589,933
Communications	3	$3,070,240
Critical Manufacturing	76	$22,354,638
Emergency Services	2	$646,451
Energy	6	$62,109,742
Food and Agriculture	90	$4,674,337

Sector	Number of Buildings at Risk	Estimated Damages
Government Facilities	38	$29,155,032
Healthcare and Public Health	21	$9,433,502
Nuclear Reactors, Materials and Waste	1	$848,479
Postal and Shipping	1	$1,390,339
Transportation Systems	36	$25,032,071
Water	1	$60,000,000
All Categories	**448**	**$291,903,350**
Town of Peletier		
Commercial Facilities	30	$23,076,081
Critical Manufacturing	13	$4,325,955
Food and Agriculture	17	$2,015,805
Transportation Systems	3	$2,391,766
All Categories	**63**	**$31,809,607**
Town of Pine Knoll Shores		
Commercial Facilities	79	$47,464,318
Critical Manufacturing	4	$541,795
Emergency Services	1	$1,135,126
Energy	2	$429,311
Government Facilities	4	$2,004,303
Healthcare and Public Health	2	$477,826
Nuclear Reactors, Materials and Waste	1	$610,197
Transportation Systems	10	$3,210,827
Water	2	$60,000,000
All Categories	**105**	**$115,873,703**

Source: NCEM Risk Management Tool

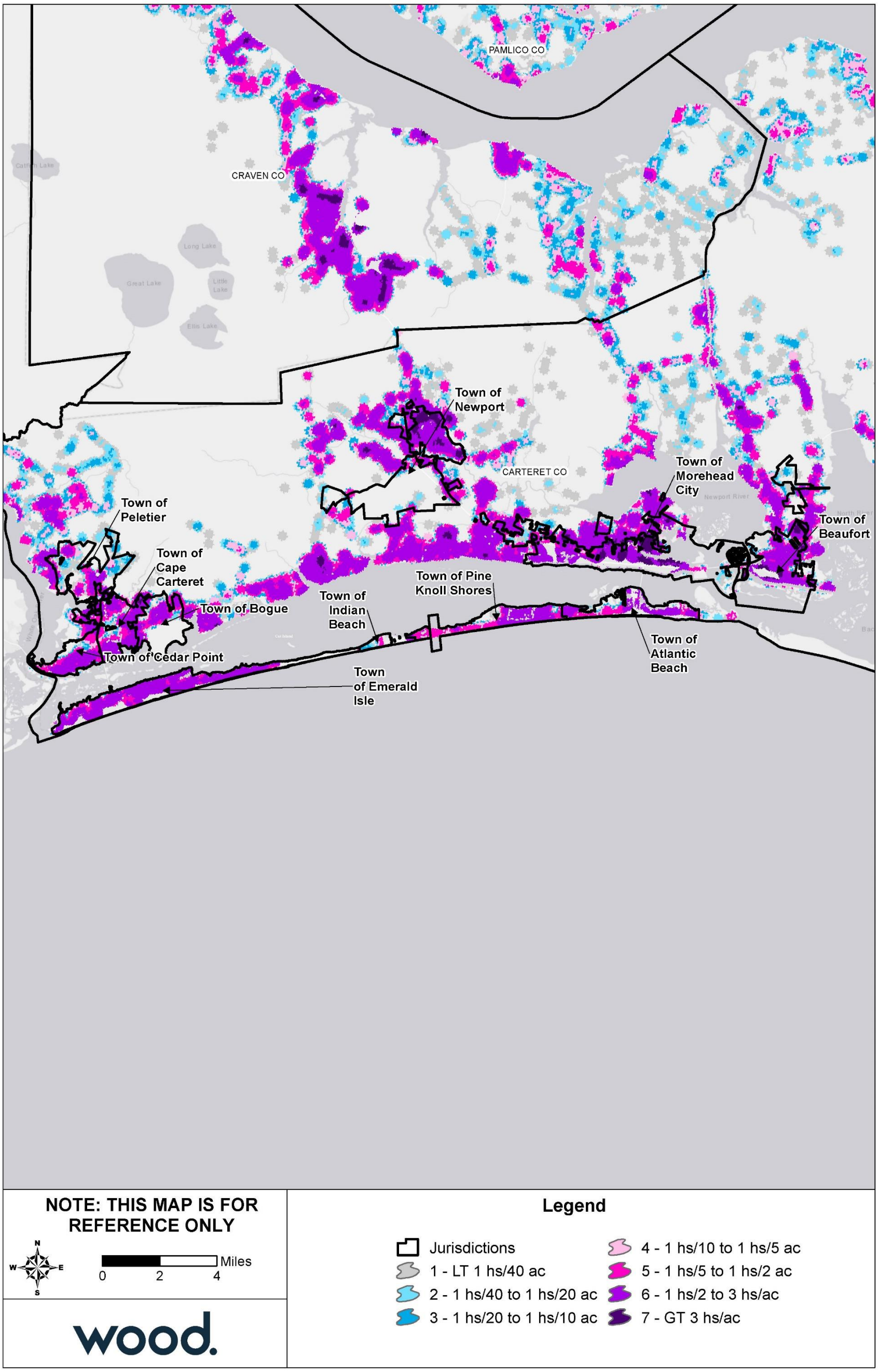
Table B.14 – High Potential Loss Properties Exposed to Wildfire by Jurisdiction, Carteret County

Category	Number of Buildings at Risk	Estimated Damages
Carteret County Unincorporated Area		
Commercial	9	$42,879,130
Government	10	$75,333,236
Religious	5	$7,943,743
Residential	2	$2,148,646
Utilities	9	$180,768,152
All Categories	**35**	**$309,072,907**
Town of Atlantic Beach		
Commercial	4	$15,049,120
Religious	1	$1,204,846
Residential	2	$13,314,781
Utilities	4	$113,548,474
All Categories	**11**	**$143,117,221**
Town of Beaufort		
Commercial	5	$86,049,713
Government	3	$16,468,606

Category	Number of Buildings at Risk	Estimated Damages
Religious	1	$2,006,617
Residential	2	$2,577,394
Utilities	4	$101,467,289
All Categories	**15**	**$208,569,619**
Town of Cape Carteret		
Commercial	1	$3,819,629
Government	1	$2,786,486
Residential	1	$1,071,979
All Categories	**3**	**$7,678,094**
Town of Cedar Point		
Commercial	1	$3,213,381
Religious	1	$1,982,355
All Categories	**2**	**$5,195,736**
Town of Emerald Isle		
Residential	1	$1,294,560
Utilities	1	$60,000,000
All Categories	**2**	**$61,294,560**
Town of Indian Beach		
Residential	6	$12,084,547
Utilities	2	$60,000,000
All Categories	**8**	**$72,084,547**
Town of Morehead City		
Commercial	19	$95,381,480
Government	11	$62,161,680
Industrial	1	$1,852,177
Religious	6	$14,060,295
Residential	8	$13,835,051
Utilities	3	$68,459,595
All Categories	**48**	**$255,750,278**
Town of Newport		
Commercial	7	$32,377,424
Government	4	$21,497,947
Religious	2	$5,663,527
Utilities	3	$120,000,000
All Categories	**16**	**$179,538,898**
Town of Peletier		
Religious	1	$1,178,726
Town of Pine Knoll Shores		
Commercial	2	$9,031,022
Government	2	$2,569,024
Religious	1	$1,059,988
Residential	11	$17,783,671
Utilities	2	$60,000,000
All Categories	**18**	**$90,443,705**

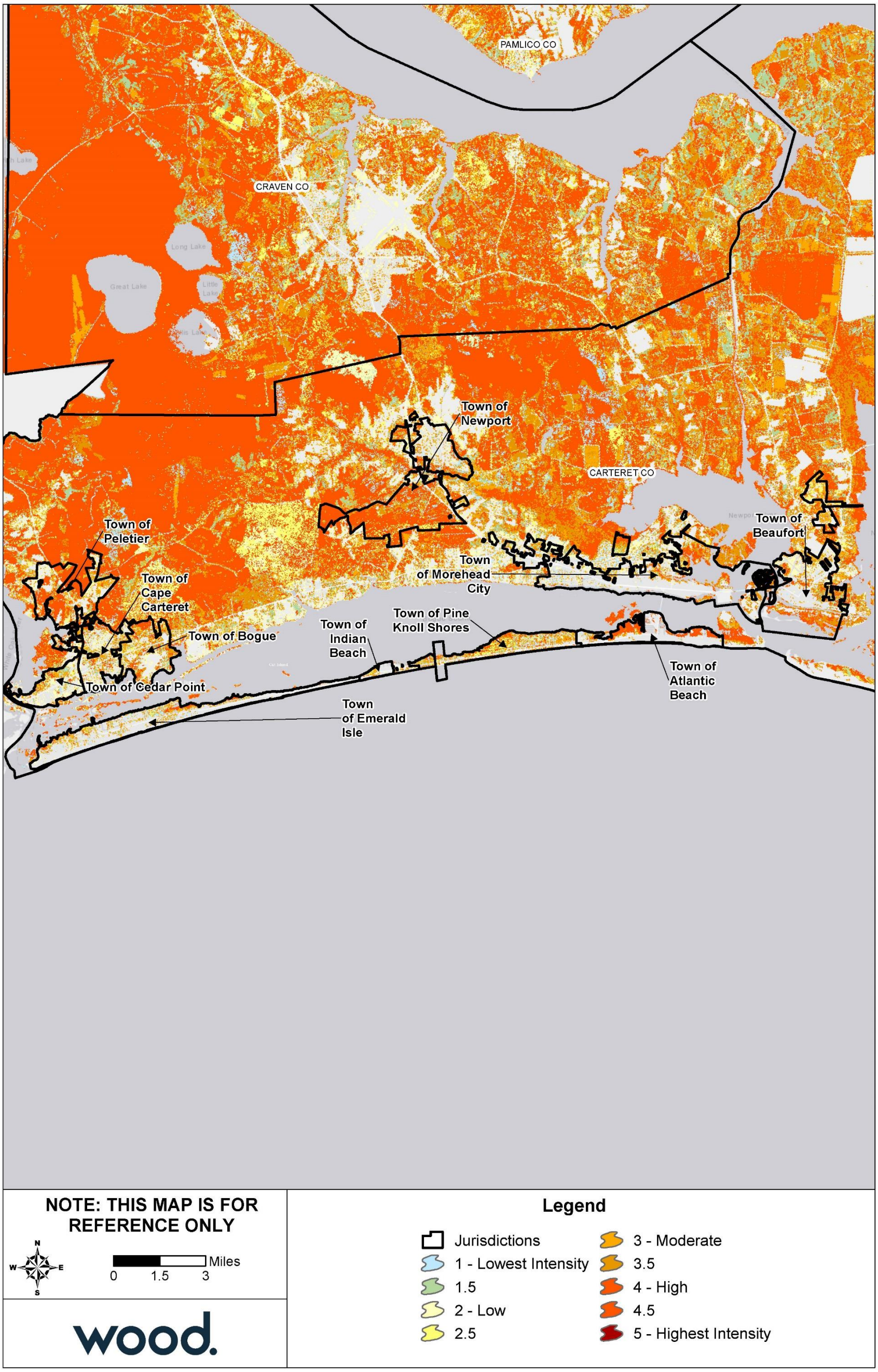
Source: NCEM Risk Management Tool

Figure B.45 – Wildland Urban Interface, Carteret County



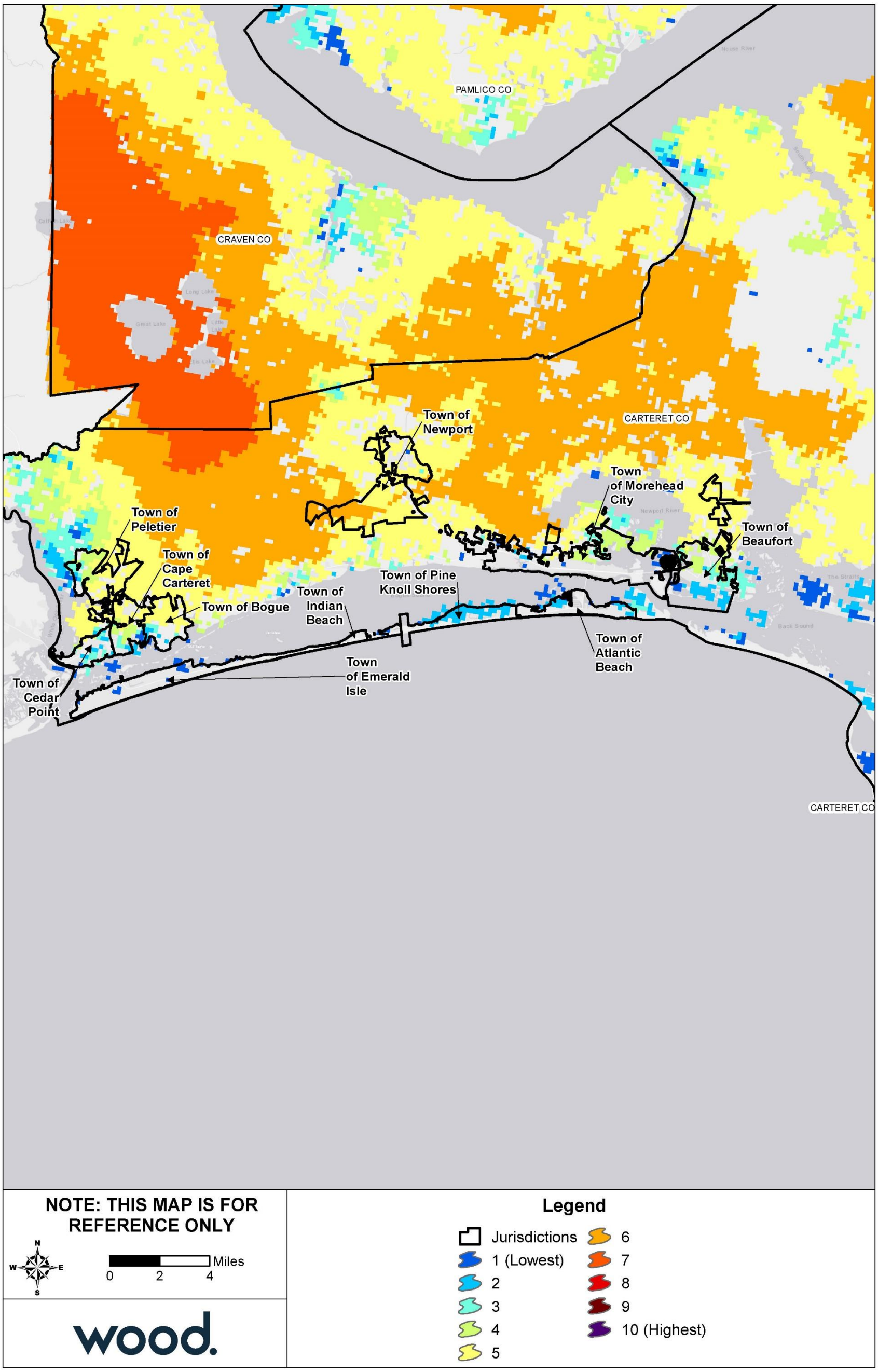
Source: Southern Wildfire Risk Assessment

Figure B.46 – Fire Intensity Scale, Carteret County



Source: Southern Wildfire Risk Assessment

Figure B.47 – Burn Probability, Carteret County



Source: Southern Wildfire Risk Assessment

B.3 CAPABILITY ASSESSMENT

B.3.1 Overall Capability

Details on the tools and resources in place and available to Carteret County were provided by the County's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Carteret County has an overall capability rating of High. Carteret County provides many resources for its incorporated jurisdictions and many of the mitigation projects in this plan are regional in nature, with the County serving as the project lead; therefore, the County's capability is also an indicator for its incorporated areas. The County's Self-Assessment of key capability areas is summarized in Table B.15 below.

Table B.15 – Capability Self-Assessment, Carteret County

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

B.3.2 Floodplain Management

The following tables reflect NFIP entry dates as well as policy and claims data for Carteret County and incorporated areas categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table B.16 – NFIP Program Entry Dates

Community	Regular Program Entry
Carteret County (Unincorporated Area)	May 5, 1980
Town of Atlantic Beach	March 15, 1977
Town of Beaufort	December 1, 1972
Town of Bogue	May 5, 1997
Town of Cape Carteret	April 1, 1977
Town of Cedar Point	July 26, 1989
Town of Emerald Isle	April 1, 1977
Town of Indian Beach	March 4, 1985
Town of Morehead City	February 16, 1977
Town of Newport	May 15, 1978
Town of Peletier	March 25, 2008
Town of Pine Knoll Shores	September 28, 1979

Table B.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Carteret County Unincorporated Area					
Single Family	3,609	$2,531,362	$862,375,500	3,398	$59,595,522.68
2-4 Family	6	$8,059	$1,285,000	39	$477,025.38

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
All Other Residential	203	$52,797	$38,556,700	33	$1,303,240.08
Non-Residential	106	$260,504	$31,690,100	140	$5,231,024.93
Total	**3,924**	**$2,852,722**	**$933,907,300**	**3,610**	**$66,606,813.07**
Town of Atlantic Beach					
Single Family	947	$1,317,577	$250,310,500	557	$8,142,033.44
2-4 Family	172	$186,837	$37,015,800	65	$781,543.34
All Other Residential	1,754	$495,195	$204,625,300	10	$967,038.97
Non-Residential	105	$244,918	$30,042,800	57	$2,544,509.40
Total	**2,978**	**$2,244,527**	**$521,994,400**	**689**	**$12,435,125.15**
Town of Beaufort					
Single Family	638	$378,420	$178,758,200	135	$2,155,814.37
2-4 Family	61	$37,410	$9,177,000	2	$28,006.02
All Other Residential	18	$19,389	$5,479,300	0	$0.00
Non-Residential	77	$260,386	$28,950,900	28	$828,933.21
Total	**794**	**$695,605**	**$222,365,400**	**165**	**$3,012,753.60**
Town of Bogue					
Single Family	42	$28,870	$12,822,200	6	$338,015.34
Non-Residential	1	$352	$144,100	0	$0.00
Total	43	$29,222	$12,966,300	6	$338,015.34
Town of Cape Carteret					
Single Family	182	$138,051	$51,755,100	136	$2,185,927.84
All Other Residential	0	$0	$0	1	$13,540.60
Non-Residential	3	$5,198	$1,659,000	3	$404,638.22
Total	**185**	**$143,249**	**$53,414,100**	**140**	**$2,604,106.66**
Town of Cedar Point					
Single Family	200	$189,885	$55,733,900	89	$1,655,053.23
All Other Residential	108	$52,682	$9,155,200	2	$440,912.42
Non-Residential	16	$39,461	$4,451,500	9	$269,476.62
Total	**324**	**$282,028**	**$69,340,600**	**100**	**$2,365,442.27**
Town of Emerald Isle					
Single Family	1,654	$1,873,950	$497,032,500	671	$8,530,088.37
2-4 Family	354	$489,485	$84,913,100	160	$3,014,986.96
All Other Residential	669	$182,477	$89,081,300	6	$283,870.09
Non-Residential	22	$35,667	$8,462,200	15	$518,349.07
Total	**2,699**	**$2,581,579**	**$679,489,100**	**852**	**$12,347,294.49**
Town of Indian Beach					
Single Family	98	$113,424	$26,035,200	20	$189,678.13
2-4 Family	2	$621	$358,000	0	$0.00
All Other Residential	541	$128,256	$120,066,200	0	$0.00
Non-Residential	5	$10,360	$1,260,400	0	$0.00
Total	**646**	**$252,661**	**$147,719,800**	**20**	**$189,678.13**
Town of Morehead City					
Single Family	1,270	$788,263	$360,149,500	286	$4,049,007.73
2-4 Family	58	$30,449	$11,868,100	3	$71,373.45
All Other Residential	238	$58,142	$58,382,100	4	$36,159.44
Non-Residential	97	$232,205	$39,148,900	35	$3,799,586.53
Total	**1,663**	**$1,109,059**	**$469,548,600**	**328**	**$7,956,127.15**

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Newport					
Single Family	198	$94,018	$44,925,600	73	$4,087,009.94
2-4 Family	4	$3,028	$539,700	1	$66,659.20
All Other Residential	1	$68	$8,000	0	$0.00
Non-Residential	5	$9,700	$1,508,200	4	$759,667.48
Total	**208**	**$106,814**	**$46,981,500**	**78**	**$4,913,336.62**
Town of Peletier					
Single Family	11	$4,860	$3,020,400	2	$18,203.89
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$130	$24,000	0	$0.00
Total	12	$4,990	$3,044,400	2	$18,203.89
Town of Pine Knoll Shores					
Single Family	486	$503,893	$150,622,600	111	$1,148,006.24
2-4 Family	74	$42,723	$15,346,900	6	$107,192.06
All Other Residential	735	$299,186	$147,336,300	14	$660,593.88
Non-Residential	37	$60,184	$9,055,900	7	$156,470.83
Total	**1,332**	**$905,986**	**$322,361,700**	**138**	**$2,072,263.01**

Source: FEMA Community Information System, accessed September 2019

Table B.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Carteret County Unincorporated Area					
A01-30 & AE Zones	2,979	$2,357,912	$684,639,200	3,031	$57,811,270.48
A Zones	1	$5,080	$154,900	76	$1,243,909.42
V01-30 & VE Zones	21	$81,387	$4,511,900	120	$1,777,028.58
D Zones	0	$0	$0	6	$50,266.13
B, C & X Zone					
Standard	191	$123,289	$41,176,000	214	$3,430,227.50
Preferred	688	$258,654	$200,389,000	106	$1,744,614.20
Total	3,880	$2,826,322	$930,871,000	3,553	$66,057,316.31
Town of Atlantic Beach					
A01-30 & AE Zones	1,007	$1,012,913	$207,717,000	499	$10,013,749.16
A Zones	3	$14,976	$790,900	9	$124,137.01
AO Zones	7	$5,968	$1,511,100	9	$84,159.98
V01-30 & VE Zones	135	$582,191	$34,000,900	42	$510,501.47
B, C & X Zone					
Standard	1,602	$540,656	$214,116,700	94	$1,305,025.56
Preferred	223	$87,223	$63,788,000	36	$397,551.97
Total	**2,977**	**$2,243,927**	**$521,924,600**	**689**	**$12,435,125.15**
Town of Beaufort					
A01-30 & AE Zones	469	$540,561	$124,217,300	141	$2,675,997.97
B, C & X Zone					
Standard	19	$29,991	$5,068,700	6	$74,123.00
Preferred	303	$123,253	$92,870,000	17	$249,032.63
Total	**791**	**$693,805**	**$222,156,000**	**164**	**$2,999,153.60**

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Bogue					
A01-30 & AE Zones	23	$19,973	$6,347,800	4	$233,087.01
B, C & X Zone					
Standard	2	$2,167	$318,500	1	$99,605.06
Preferred	18	$7,082	$6,300,000	1	$5,323.27
Total	**43**	**$29,222**	**$12,966,300**	**6**	**$338,015.34**
Town of Cape Carteret					
A01-30 & AE Zones	117	$102,799	$32,845,500	108	$2,090,831.19
V01-30 & VE Zones	1	$3,952	$236,000	4	$75,267.29
B, C & X Zone					
Standard	5	$9,067	$1,465,100	9	$152,404.91
Preferred	59	$25,631	$18,693,000	17	$220,099.45
Total	**182**	**$141,449**	**$53,239,600**	**138**	**$2,538,602.84**
Town of Cedar Point					
A01-30 & AE Zones	163	$155,907	$33,479,800	68	$1,616,520.75
A Zones	1	$1,631	$64,100	0	$0.00
V01-30 & VE Zones	16	$64,959	$2,871,200	22	$573,699.84
B, C & X Zone					
Standard	55	$19,899	$4,967,700	3	$62,642.82
Preferred	88	$39,032	$27,888,000	7	$112,578.86
Total	**323**	**$281,428**	**$69,270,800**	**100**	**$2,365,442.27**
Town of Emerald Isle					
A01-30 & AE Zones	605	$317,862	$161,726,600	246	$3,155,862.29
V01-30 & VE Zones	204	$976,961	$55,559,200	112	$1,676,060.21
B, C & X Zone					
Standard	1,163	$989,512	$226,409,500	336	$5,568,195.50
Preferred	726	$296,644	$235,724,000	157	$1,941,525.06
Total	**2,698**	**$2,580,979**	**$679,419,300**	**851**	**$12,341,643.06**
Town of Indian Beach					
A01-30 & AE Zones	147	$45,931	$30,575,000	16	$162,111.10
V01-30 & VE Zones	18	$65,058	$3,746,300	0	$0.00
B, C & X Zone					
Standard	455	$132,398	$106,264,500	2	$16,303.98
Preferred	26	$9,274	$7,134,000	2	$11,263.05
Total	**646**	**$252,661**	**$147,719,800**	**20**	**$189,678.13**
Town of Morehead City					
A01-30 & AE Zones	925	$713,355	$240,347,000	255	$6,538,797.36
V01-30 & VE Zones	6	$25,465	$1,352,500	3	$24,645.47
B, C & X Zone					
Standard	65	$70,287	$13,820,400	26	$425,486.72
Preferred	660	$295,752	$213,575,000	44	$967,197.60
Total	**1,656**	**$1,104,859**	**$469,094,900**	**328**	**$7,956,127.15**
Town of Newport					
A01-30 & AE Zones	75	$54,374	$15,403,400	61	$4,208,867.62
B, C & X Zone					
Standard	2	$4,088	$730,700	2	$276,832.06
Preferred	118	$40,552	$29,940,000	10	$202,888.47

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Total	195	$99,014	$46,074,100	78	$4,913,336.62
Town of Peletier					
A01-30 & AE Zones	8	$3,401	$1,644,400	1	$4,840.41
B, C & X Zone					
Preferred	4	$1,589	$1,400,000	1	$13,363.48
Total	**12**	**$4,990**	**$3,044,400**	**2**	**$18,203.89**
Town of Pine Knoll Shores					
A01-30 & AE Zones	224	$116,742	$58,680,600	41	$337,288.40
B, C & X Zone					
Standard	783	$413,215	$163,825,600	52	$694,347.59
Preferred	261	$103,985	$85,822,000	37	$738,783.51
Total	**1,332**	**$905,986**	**$322,361,700**	**138**	**$2,072,263.01**

Source: FEMA Community Information System, accessed September 2019

Table B.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Carteret County Unincorporated Area					
A01-30 & AE Zones	800	$1,090,097	$144,562,600	1,692	$40,007,830.04
A Zones	1	$5,080	$154,900	71	$1,198,404.24
V01-30 & VE Zones	6	$22,317	$939,900	105	$1,732,233.79
D Zones	0	$0	$0	6	$50,266.13
B, C & X Zone	191	$102,890	$53,971,000	211	$3,434,510.70
Standard	25	$39,632	$6,477,000	151	$2,312,715.82
Preferred	166	$63,258	$47,494,000	60	$1,121,794.88
Total	**998**	**$1,220,384**	**$199,628,400**	**2,085**	**$46,423,244.90**
Town of Atlantic Beach					
A01-30 & AE Zones	476	$627,506	$64,612,200	371	$8,544,083.49
A Zones	3	$14,976	$790,900	9	$124,137.01
AO Zones	7	$5,968	$1,511,100	7	$40,498.58
V01-30 & VE Zones	49	$228,213	$10,652,800	41	$507,123.47
B, C & X Zone	368	$268,381	$64,724,300	74	$685,430.33
Standard	296	$242,588	$44,839,300	60	$590,485.37
Preferred	72	$25,793	$19,885,000	14	$94,944.96
Total	**903**	**$1,145,044**	**$142,291,300**	**502**	**$9,901,272.88**
Town of Beaufort					
A01-30 & AE Zones	188	$343,112	$45,086,700	70	$1,490,522.70
B, C & X Zone	128	$55,059	$38,521,100	12	$111,207.60
Standard	6	$9,006	$1,187,100	4	$19,663.39
Preferred	122	$46,053	$37,334,000	8	$91,544.21
Total	**316**	**$398,171**	**$83,607,800**	**82**	**$1,601,730.30**
Town of Bogue					
A01-30 & AE Zones	3	$4,660	$540,600	1	$71,036.28
B, C & X Zone	4	$3,014	$1,018,500	1	$99,605.06
Standard	2	$2,167	$318,500	1	$99,605.06
Preferred	2	$847	$700,000	0	$0.00
Total	**7**	**$7,674**	**$1,559,100**	**2**	**$170,641.34**

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Cape Carteret					
A01-30 & AE Zones	29	$39,249	$7,255,700	46	$1,410,527.98
V01-30 & VE Zones	1	$3,952	$236,000	3	$18,905.25
B, C & X Zone	16	$6,078	$5,145,000	9	$74,863.29
Standard	0	$0	$0	3	$18,053.53
Preferred	16	$6,078	$5,145,000	6	$56,809.76
Total	**46**	**$49,279**	**$12,636,700**	**58**	**$1,504,296.52**
Town of Cedar Point					
A01-30 & AE Zones	88	$110,259	$11,756,400	53	$1,539,167.50
A Zones	1	$1,631	$64,100	0	$0.00
V01-30 & VE Zones	12	$41,161	$1,816,700	22	$573,699.84
B, C & X Zone	64	$24,676	$8,003,800	4	$118,148.46
Standard	54	$19,724	$4,955,800	2	$60,322.10
Preferred	10	$4,952	$3,048,000	2	$57,826.36
Total	**165**	**$177,727**	**$21,641,000**	**79**	**$2,231,015.80**
Town of Emerald Isle					
A01-30 & AE Zones	37	$45,222	$8,888,600	49	$554,497.14
V01-30 & VE Zones	29	$150,135	$6,358,300	44	$469,104.28
B, C & X Zone	156	$143,075	$43,548,600	120	$1,480,489.55
Standard	79	$112,743	$19,872,600	85	$1,005,167.00
Preferred	77	$30,332	$23,676,000	35	$475,322.55
Total	**222**	**$338,432**	**$58,795,500**	**213**	**$2,504,090.97**
Town of Indian Beach					
A01-30 & AE Zones	9	$2,917	$577,200	4	$66,915.99
V01-30 & VE Zones	3	$7,784	$398,100	0	$0.00
B, C & X Zone	101	$30,267	$17,100,000	2	$5,574.69
Standard	95	$28,731	$16,358,000	1	$1,509.10
Preferred	6	$1,536	$742,000	1	$4,065.59
Total	**113**	**$40,968**	**$18,075,300**	**6**	**$72,490.68**
Town of Morehead City					
A01-30 & AE Zones	210	$364,348	$46,255,700	180	$4,416,223.99
V01-30 & VE Zones	1	$1,665	$50,000	3	$24,645.47
B, C & X Zone	178	$99,706	$56,907,200	39	$649,287.00
Standard	19	$26,692	$4,815,200	16	$367,034.12
Preferred	159	$73,014	$52,092,000	23	$282,252.88
Total	**389**	**$465,719**	**$103,212,900**	**222**	**$5,090,156.46**
Town of Newport					
A01-30 & AE Zones	8	$9,443	$1,393,500	9	$215,193.65
B, C & X Zone	24	$9,329	$5,882,700	6	$92,064.63
Standard	1	$1,617	$300,700	0	$0.00
Preferred	23	$7,712	$5,582,000	6	$92,064.63
Total	**32**	**$18,772**	**$7,276,200**	**19**	**$399,106.75**
Town of Peletier					
A01-30 & AE Zones	5	$1,700	$731,900	0	$0.00
B, C & X Zone	1	$399	$350,000	1	$13,363.48
Preferred	1	$399	$350,000	1	$13,363.48
Total	**6**	**$2,099**	**$1,081,900**	**1**	**$13,363.48**

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Pine Knoll Shores					
A01-30 & AE Zones	13	$11,948	$3,753,000	2	$16,071.94
V01-30 & VE Zones	28	$92,429	$4,074,500	6	$300,226.59
B, C & X Zone	161	$112,510	$44,445,300	30	$480,439.53
Standard	92	$85,784	$22,235,300	18	$297,853.24
Preferred	69	$26,726	$22,210,000	12	$182,586.29
Total	**202**	**$216,887**	**$52,272,800**	**38**	**$796,738.06**

Source: FEMA Community Information System, accessed September 2019

Table B.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Carteret County Unincorporated Area					
A01-30 & AE Zones	2,179	$1,267,815	$540,076,600	1,339	$17,803,440.44
A Zones	0	$0	$0	5	$45,505.18
V01-30 & VE Zones	15	$59,070	$3,572,000	15	$44,794.79
B, C & X Zone	688	$279,053	$187,594,000	109	$1,740,331.00
Standard	166	$83,657	$34,699,000	63	$1,117,511.68
Preferred	522	$195,396	$152,895,000	46	$622,819.32
Total	**2,882**	**$1,605,938**	**$731,242,600**	**1,468**	**$19,634,071.41**
Town of Atlantic Beach					
A01-30 & AE Zones	531	$385,407	$143,104,800	128	$1,469,665.67
V01-30 & VE Zones	86	$353,978	$23,348,100	1	$3,378.00
B, C & X Zone	1,457	$359,498	$213,180,400	56	$1,017,147.20
Standard	1,306	$298,068	$169,277,400	34	$714,540.19
Preferred	151	$61,430	$43,903,000	22	$302,607.01
Total	**2,074**	**$1,098,883**	**$379,633,300**	**187**	**$2,533,852.27**
Town of Beaufort					
A01-30 & AE Zones	281	$197,449	$79,130,600	71	$1,185,475.27
B, C & X Zone	194	$98,185	$59,417,600	11	$211,948.03
Standard	13	$20,985	$3,881,600	2	$54,459.61
Preferred	181	$77,200	$55,536,000	9	$157,488.42
Total	**475**	**$295,634**	**$138,548,200**	**82**	**$1,397,423.30**
Town of Bogue					
A01-30 & AE Zones	20	$15,313	$5,807,200	3	$162,050.73
B, C & X Zone	16	$6,235	$5,600,000	1	$5,323.27
Standard	0	$0	$0	0	$0.00
Preferred	16	$6,235	$5,600,000	1	$5,323.27
Total	**36**	**$21,548**	**$11,407,200**	**4**	**$167,374.00**
Town of Cape Carteret					
A01-30 & AE Zones	88	$63,550	$25,589,800	62	$680,303.21
B, C & X Zone	48	$28,620	$15,013,100	17	$297,641.07
Standard	5	$9,067	$1,465,100	6	$134,351.38
Preferred	43	$19,553	$13,548,000	11	$163,289.69
Total	**136**	**$92,170**	**$40,602,900**	**80**	**$1,034,306.32**
Town of Cedar Point					
A01-30 & AE Zones	75	$45,648	$21,723,400	15	$77,353.25

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
V01-30 & VE Zones	4	$23,798	$1,054,500	0	$0.00
B, C & X Zone	79	$34,255	$24,851,900	6	$57,073.22
Standard	1	$175	$11,900	1	$2,320.72
Preferred	78	$34,080	$24,840,000	5	$54,752.50
Total	**158**	**$103,701**	**$47,629,800**	**21**	**$134,426.47**
Town of Emerald Isle					
A01-30 & AE Zones	568	$272,640	$152,838,000	197	$2,601,365.15
V01-30 & VE Zones	175	$826,826	$49,200,900	68	$1,206,955.93
B, C & X Zone	1,733	$1,143,081	$418,584,900	373	$6,029,231.01
Standard	1,084	$876,769	$206,536,900	251	$4,563,028.50
Preferred	649	$266,312	$212,048,000	122	$1,466,202.51
Total	**2,476**	**$2,242,547**	**$620,623,800**	**638**	**$9,837,552.09**
Town of Indian Beach					
A01-30 & AE Zones	138	$43,014	$29,997,800	12	$95,195.11
V01-30 & VE Zones	15	$57,274	$3,348,200	0	$0.00
B, C & X Zone	380	$111,405	$96,298,500	2	$21,992.34
Standard	360	$103,667	$89,906,500	1	$14,794.88
Preferred	20	$7,738	$6,392,000	1	$7,197.46
Total	**533**	**$211,693**	**$129,644,500**	**14**	**$117,187.45**
Town of Morehead City					
A01-30 & AE Zones	715	$349,007	$194,091,300	75	$2,122,573.37
V01-30 & VE Zones	5	$23,800	$1,302,500	0	$0.00
B, C & X Zone	547	$266,333	$170,488,200	31	$743,397.32
Standard	46	$43,595	$9,005,200	10	$58,452.60
Preferred	501	$222,738	$161,483,000	21	$684,944.72
Total	**1,267**	**$639,140**	**$365,882,000**	**106**	**$2,865,970.69**
Town of Newport					
A01-30 & AE Zones	67	$44,931	$14,009,900	52	$3,993,673.97
B, C & X Zone	96	$35,311	$24,788,000	6	$387,655.90
Standard	1	$2,471	$430,000	2	$276,832.06
Preferred	95	$32,840	$24,358,000	4	$110,823.84
Total	**163**	**$80,242**	**$38,797,900**	**59**	**$4,514,229.87**
Town of Peletier					
A01-30 & AE Zones	3	$1,701	$912,500	1	$4,840.41
B, C & X Zone	3	$1,190	$1,050,000	0	$0.00
Preferred	3	$1,190	$1,050,000	0	$0.00
Total	**6**	**$2,891**	**$1,962,500**	**1**	**$4,840.41**
Town of Pine Knoll Shores					
A01-30 & AE Zones	211	$104,794	$54,927,600	39	$321,216.46
V01-30 & VE Zones	36	$179,615	$9,959,000	2	$1,616.92
B, C & X Zone	883	$404,690	$205,202,300	59	$952,691.57
Standard	691	$327,431	$141,590,300	34	$396,494.35
Preferred	192	$77,259	$63,612,000	25	$556,197.22
Total	**1,130**	**$689,099**	**$270,088,900**	**100**	**$1,275,524.95**

Source: FEMA Community Information System, accessed September 2019

B.4 MITIGATION STRATEGY

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA1	Address the sheltering needs of County residents. Continue to work on improving the preparedness of all existing shelter facilities, including the installation of on-site generators at all shelter locations. Maintain updated information regarding all shelters on the County website. Continue support of the NC Coastal Region Evacuation and Sheltering (CRES) plan aimed at providing inland sheltering resources for coastal counties and preparation and adoption of a county sheltering plan.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.1	ES	• **Carteret County Emergency Services** • Carteret County Social Services	To Be Determined	GF, NCDPS, ARC	2-3 years	In Progress – Carry Forward	Carteret County Emergency Services continues to work towards improving emergency shelters and updates to the state CRES plan. A list of shelters is maintained on the County website.
CA2	Provide information regarding evacuation procedures and routes through County and municipal websites, as well as other means when feasible. These efforts will involve assisting the Towns of Atlantic Beach, Cape Carteret, Indian Beach, Morehead City, and Pine Knoll Shores with efforts relating to bridge closures and re-entry policies and procedures. As part of these efforts, the County will make handouts available for citizens and visitors outlining evacuation routes and procedures provide education and outreach for implementation of the Know Your Zone initiative.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Wildfire, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Emergency Services** • NC Highway Patrol • Atlantic Beach Administration • Cape Carteret Administration • Indian Beach Administration • Morehead City Administration • Pine Knoll Shores Administration	Staff Time	GF, NCDPS	1 year	In Progress – Carry Forward	The County maintains up to date evacuation route information on the County website and is working to develop educational materials for the Know Your Zone initiative and coordination of re-entry procedures.
CA3	Annually review and maintain the County's Continuity of Operations Plan in an effort to ensure ongoing governmental operations following a natural or man-made disaster event. The County, in conjunction with all participating municipal jurisdictions, will review this plan annually and update as deemed necessary.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Med	3	3.2	ES	• **Carteret County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	County Risk Management will work to develop and maintain a robust Continuity of Operations Plan to ensure ongoing government operations and review and update this plan annually.
CA4	Annually review and update the County's Emergency Operations Plan (EOP) to ensure compliance with all NCEM and NCOEMS procedures and policies. Through these updates, the County will work closely with all participating municipalities to ensure that all jurisdictions continue to be educated and prepared for activation of the EOP in the event of a disaster event.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Med	3	3.2	ES	• **Carteret County Emergency Services**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services works closely with all participating municipalities to review and update the Emergency Operations Plan (EOP) on an annual basis.
CA5	Maintain, and where necessary, establish backup generators at all identified critical facilities. Additionally, County Emergency Services will evaluate the equipment on a regular basis to assure it continues to meet operational demands at county facilities.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	1	1.2	PP	• **Carteret County Emergency Services** • Independent Facility Operators • Town Public Utilities	To Be Determined	GF, NCDPS, NCDOT, HMGP	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services evaluates all emergency generators on a regular basis to ensure operability.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA6	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Winter Storm, Earthquake, Wildfire, Dam & Levee Failure	Med	3	3.1	PP	• **Carteret County Governing Board** • Municipal Governing Boards	To Be Determined	GF, HMGP	Other – Reviewed Annually	In Progress – Carry Forward	Carteret County maintains a contractor for generators and storm cleanup.
CA7	Hold a public information meeting (once annually) aimed at educating the public and elected officials about the jurisdictions' overall vulnerability to natural and man-made hazards, and the jurisdictions' hazard mitigation efforts.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	2	2.2	PIO	• **Carteret County Emergency Services** • Carteret County Planning • Municipal Administrations	Staff Time	GF	1 Year	In Progress – Carry Forward	Carteret County Emergency Services holds a public officials conference at least annually to educate decision makers on the vulnerability to hazards and mitigation efforts.
CA8	Continue to maintain the County's Crisis Management System to efficiently deal with emergency situations. These efforts will involve training for officials and relevant staff regarding use of the program.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	4	4.2	ES	• **Carteret County Emergency Services** • Carteret County Planning	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services provides annual training to officials and all relevant staff on the County's Crisis Management system.
CA9	Meet annually with all electric service providers operating within the County prior to hurricane season, in preparation for the effects of severe weather, and will provide the preliminary planning steps required for effective post-disaster recovery.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Severe Winter Storm, Earthquake, Dam & Levee Failure	Med	4	4.2	P	• **Carteret County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, Electric Service Providers	Other – meet annually	In Progress – Carry Forward	Carteret County Emergency Services continues to meet annually with all electric service providers operating in the county.
CA10	Maintain all property acquired within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to proactively establish open space within the floodplain and floodway as HMGP grant funds become available to carry out this initiative.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	NRP	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County will maintain property within the SFHA acquired with FMA or HMGP funding as undisturbed open space.
CA11	Integrate, when feasible, new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with the County's certified CAMA Land Use Plans).	Carteret County, Morehead City	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	SP	• **Carteret County Parks and Recreation** • Carteret County Planning • Morehead City Parks and Recreation	To Be Determined	GF, NCDENR	Other – as opportunities arise	In Progress – Carry Forward	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.
CA12	Maintain reciprocal mutual aid agreements with all neighboring communities in an effort to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	High	4	4.2	ES	• **Carteret County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA13	Review and update respective Flood Damage Prevention Ordinances as deemed necessary. Once annually, all jurisdictions will conduct a review to ensure that the current FDPO is compliant with all FEMA and NCEM mandates.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.2	PP	• **Carteret County Planning** • Municipal NFIP participants	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County has had no amendments to its FDPO and it continues to be compliant with all FEMA and NCEM mandates.
CA14	Strive to maintain respective CRS ratings through implementation of a comprehensive floodplain management program.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	PP	• **Carteret County Planning** • **Municipal Administrations**	$15,000/Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – next 5 years	In Progress – Carry Forward	Staff continues to provide required CRS recertification documentation on an annual basis and to conduct credited activities to maintain its CRS Class 7 Rating.
CA15	Maintain a map information service involving the following: (1) Provide information relating to Flood Insurance Rate Maps (FIRMs) to all inquirers, including a provision of information on whether a given property is located with a flood hazard area; (2) Provide information regarding the flood insurance purchase requirement; (3) Maintain historical and current FIRMs; (4) Advertise once annually in the local newspaper the availability of FIRMs; and (5) Provide information to inquirers about local floodplain management requirements.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County continues to provide a map information service to residents/visitors/property owners/real estate agents and anyone else inquiring about FIRM information for properties located in Carteret County.
CA16	Mail a notice annually to all property owners in an effort to educate citizens about dangers associated with flooding in low-lying coastal areas.	Carteret County, Atlantic Beach, Beaufort, Cape Carteret, Cedar Point, Emerald Isle, Morehead City, Newport, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	To Be Determined	GF, NCDPS	Other – Once Annually	In Progress – Carry Forward	Carteret County mails all property owners a flood tips brochure each year with their tax bill regardless of flood zone. 100% of property owners receive this flood tips brochure. Additionally, property owners in Repetitive Loss Areas receive annual notification on their susceptibility to flooding and grant opportunities.
CA17	Make information regarding hazards and development regulations within floodplains available through: (1) Ensure that the local library maintains information relating to flooding and flood protection; (2) Provide a link on the county website to FEMA resources addressing flooding and flood protection; (3) Provide a link on all participating municipalities' websites to FEMA resources addressing flooding and flood protection, evacuation procedures, disaster preparedness, and post-disaster recovery; and (4) Provide website links to relevant hazard mitigation websites. (5) Provide information to local real estate agents.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	2	2.2	PIO	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County maintains links to numerous FEMA resources on its website Carteret County maintains an emergency preparedness page as well as a flood information page with relevant hazard mitigation links, emergency preparedness links, flood information links, and post-disaster recovery information.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA18	Support the efforts of the Carteret County Local Emergency Planning Committee (LEPC) in their effort to address hazards associated with the storage of chemicals, noxious waste material and bulk fuel.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Hurricane & Tropical Storm, Flood	Low	4	4.2	ES	• **Carteret County LEPC**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County maintains an active LEPC and will continue to do so through the implementation of this plan.
CA19	Continue to monitor water resources to mitigate the impacts of drought conditions. These efforts will include maintaining a local water shortage ordinance. This ordinance will be activated in coordination with all utility providers as the need arises.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Drought	Med	1	1.5	NRP	• **Carteret County Planning** • Municipal Administrations	Staff Time	GF, NCDENR	Other – As necessary	In Progress – Carry Forward	Carteret County continually monitors water resources and maintains a water shortage ordinance.
CA20	Collaborate to provide education and training to local government officials in an effort to broaden understanding of public policy relating to hazard mitigation.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	All Hazards	Low	4	4.2	P	• **Carteret County Emergency Services** • Carteret County Administration • Municipal Administration	Staff Time	GF	Other - Annually	In Progress – Carry Forward	Staff attends meetings of the Carteret County Floodplain Administrators group and is supportive of efforts to provide training to local government officials. Staff also employs two CFMs.
CA21	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Carteret County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.1	PP	• **Carteret County Planning Department** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – next 5 years	In Progress – Carry Forward	Carteret County continues to aggressively seek out grant funding for elevating RLPs and SRLPs and is currently administering a grant program to rehabilitate and mitigate properties during recent hurricanes. The County also maintains an up-to-date list of all RLPs in the County.
CA22	Increase the availability of skilled contractors to perform needed work post hazard by: • Developing a partnership with major national contractors in selected areas (roofing, tree trimming, etc.), such that they will deploy resources and skilled contractors to affected areas as needed. • Creating local contractor retention plan (perhaps with incentives related to permits, commitments for County/City projects, a reduction in community college tuition, etc.) to reduce the flight of local skilled labor.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Earthquake, Dam & Levee Failure	Med	2	2.2	PP	• **Carteret County Planning Department** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF	2 to 3 years	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CA23	Improve awareness regarding the intensity of natural hazard events as they materialize and subside by: • Establishing an emergency radio broadcast frequency that runs a recorded message pre- and post-hazard to communicate critical-time sensitive information. It could include things like routes/ bridges that are open or closed, weather/hazard forecasts, location of emergency shelters. • More fully utilizing County/Town websites to provide pre-hazard and post-hazard recovery information (debris pick up schedule, critical dates, forms, phone numbers, housing availability, etc.).	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Earthquake, Dam & Levee Failure	High	2	2.2	ES	• **Carteret County Emergency Services** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF	2 to 3 years	New	N/A
CA24	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Carteret County, Atlantic Beach, Beaufort, Bogue, Cape Carteret, Cedar Point, Emerald Isle, Indian Beach, Morehead City, Newport, Peletier, Pine Knoll Shores	Wildfire	High	4	4.1	PP	• **Carteret County Emergency Services** • Carteret County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Annex C Craven County

C.1 COMMUNITY PROFILE

This section contains a summary of maps and statistics for current conditions and characteristics of Craven County, including information on population, asset exposure, housing, and economy. Throughout the section, information will be reported at the jurisdictional level. In some cases, information will only be reported for communities participating in the Community Rating System (CRS).

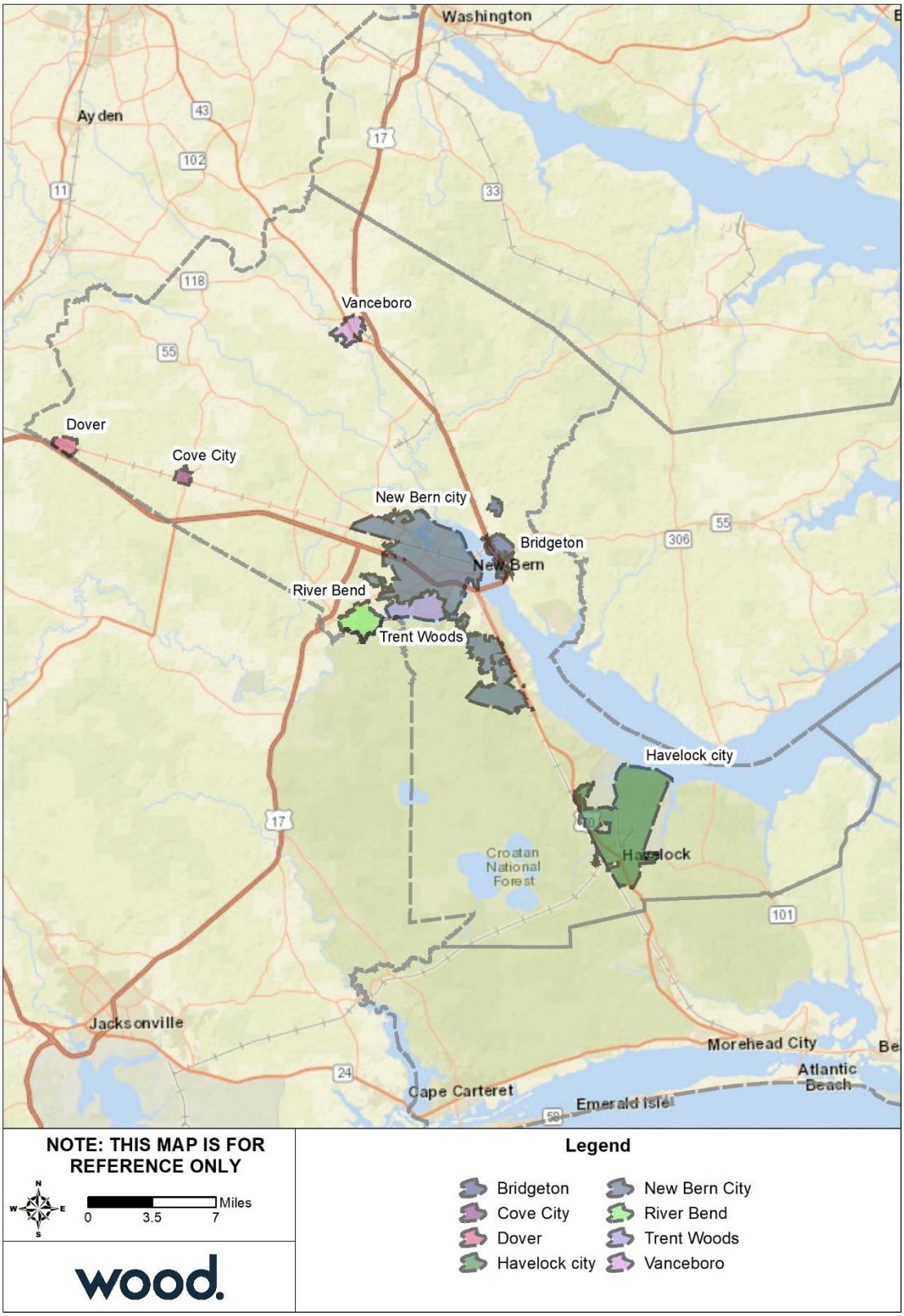
Table C.1 – CRS Participation by Jurisdiction, Craven County

Jurisdiction	CRS Participant
Craven County (Unincorporated Area)	Yes
City of Havelock	Yes
City of New Bern	No
Town of Bridgeton	No
Town of Cove City	No
Town of Dover	No
Town of River Bend	Yes
Town of Trent Woods	No
Town of Vanceboro	No

Geography

Figure B.1 shows a base map of Craven County and participating jurisdictions.

Figure C.1 – Jurisdictional Locations, Craven County



Population and Demographics

Table C.2 provides population counts and growth estimates for Craven County and participating jurisdictions as compared to the Region overall. Table C.3 provides demographic information for the County.

Table C.2 – Population Counts, Craven County, 2000-2017

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Unincorporated Areas	36,784	36,721	43,943	-0.2%	19.7%	19.5%
Bridgeton	328	454	255	38.4%	-43.8%	-22.3%
Cove City	433	399	415	-7.9%	4.0%	-4.2%
Dover	443	401	257	-9.5%	-35.9%	-42.0%
Havelock	22,442	20,735	20,404	-7.6%	-1.6%	-9.1%
New Bern	23,111	29,524	29,664	27.7%	0.5%	28.4%
River Bend	2,923	3,119	3,095	6.7%	-0.8%	5.9%
Trent Woods	4,224	4,155	4,117	-1.6%	-0.9%	-2.5%
Vanceboro	898	1,055	1,224	17.5%	16.0%	36.3%
Jurisdictions	**54,802**	**59,842**	**59,431**	**9.2%**	**-0.7%**	**8.4%**
Craven County Total	**91,586**	**96,563**	**103,374**	**5.4%**	**7.1%**	**12.9%**
Pamlico Sound Region Total	**208,861**	**223,935**	**232,192**	**7.2%**	**3.7%**	**11.2%**

Source: US Census Bureau American Community Survey.

Table C.3 – Racial Demographics, Craven County, 2017

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Bridgeton	86.7%	13.3%	0.0%	0.0%	0.0%	0.4%
Cove City	52.0%	47.7%	0.0%	0.2%	0.0%	2.7%
Dover	33.9%	65.4%	0.0%	0.0%	0.8%	1.2%
Havelock	68.8%	19.7%	1.8%	3.6%	6.1%	11.7%
New Bern	56.6%	31.7%	6.5%	2.3%	2.4%	6.7%
River Bend	84.4%	5.4%	8.3%	0.0%	2.0%	1.3%
Trent Woods	97.2%	0.9%	0.0%	1.0%	0.9%	3.3%
Vanceboro	52.2%	45.1%	0.0%	0.5%	2.2%	4.3%
Craven County	**70.2%**	**21.4%**	**2.8%**	**2.8%**	**2.7%**	**7.1%**

*Other races include American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Future Growth and Development

This section provides an explanation of anticipated development trends for jurisdictions in Craven County that are participants in the CRS. Evaluating future growth and development decisions in relation to known hazard areas can lead to better growth management and more effective risk reduction strategies.

Each County and respective municipality have handled their planning processes in different fashions. Some communities have consolidated plans, while others conducted their planning process independently. This information provided reflects this fact and portrays the plan for future growth

throughout these communities. Each of these plans were developed under varying conditions, some involving specific guidance, such as that dictated by the NC Division of Coastal Management.

Craven County

Forecast development trends throughout Craven County are similar to those described under Beaufort County. Like Beaufort County, Craven County does not maintain zoning regulations within unincorporated areas. Additionally, the County is characterized by rural landscapes interspersed with small towns that maintain a commercial core and moderate density residential development. However, Craven County has two large municipal jurisdictions including the City of New Bern and the City of Havelock. These two communities are connected by a fifteen mile stretch of US Highway 70.

It is anticipated that residential and non-residential development will continue to occur at a fairly rapid pace along this stretch. As this development continues, the County will consider instituting corridor planning and ultimately, there is potential for the establishment of corridor specific zoning regulations. In addition to US Highway 70 leading to Havelock, growth will also continue to materialize along US Highway 70 east of New Bern and along US Highway 17 north of New Bern to the Pitt County line.

As with many of the other municipalities in the region, development within New Bern and Havelock will continue to expand in a traditional fashion. It is expected that New Bern's downtown commercial core will continue to experience redevelopment and expansion. This is limited in some ways due to the historical protection measures which exist in this area. Development in Havelock will continue along the US Highway 70 corridor, which in many ways serves at the City's commercial core. Future growth within Havelock is dependent upon potential growth of Cherry Point Naval Air Station. The Town of River Bend is predominantly residential in character and is located outside the City of New Bern's corporate limits.

Craven County CAMA Core Land Plan

The Craven County CAMA Core Land Use Plan was adopted by the Craven County Board of Commissioners in August of 2009. The plan defines nine future land use districts including:

- Commercial
- Conservation
- Industrial
- Agricultural/Low Density Residential
- Military
- Mixed Use
- Office & Institutional
- Recreational
- Residential

These districts are defined in detail under Section 6 (Page 169) of the Craven County CAMA Core Land Use Plan available through the following URL:

https://www.cravencountync.gov/DocumentCenter/View/872/Coastal-Area-Management-Act-CAMA-Land-Use-Plan-PDF?bidId=

Figure C.2 and Figure C.3 provide the delineation of each Future Land Use District.

Figure C.2 – Craven County Future Land Use

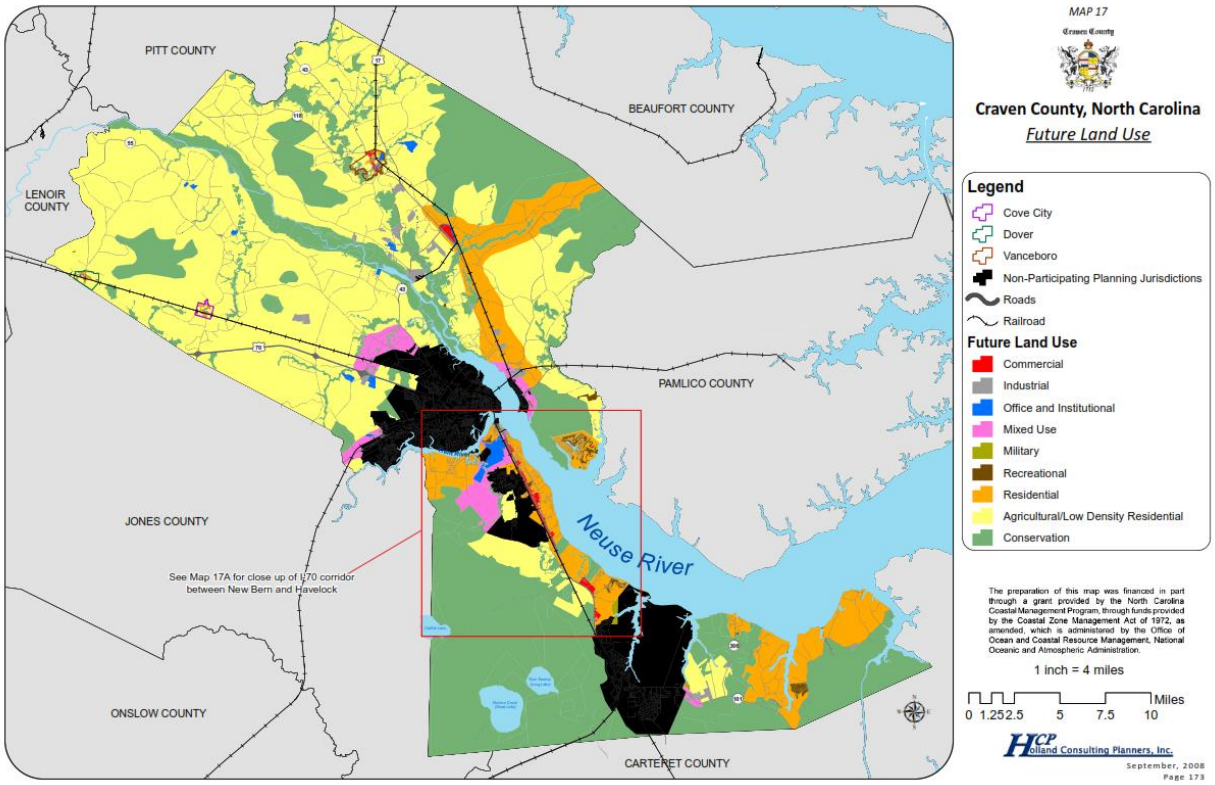
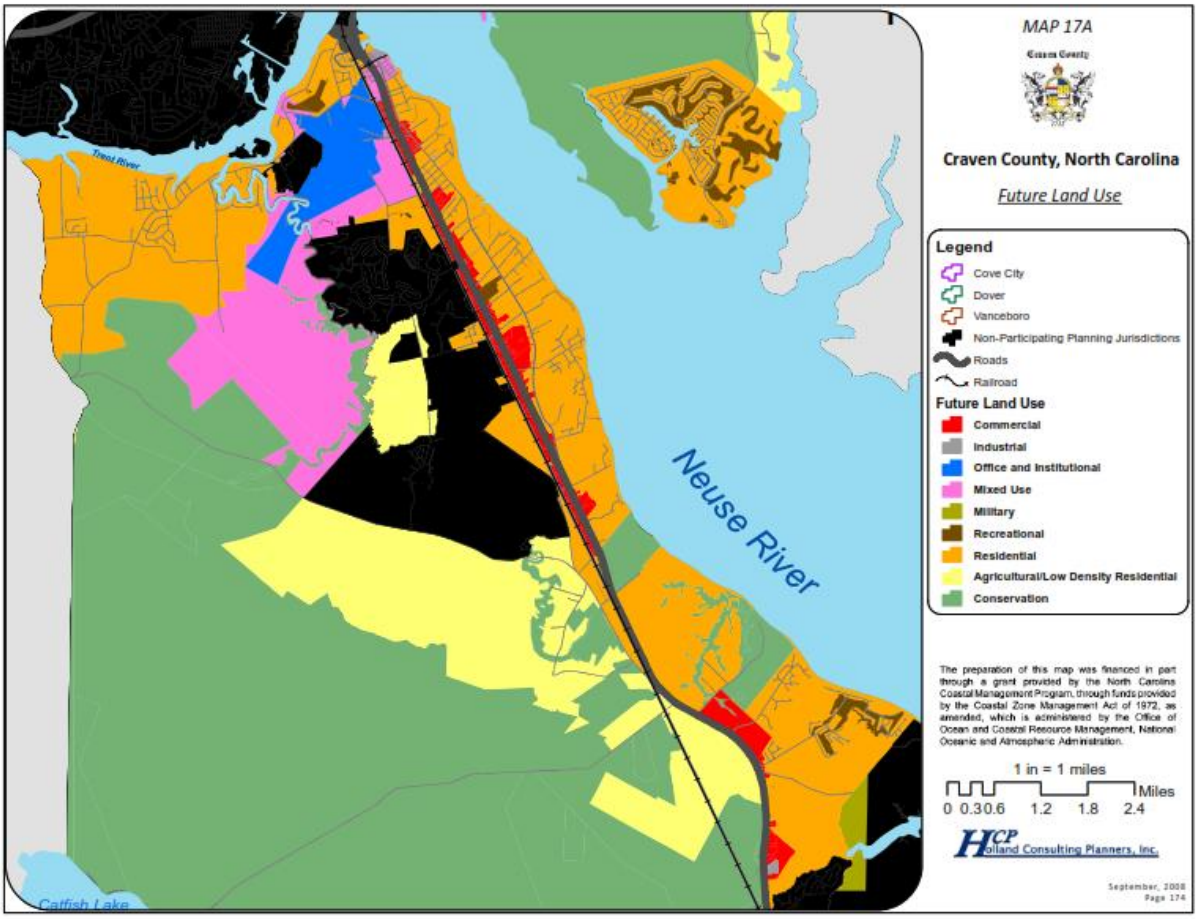


Figure C.3 – Craven County Future Land Use



City of Havelock 2030 Comprehensive Plan

The City of Havelock 2030 Comprehensive Plan was adopted by the City of Havelock City Council in June of 2009. The plan defines thirteen future land use districts including:

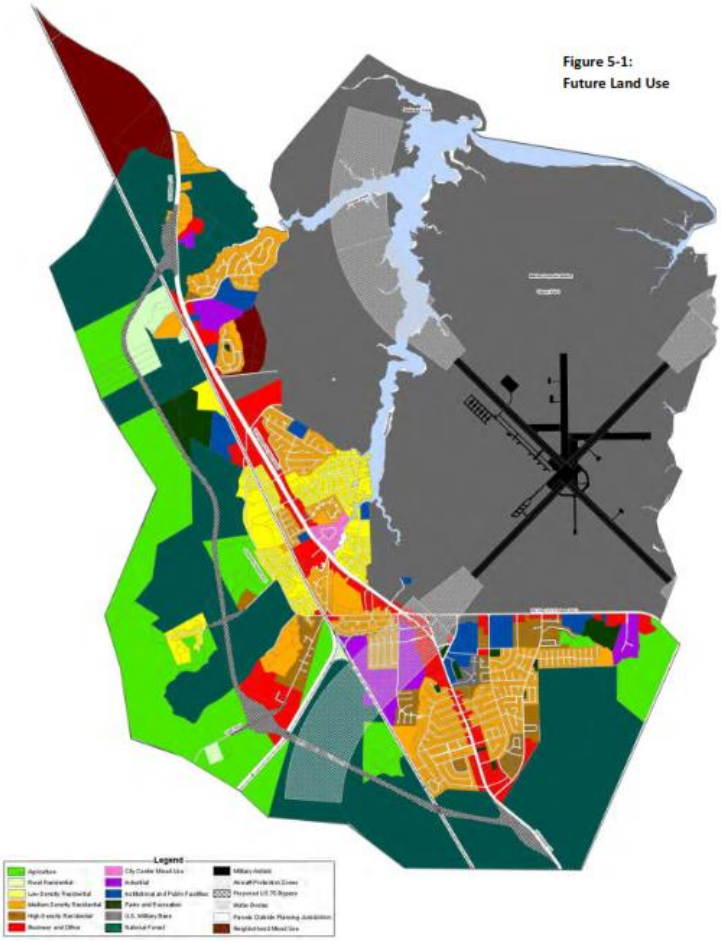
- Agricultural Use
- Rural Residential
- Low-Density Residential
- Medium-Density Residential
- High Density Residential
- Industrial
- Institutional and Public Facility
- Business and Office
- City Center Mixed-Use
- Neighborhood Mixed Use
- Parks and Recreation
- U.S. Military Base
- U.S. National Forest

These districts are defined in detail under Chapter 5 (page 5-15) of the City of Havelock 2030 Comprehensive Plan available through the following URL:

https://www.havelocknc.us/download/planning/LandUsePlan.pdf

Figure C.4 provides the delineation of each Future Land Use District.

Figure C.4 – City of Havelock Future Land Use



City of New Bern/Town of River Bend Regional Land Use Plan

The City of New Bern/Town of River Bend Regional Land Use Plan was adopted by the City of New Bern and Town of River Bend's elected boards in August of 2010. The plan defines five future land use districts including:

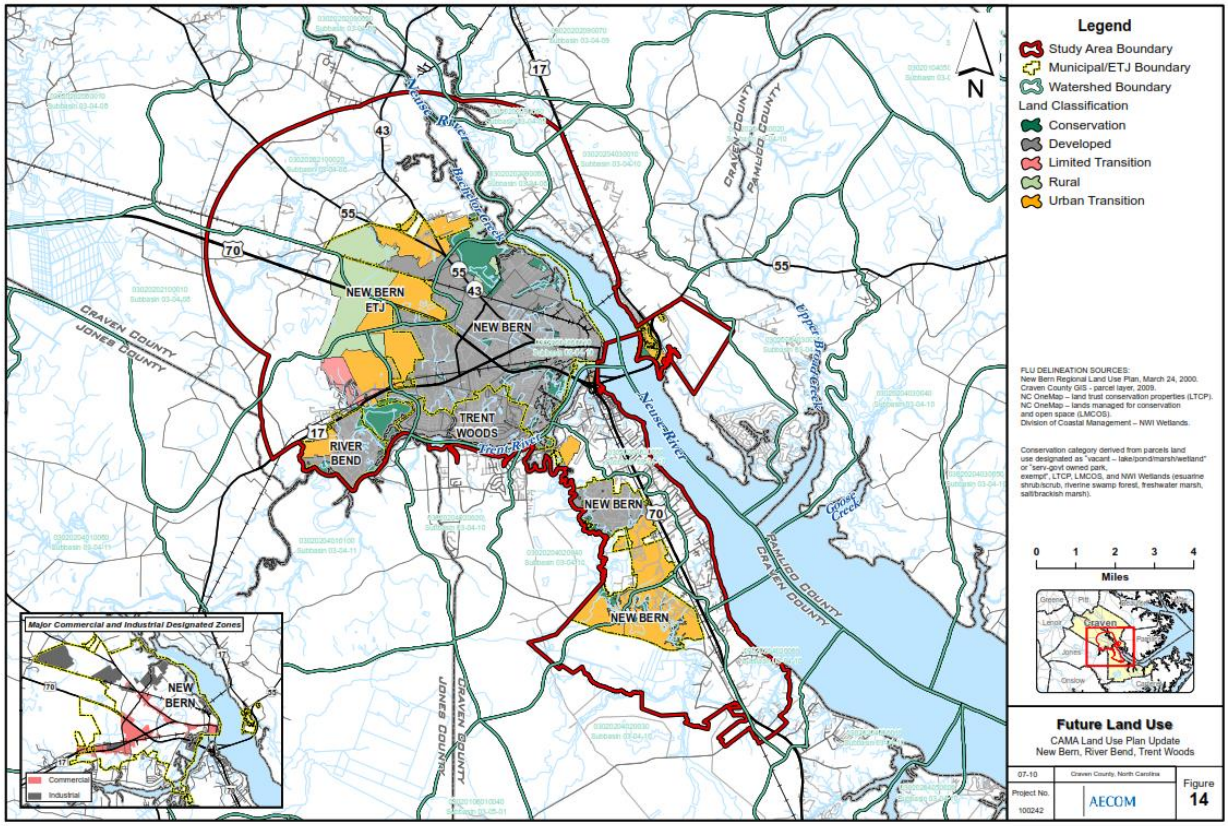
- Conservation Areas
- Developed
- Limited Transition
- Urban Transition
- Rural

These districts are defined in detail under Section X (page 93) of the City of New Bern/Town of River Bend Regional Land Use Plan available through the following URL:

https://www.dropbox.com/s/wbz91a8fxt2p943/New_Bern_Final__Draft_8_10.pdf?dl=0

Figure C.5 provides the delineation of each Future Land Use District for both the City of New Bern and the Town of River Bend.

Figure C.5 – City of New Bern and Town of River Bend Future Land Use



Asset Inventory

The following tables summarize the asset inventory for Craven County unincorporated areas and incorporated jurisdictions in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure C.6 through Figure C.14. Note, if there is no map for the jurisdiction, data was unavailable in iRisk. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table C.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense Industrial Base	Government Facilities	Healthcare	Postal and Shipping	Transportation Systems	Energy	Emergency Services	Water	Total
Craven County	983	7	0	793	2	220	2	92	16	0	79	10	23	6	2,233
Bridgeton	0	3	0	61	0	8	0	4	0	0	2	1	2	1	82
Cove City	3	0	0	28	0	1	0	4	0	0	2	0	1	1	40
Dover	0	0	0	17	0	0	0	5	1	0	0	0	1	0	24
Havelock	7	10	0	320	2	20	2	112	17	1	30	5	2	5	533
New Bern	32	34	0	855	12	132	2	164	151	0	205	8	7	15	1,617
River Bend	0	0	0	15	0	2	0	1	11	0	2	0	4	1	36
Trent Woods	0	0	0	21	0	4	0	9	3	0	10	1	2	0	50
Vanceboro	6	1	0	63	0	2	0	17	4	0	3	0	3	0	99
Craven County Total	**1031**	**55**	**0**	**2173**	**16**	**389**	**6**	**408**	**203**	**1**	**333**	**25**	**45**	**29**	**4,714**

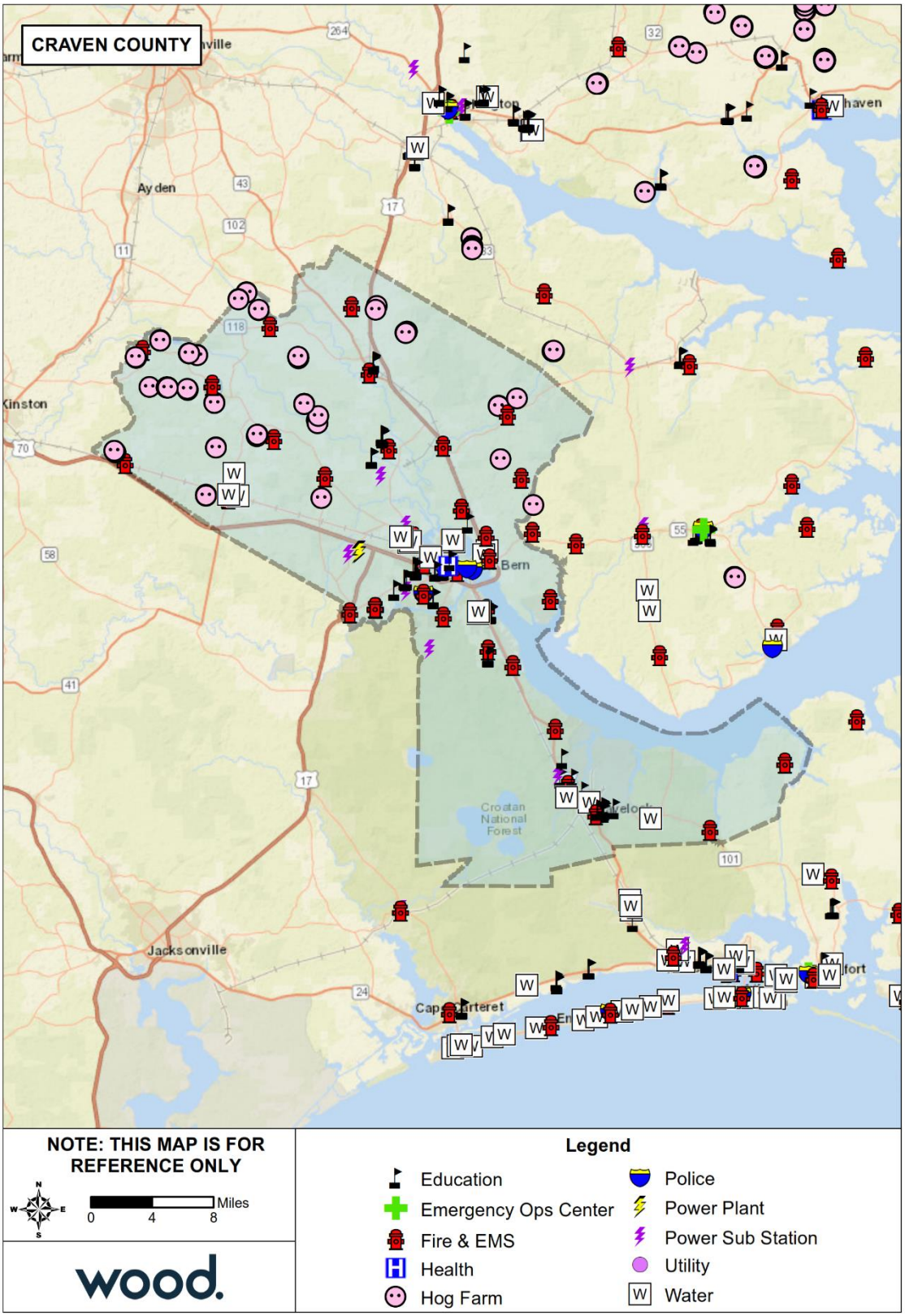
Source: NCEM Risk Management Tool

Table C.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Craven County	7	13	7	22	0	51	9	**109**
Bridgeton	0	1	0	0	0	0	0	**1**
Cove City	0	0	0	0	0	1	0	**1**
Dover	0	0	0	0	0	2	0	**2**
Havelock	0	18	1	44	0	8	1	**72**
New Bern	20	106	8	52	0	46	4	**236**
River Bend	0	2	0	0	0	1	0	**3**
Trent Woods	11	1	0	2	0	5	1	**20**
Vanceboro	0	1	0	2	0	2	0	**5**
Craven County Total	**38**	**142**	**16**	**122**	**0**	**116**	**15**	**449**

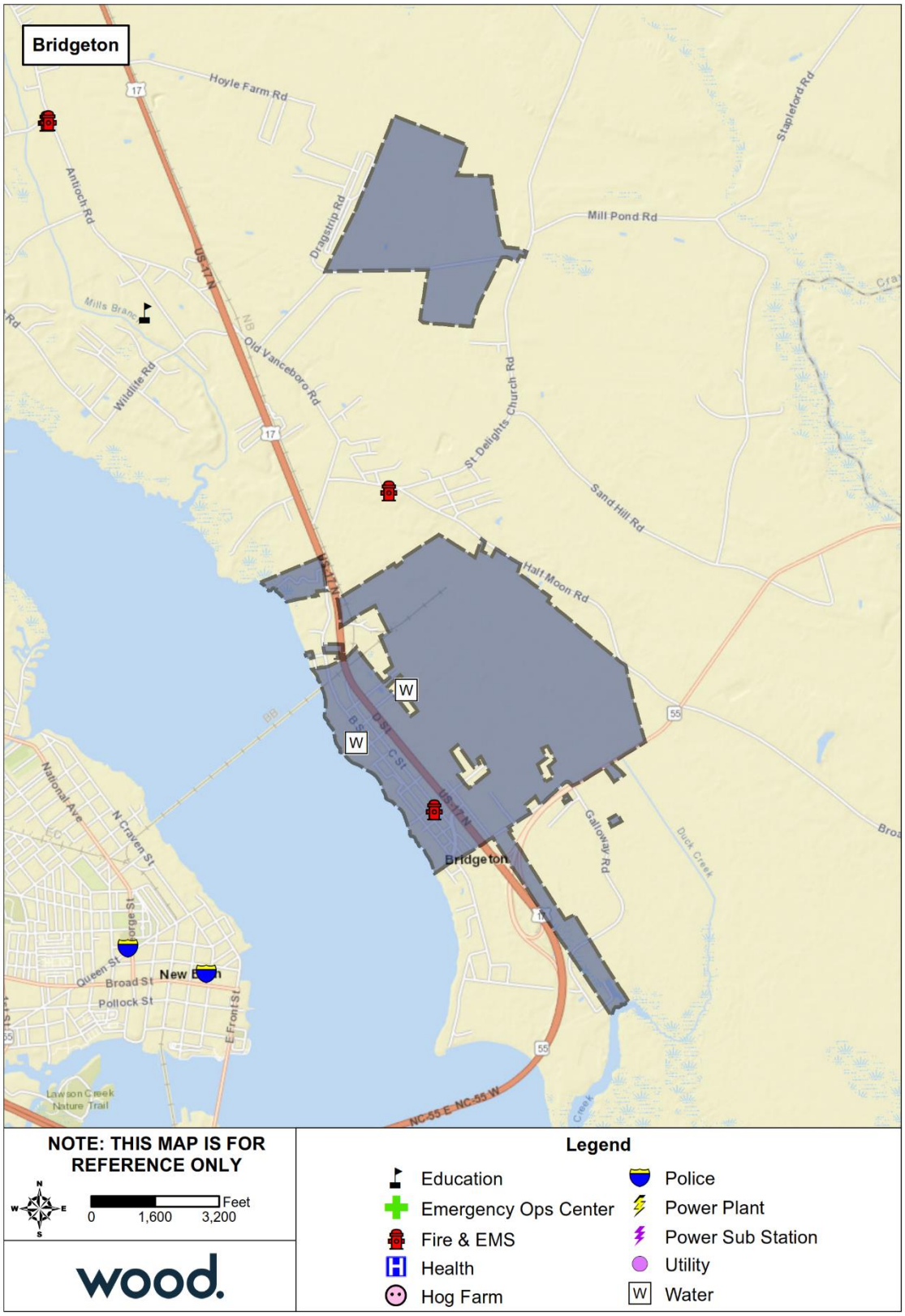
Source: NCEM Risk Management Tool
Note: A dash (-) indicates that no high potential loss facilities were reported in RMT.

Figure C.6 – Critical Facilities, Craven County



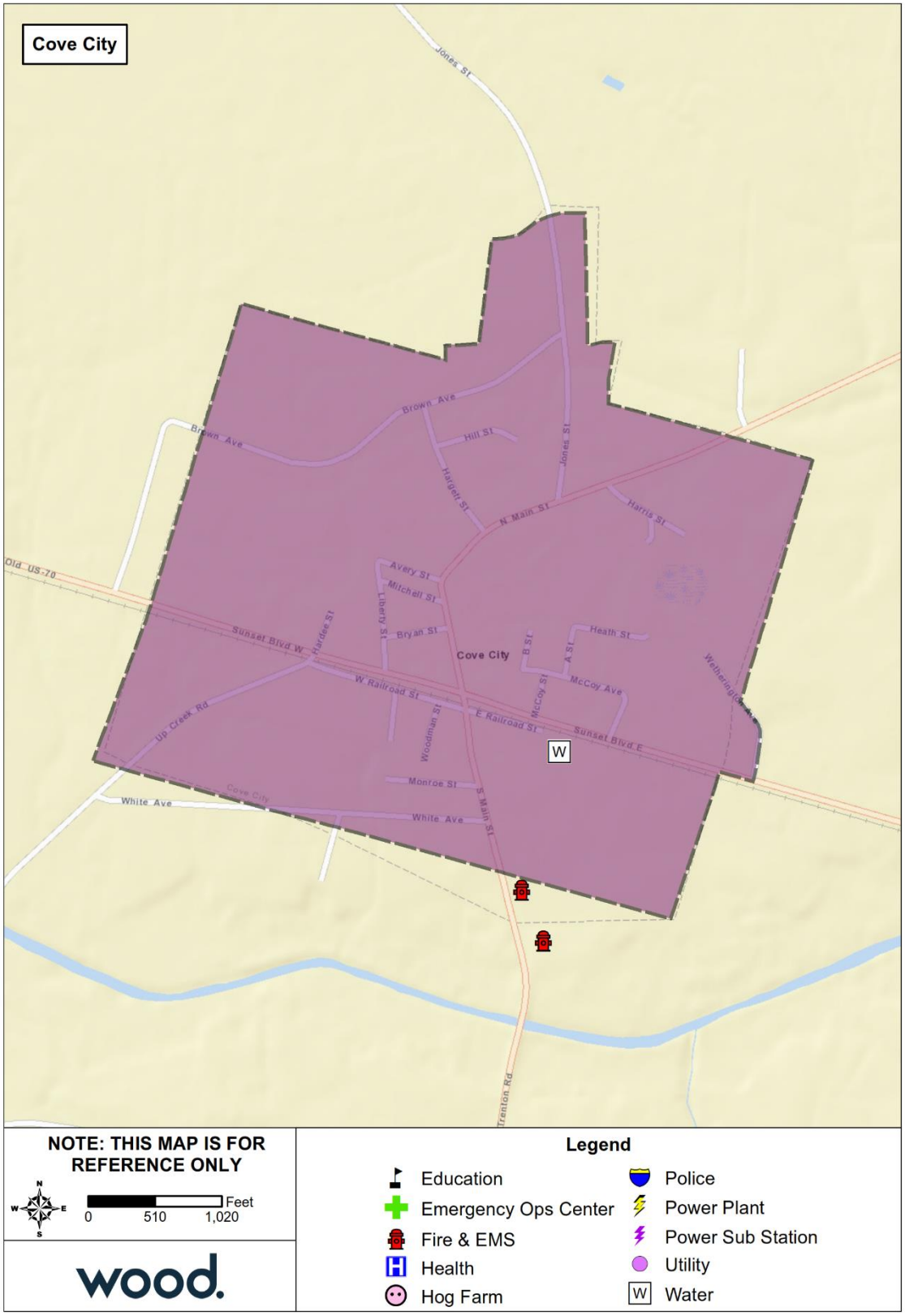
Source: NCEM IRISK Database, GIS Analysis

Figure C.7 – Critical Facilities, Town of Bridgeton



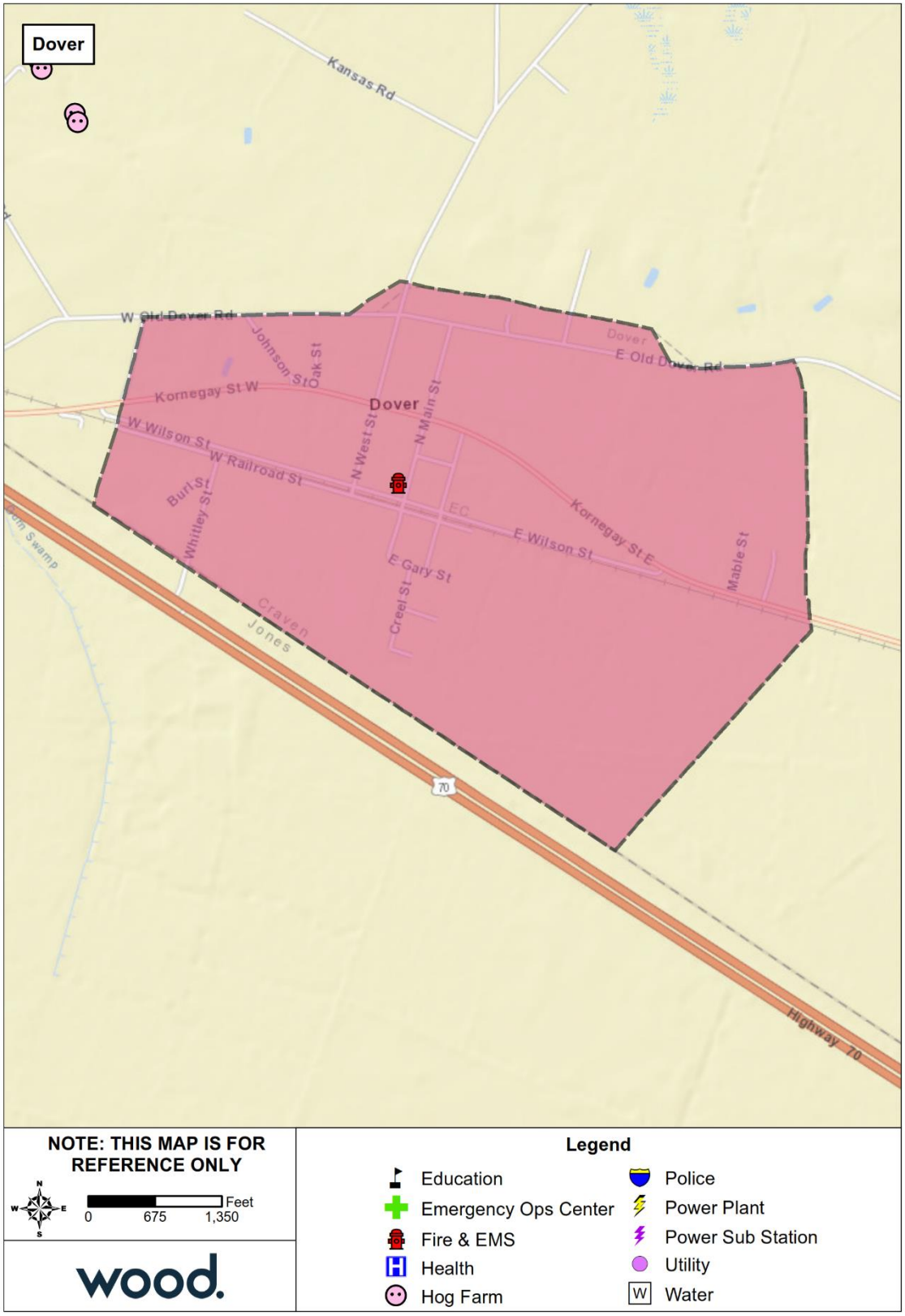
Source: NCEM IRISK Database, GIS Analysis

Figure C.8 – Critical Facilities, Town of Cove City



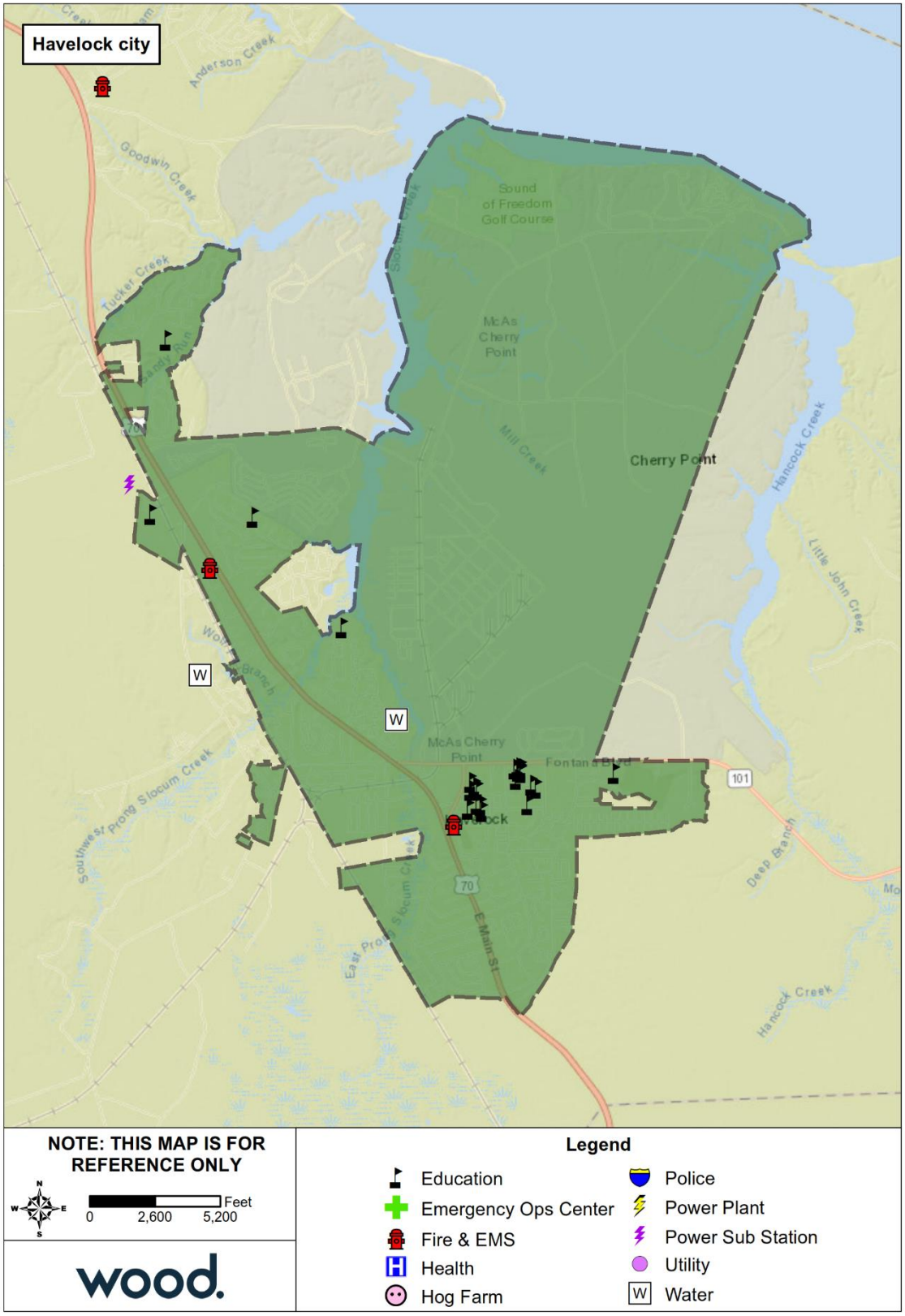
Source: NCEM IRISK Database, GIS Analysis

Figure C.9 – Critical Facilities, Town of Dover



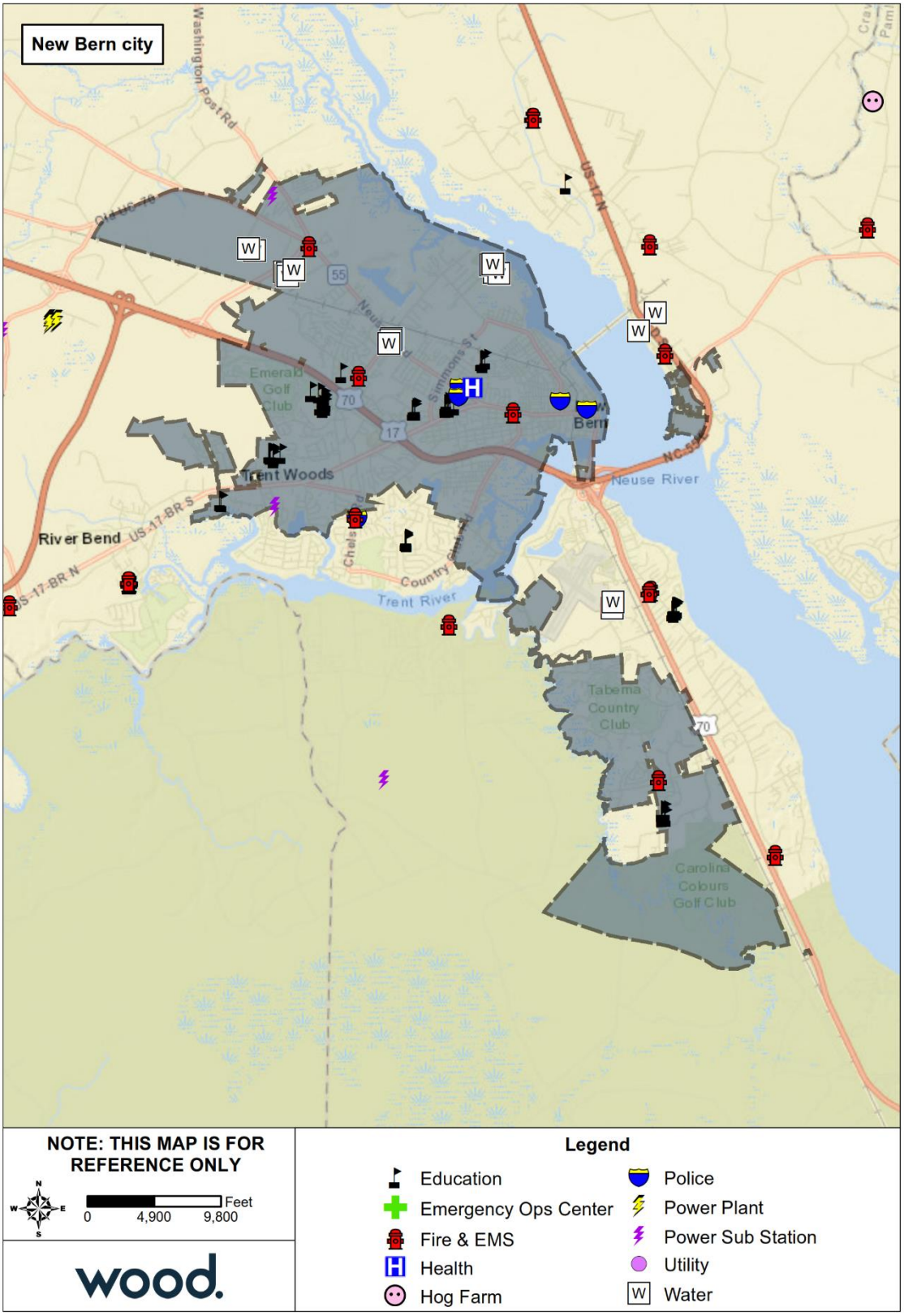
Source: NCEM IRISK Database, GIS Analysis

Figure C.10 – Critical Facilities, City of Havelock



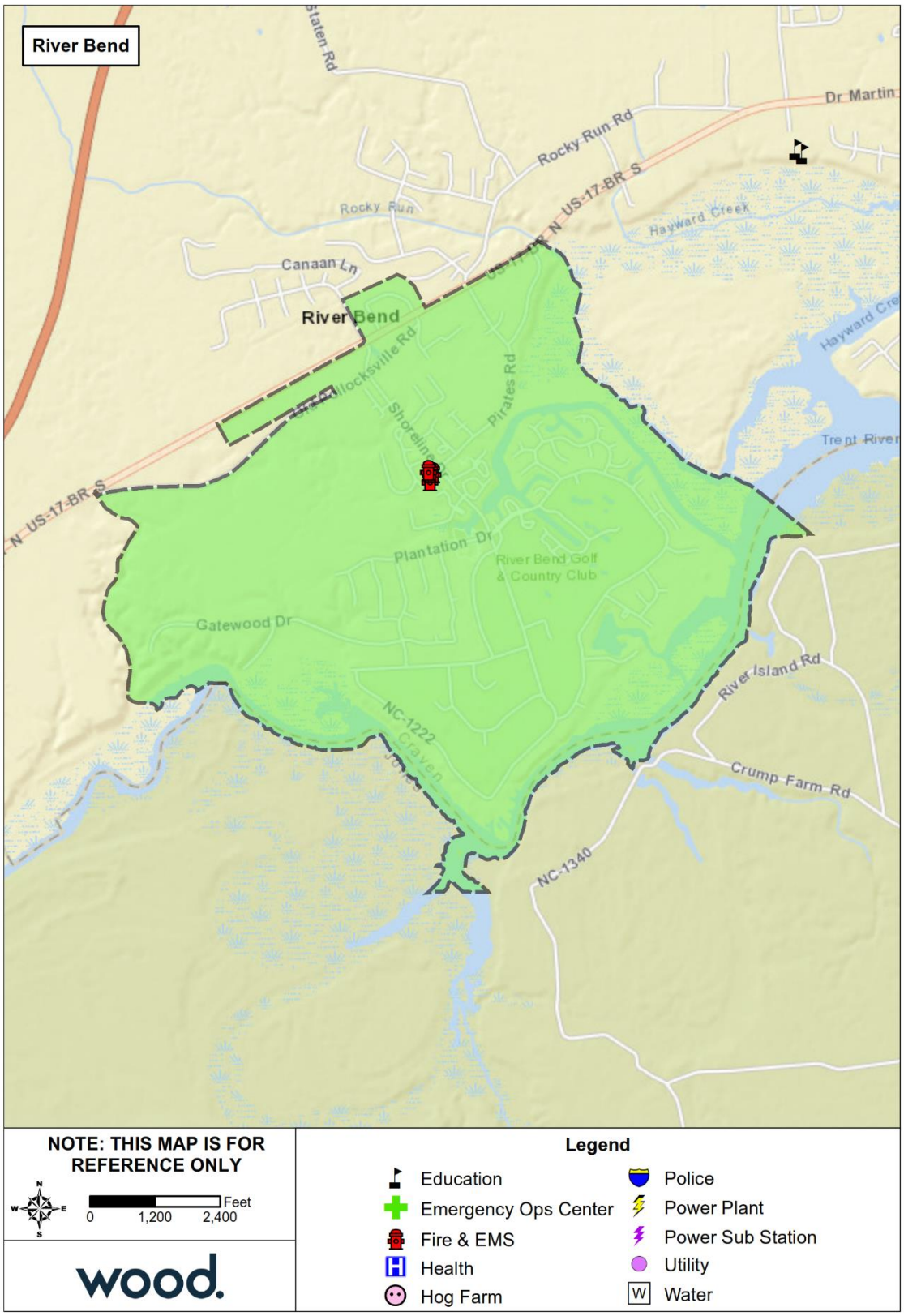
Source: NCEM IRISK Database, GIS Analysis

Figure C.11 – Critical Facilities, City of New Bern



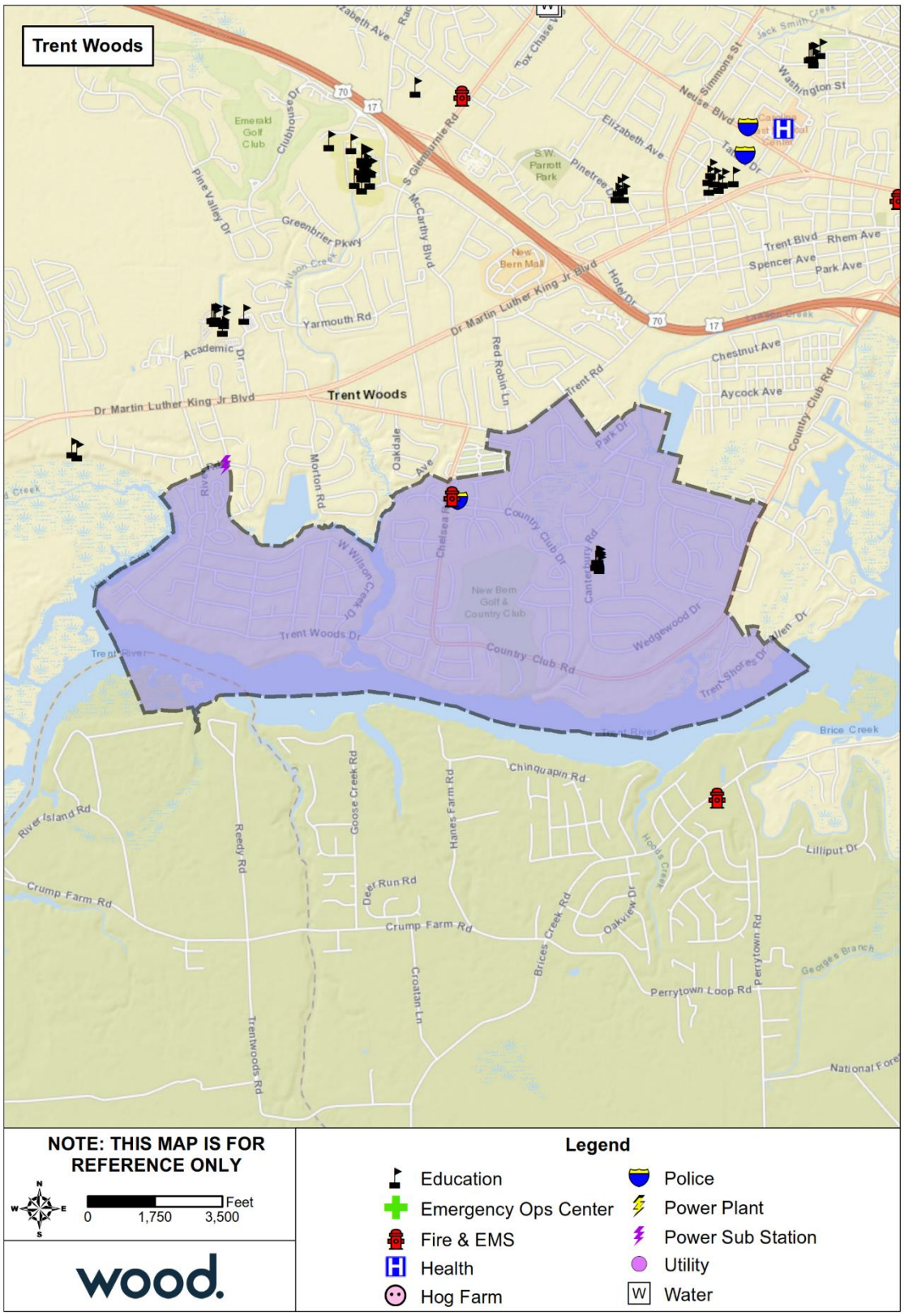
Source: NCEM IRISK Database, GIS Analysis

Figure C.12 – Critical Facilities, Town of River Bend



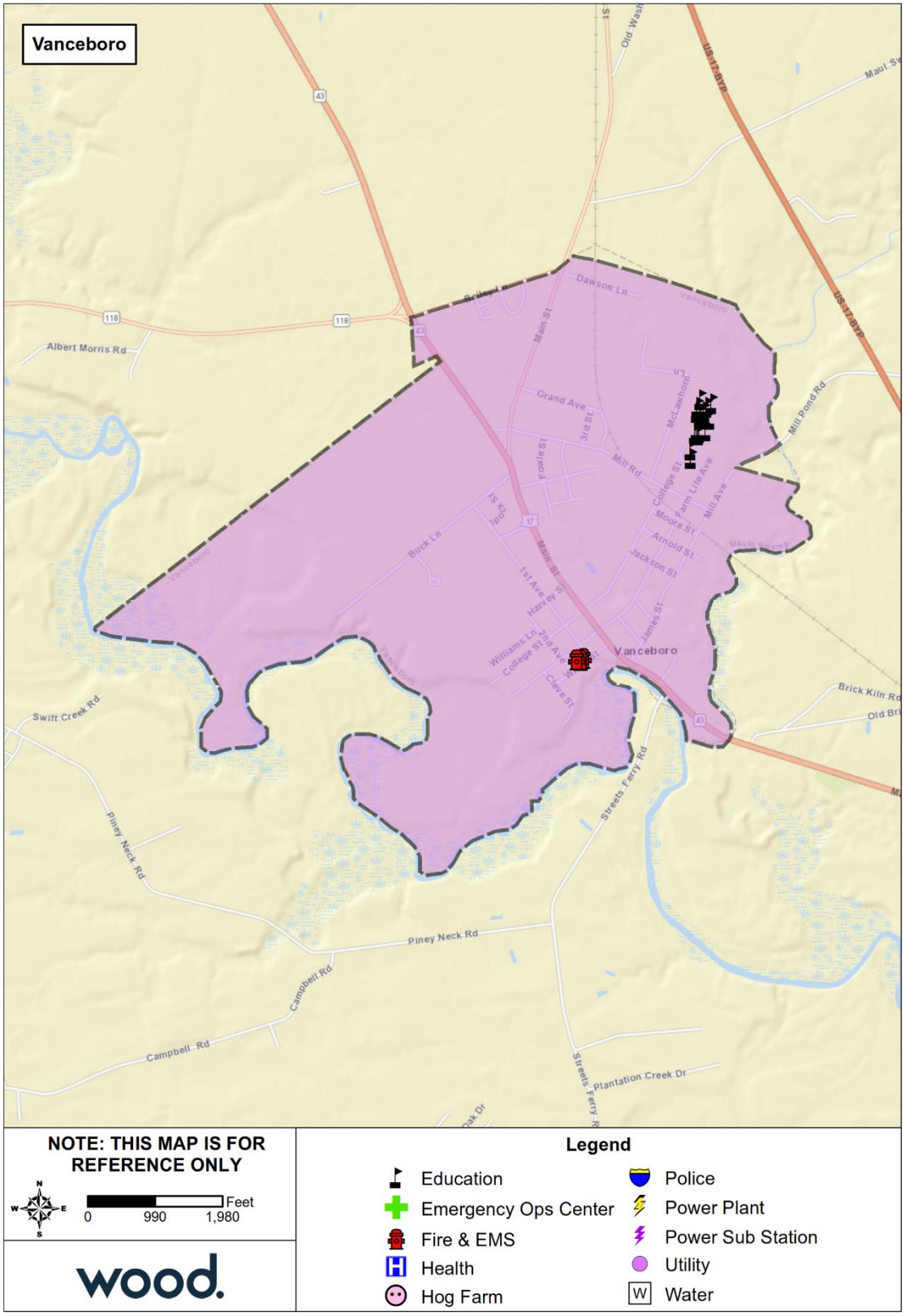
Source: NCEM IRISK Database, GIS Analysis

Figure C.13 – Critical Facilities, Town of Trent Woods



Source: NCEM IRISK Database, GIS Analysis

Figure C.14 – Critical Facilities, Town of Vanceboro



Source: NCEM IRISK Database, GIS Analysis

Housing

The table below details key housing statistics for Craven County. As a percent of growth from 2010 housing, Craven County's housing stock has grown by 4.9%.

Table C.6 – Housing Statistics, Craven County, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Bridgeton	194	217	11.9%	79.0%	36.4%
Cove City	230	248	7.8%	75.0%	14.1%
Dover	258	260	0.8%	67.8%	9.0%
Havelock	6,844	7,289	6.5%	39.9%	11.2%
New Bern	14,504	15,051	3.8%	50.6%	13.7%
River Bend	1,618	1,640	1.4%	81.3%	11.4%
Trent Woods	1,805	1,887	4.5%	86.1%	7.1%
Vanceboro	359	551	53.5%	44.3%	13.1%
Craven County	**44,302**	**46,453**	**4.9%**	**63.3%**	**12.7%**

Source: US Census Bureau American Community Survey.

Economy

The following tables present key economic statistics for Craven County.

Table C.7 – Economic Indicators, Craven County, 2017

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Bridgeton	65.2%	59.0%	0.0%	34.8%	0.0%
Cove City	50.0%	45.1%	4.9%	50.0%	9.9%
Dover	49.0%	48.5%	0.5%	51.0%	1.0%
Havelock	81.0%	40.5%	4.1%	19.0%	9.1%
New Bern	60.9%	52.5%	5.6%	39.1%	9.6%
River Bend	48.7%	45.5%	2.7%	51.3%	5.7%
Trent Woods	55.9%	53.6%	0.8%	44.1%	1.5%
Vanceboro	55.8%	49.2%	6.6%	44.2%	11.8%
Craven County	**61.8%**	**48.8%**	**4.3%**	**38.2%**	**8.1%**

Source: US Census Bureau American Community Survey.

Table C.8 – Employment by Industry, Craven County, 2017

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Bridgeton	48.5%	10.4%	22.4%	13.4%	5.2%
Cove City	17.8%	9.6%	14.4%	24.7%	33.6%
Dover	13.3%	8.2%	19.4%	14.3%	44.9%
Havelock	24.5%	29.8%	24.0%	11.9%	9.8%
New Bern	34.9%	22.6%	21.1%	8.1%	13.3%
River Bend	29.6%	18.9%	32.0%	9.8%	9.8%
Trent Woods	52.1%	12.3%	24.5%	5.0%	6.2%
Vanceboro	28.2%	22.6%	24.6%	13.1%	11.5%
Craven County	**33.1%**	**20.4%**	**22.0%**	**12.1%**	**12.5%**

Source: US Census Bureau American Community Survey.

C.2 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority by jurisdiction in Craven County than for the Pamlico Sound Region as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are flood and wildfire.

C.2.1 Flood

Table C.9 details the acreage of Craven County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at nearly 62 percent, the Town of Bridgeton has the largest portion of its land area within the mapped 1%-annual-chance floodplain. At least 30 percent of the total land area in New Bern, River Bend, Trent Woods, and Vanceboro all fall within the Special Flood Hazard Area. Neither Cove City nor Dover have any land in the high or moderate risk flood zone. Overall, 27.3 percent of the county's total land area falls within this floodplain.

Table C.9 – Flood Zone Acreage by Jurisdiction, Craven County

Flood Zone	Acreage	Percent of Total (%)
Bridgeton		
Zone AE	808.55	61.7
Zone X (500-year)	177.04	13.5
Zone X Unshaded	325.68	24.8
Total	**1,311.27**	--
Cove City		
Zone X Unshaded	408.00	100.00
Total	**408.00**	--
Dover		
Zone X Unshaded	613.94	100.00
Total	**613.94**	--
Havelock		
Zone AE	1584.2	13.6
Zone X (500-year)	209.97	1.8
Zone X (unshaded)	9,819.81	84.6
Total	**11,613.98**	--
New Bern		
Zone AE	5,740.26	30.1
Zone X (500-year)	676.93	3.6
Zone X (unshaded)	12,629.00	66.3
Total	**19,046.19**	--
River Bend		
Zone AE	745.76	40.7
Zone X (500-year)	28.55	1.6
Zone X (unshaded)	1,060.11	57.8
Total	**1,834.42**	--
Trent Woods		
Zone AE	730.76	32.1
Zone X (500-year)	131.61	5.8
Zone X (unshaded)	1,411.75	62.1
Total	**2,274.12**	--

Vanceboro		
Zone AE	336.1	30.6
Zone X (500-year)	55.2	5.0
Zone X (unshaded)	705.56	64.3
Total	**1,096.86**	**--**
Craven County		
Zone A	19,340.10	3.91
Zone AE	115,854.51	23.41
Zone X(500YR)	11,390.77	2.30
Zone X (unshaded)	348,244.47	70.38
County Total	**494,829.85**	**--**

Source: FEMA Effective DFIRM

Figure C.15 through Figure C.21 reflect the effective mapped flood hazard zones for all jurisdictions that have land in the Special Flood Hazard Area in Craven County, and Figure C.22 through Figure C.28 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table C.10 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and event in Craven County and incorporated jurisdictions. Table C.11 provides building counts and estimated damages for High Potential Loss Structures in the 1%-annual-chance floodplain.

Table C.10 – Critical Facilities Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Craven County Unincorporated Areas			
Commercial Facilities	100 Year	21	$408,780
Communications	100 Year	1	$1,396
Critical Manufacturing	100 Year	8	$101,028
Food and Agriculture	100 Year	11	$8,089
	Floodway	1	$10
Transportation Systems	100 Year	3	$2,640
All Categories	**100 Year**	**44**	**$521,933**
	Floodway	**1**	**$10**
Town of Bridgeton			
Commercial Facilities	100 Year	5	$49,787
City of Havelock			
Government Facilities	100 Year	2	$8,394,367
City of New Bern			
Banking and Finance	100 Year	1	$35,670
Commercial Facilities	100 Year	44	$653,116
Critical Manufacturing	100 Year	10	$278,038
Food and Agriculture	100 Year	6	$7,876
Government Facilities	100 Year	5	$52,249
Healthcare and Public Health	100 Year	2	$17,971
Transportation Systems	100 Year	1	$96
All Categories	**100 Year**	**69**	**$1,045,016**
Town of River Bend			
Commercial Facilities	100 Year	1	$2,680

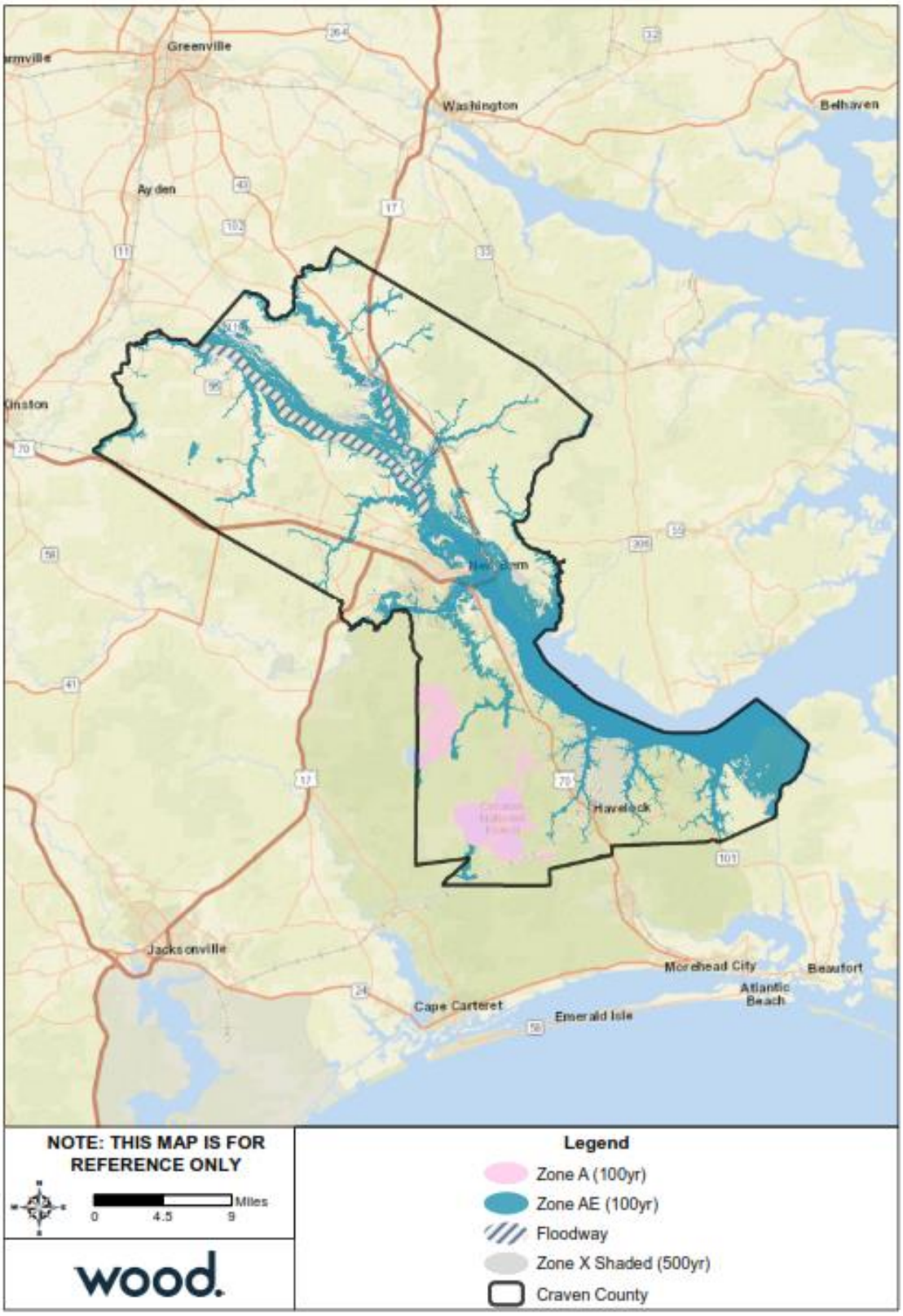
Critical Manufacturing	100 Year	1	$1,624
All Categories	**100 Year**	**2**	**$4,304**

Source: NCEM Risk Management Tool

Table C.11 – High Potential Loss Properties Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Craven County Unincorporated Areas			
Commercial	100 Year	2	$217,381
Residential	100 Year	1	$496,094
All Categories	**100 Year**	**3**	**$713,475**
City of Havelock			
Government	100 Year	2	$8,394,367
City of New Bern			
Commercial	100 Year	1	$17,007
Residential	100 Year	3	$90,609
All Categories	**100 Year**	**4**	**$107,616**
Town of Trent Woods			
Residential	100 Year	3	$118,246

Figure C.15 – FEMA Flood Hazard Areas, Unincorporated Craven County

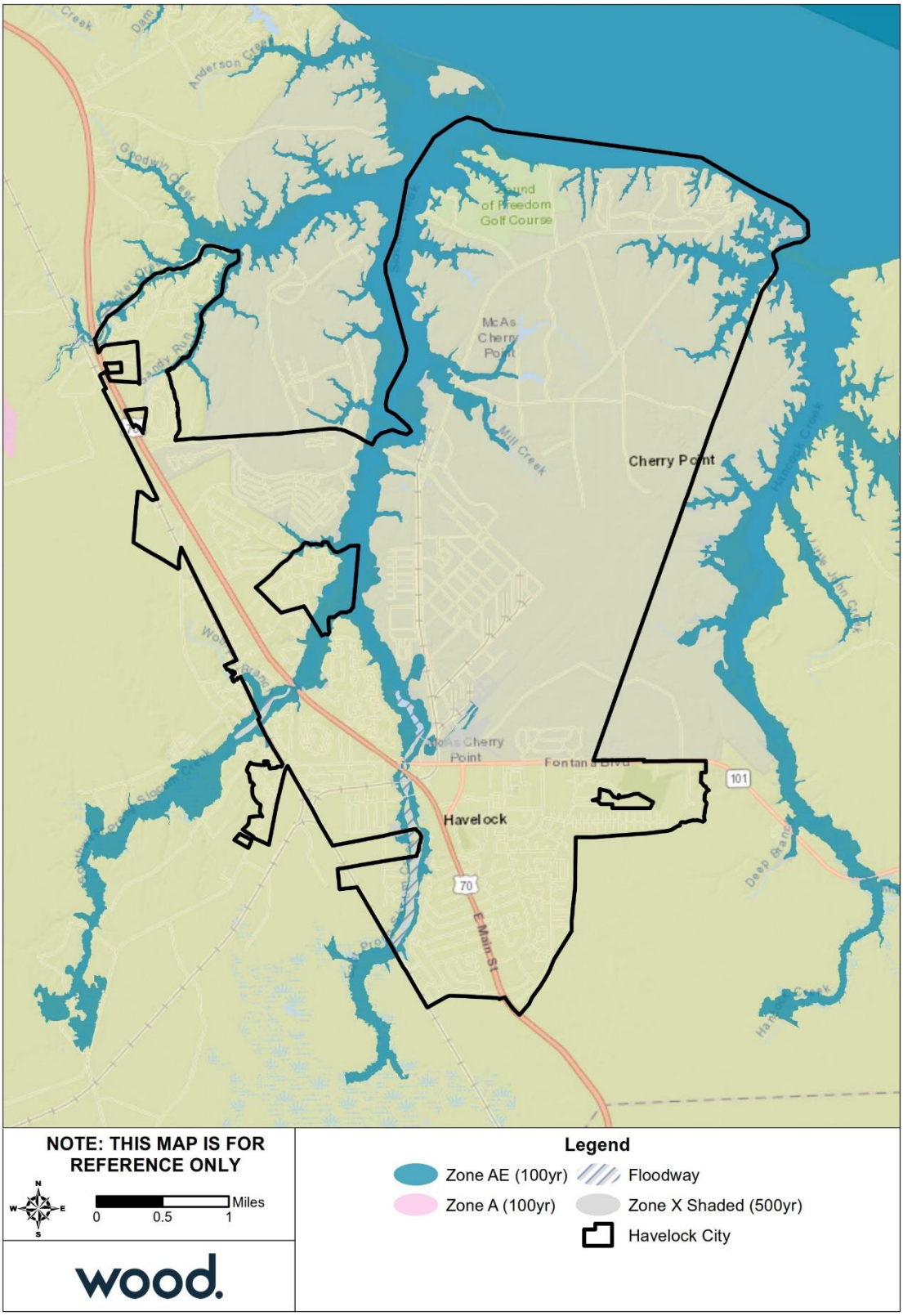


Source: FEMA Effective DFIRM

Figure C.16 – FEMA Flood Hazard Areas, Town of Bridgeton

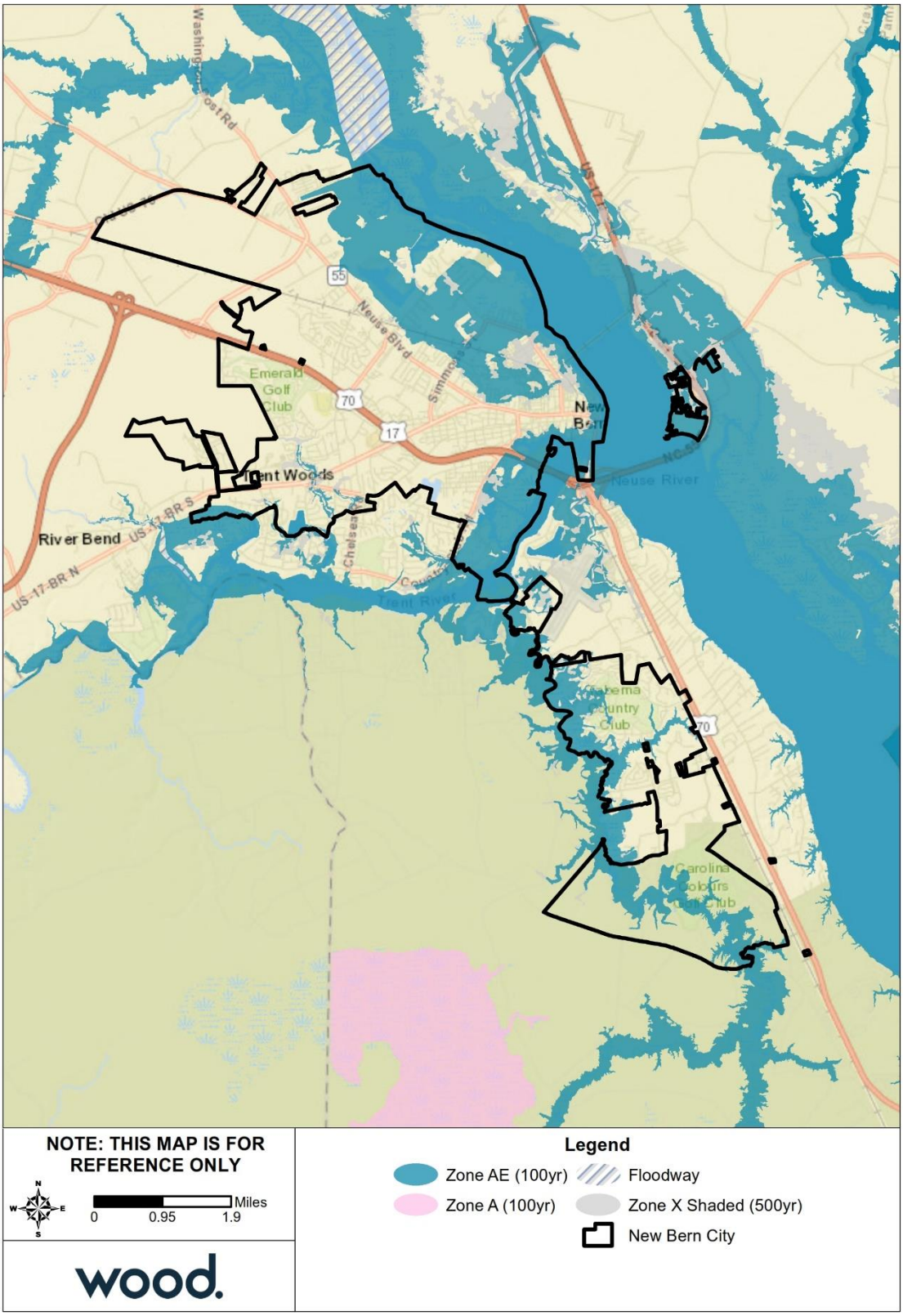
Source: FEMA Effective DFIRM

Figure C.17 – FEMA Flood Hazard Areas, City of Havelock



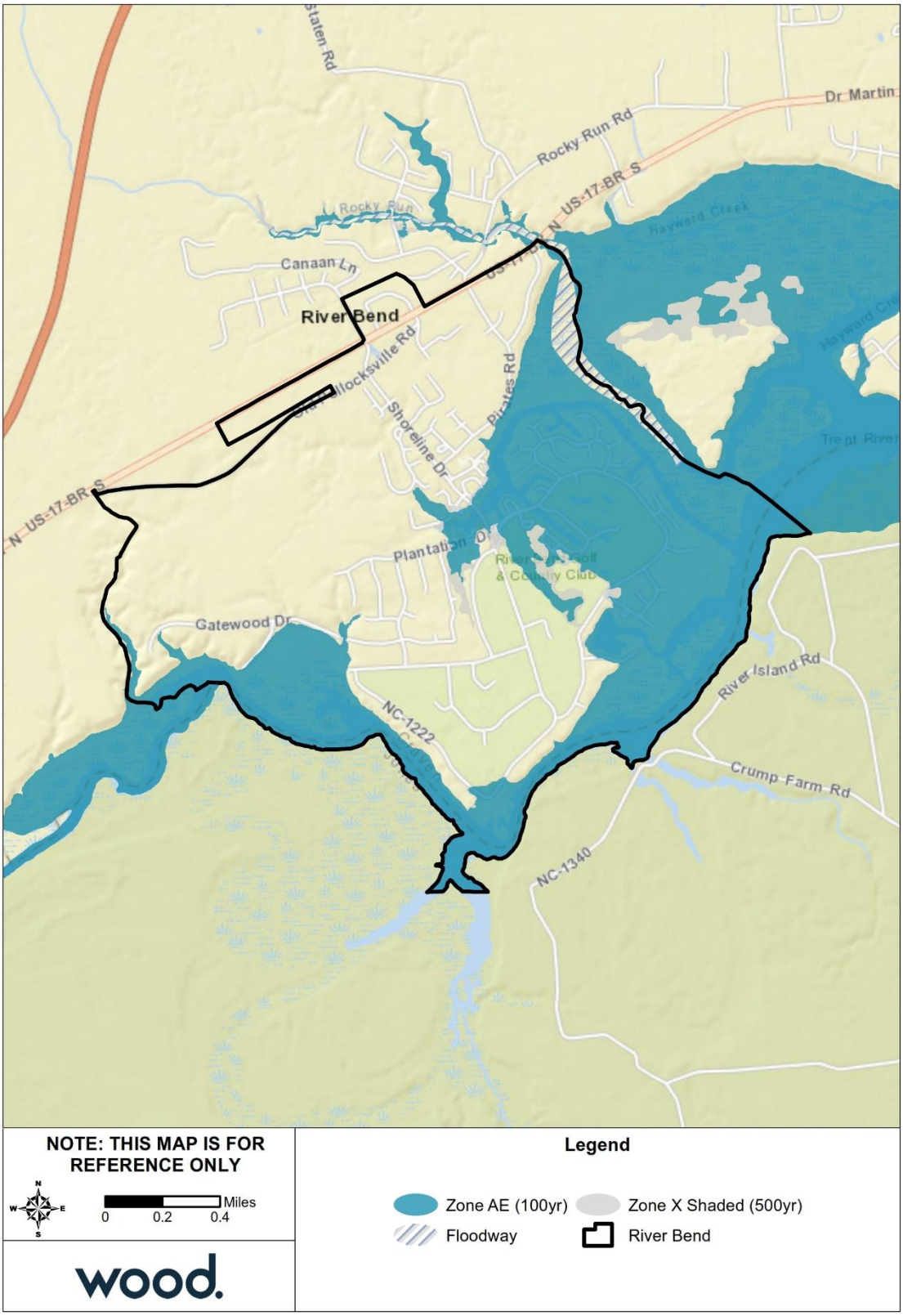
Source: FEMA Effective DFIRM

Figure C.18 – FEMA Flood Hazard Areas, City of New Bern



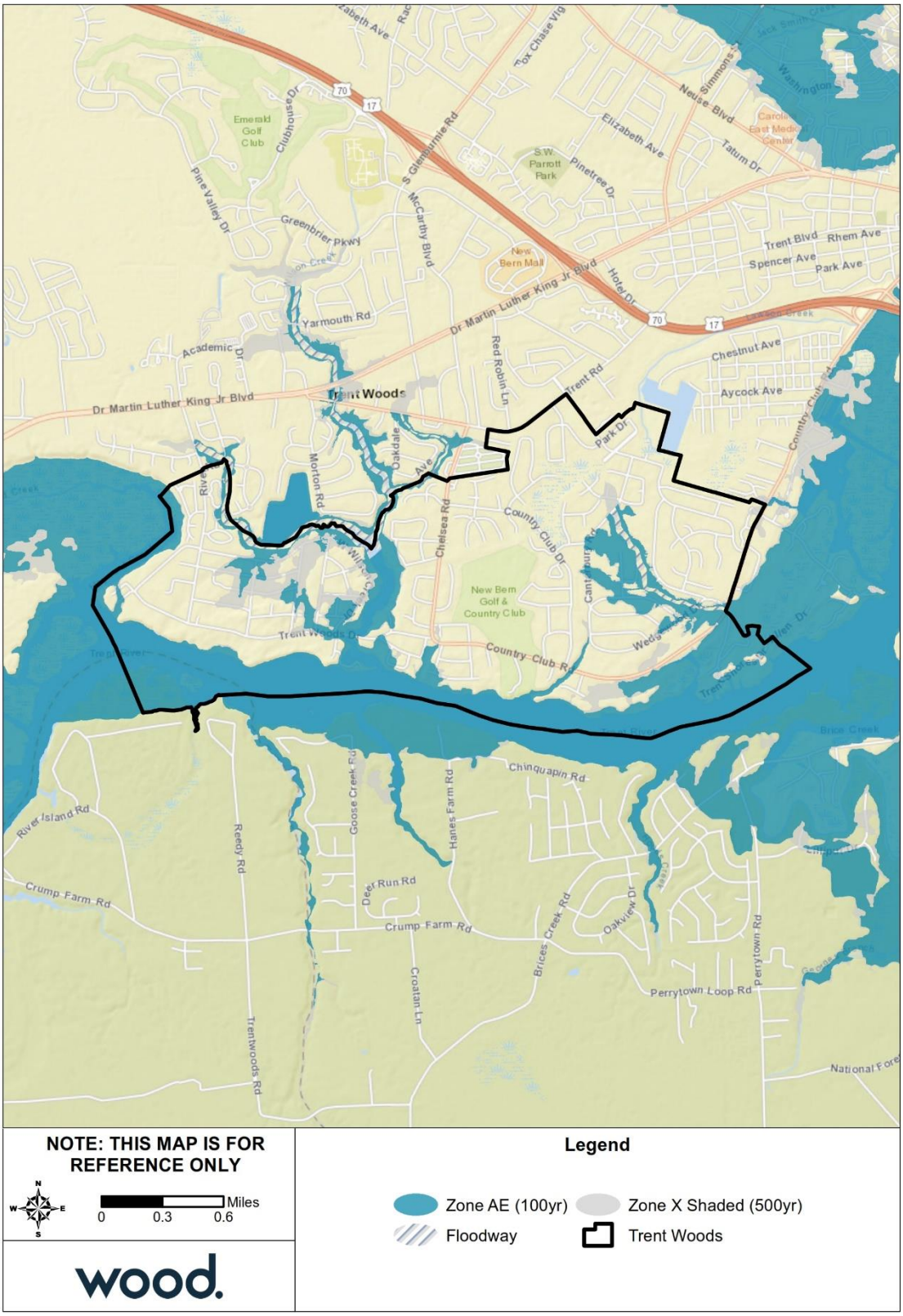
Source: FEMA Effective DFIRM

Figure C.19 – FEMA Flood Hazard Areas, Town of River Bend



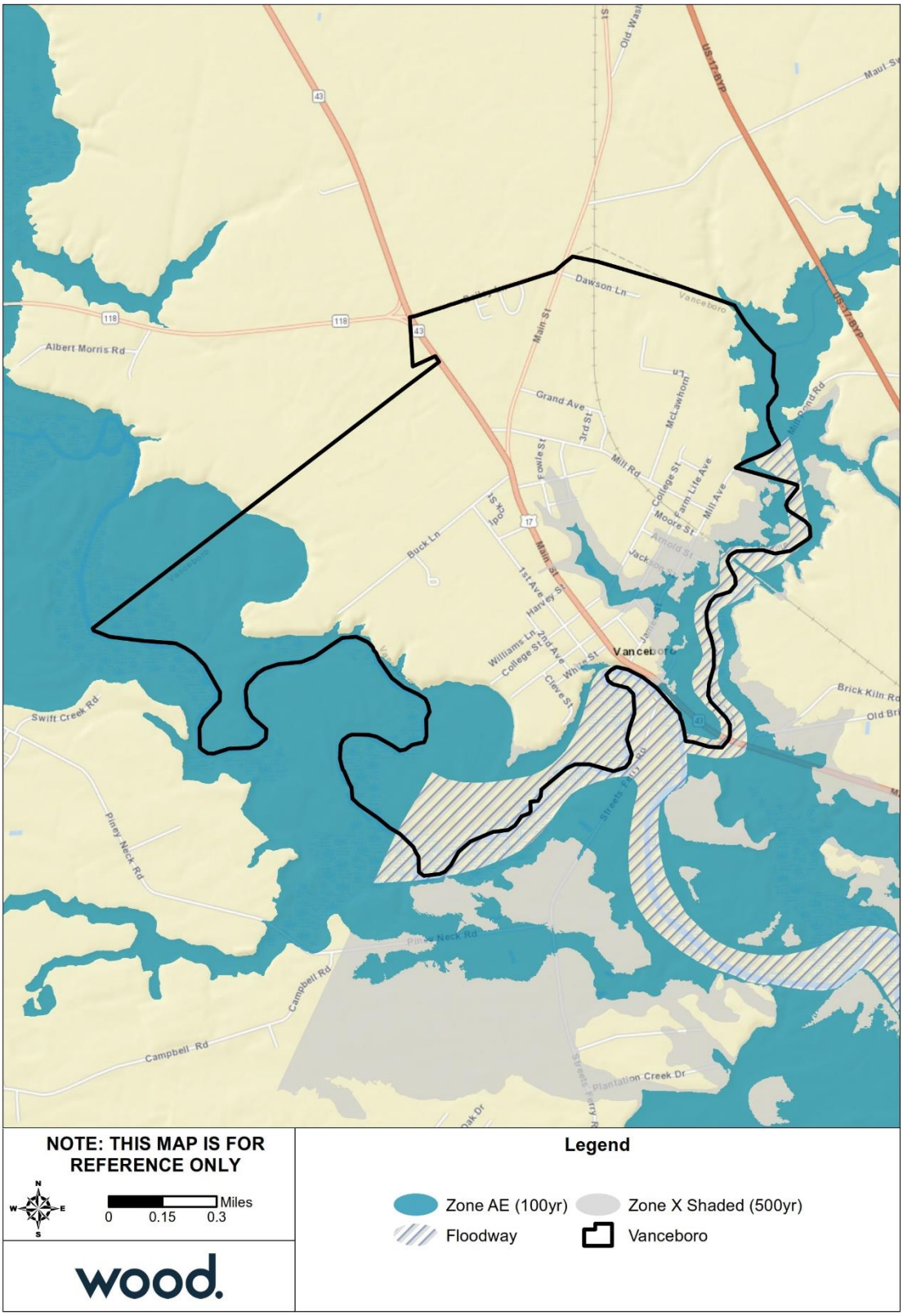
Source: FEMA Effective DFIRM

Figure C.20 – FEMA Flood Hazard Areas, Town of Trent Woods



Source: FEMA Effective DFIRM

Figure C.21 – FEMA Flood Hazard Areas, Town of Vanceboro

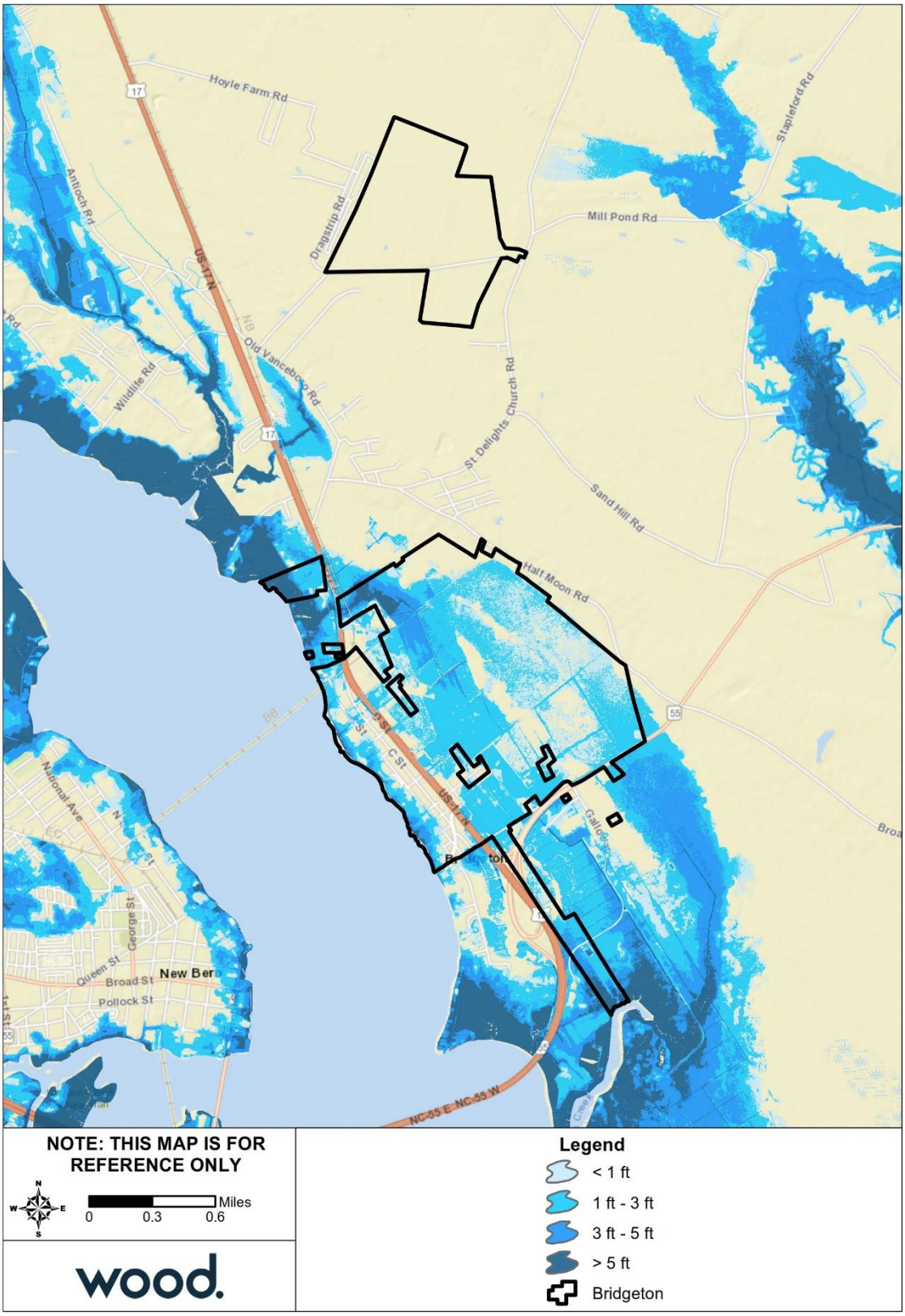


Source: FEMA Effective DFIRM

Figure C.22 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Craven County

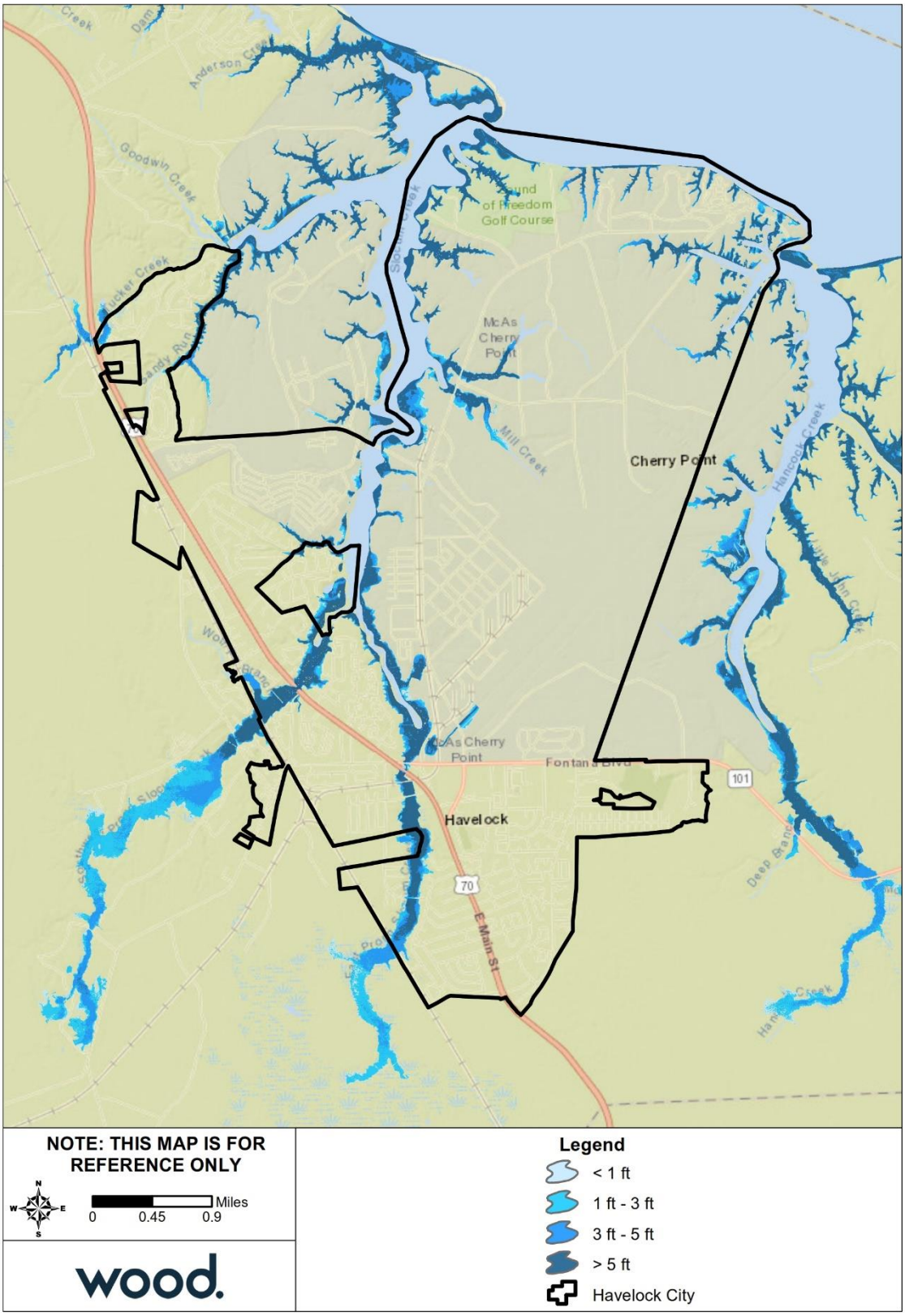
Source: FEMA Effective DFIRM

Figure C.23 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Bridgeton



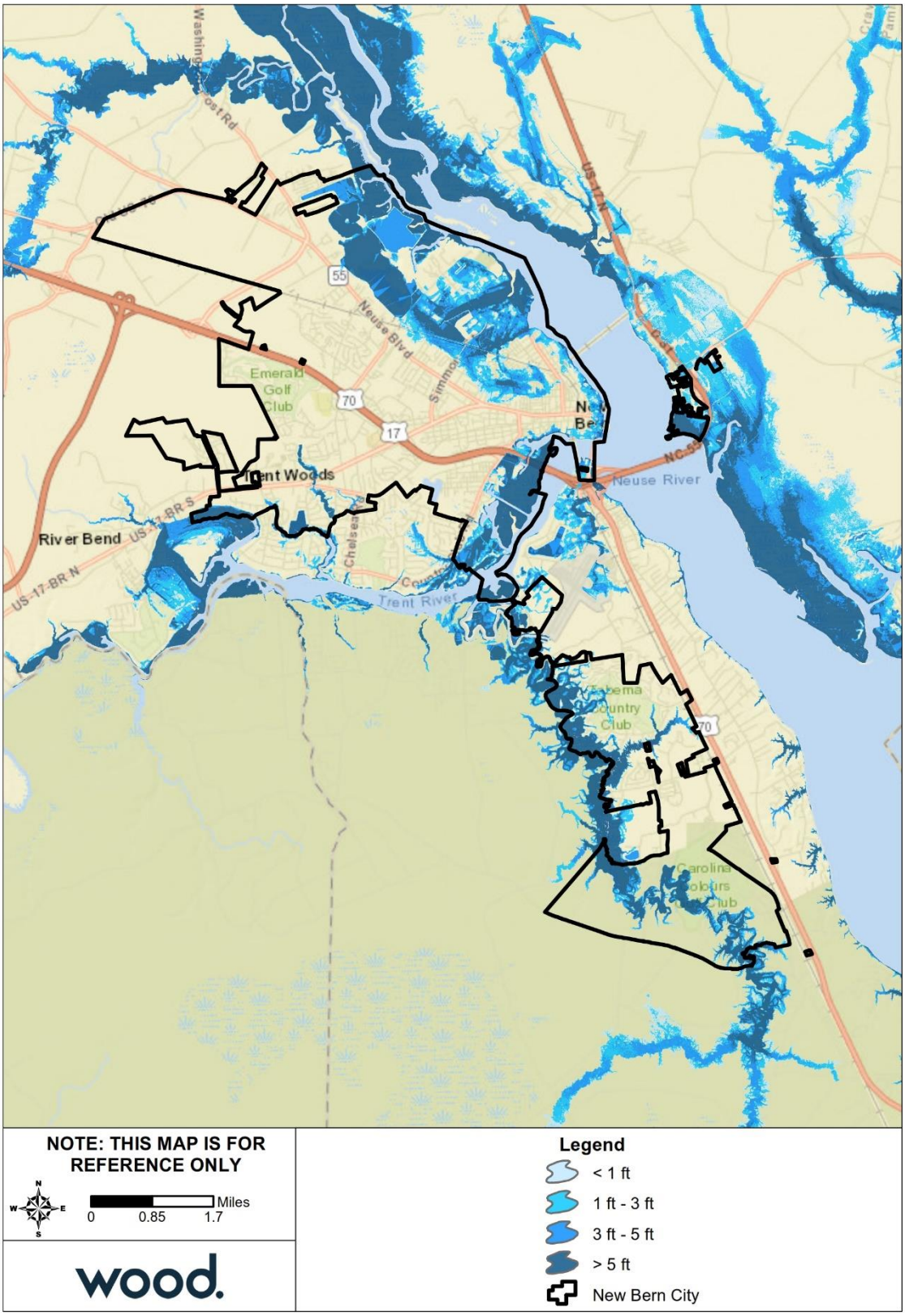
Source: FEMA Effective DFIRM

Figure C.24 – Flood Depth, 1%-Annual-Chance Floodplain, City of Havelock



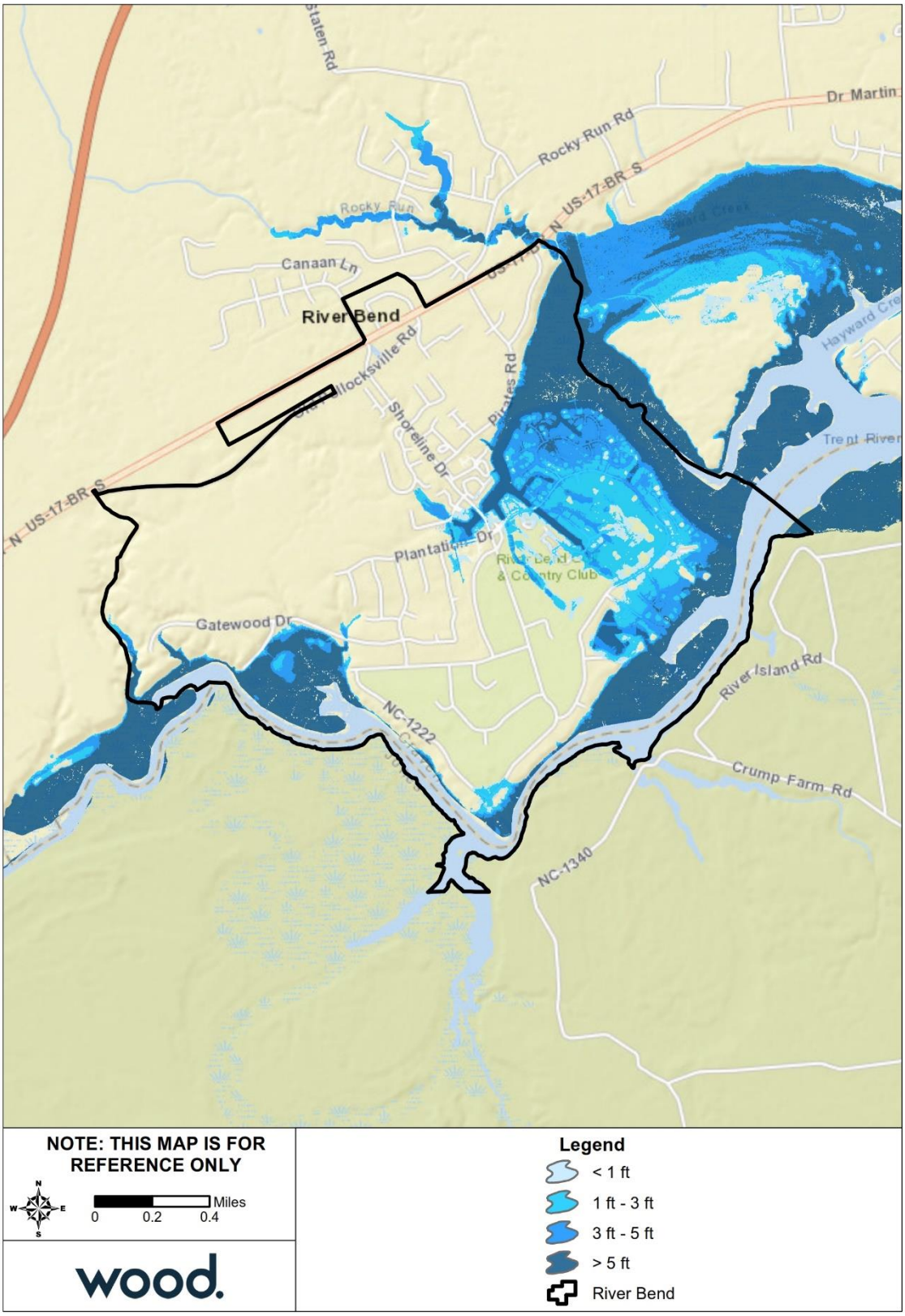
Source: FEMA Effective DFIRM

Figure C.25 – Flood Depth, 1%-Annual-Chance Floodplain, City of New Bern



Source: FEMA Effective DFIRM

Figure C.26 – Flood Depth, 1%-Annual-Chance Floodplain, Town of River Bend

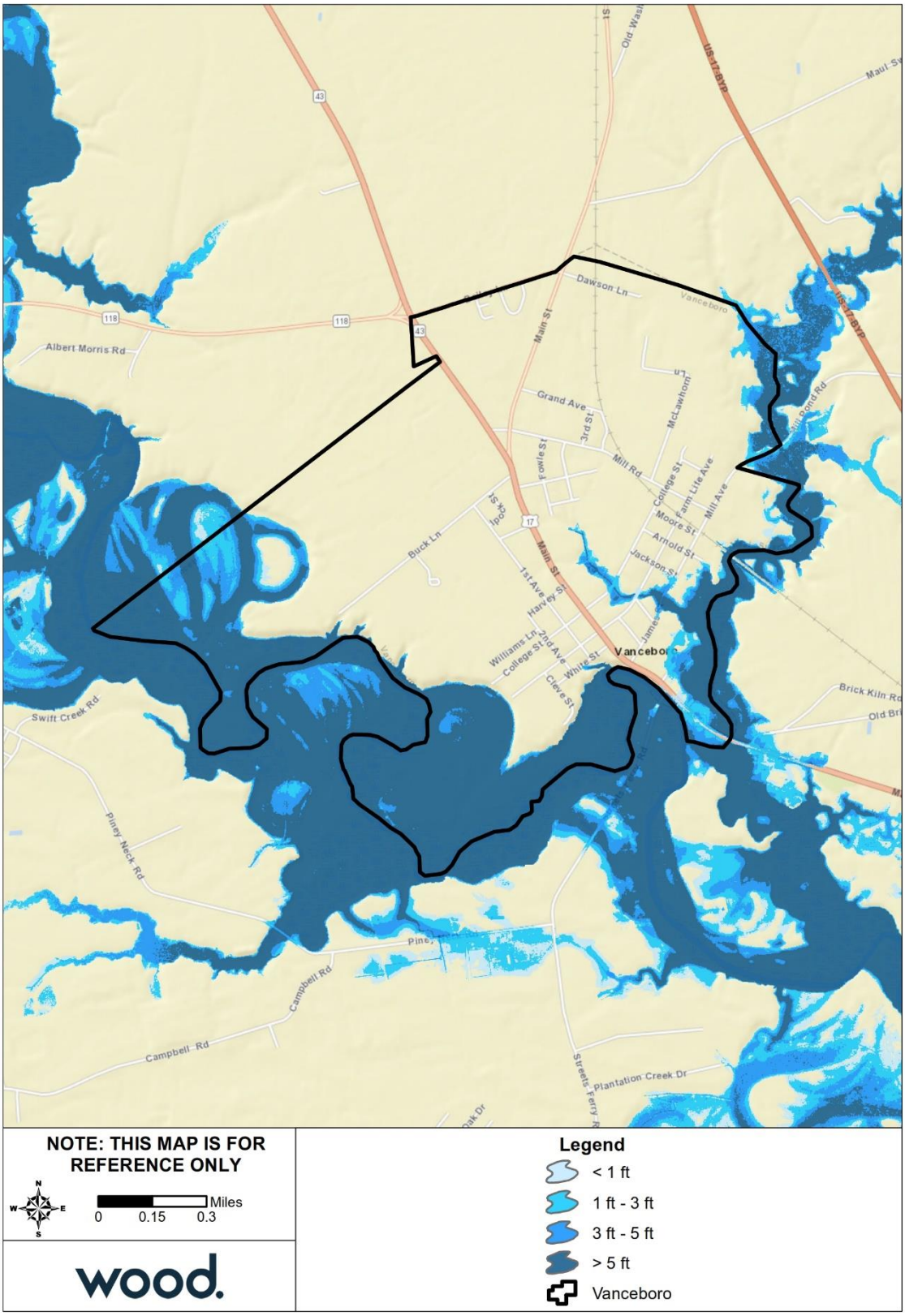


Source: FEMA Effective DFIRM

Figure C.27 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Trent Woods

Source: FEMA Effective DFIRM

Figure C.28 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Vanceboro



Source: FEMA Effective DFIRM

C.2.2 Wildfire

Table C.12 summarizes the acreage in Craven County that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 68 percent of Craven County is not included in the WUI.

Table C.12 – Wildland Urban Interface Acreage, Craven County

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*337,236.4*	*68.3%*
	LT 1hs/40ac	46,685.9	9.5%
	1hs/40ac to 1hs/20ac	21,776.5	4.4%
	1hs/20ac to 1hs/10ac	25,168.3	5.1%
	1hs/10ac to 1hs/5ac	19,710.3	4.0%
	1hs/5ac to 1hs/2ac	19,327.7	3.9%
	1hs/2ac to 3hs/1ac	22,825.1	4.6%
	GT 3hs/1ac	1,007.7	0.2%
	Total	**493,737.7**	

Source: Southern Wildfire Risk Assessment

Figure C.29 depicts the WUI for Craven County and all participating jurisdictions. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure C.32 through Figure C.32 detail the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure C.33 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in the unincorporated areas of Craven County, particularly in the southwestern and northeastern corners of the county as well as south of the Neuse River between Cove City and New Bern. Burn probability is highest in the southwestern corner of the county, and in much of unincorporated areas, it is moderate. Burn probability is low in most incorporated areas. While the southwest corner of the county has both high potential fire intensity and a high burn probability, this area is located outside of the WUI, so a fire here would not likely threaten human life or property.

Table C.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard in Craven County and participating jurisdictions. Table C.14 provides counts and estimated damages for High Potential Loss Properties in these areas.

Table C.13 – Critical Facilities Exposed to Wildfire by Jurisdiction, Craven County

Sector	Number of Buildings at Risk	Estimated Damages
Craven County Unincorporated Area		
Banking and Finance	2	$2,107,757
Commercial Facilities	422	$394,447,997
Communications	2	$309,970
Critical Manufacturing	105	$85,179,620
Defense Industrial Base	1	$6,138,897
Emergency Services	16	$11,961,897

Sector	Number of Buildings at Risk	Estimated Damages
Energy	4	$31,531,666
Food and Agriculture	534	$35,928,462
Government Facilities	32	$87,884,279
Healthcare and Public Health	7	$11,196,935
Transportation Systems	42	$43,047,458
Water	5	$750,000
All Categories	**1,172**	**$710,484,938**
Town of Bath		
Banking and Finance	2	$426,558
Commercial Facilities	43	$14,032,940
Critical Manufacturing	4	$4,537,724
Emergency Services	1	$225,336
Energy	1	$31,000
Government Facilities	3	$1,201,032
Transportation Systems	1	$546,590
All Categories	**55**	**$21,001,180**
Town of Dover		
Healthcare and Public Health	1	$218,943
City of Havelock		
Banking and Finance	5	$11,702,334
Commercial Facilities	158	$193,073,632
Critical Manufacturing	9	$14,188,919
Defense Industrial Base	1	$1,928,422
Emergency Services	1	$3,269,690
Energy	1	$10,000,000
Food and Agriculture	2	$590,046
Government Facilities	9	$85,372,885
Healthcare and Public Health	6	$19,840,538
Transportation Systems	7	$6,744,517
Water	2	$350,000
All Categories	**201**	**$347,060,983**
City of New Bern		
Banking and Finance	3	$2,900,143
Commercial Facilities	98	$148,294,700
Communications	4	$30,807,805
Critical Manufacturing	23	$211,497,683
Emergency Services	1	$2,445,812
Food and Agriculture	5	$511,763
Government Facilities	38	$130,227,796
Healthcare and Public Health	41	$84,253,883
Transportation Systems	36	$18,195,846

Sector	Number of Buildings at Risk	Estimated Damages
Water	7	$1,200,598
All Categories	**256**	**$630,336,029**
Town of River Bend		
Commercial Facilities	11	$12,657,039
Emergency Services	4	$653,213
Government Facilities	1	$588,136
Healthcare and Public Health	10	$19,137,521
Transportation Systems	2	$46,486,207
Water	1	$300,000
All Categories	**29**	**$79,822,116**
Town of Trent Woods		
Commercial Facilities	7	$17,069,741
Critical Manufacturing	2	$787,912
Government Facilities	7	$11,527,619
Transportation Systems	3	$1,311,872
All Categories	**19**	**$30,697,144**
Town of Vanceboro		
Commercial Facilities	57	$25,146,869
Critical Manufacturing	2	$1,080,118
Emergency Services	3	$1,791,515
Food and Agriculture	3	$228,989
Government Facilities	17	$24,257,237
Healthcare and Public Health	4	$3,078,719
Transportation Systems	2	$295,220
All Categories	**88**	**$55,878,667**

Source: NCEM Risk Management Tool

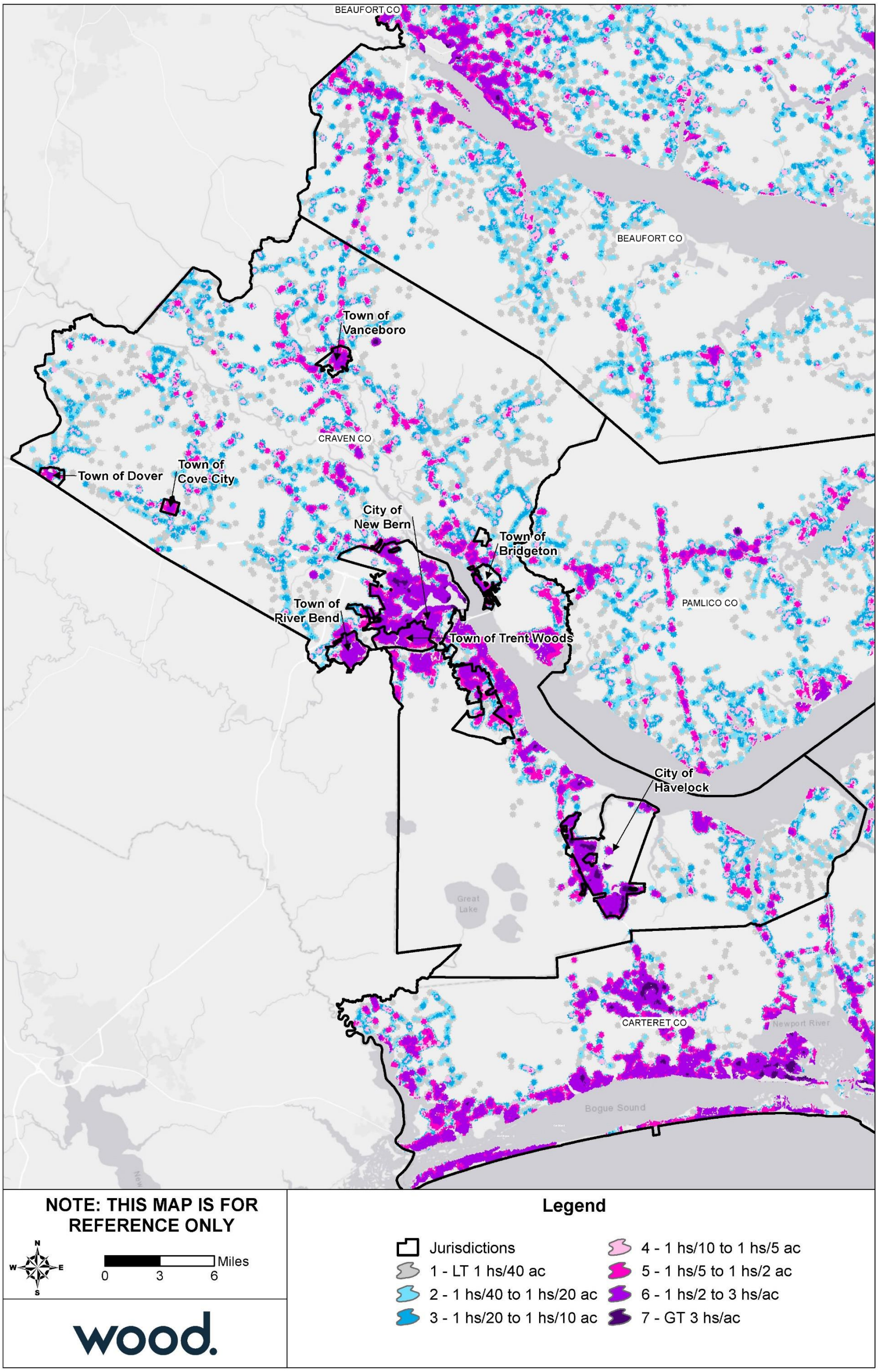
Table C.14 – High Potential Loss Properties Exposed to Wildfire by Jurisdiction, Craven County

Category	Number of Buildings at Risk	Estimated Damages
Craven County Unincorporated Area		
Commercial	6	$15,391,524
Government	11	$36,748,016
Industrial	7	$106,685,966
Religious	26	$73,529,301
Residential	3	$3,728,560
Utilities	3	$30,000,000
All Categories	**56**	**$266,083,367**
City of Havelock		
Commercial	12	$53,157,074
Government	5	$80,182,289
Industrial	1	$6,799,216
Religious	6	$22,694,928
Utilities	1	$10,000,000

Category	Number of Buildings at Risk	Estimated Damages
All Categories	**25**	**$172,833,507**
City of New Bern		
Commercial	28	$140,961,691
Government	20	$156,126,054
Industrial	5	$125,358,456
Religious	6	$16,881,744
Residential	12	$20,961,826
Utilities	2	$67,074,926
All Categories	**73**	**$527,364,697**
Town of River Bend		
Commercial	1	$45,428,086
Religious	1	$2,126,728
All Categories	**2**	**$47,554,814**
Town of Trent Woods		
Government	1	$9,914,313
Religious	4	$13,601,034
All Categories	**5**	**$23,515,347**
Town of Vanceboro		
Commercial	1	$1,681,000
Government	2	$4,169,815
Religious	1	$2,330,510
All Categories	**4**	**$8,181,325**

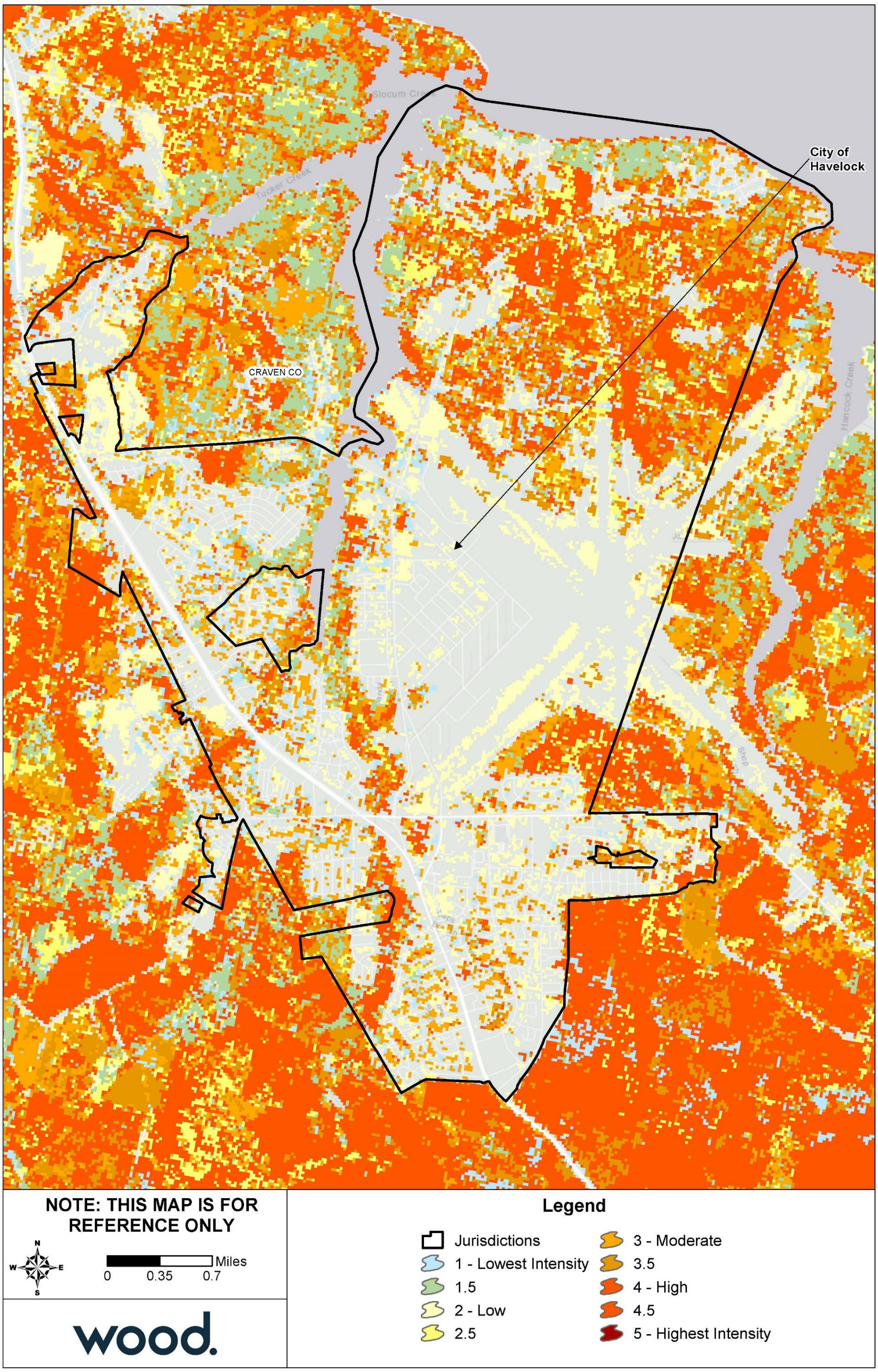
Source: NCEM Risk Management Tool

Figure C.29 – Wildland Urban Interface, Craven County



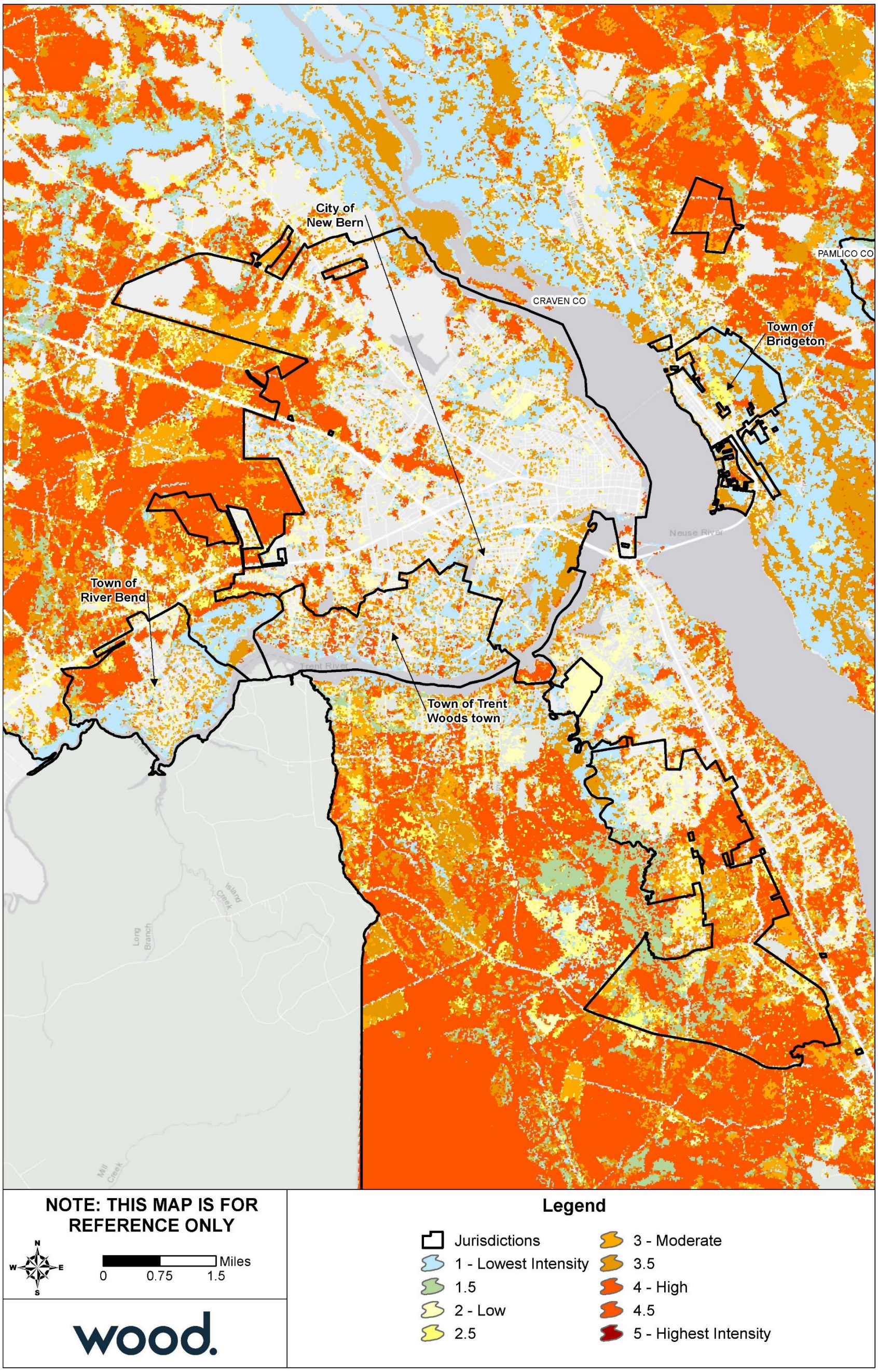
Source: Southern Wildfire Risk Assessment

Figure C.30 – Fire Intensity Scale, Craven County



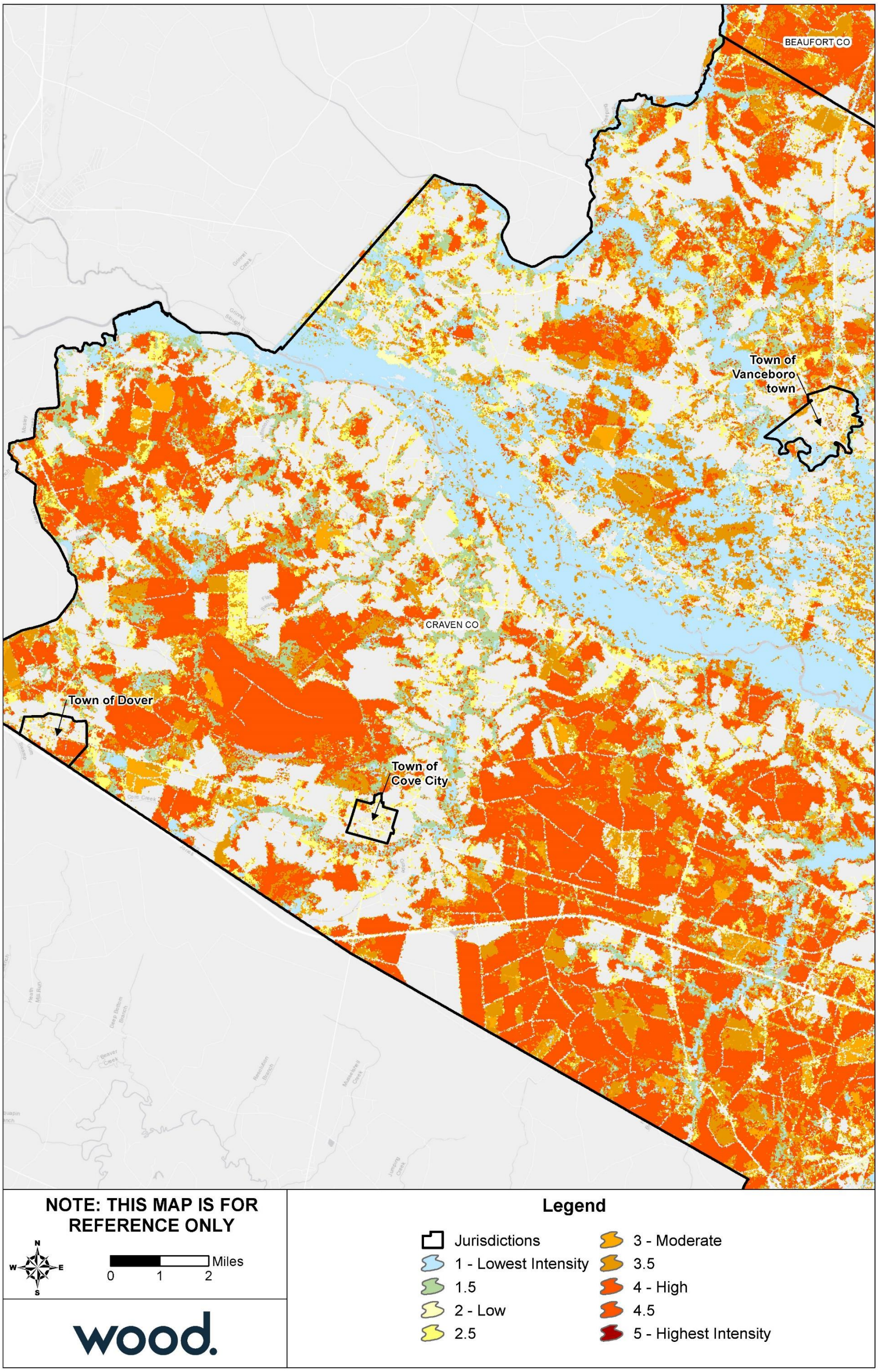
Source: Southern Wildfire Risk Assessment

Figure C.31 – Fire Intensity Scale, Craven County (Detail 2)



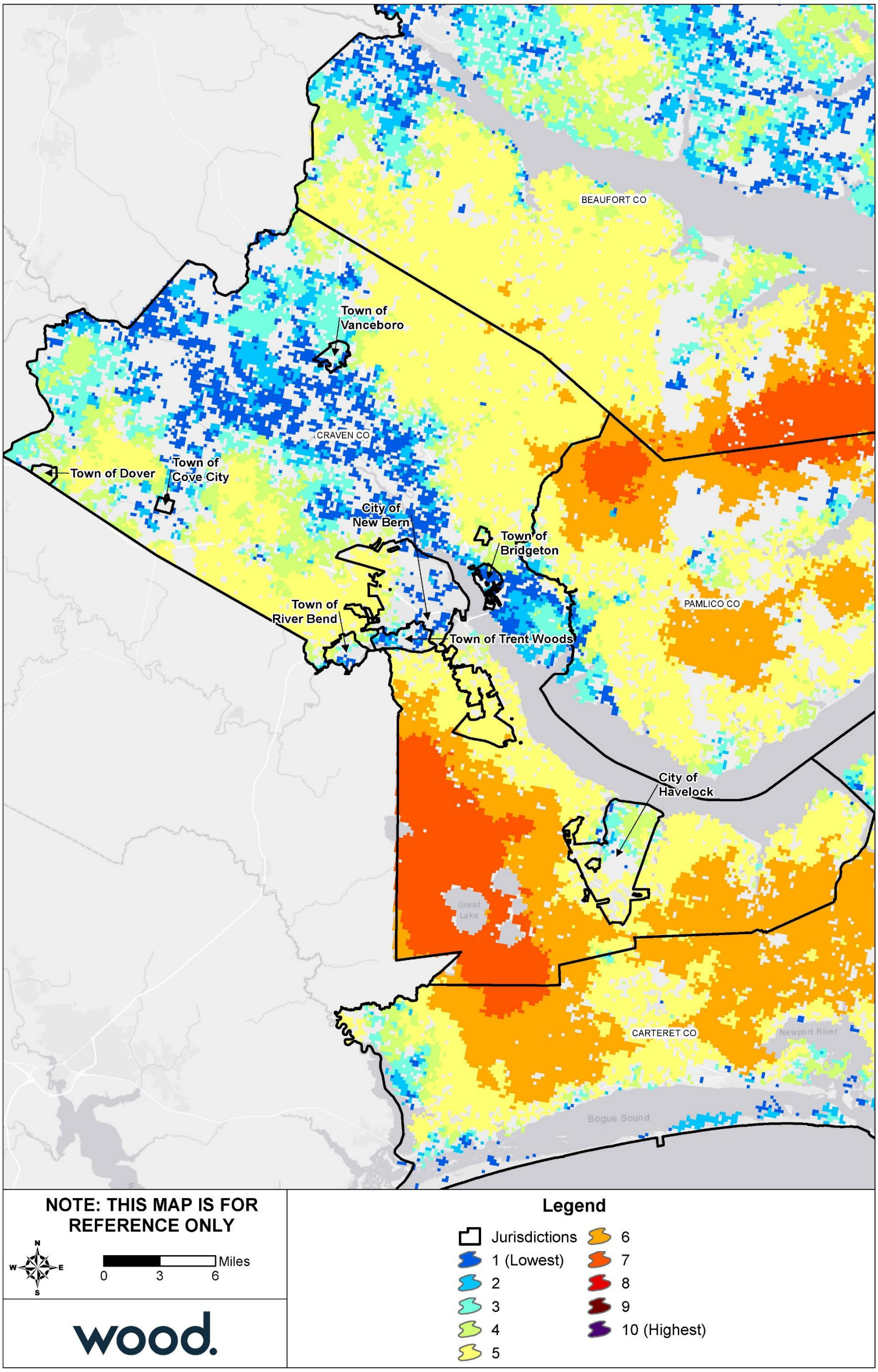
Source: Southern Wildfire Risk Assessment

Figure C.32 – Fire Intensity Scale, Craven County (Detail 3)



Source: Southern Wildfire Risk Assessment

Figure C.33 – Burn Probability, Craven County



Source: Southern Wildfire Risk Assessment

C.3 CAPABILITY ASSESSMENT

C.3.1 Overall Capability

Details on the tools and resources in place and available to Craven County were provided by the County's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Craven County has an overall capability rating of Moderate, however the County self-assessed its overall capability as High. Craven County provides many resources for its incorporated jurisdictions and many of the mitigation projects in this plan are regional in nature, with the County serving as the project lead; therefore, the County's capability is also an indicator for its incorporated areas. The County's Self-Assessment of key capability areas is summarized in Table C.15 below.

Table C.15 – Capability Self-Assessment, Craven County

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

C.3.2 Floodplain Management

The following tables reflect NFIP entry dates as well as policy and claims data for Craven County and incorporated categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table C.16 – NFIP Program Entry Dates

Community	Regular Entry Date
Craven County (Unincorporated Area)	May 4, 1987
Town of Bridgeton	May 4, 1987
Town of Cove City	July 2, 2004
Town of Dover	May 29, 2007
City of Havelock	May 4, 1987
City of New Bern	June 1, 1978
Town of River Bend	August 19, 1986
Town of Trent Woods	May 4, 1987
Town of Vanceboro	August 4, 1988

Table C.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Craven County Unincorporated Area					
Single Family	2,369	$1,353,649	$619,976,400	2,236	$85,990,386.46
2-4 Family	122	$45,186	$19,747,000	124	$4,668,283.50
All Other Residential	149	$42,446	$22,209,500	28	$3,434,745.80
Non-Residential	49	$76,983	$12,488,300	43	$2,456,983.10
Total	**2,689**	**$1,518,264**	**$674,421,200**	**2,431**	**$96,550,398.86**

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Bridgeton					
Single Family	71	$46,680	$13,364,900	85	$2,601,932.19
2-4 Family	8	$12,709	$1,487,200	7	$269,886.94
All Other Residential	1	$977	$121,000	1	$15,627.83
Non-Residential	6	$15,721	$2,550,000	3	$152,498.82
Total	**86**	**$76,087**	**$17,523,100**	**96**	**$3,039,945.78**
Town of Cove City					
Single Family	1	$345	$210,000	0	$0.00
Town of Dover					
Single Family	1	$307	$140,000	0	$0.00
City of Havelock					
Single Family	294	$119,639	$69,767,600	134	$4,807,458.31
2-4 Family	1	$137	$20,000	1	$61,147.62
All Other Residential	1	$137	$20,000	4	$250,128.11
Non-Residential	6	$8,764	$1,522,500	2	$486,410.42
Total	302	$128,677	$71,330,100	141	$5,605,144.46
City of New Bern					
Single Family	1,336	$868,966	$294,484,300	1,300	$47,472,267.45
2-4 Family	96	$59,297	$18,201,100	73	$2,575,801.21
All Other Residential	189	$63,785	$37,645,700	76	$2,577,133.63
Non-Residential	97	$229,518	$36,244,900	106	$9,902,533.78
Total	**1,718**	**$1,221,566**	**$386,576,000**	**1,555**	**$62,527,736.07**
Town of River Bend					
Single Family	496	$380,626	$113,617,400	705	$39,322,761.07
2-4 Family	18	$12,972	$3,060,100	25	$1,173,619.15
All Other Residential	0	$0	$0	4	$131,641.61
Non-Residential	1	$791	$60,500	2	$378,287.88
Total	**515**	**$394,389**	**$116,738,000**	**736**	**$41,006,309.71**
Town of Trent Woods					
Single Family	341	$215,254	$101,522,900	227	$13,162,508.58
2-4 Family	2	$579	$310,000	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	6	$5,893	$1,933,400	3	$626,878.29
Total	**349**	**$221,726**	**$103,766,300**	**230**	**$13,789,386.87**
Town of Vanceboro					
Single Family	6	$3,144	$1,334,600	3	$15,959.35
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$739	$500,000	0	$0.00
Total	**7**	**$3,883**	**$1,834,600**	**3**	**$15,959.35**

Source: FEMA Community Information System, accessed September 2019

Table C.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Craven County Unincorporated Area					
A01-30 & AE Zones	1,668	$1,063,312	$391,598,100	2,164	$90,309,444.32

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A Zones	2	$1,721	$366,500	40	$1,098,474.10
B, C & X Zone					
Standard	32	$45,969	$7,286,700	28	$1,050,540.91
Preferred	889	$348,462	$269,202,000	145	$3,852,208.63
Total	**2,591**	**$1,459,464**	**$668,453,300**	**2,377**	**$96,310,667.96**
Town of Bridgeton					
A01-30 & AE Zones	70	$66,655	$14,368,900	92	$2,848,635.57
B, C & X Zone					
Preferred	12	$7,032	$2,875,000	3	$131,310.21
Total	**82**	**$73,687**	**$17,243,900**	**96**	**$3,039,945.78**
Town of Cove City					
B, C & X Zone					
Preferred	1	$345	$210,000	0	$0.00
Town of Dover					
B, C & X Zone					
Preferred	1	$307	$140,000	0	$0.00
City of Havelock					
A01-30 & AE Zones	28	$24,665	$7,295,700	54	$2,868,557.96
A Zones	0	$0	$0	1	$860.56
B, C & X Zone					
Standard	6	$12,444	$1,990,000	10	$601,677.73
Preferred	265	$89,768	$61,835,000	76	$2,134,048.21
Total	**299**	**$126,877**	**$71,120,700**	**141**	**$5,605,144.46**
City of New Bern					
A01-30 & AE Zones	1,004	$908,091	$216,281,000	1,389	$58,475,760.26
V01-30 & VE Zones	0	$0	$0	8	$171,500.11
B, C & X Zone					
Standard	13	$21,168	$3,054,600	24	$876,325.99
Preferred	633	$251,507	$162,494,000	123	$2,955,970.11
Total	**1,650**	**$1,180,766**	**$381,829,600**	**1,544**	**$62,479,556.47**
Town of River Bend					
A01-30 & AE Zones	365	$332,537	$80,129,600	704	$39,639,772.81
B, C & X Zone					
Standard	4	$5,131	$936,400	9	$660,826.43
Preferred	131	$47,721	$34,625,000	20	$698,806.58
Total	**500**	**$385,389**	**$115,691,000**	**733**	**$40,999,405.82**
Town of Trent Woods					
A01-30 & AE Zones	163	$140,395	$44,176,600	186	$11,836,148.44
A Zones	0	$0	$0	2	$16,609.82
B, C & X Zone					
Standard	4	$7,075	$947,100	10	$1,310,836.72
Preferred	180	$73,056	$58,503,000	32	$625,791.89
Total	**347**	**$220,526**	**$103,626,700**	**230**	**$13,789,386.87**
Town of Vanceboro					
A01-30 & AE Zones	4	$2,693	$854,600	0	$0.00
A Zones	0	$0	$0	1	$3,323.29
B, C & X Zone					

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	0	$0	$0	0	$0.00
Preferred	3	$1,190	$980,000	2	$12,636.06
Total	**7**	**$3,883**	**$1,834,600**	**3**	**$15,959.35**

Source: FEMA Community Information System, accessed September 2019

Table C.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Craven County Unincorporated Area					
A01-30 & AE Zones	620	$458,682	$118,502,500	1,006	$39,652,968.88
A Zones	1	$1,159	$108,900	31	$959,802.18
B, C & X Zone	227	$101,862	$63,143,400	90	$2,416,742.47
Standard	12	$16,826	$2,387,400	19	$420,391.57
Preferred	215	$85,036	$60,756,000	71	$1,996,350.90
Total	**848**	**$561,703**	**$181,754,800**	**1,127**	**$43,029,513.53**
Town of Bridgeton					
A01-30 & AE Zones	53	$53,914	$9,514,200	75	$2,520,212.34
B, C & X Zone	10	$6,171	$2,245,000	2	$131,543.33
Standard	0	$0	$0	1	$60,000.00
Preferred	10	$6,171	$2,245,000	1	$71,543.33
Total	**63**	**$60,085**	**$11,759,200**	**77**	**$2,651,755.67**
Town of Cove City					
B, C & X Zone	1	$345	$210,000	0	$0.00
Preferred	1	$345	$210,000	0	$0.00
Town of Dover					
B, C & X Zone	1	$307	$140,000	0	$0.00
Preferred	1	$307	$140,000	0	$0.00
City of Havelock					
A01-30 & AE Zones	18	$17,343	$4,387,400	44	$1,839,969.07
A Zones	0	$0	$0	1	$860.56
B, C & X Zone	150	$61,550	$35,523,000	69	$2,074,371.96
Standard	6	$12,444	$1,990,000	10	$601,677.73
Preferred	144	$49,106	$33,533,000	59	$1,472,694.23
Total	**168**	**$78,893**	**$39,910,400**	**114**	**$3,915,201.59**
City of New Bern					
A01-30 & AE Zones	457	$592,632	$79,864,600	932	$34,387,158.75
V01-30 & VE Zones	0	$0	$0	8	$171,500.11
B, C & X Zone	270	$110,692	$63,719,400	90	$2,267,588.23
Standard	7	$10,550	$1,457,400	20	$733,803.54
Preferred	263	$100,142	$62,262,000	70	$1,533,784.69
Total	**727**	**$703,324**	**$143,584,000**	**1,030**	**$36,826,247.09**
Town of River Bend					
A01-30 & AE Zones	246	$242,333	$48,992,800	481	$26,723,367.71
B, C & X Zone	60	$23,679	$15,461,400	14	$752,470.49
Standard	2	$2,784	$436,400	4	$290,587.69
Preferred	58	$20,895	$15,025,000	10	$461,882.80
Total	**306**	**$266,012**	**$64,454,200**	**495**	**$27,475,838.20**

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Town of Trent Woods					
A01-30 & AE Zones	101	$101,449	$25,964,100	130	$8,960,190.60
A Zones	0	$0	$0	2	$16,609.82
B, C & X Zone	121	$54,496	$38,385,100	33	$1,783,630.22
Standard	4	$7,075	$947,100	10	$1,310,836.72
Preferred	117	$47,421	$37,438,000	23	$472,793.50
Total	**222**	**$155,945**	**$64,349,200**	**165**	**$10,760,430.64**
Town of Vanceboro					
A01-30 & AE Zones	3	$2,059	$640,100	0	$0.00
A Zones	0	$0	$0	1	$3,323.29
B, C & X Zone	3	$1,190	$980,000	2	$12,636.06
Standard	0	$0	$0	0	$0.00
Preferred	3	$1,190	$980,000	2	$12,636.06
Total	**6**	**$3,249**	**$1,620,100**	**3**	**$15,959.35**

Source: FEMA Community Information System, accessed September 2019

Table C.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Craven County Unincorporated Area					
A01-30 & AE Zones	1,048	$604,630	$273,095,600	1,158	$50,656,475.44
A Zones	1	$562	$257,600	9	$138,671.92
B, C & X Zone	694	$292,569	$213,345,300	83	$2,486,007.07
Standard	20	$29,143	$4,899,300	9	$630,149.34
Preferred	674	$263,426	$208,446,000	74	$1,855,857.73
Total	**1,743**	**$897,761**	**$486,698,500**	**1,250**	**$53,281,154.43**
Town of Bridgeton					
A01-30 & AE Zones	17	$12,741	$4,854,700	17	$328,423.23
B, C & X Zone	2	$861	$630,000	2	$59,766.88
Preferred	2	$861	$630,000	2	$59,766.88
Total	**19**	**$13,602**	**$5,484,700**	**19**	**$388,190.11**
City of Havelock					
A01-30 & AE Zones	10	$7,322	$2,908,300	10	$1,028,588.89
B, C & X Zone	121	$40,662	$28,302,000	17	$661,353.98
Standard	0	$0	$0	0	$0.00
Preferred	121	$40,662	$28,302,000	17	$661,353.98
Total	**131**	**$47,984**	**$31,210,300**	**27**	**$1,689,942.87**
City of New Bern					
A01-30 & AE Zones	547	$315,459	$136,416,400	457	$24,088,601.51
B, C & X Zone	376	$161,983	$101,829,200	57	$1,564,707.87
Standard	6	$10,618	$1,597,200	4	$142,522.45
Preferred	370	$151,365	$100,232,000	53	$1,422,185.42
Total	**923**	**$477,442**	**$238,245,600**	**514**	**$25,653,309.38**
Town of River Bend					
A01-30 & AE Zones	119	$90,204	$31,136,800	223	$12,916,405.10
B, C & X Zone	75	$29,173	$20,100,000	15	$607,162.52
Standard	2	$2,347	$500,000	5	$370,238.74

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Preferred	73	$26,826	$19,600,000	10	$236,923.78
Total	**194**	**$119,377**	**$51,236,800**	**238**	**$13,523,567.62**
Town of Trent Woods					
A01-30 & AE Zones	62	$38,946	$18,212,500	56	$2,875,957.84
B, C & X Zone	63	$25,635	$21,065,000	9	$152,998.39
Standard	0	$0	$0	0	$0.00
Preferred	63	$25,635	$21,065,000	9	$152,998.39
Total	**125**	**$64,581**	**$39,277,500**	**65**	**$3,028,956.23**
Town of Vanceboro					
A01-30 & AE Zones	1	$634	$214,500	0	$0.00
Total	**1**	**$634**	**$214,500**	**0**	**$0.00**

Source: FEMA Community Information System, accessed September 2019

C.4 MITIGATION STRATEGY

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR1	Review respective Comprehensive Land Use Plans annually to ensure that the Future Land Use Map adequately delineates portions of the community deemed unsuitable for development due to existing environmental conditions. This effort will also involve the identification of potential drainage easements and open space areas that will positively affect drainage conditions within areas documented as stormwater/flooding hot spots. Additionally, the County will attempt to identify portions of the County susceptible to wildfire damage.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDCM, NCDPS	2 to 3 years	Carry Forward – Not Started	Craven County, as well as participating municipal jurisdictions, will consider updating the County's Comprehensive land Use Plan over the next three fiscal years.
CR2	Review respective Flood Damage Prevention Ordinances to assess whether any revisions and/or updates have been mandated by FEMA or NCEM. Additionally, jurisdictions will consider whether regulatory options are available to provide for more effective floodplain management.	Craven County, Bridgeton, Cove City, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS	Other – Review annually	Ongoing – As Needed	Craven County, as well as all participating municipal jurisdictions, will review their respective Flood Damage Prevention Ordinances annually, or as directed by NCDPS.
CR3	Continue to support NCDENR in efforts to enforce the Neuse River Basinwide Water Quality Management Rules.	Craven County, Havelock, New Bern, River Bend, Trent Woods	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Low	1	1.3	NRP	• **Craven County Planning Department** • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	These rules are currently being enforced. Changes in standards will coincide with amendments established by NCDEQ.
CR4	Consider the data and recommendations outlined within this plan when preparing updates to respective Capital Improvements Plans. All recommendations regarding capital expenditures will focus on siting infrastructure and public facilities outside of the Flood Hazard Area.	Craven County, New Bern, River Bend, Havelock	All Hazards	Med	1	1.3	SP	• **Craven County Board of Commissioners** • Municipal Elected Boards	Staff Time	GF	Other – review annually with budget preparation	In Progress – Carry Forward	Craven County, New Bern, River Ben and Havelock establish capital outlay for infrastructure projects through their respective Capital Improvements Plans. This will continue to occur in line with annual budget preparation.
CR5	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Craven County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.1	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Craven County in coordination with all participating municipal jurisdictions will utilize annual as well as post disaster funding to treat repetitive loss properties through elevation or acquisition/demolition.
CR6	Continue to expand upon the County's Emergency Notification System available to all residents. Craven County Emergency Services will coordinate with all municipal jurisdictions regarding registration.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	$21,000	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County utilizes, and will continue to employ, the CODE RED Emergency Alert System to notify residents of the status of natural hazard events.
CR7	Consider all of the data, information, maps and recommendations outlined throughout this plan when siting for the development of all new critical facilities.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	PP	• **Craven County Board of Commissioners** • Municipal Elected Boards	To Be Determined	GF, NCDPS, FEMA, USDA	Ongoing – as needed	In Progress – Carry Forward	Mitigation measures will be considered any time development or relocation of any County or Municipal facility (critical) takes place.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR8	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Craven County will coordinate with NCEM, American Red Cross, local animal shelters, local care homes, etc., in making determinations related to need and capacity required in the event of a disaster.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.1	P	• **Craven County Emergency Services** • Craven County Board of Commissioners • Municipal Elected Boards	Staff Time	GF, NCDPS, American Red Cross	2 to 3 years	In Progress – Carry Forward	Craven County in coordination with all participating municipal jurisdictions, will work through this exercise annually, as well as following the effects of a natural hazard event through the corrective action planning process.
CR9	In conjunction with annual EOP updates, determine if access to all critical facilities is readily available in the event of a flooding event. Careful consideration should be given to localized flooding issues that may restrict access along limited access thoroughfares. Where access issues are identified, the County will establish a plan for alternative transportation.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
CR10	Continue to maintain the County's Continuity of Operations (COP). This effort will include an annual update addressing risk management, service retention, alternative staffing procedures and recovery checklist for each County department.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County COOP is reviewed annually and updated as necessary.
CR11	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	3	3.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
CR12	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Wildfire	High	4	4.1	PP	• **Craven County Emergency Services** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	This strategy will be completed through implementation of this update.
CR13	Work to expand upon the County's Special Medical Needs Registry (SMNR). The SMNR is available to all County residents. Effective participation will require close cooperation between County ES and local government staff members. All jurisdictions will work to advertise the availability of this service within their respective communities. It should be noted that applicants must be approved once application is made. Application alone does not result in guaranteed emergency service.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	Med	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF	Ongoing – over next five years	In Progress – Carry Forward	The County will work with participating municipal jurisdictions to advertise, maintain, and expand upon the County's special needs registry.
CR14	Continue to maintain the County's Local Emergency Planning Committee (LEPC) focused on monitoring the presence and proliferation of hazard materials throughout the County. The LEPC and County staff will continue to monitor these materials as submitted.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Hurricane & Tropical Storm, Flood	Med	4	4.2	ES	• **Craven County LEPC**	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County Emergency Management will coordinate and maintain the County LEPC with representation from all participating municipalities.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
CR15	Maintain information on the County website relating to evacuation and sheltering. Emergency information on the website will include: evacuation routes, sheltering, delays and closures, pet sheltering options, and special needs information.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	2	2.2	ES	• **Craven County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – next 5 years	In Progress – Carry Forward	Craven County maintains this information on the County's website and will continue to do so through the planning period.
CR16	Continue to provide detailed information regarding properties located within flood hazard areas as outlined under CRS Manual Section 322.a through 322.g.	Craven County, Havelock, New Bern, River Bend	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	3	3.2	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Craven County, Havelock, New Bern, and River Bend will continue to implement all activities defined under their respective CRS programs. Other Craven County municipalities will consider joining the program through implementation of this plan.
CR17	Continue to maintain a library of materials focused on educating citizens, builders, realtors and developers about the dangers associated with floodplain development. This information will also provide material outlining sound techniques for floodplain development and floodproofing of existing structures. The County will also maintain staff educated in these issues to work with prospective builders.	Craven County, Havelock, New Bern, River Bend	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	2	2.2	PP	• **Craven County Planning Department** • Craven County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	This activity is carried out by the County for the benefit of all Citizens including all participating municipal jurisdictions.
CR18	Maintain a contract with a qualified post-disaster recovery service provider. This contract will include the provision of essential services and equipment, including generators, and will include documentation required for reimbursement from FEMA/NCEM.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	Med	1	1.1	PP	• **Craven County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS	Other – Review Annually	New	Craven County, and all participating municipal jurisdictions, maintains a contractor for generators and storm cleanup.
CR19	Maintain reciprocal mutual aid agreements with all neighboring communities in an effort to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	All Hazards	High	4	4.2	ES	• **Craven County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	New	Craven County Emergency Services maintains mutual aid agreements with neighboring communities and updates them annually.
CR20	Work to implement all strategies outlined within the Hurricane Matthew Resilient Redevelopment Plan.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	P	• **Craven County Board of Commissioners** • Municipal Governing Boards	To Be Determined	GF, NCDPS, FEMA, NCDCM, USDA, NCDEQ, NCDOT	Ongoing – next 5 years	New	N/A
CR21	Continue to proactively seek out grant funding through NCEM and FEMA for mitigation of Craven County Schools and other critical facilities that involves general public usage during and after disaster events (such as generators, structural modifications, etc.) which would make structures more resilient during future storms and natural hazard events.	Craven County, Bridgeton, Cove City, Dover, Havelock, New Bern, River Bend, Trent Woods, Vanceboro	Flooding, Hurricanes and Costal Hazards, Dam Failure, Levee Failure, Tsunamis	High	2	2.1	SP	• **Craven County Planning Department** • Craven County Administration • Municipal Administrations	Based on need and availability of funding	GF, FEMA, NCDPS	2 to 3 years	New	Craven County monitors and applies for grant funding as the need arises and/or funding becomes available. The County has currently applied for funding associated with Hurricane Florence and will continue to utilize funding when available to improve the resiliency of County Critical Facilities.

Annex D Pamlico County

D.1 COMMUNITY PROFILE

This section contains a summary of maps and statistics for current conditions and characteristics of Pamlico County, including information on population, asset exposure, housing, and economy. Throughout the section, information will be reported at the jurisdictional level. In some cases, information will only be reported for communities participating in the Community Rating System (CRS).

Table D.1 – CRS Participation by Jurisdiction, Pamlico County

Jurisdiction	CRS Participant
Pamlico County (Unincorporated Area)	Yes
Town of Alliance	Yes
Town of Arapahoe	No
Town of Bayboro	Yes
Town of Grantsboro	No
Town of Mesic	Yes
Town of Minnesott Beach	Yes
Town of Oriental	Yes
Town of Stonewall	Yes
Town of Vandemere	Yes

Geography

Figure D.1 shows a base map of Pamlico County and participating jurisdictions.

Figure D.1 – Jurisdictional Locations, Pamlico County

Population and Demographics

Table D.2 provides population counts and growth estimates for Pamlico County and participating jurisdictions as compared to the Region overall. Table D.3 provides demographic information for the County.

Table D.2 – Population Counts, Pamlico County, 2000-2017

Jurisdiction	2000	2010	2017	% Change 2000-2010	% Change 2010-2017	Overall % Change 2000-2017
Unincorporated Areas	**8,201**	**7,775**	**7,234**	-5.2%	-7.0%	-11.8%
Alliance	785	776	732	-1.1%	-5.7%	-6.8%
Arapahoe	436	556	575	27.5%	3.4%	31.9%
Bayboro	741	1,263	1,378	70.4%	9.1%	86.0%
Grantsboro	754	688	809	-8.8%	17.6%	7.3%
Mesic	257	220	195	-14.4%	-11.4%	-24.1%
Minnesott Beach	311	440	389	41.5%	-11.6%	25.1%
Oriental	875	900	1,003	2.9%	11.4%	14.6%
Stonewall	285	281	255	-1.4%	-9.3%	-10.5%
Vandemere	289	245	233	-15.2%	-4.9%	-19.4%
Jurisdictions	**4,733**	**5,369**	**5,569**	**13.4%**	**3.7%**	**17.7%**
Pamlico County Total	**12,934**	**13,144**	**12,803**	**1.6%**	**-2.6%**	**-1.0%**
Pamlico Sound Region Total	**208,861**	**223,935**	**232,192**	**7.2%**	**3.7%**	**11.2%**

Source: US Census Bureau American Community Survey.

Table D.3 – Racial Demographics, Pamlico County, 2017

Jurisdiction	Caucasian	African-American	Asian	Other Race*	Two or More Races	Persons of Hispanic or Latino Origin**
Alliance	85.7%	14.2%	0.0%	0.0%	0.1%	7.7%
Arapahoe	87.1%	11.7%	0.0%	0.0%	1.2%	1.0%
Bayboro	40.6%	53.1%	0.8%	2.5%	3.0%	6.3%
Grantsboro	63.5%	13.8%	0.0%	15.8%	6.9%	9.0%
Mesic	44.6%	55.4%	0.0%	0.0%	0.0%	0.0%
Minnesott Beach	95.4%	3.3%	1.3%	0.0%	0.0%	2.3%
Oriental	90.4%	8.3%	0.0%	0.0%	1.3%	0.0%
Stonewall	62.7%	29.8%	0.8%	0.0%	6.7%	9.0%
Vandemere	38.2%	60.5%	0.0%	0.0%	1.3%	0.0%
Pamlico County	**75.6%**	**18.6%**	**0.2%**	**3.1%**	**2.5%**	**3.6%**

*Other races include American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, etc.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.
Source: US Census Bureau American Community Survey.

Future Growth and Development

This section provides an explanation of anticipated development trends for jurisdictions in Pamlico County that are participants in the CRS. Evaluating future growth and development decisions in relation to known hazard areas can lead to better growth management and more effective risk reduction strategies.

Each County and respective municipality have handled their planning processes in different fashions. Some communities have consolidated plans, while others conducted their planning process

independently. This information provided reflects this fact and portrays the plan for future growth throughout these communities. Each of these plans were developed under varying conditions, some involving specific guidance, such as that dictated by the NC Division of Coastal Management.

Pamlico County and the municipalities throughout the County are by far the most rural of the Pamlico Sound Region. There is no zoning throughout unincorporated Pamlico County and development is generally associated with agriculture and industry within rural portions of the County. This development like Beaufort County and Craven County is located along the County's key transportation thoroughfares including NC Highway 55, NC Highway 306, and NC Highway 304. Development is expected to continue in this manner; however, it should be noted that growth throughout the County is expected to be fairly limited.

Throughout Pamlico County, there are several small towns with quaint small downtown districts and supporting residential land uses. There has been new investment within these small communities, but it generally has not taken place in the form of greenfield development. All towns within the County maintain current zoning ordinances which promote organized growth and will continue to regulate development within low lying portions of the County which have been substantially impacted by both Hurricanes Matthew and Florence.

Pamlico County Joint CAMA Land Use Plan (Mesic, Vandemere, Bayboro, Minnesott Beach)

The Pamlico County Joint CAMA Land Use Plan was adopted by the Pamlico County Board of Commissioners in November of 2004 and amended in 2012. The plan defines seven future land use districts including:

- Conservation I (Estuarine waters)
- Conservation II (Estuarine shoreline conservation zone
- Conservation III (Coastal wetlands)
- Conservation IV (Non-coastal wetlands)
- Towns and Community Centers
- Rural with Services
- Agriculture and Rural Housing

These districts are defined in detail under Part 3 (page 73) of the Pamlico County Joint CAMA Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/Pamlico%20Land%20Use%20Plan.pdf

Figure D.2 and Figure D.3 provide the delineation of each Future Land Use District for all jurisdictions in Pamlico County.

Figure D.2 – Pamlico County Future Land Use

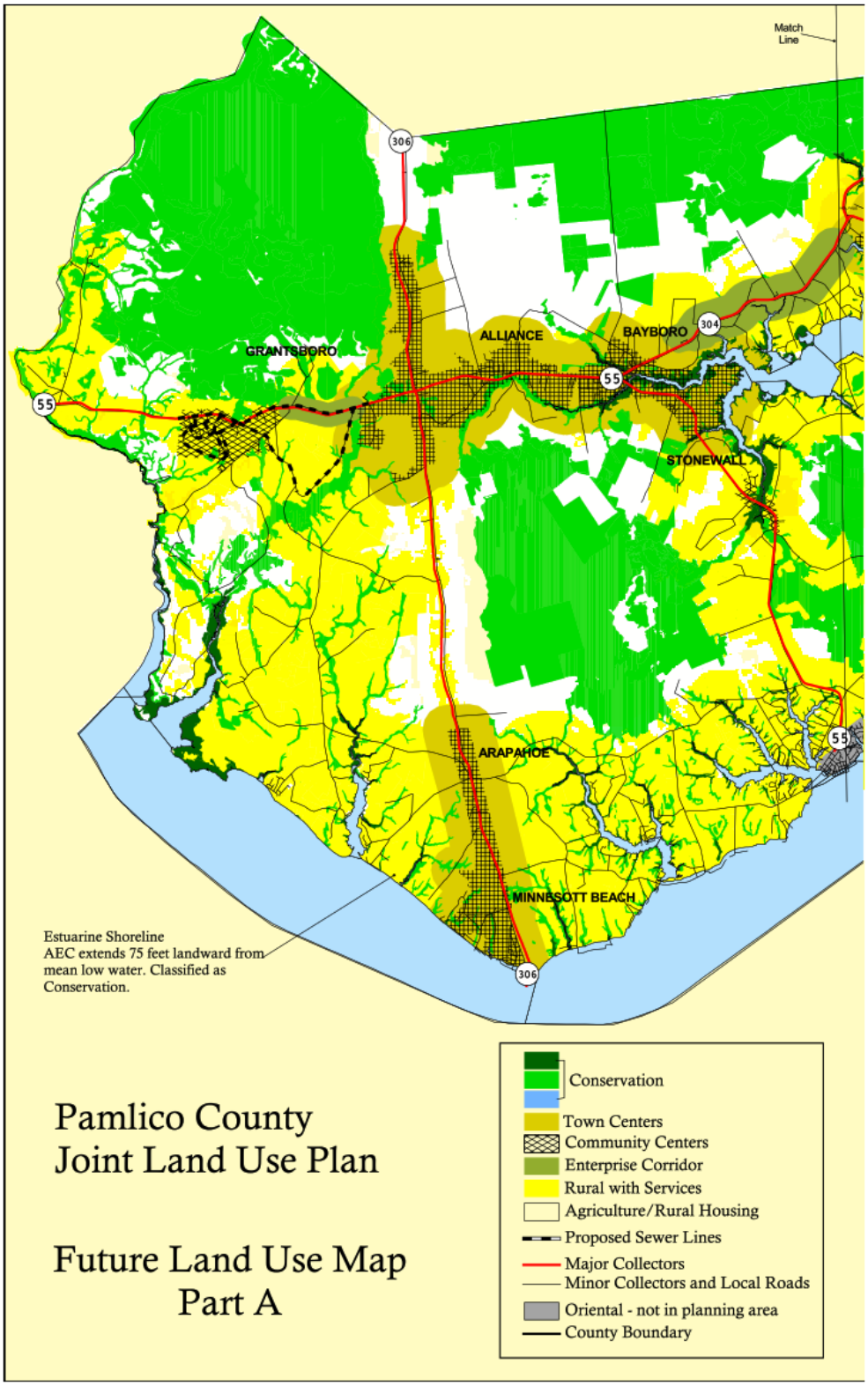
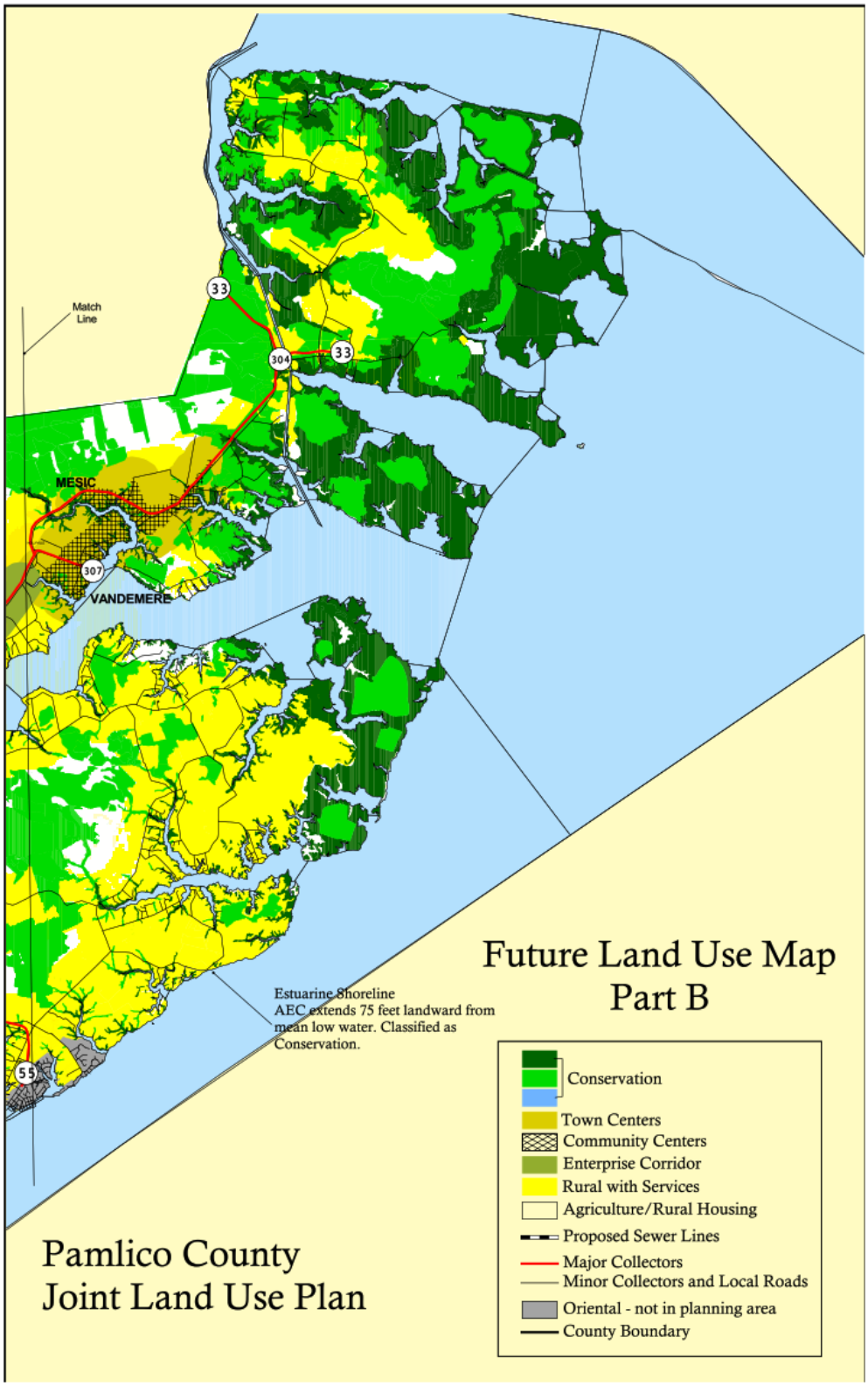


Figure D.3 – Pamlico County Future Land Use, Part B



Town of Oriental CAMA Land Use Plan

The Town of Oriental CAMA Land Use Plan was adopted by the Oriental Board of Commissioners in December of 2007. The plan defines five future land use districts including:

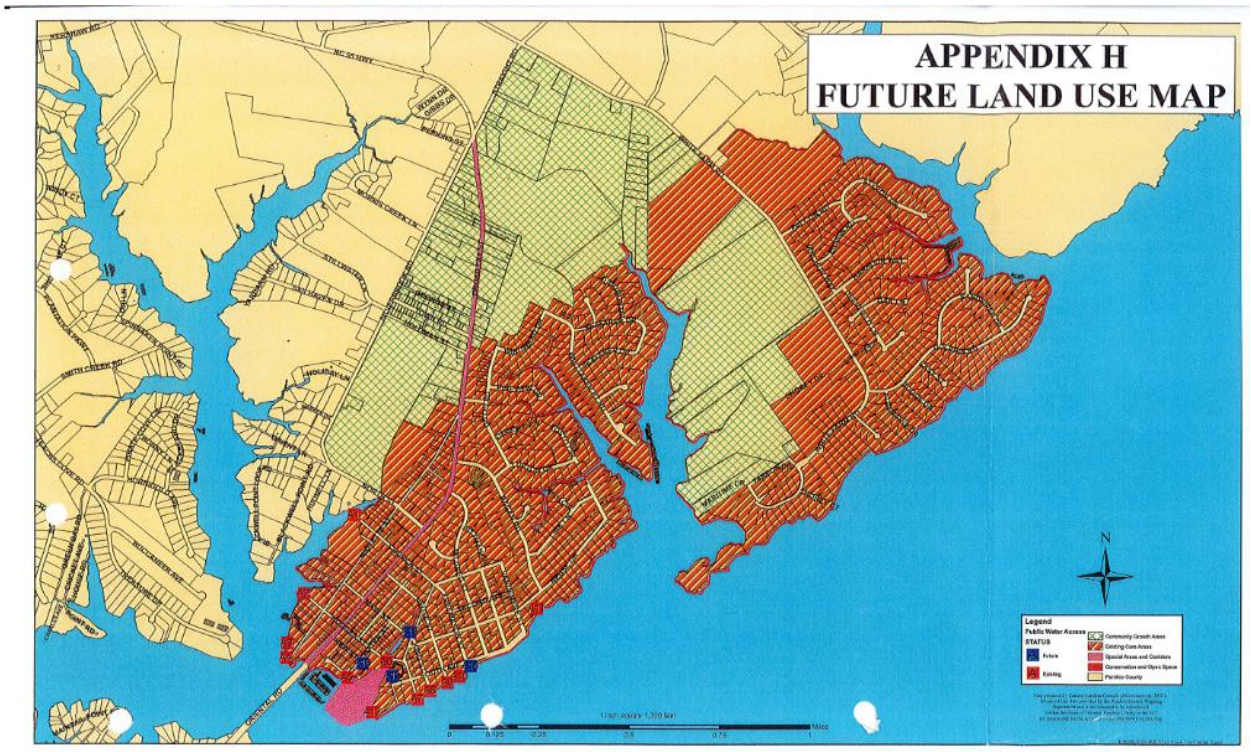
- Conservation and Open Space
- Existing Core Areas
- Community Growth Areas
- Special Areas and Corridors
- Public Access to Water

These districts are defined in detail under Section 2-4 (page 17) of the Town of Oriental CAMA Land Use Plan available through the following URL:

https://files.nc.gov/ncdeq/Coastal%20Management/documents/PDF/Land%20Use%20Plans/Oriental%20LUP.pdf

Figure D.4 provides the delineation of each Future Land Use District.

Figure D.4 – Town of Oriental Future Land Use



Asset Inventory

The following tables summarize the asset inventory for Pamlico County unincorporated and incorporated areas in order to estimate the total physical exposure to hazards in this area. The locations of critical facilities are shown in Figure D.5 through Figure D.11. Note, if there is no map for the jurisdiction, data was unavailable in iRisk. Critical facilities are a subset of identified assets from the Critical Infrastructure & Key Resources dataset. Note that the counts are by building; where a critical facility comprises a cluster of buildings, each building is counted and displayed.

Table D.4 – Critical Infrastructure & Key Resources by Type

Jurisdiction	Food and Agriculture	Banking and Finance	Chemical & Hazardous	Commercial	Communications	Critical Manufacturing	Defense Industrial Base	Government Facilities	Healthcare	Nuclear Reactors, Materials and Waste	Transportation Systems	Energy	Emergency Services	Water	Total
Pamlico County	179	0	1	312	0	53	1	14	5	0	21	4	3	9	**602**
Alliance	0	0	0	66	0	3	0	8	8	0	8	1	0	0	**94**
Arapahoe	0	0	0	26	0	4	0	8	0	0	3	0	1	0	**42**
Bayboro	8	3	0	55	2	2	0	22	3	0	11	1	3	1	**111**
Grantsboro	0	1	0	44	0	0	0	3	2	1	2	1	1	0	**55**
Mesic	3	0	0	9	0	1	0	2	0	0	0	0	0	0	**15**
Minnesott Beach	0	0	0	15	0	2	0	1	0	0	1	0	0	0	**19**
Oriental	10	1	0	71	0	6	0	4	3	0	23	0	1	1	**120**
Stonewall	1	0	0	19	0	4	0	3	0	0	1	0	0	0	**28**
Vandemere	0	0	0	10	0	5	0	3	0	0	0	0	1	0	**19**
Pamlico County Total	**201**	**5**	**1**	**627**	**2**	**80**	**1**	**68**	**21**	**1**	**70**	**7**	**10**	**11**	**1,105**

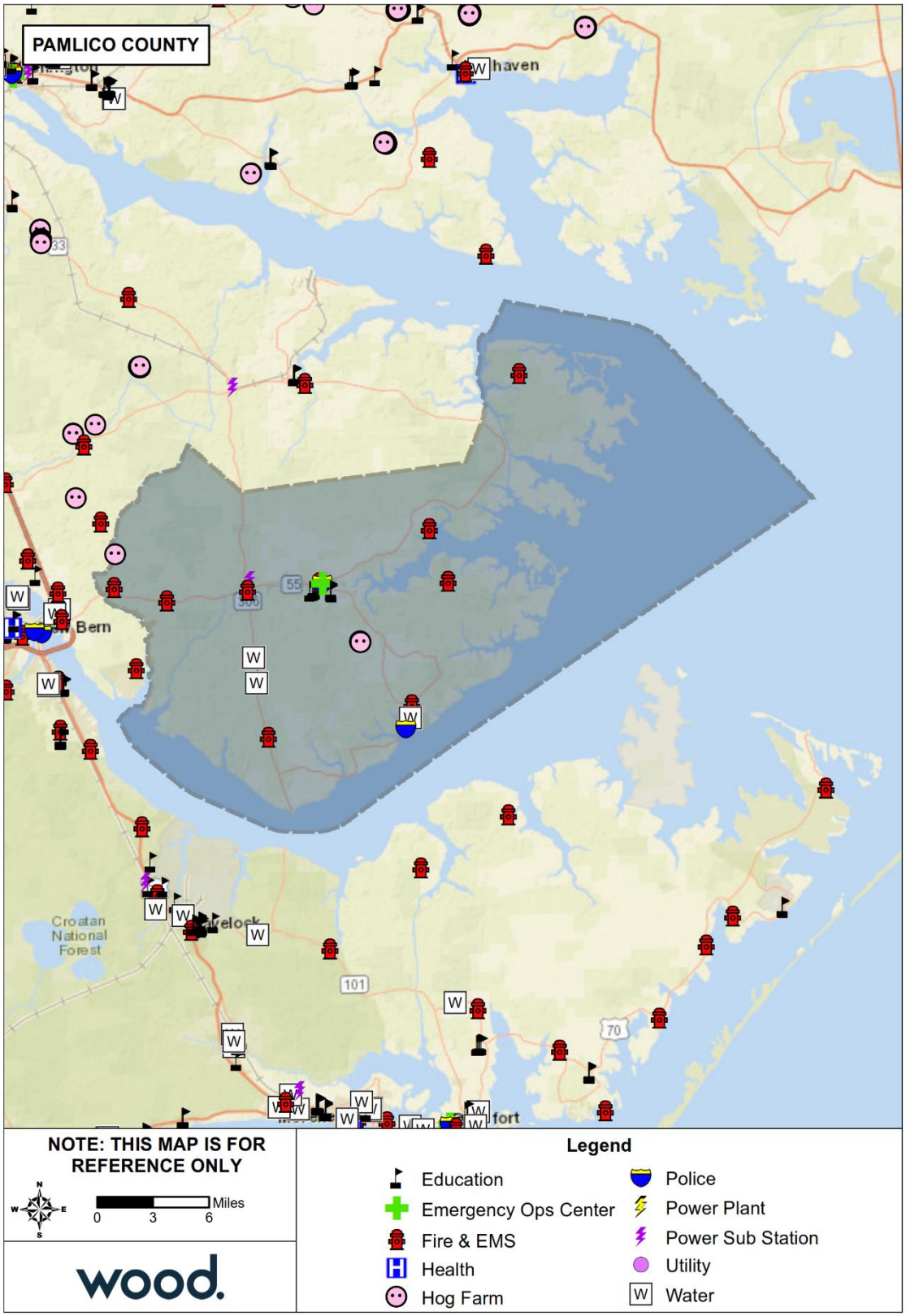
Source: NCEM Risk Management Tool

Table D.5 – High Potential Loss Facilities by Use

Jurisdiction	Residential	Commercial	Industrial	Government	Agricultural	Religious	Utilities	Total
Pamlico County	0	1	0	2	0	0	2	**5**
Alliance	-	-	-	-	-	-	-	**-**
Arapahoe	0	0	0	1	0	0	0	**1**
Bayboro	0	0	0	7	0	0	0	**7**
Grantsboro	0	2	0	0	0	0	1	**3**
Mesic	-	-	-	-	-	-	-	-
Minnesott Beach	-	-	-	-	-	-	-	-
Oriental	-	-	-	-	-	-	-	-
Stonewall	0	0	0	1	0	0	0	**1**
Vandemere	-	-	-	-	-	-	-	-
Pamlico County Total	**0**	**3**	**0**	**11**	**0**	**0**	**3**	**17**

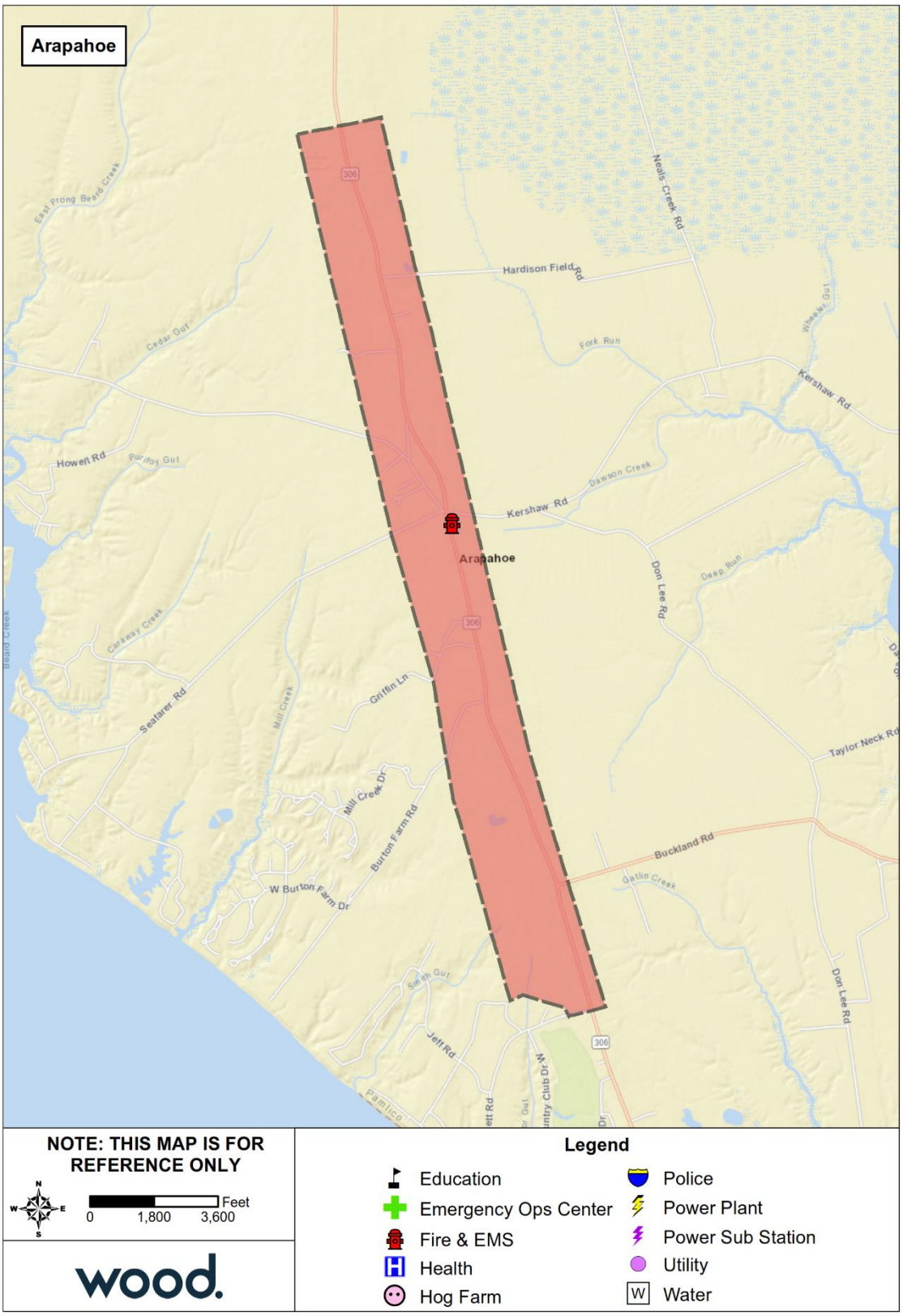
Source: NCEM Risk Management Tool
Note: A dash (-) indicates that no high potential loss facilities were reported in RMT.

Figure D.5 – Critical Facilities, Pamlico County



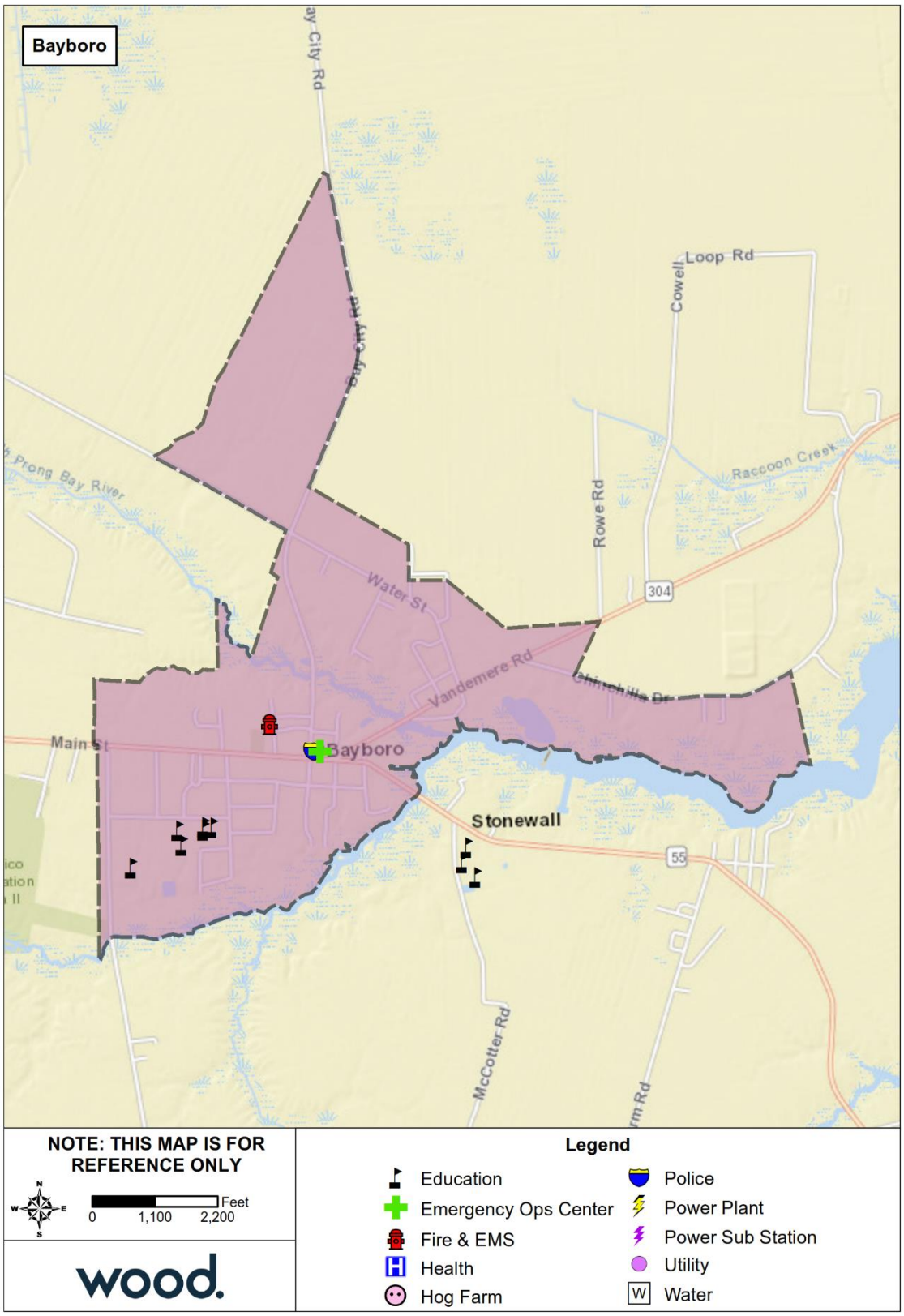
Source: NCEM IRISK Database, GIS Analysis

Figure D.6 – Critical Facilities, Town of Arapahoe



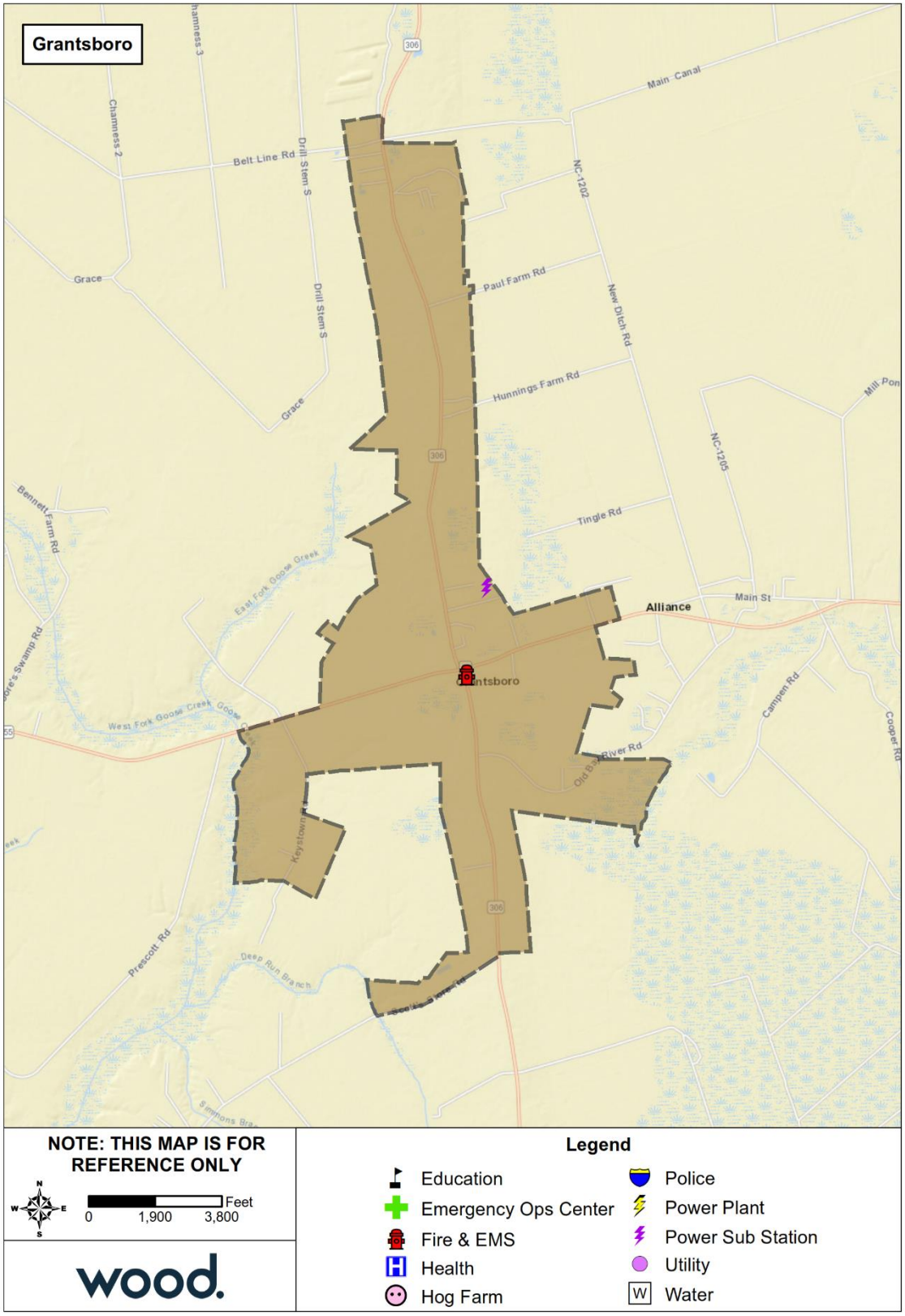
Source: NCEM IRISK Database, GIS Analysis

Figure D.7 – Critical Facilities, Town of Bayboro



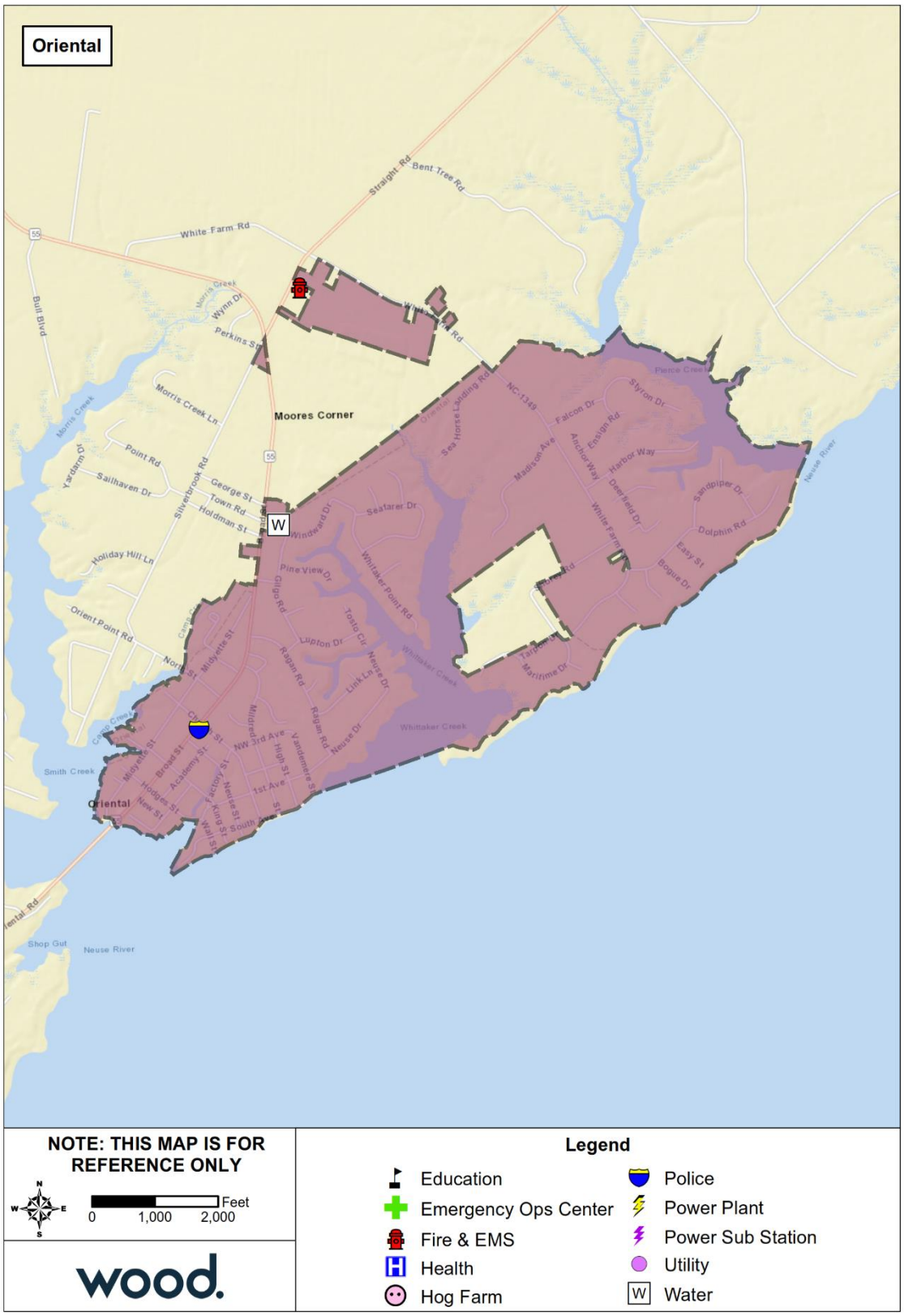
Source: NCEM IRISK Database, GIS Analysis

Figure D.8 – Critical Facilities, Town of Grantsboro



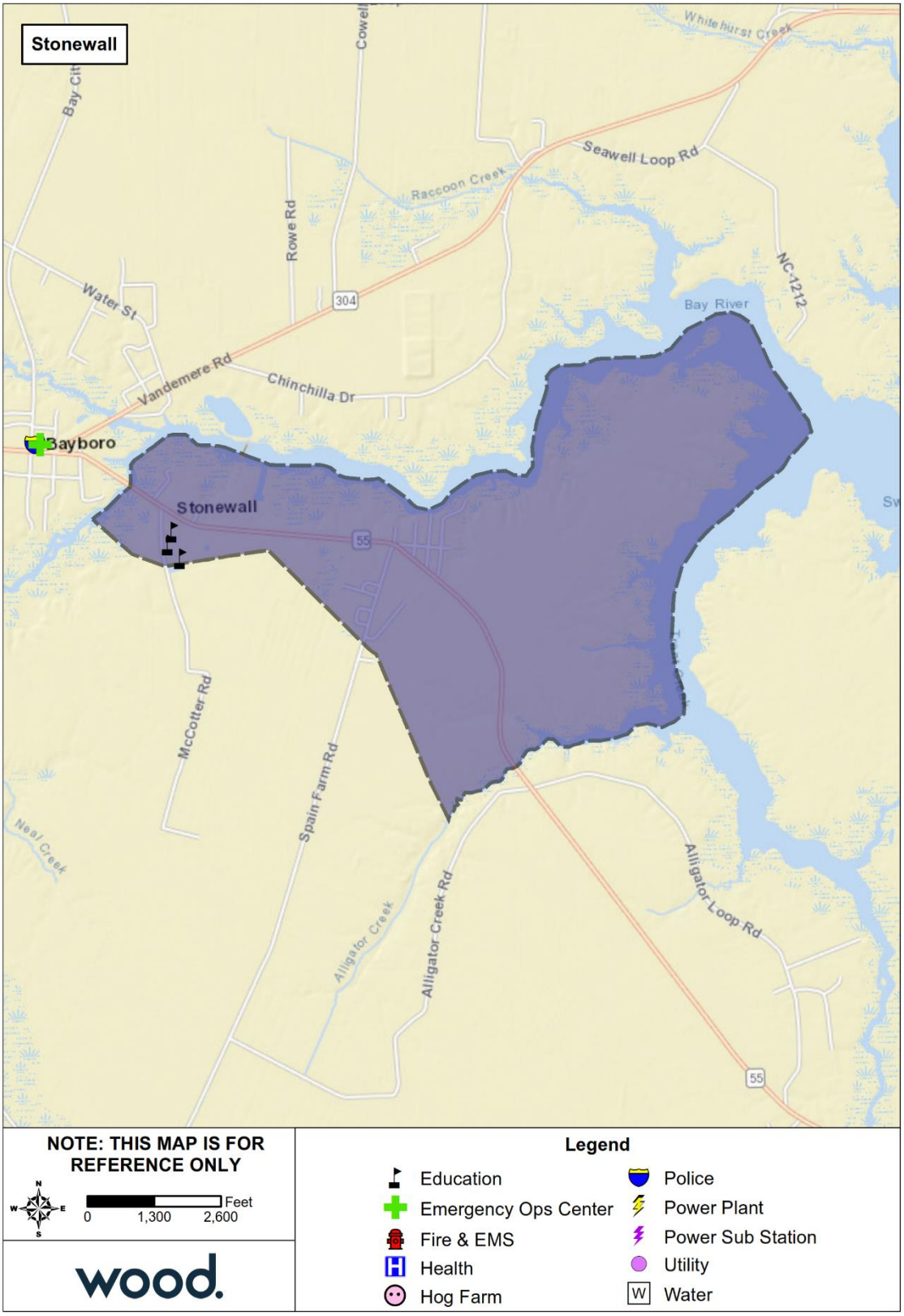
Source: NCEM IRISK Database, GIS Analysis

Figure D.9 – Critical Facilities, Town of Oriental



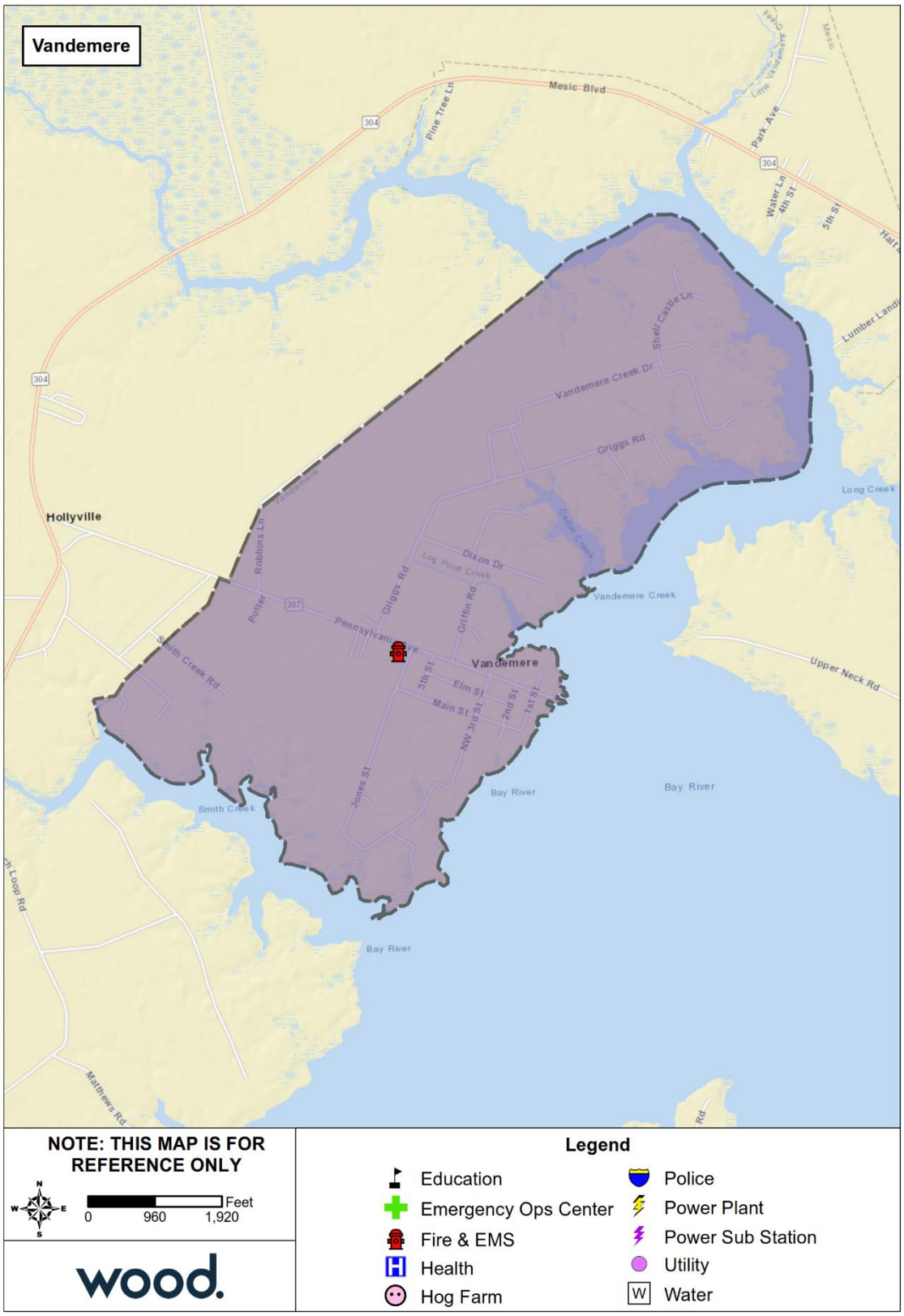
Source: NCEM IRISK Database, GIS Analysis; HMPC input

Figure D.10 – Critical Facilities, Town of Stonewall



Source: NCEM IRISK Database, GIS Analysis

Figure D.11 – Critical Facilities, Town of Vandemere



Source: NCEM IRISK Database, GIS Analysis

Housing

The table below details key housing statistics for Pamlico County. As a percent of growth from 2010 housing, Pamlico County's housing stock has grown by 3.2%.

Table D.6 – Housing Statistics, Pamlico County, 2010-2017

Jurisdiction	Housing Units (2010)	Housing Units (2017)	% Change 2010-2017	% Owner Occupied (2017)	% Vacant Units (2017)
Alliance	360	374	3.9%	68.8%	8.0%
Arapahoe	281	313	11.4%	78.2%	24.0%
Bayboro	406	441	8.6%	56.3%	17.5%
Grantsboro	323	368	13.9%	68.1%	11.4%
Mesic	189	215	13.8%	81.3%	19.3%
Minnesott Beach	296	351	18.6%	89.0%	37.6%
Oriental	620	716	15.5%	74.3%	31.0%
Stonewall	130	142	9.2%	79.0%	18.7%
Vandemere	159	174	9.4%	78.4%	41.4%
Pamlico County	**7,449**	**7,687**	**3.2%**	**74.9%**	**29.8%**

Source: US Census Bureau American Community Survey.

Economy

The following tables present key economic statistics for Pamlico County.

Table D.7 – Economic Indicators, Pamlico County, 2017

Jurisdiction	Population in Labor Force	Percent Employed (%)	Percent Unemployed (%)	Percent Not in Labor Force (%)	Unemployment Rate (%)
Alliance	44.6%	41.9%	2.7%	55.4%	6.2%
Arapahoe	52.9%	52.7%	0.2%	47.1%	0.4%
Bayboro	28.9%	25.9%	2.9%	71.1%	10.1%
Grantsboro	57.6%	54.0%	3.7%	42.4%	6.3%
Mesic	32.4%	29.5%	2.8%	67.6%	8.8%
Minnesott Beach	44.5%	41.0%	3.5%	55.5%	7.8%
Oriental	40.0%	38.7%	1.3%	60.0%	3.4%
Stonewall	48.0%	45.6%	2.5%	52.0%	5.1%
Vandemere	51.7%	47.4%	4.3%	48.3%	8.3%
Pamlico County	**49.6%**	**45.5%**	**4.0%**	**50.4%**	**8.1%**

Source: US Census Bureau American Community Survey.

Table D.8 – Employment by Industry, Pamlico County, 2017

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Alliance	35.7%	7.0%	24.2%	22.5%	10.7%
Arapahoe	21.2%	29.8%	23.1%	8.2%	17.6%
Bayboro	27.2%	26.6%	15.0%	7.0%	24.3%
Grantsboro	23.2%	27.4%	18.6%	21.5%	9.3%
Mesic	30.8%	23.1%	23.1%	21.2%	1.9%
Minnesott Beach	36.6%	14.4%	38.6%	8.5%	2.0%
Oriental	40.5%	13.0%	39.6%	5.2%	1.7%

Jurisdiction	Management, Business, Science and Arts (%)	Service (%)	Sales and Office (%)	Natural Resources, Construction, and Maintenance (%)	Production, Transportation, and Material Moving (%)
Stonewall	34.4%	40.9%	12.9%	6.5%	5.4%
Vandemere	15.0%	35.0%	10.0%	15.0%	25.0%
Pamlico County	**29.3%**	**17.6%**	**24.8%**	**16.0%**	**12.3%**

Source: US Census Bureau American Community Survey.

D.2 RISK ASSESSMENT

This section contains a hazard profile and vulnerability assessment for those hazards that were rated with a higher priority by jurisdiction in Pamlico County than for the Pamlico Sound Region as a whole. Risk and vulnerability findings are also presented here for those hazards that are spatially defined and have variations in risk that could be evaluated quantitatively on a jurisdictional level. The hazards included in this section are flood and wildfire.

D.2.1 Flood

Table D.9 details the acreage of Pamlico County's total area by jurisdiction and flood zone on the Effective DFIRM. Per this assessment, at 100 percent, the Town of Mesic has the largest portion of its land area within the mapped 1%-annual-chance floodplain. Over 50 percent of the total land area in Oriental, Stonewall, and Vandemere, falls within the Special Flood Hazard Area. Arapahoe falls entirely outside the SFHA. Overall, nearly 41 percent of the county's total area falls within the SFHA.

Table D.9 – Flood Zone Acreage by Jurisdiction, Pamlico County

Flood Zone	Acreage	Percent of Total (%)
Alliance		
Zone AE	257.16	19.3
Zone X (500-year)	130.72	9.8
Zone X Unshaded	946.92	70.9
Total	**1,334.80**	--
Arapahoe		
Zone X Unshaded	1,389.23	100.00
Total	**1,389.23**	--
Bayboro		
Zone AE	510.84	43.0
Zone X (500-year)	145.77	12.3
Zone X Unshaded	532.04	44.8
Total	**1,188.65**	--
Grantsboro		
Zone AE	110.45	4.5
Zone X (unshaded)	2,355.47	95.5
Total	**2,465.92**	--
Mesic		
Zone AE	738.54	100.0
Total	**738.54**	--
Minnesott Beach		
Zone AE	173.56	7.7
Zone X (500-year)	85.7	3.8
Zone X (unshaded)	2,009.47	88.6

Total	**2,268.73**	--
Oriental		
Zone AE	784.5	74.5
Zone X (500-year)	134	12.7
Zone X (unshaded)	135	12.8
Total	**1,053.5**	--
Stonewall		
Zone AE	824.33	64.0
Zone X (500-year)	165.22	12.8
Zone X (unshaded)	298.65	23.2
Total	**1,288.20**	--
Vandemere		
Zone A	1,018.43	97.5
Zone X (unshaded)	25.64	2.5
Total	**1,044.07**	

Source: FEMA Effective DFIRM

Figure D.12 through Figure D.20 reflect the effective mapped flood hazard zones for all jurisdictions with land in the Special Flood Hazard Area in Pamlico County, and Figure D.21 through Figure D.29 display the depth of flooding estimated to occur in these areas during the 1%-annual-chance flood.

Table D.10 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector and event in Pamlico County and incorporated jurisdictions. Table D.11 provides building counts and estimated damages for High Potential Loss Structures in the 1%-annual-chance floodplain.

Table D.10 – Critical Facilities Exposed to Flooding by Event and Jurisdiction

Sector	Event	Number of Buildings at Risk	Estimated Damages
Pamlico County Unincorporated Areas			
Commercial Facilities	100 Year	70	$950,124
Critical Manufacturing	100 Year	17	$127,491
Food and Agriculture	100 Year	46	$126,533
Government Facilities	100 Year	1	$2,164
Healthcare and Public Health	100 Year	1	$1,487
Transportation Systems	100 Year	3	$11,672
Water	100 Year	2	$78,548
All Categories	**100 Year**	**140**	**$1,298,019**
Town of Bayboro			
Commercial Facilities	100 Year	3	$3,440
Critical Manufacturing	100 Year	1	$1,562
Food and Agriculture	100 Year	5	$31,856
Transportation Systems	100 Year	2	$18,418
All Categories	**100 Year**	**11**	**$55,276**
Town of Mesic			
Commercial Facilities	100 Year	8	$39,433
Food and Agriculture	100 Year	3	$1,693
All Categories	**100 Year**	**11**	**$41,126**
Town of Oriental			
Commercial Facilities	100 Year	12	$64,412

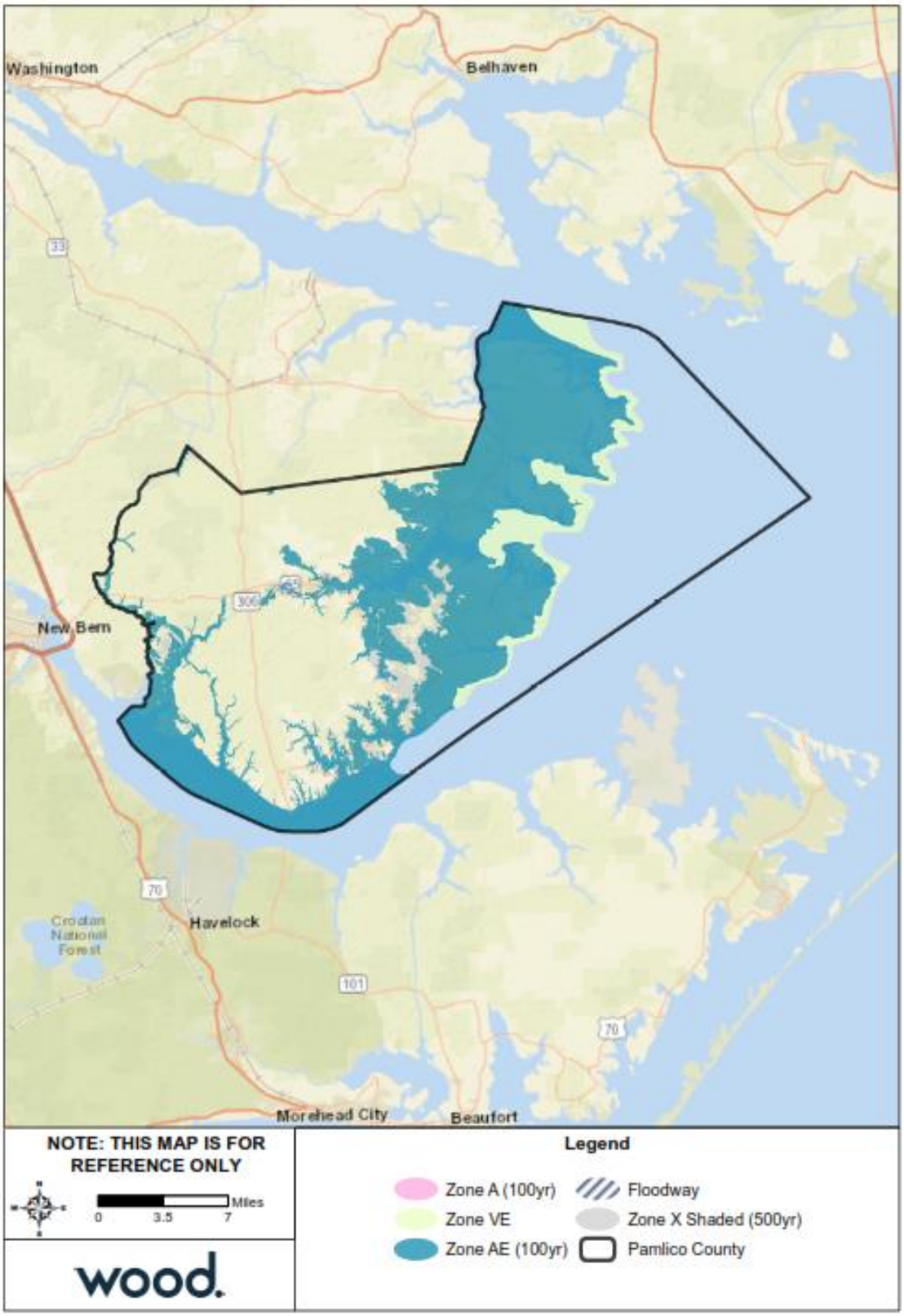
Food and Agriculture	100 Year	3	$8,445
Healthcare and Public Health	100 Year	1	$6,952
Transportation Systems	100 Year	6	$161,254
All Categories	**100 Year**	**22**	**$241,063**
Town of Stonewall			
Critical Manufacturing	100 Year	1	$3,601
Food and Agriculture	100 Year	1	$120
All Categories	**100 Year**	**2**	**$3,721**
Town of Vandemere			
Commercial Facilities	100 Year	5	$99,026
Critical Manufacturing	100 Year	5	$30,702
Government Facilities	100 Year	2	$38,534
All Categories	**100 Year**	**12**	**$168,262**

Source: NCEM Risk Management Tool

Table D.11 – High Potential Loss Properties Exposed to Flooding by Event and Jurisdiction

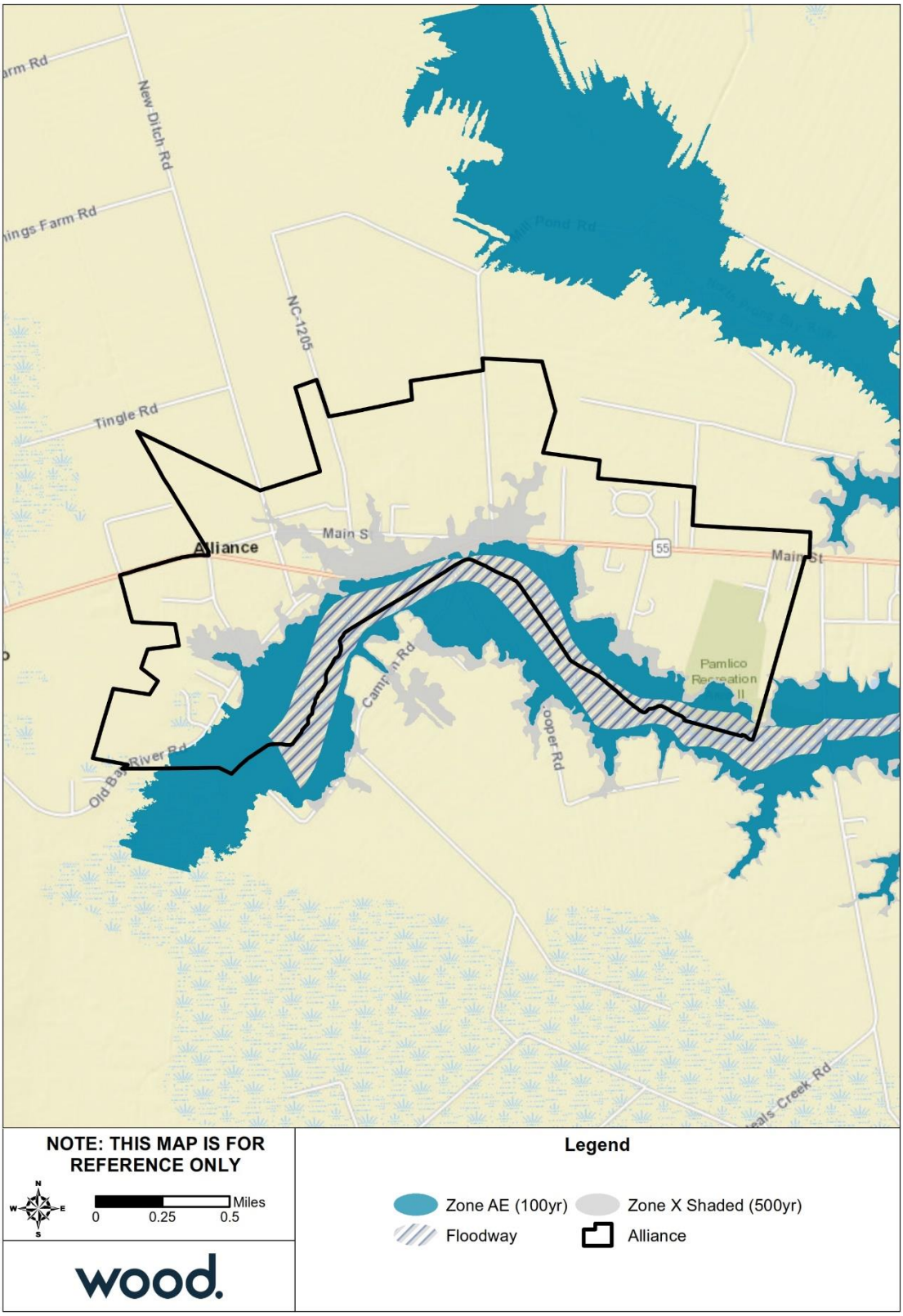
Sector	Event	Number of Buildings at Risk	Estimated Damages
Pamlico County Unincorporated Areas			
Commercial	100 Year	1	$317,590
Utilities	100 Year	1	$75,000
All Categories	**100 Year**	**2**	**$392,590**

Figure D.12 – FEMA Flood Hazard Areas, Unincorporated Pamlico County



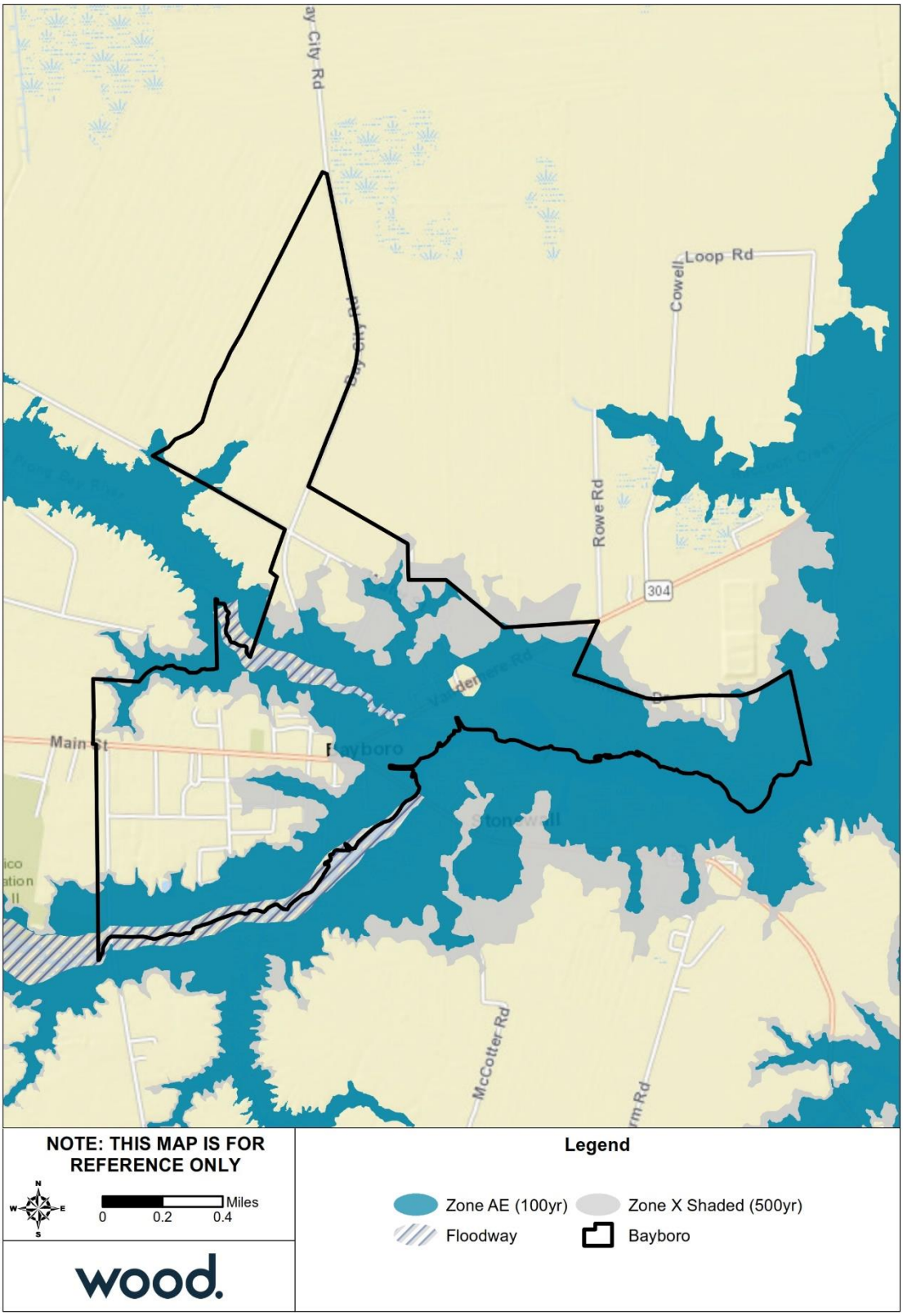
Source: FEMA Effective DFIRM

Figure D.13 – FEMA Flood Hazard Areas, Town of Alliance



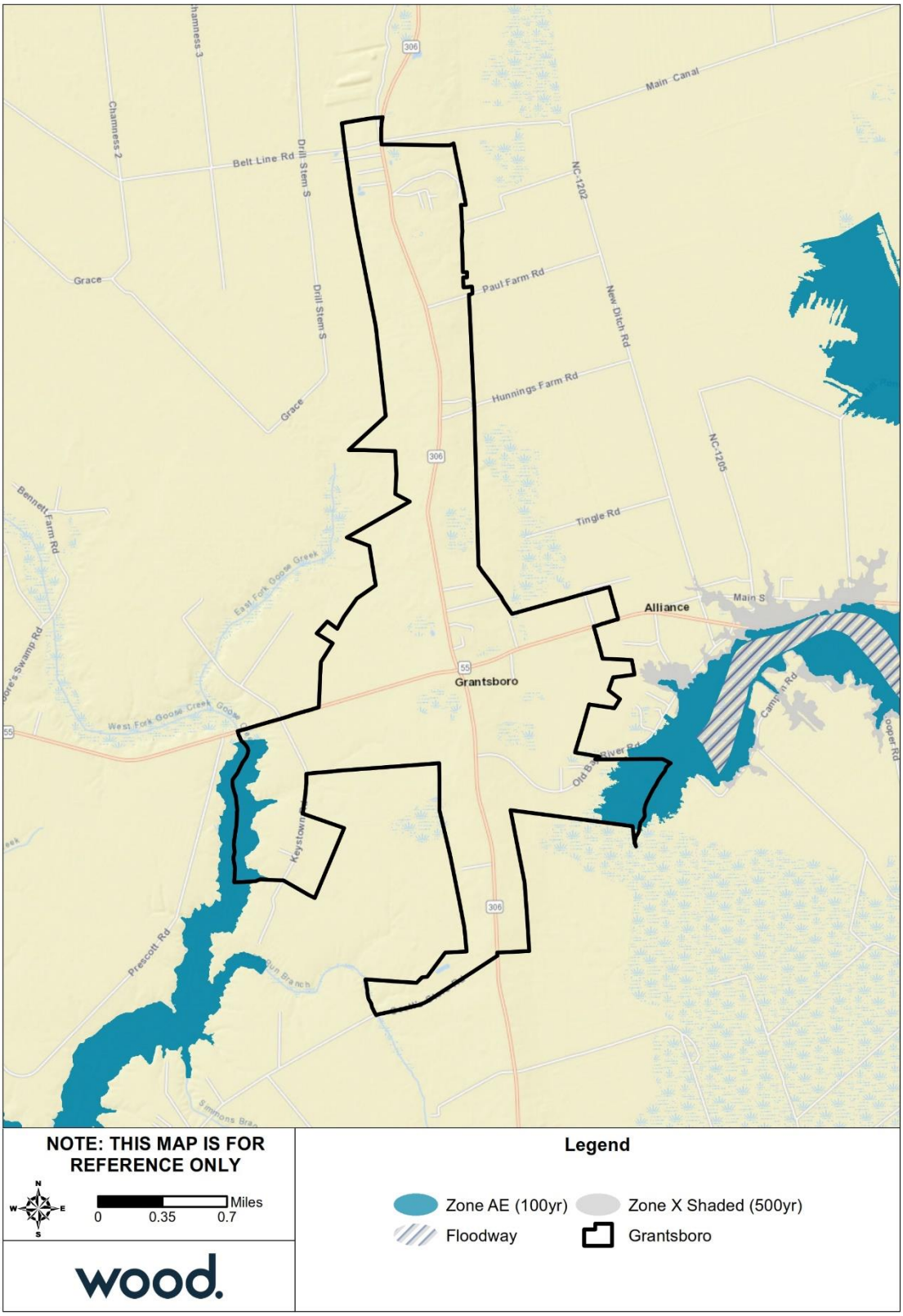
Source: FEMA Effective DFIRM

Figure D.14 – FEMA Flood Hazard Areas, Town of Bayboro



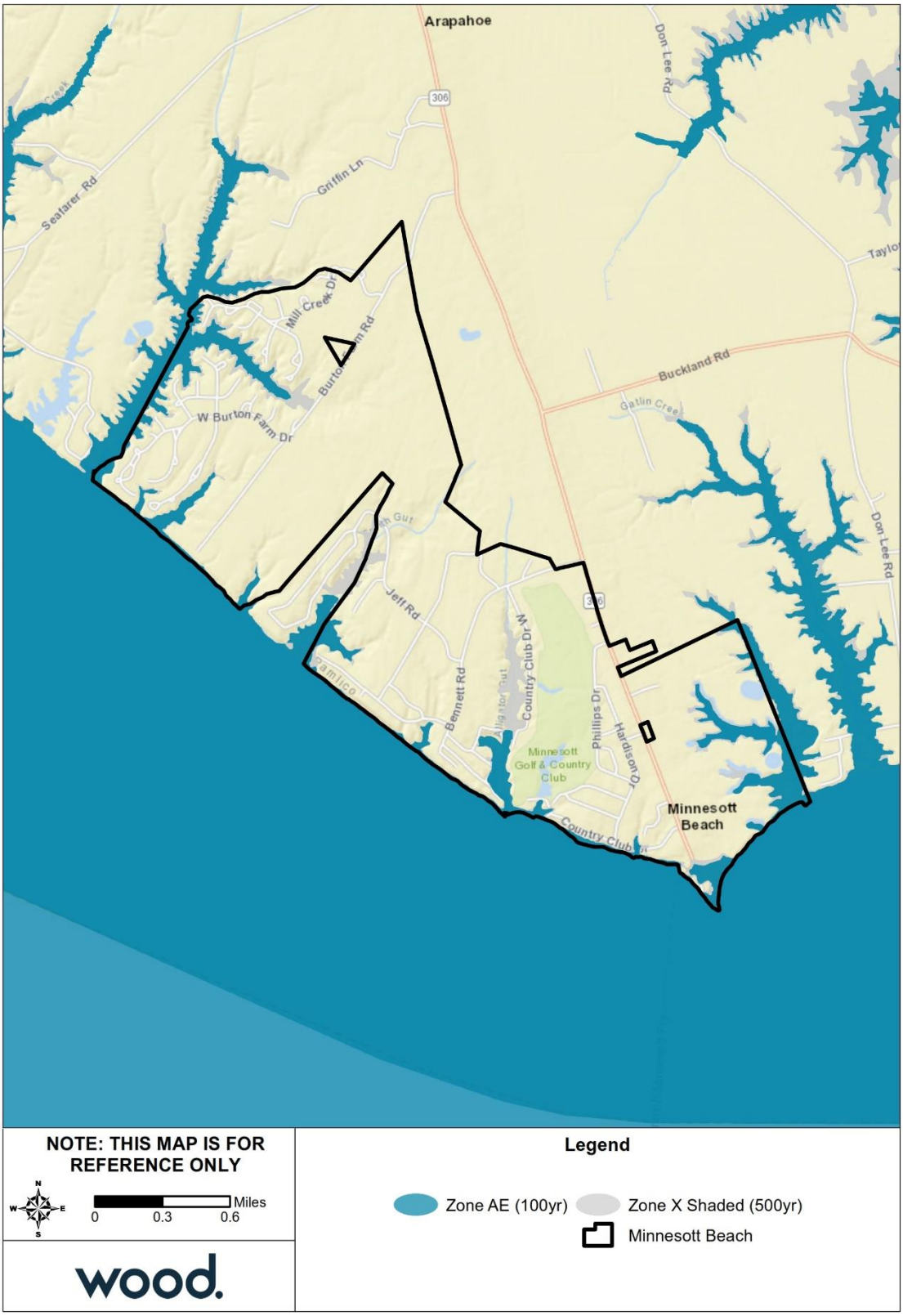
Source: FEMA Effective DFIRM

Figure D.15 – FEMA Flood Hazard Areas, Town of Grantsboro



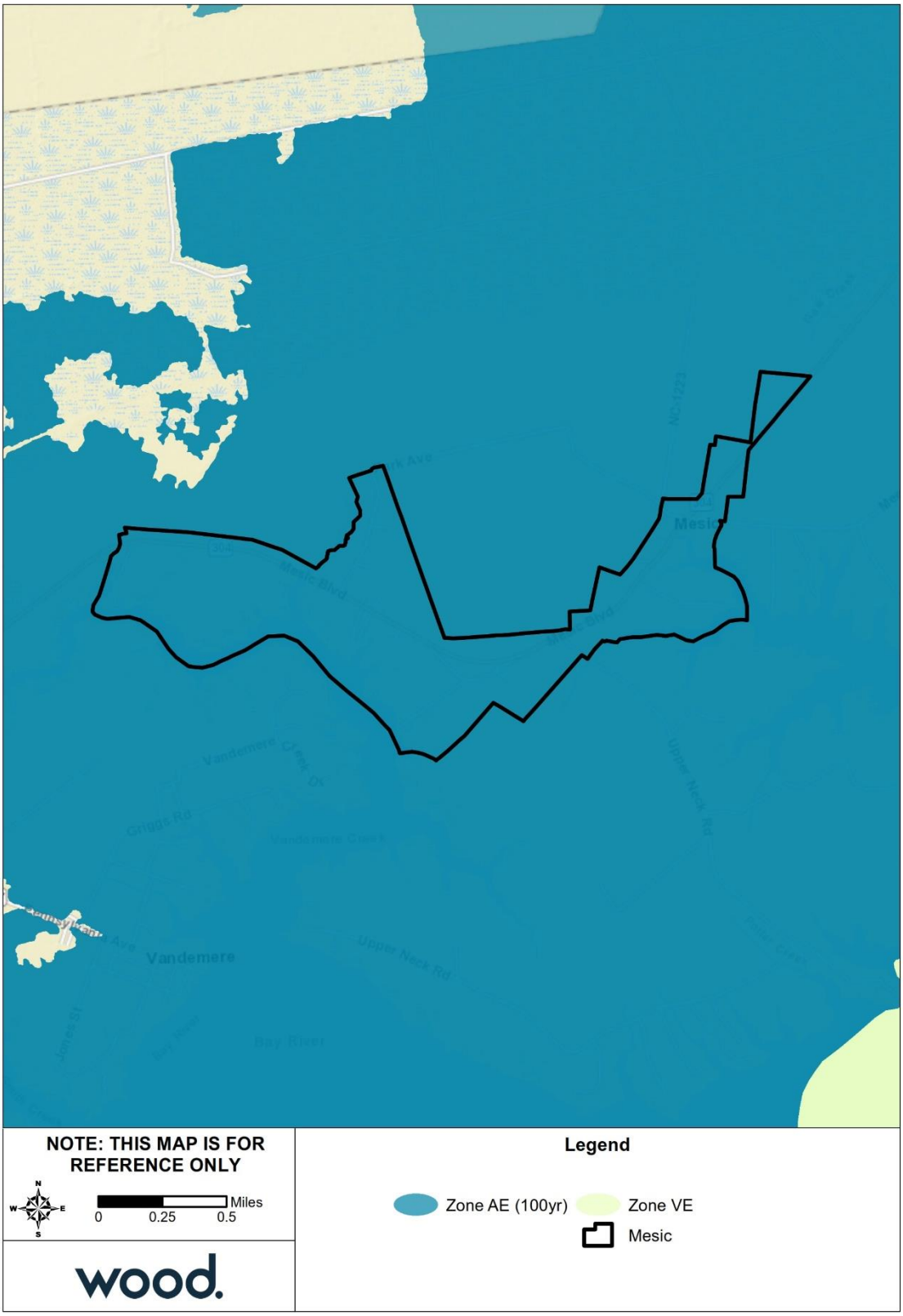
Source: FEMA Effective DFIRM

Figure D.16 – FEMA Flood Hazard Areas, Town of Minnesott Beach



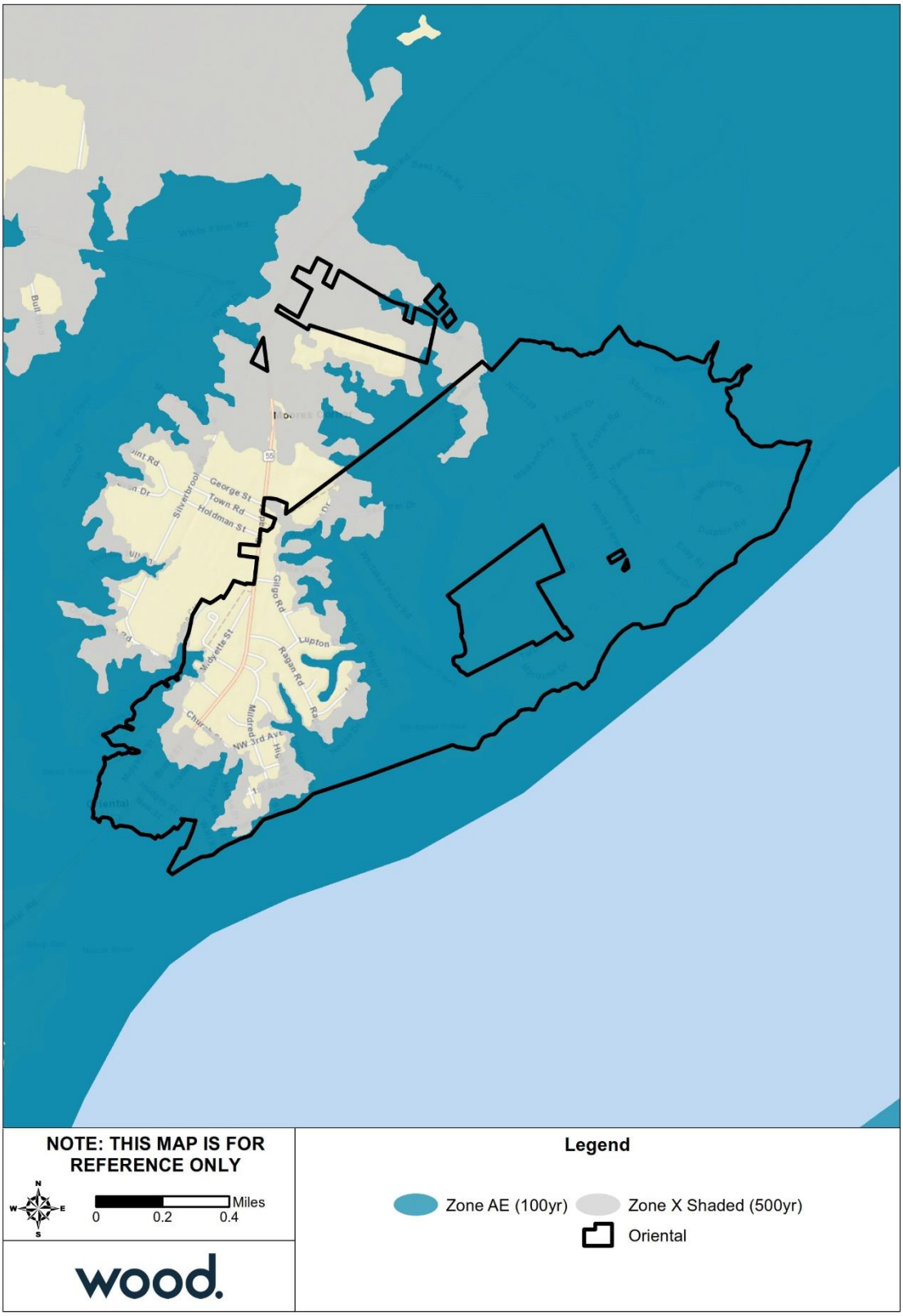
Source: FEMA Effective DFIRM

Figure D.17 – FEMA Flood Hazard Areas, Town of Mesic



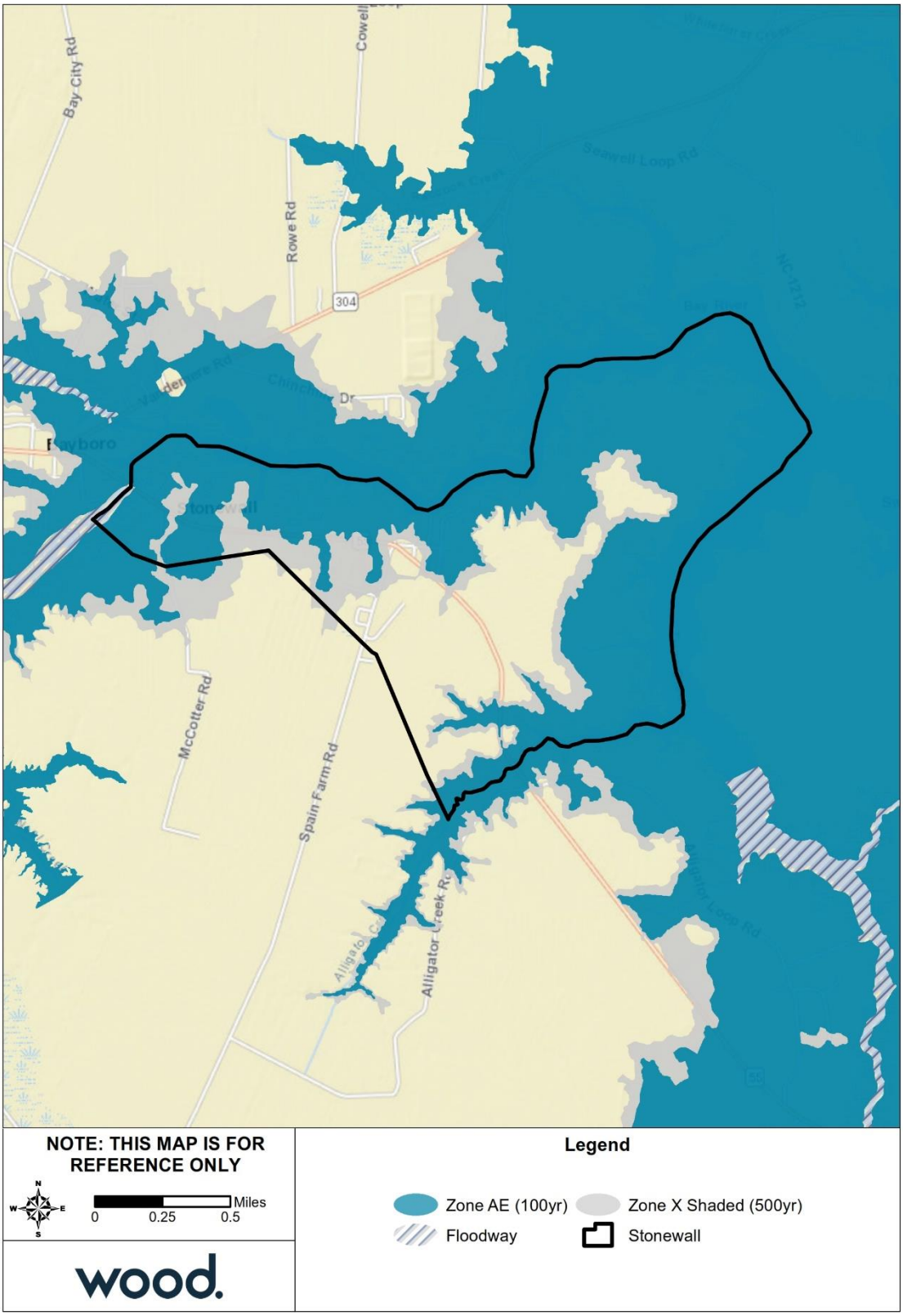
Source: FEMA Effective DFIRM

Figure D.18 – FEMA Flood Hazard Areas, Town of Oriental



Source: FEMA Effective DFIRM

Figure D.19 – FEMA Flood Hazard Areas, Town of Stonewall

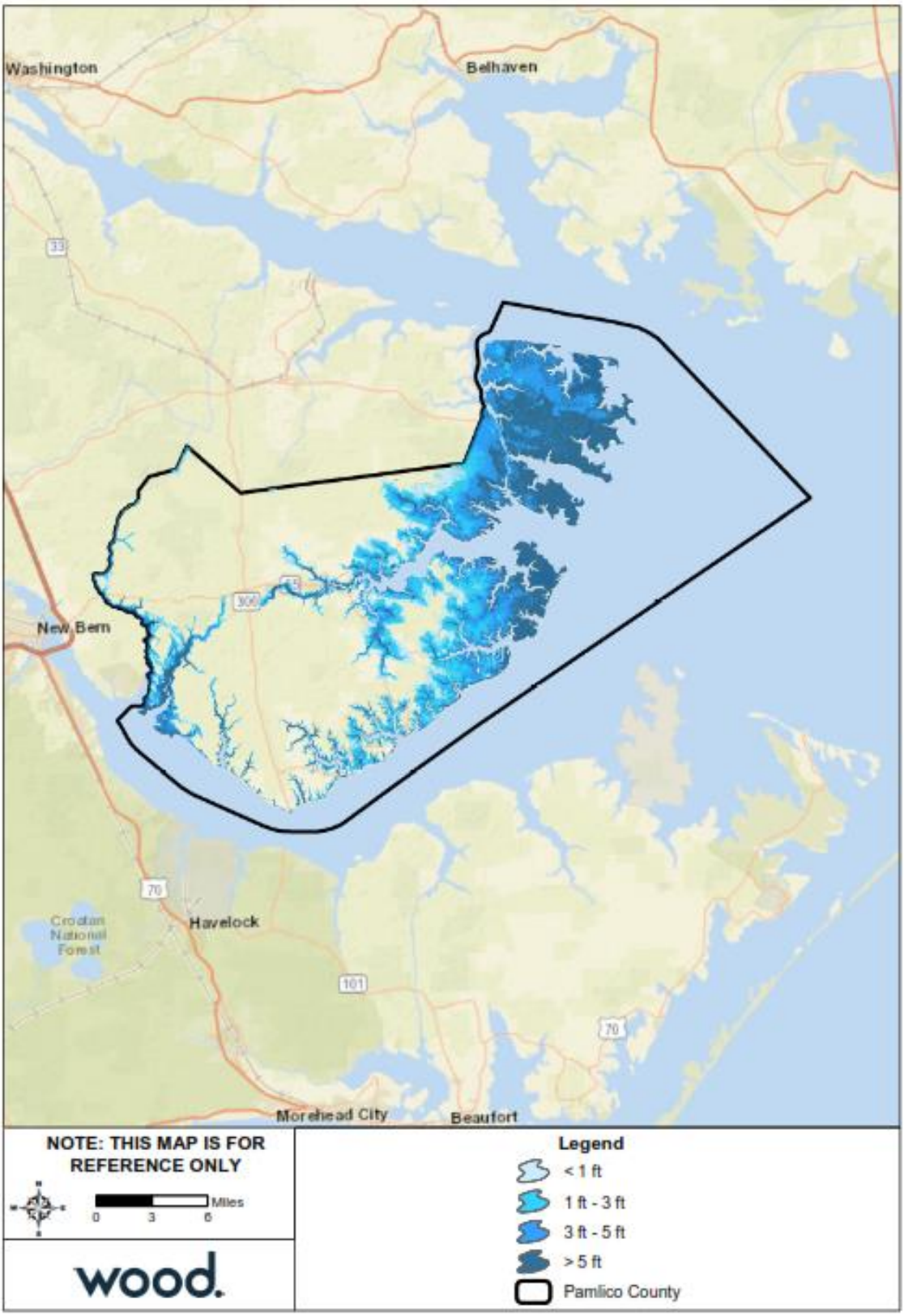


Source: FEMA Effective DFIRM

Figure D.20 – FEMA Flood Hazard Areas, Town of Vandemere

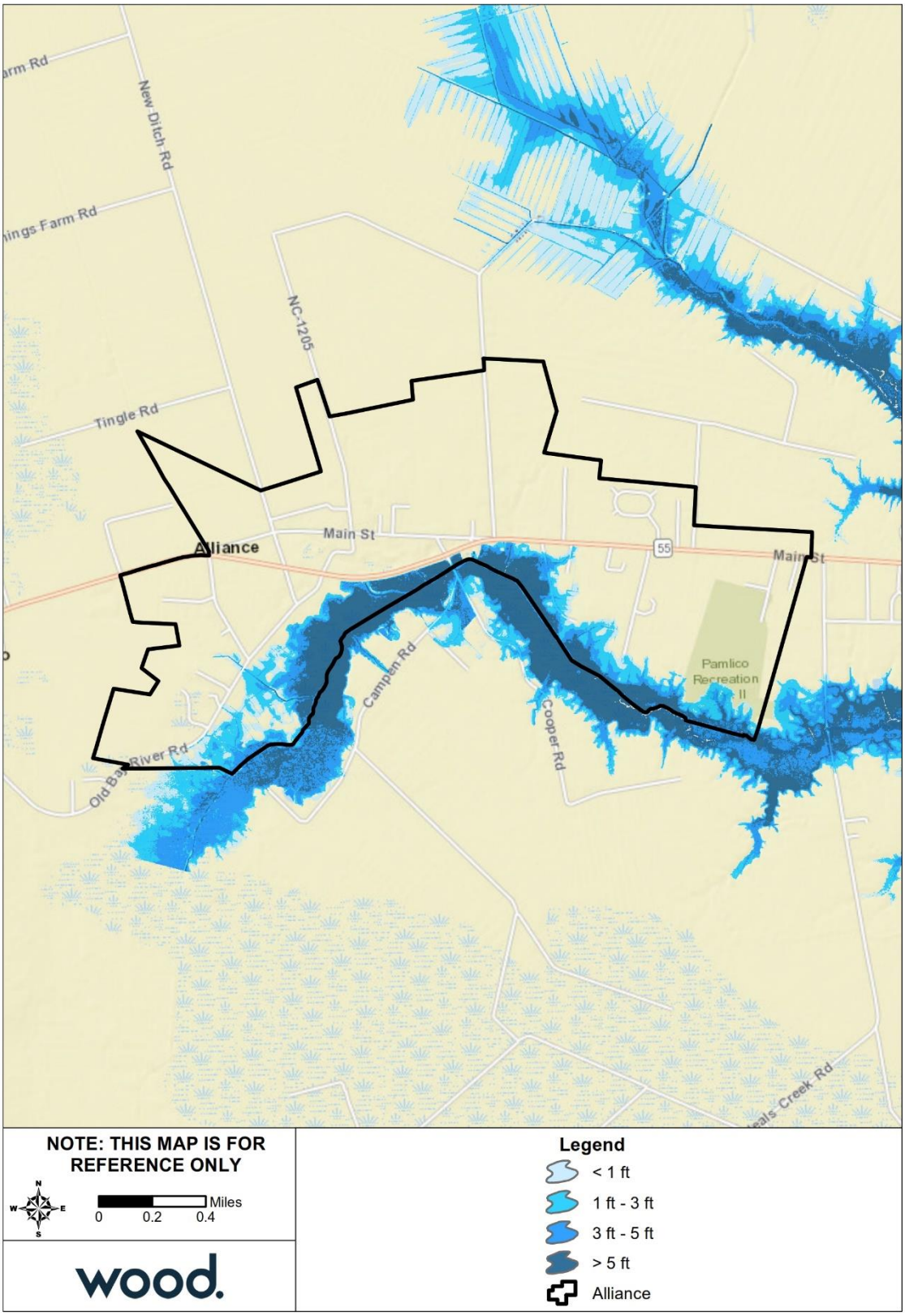
Source: FEMA Effective DFIRM

Figure D.21 – Flood Depth, 1%-Annual-Chance Floodplain, Unincorporated Pamlico County



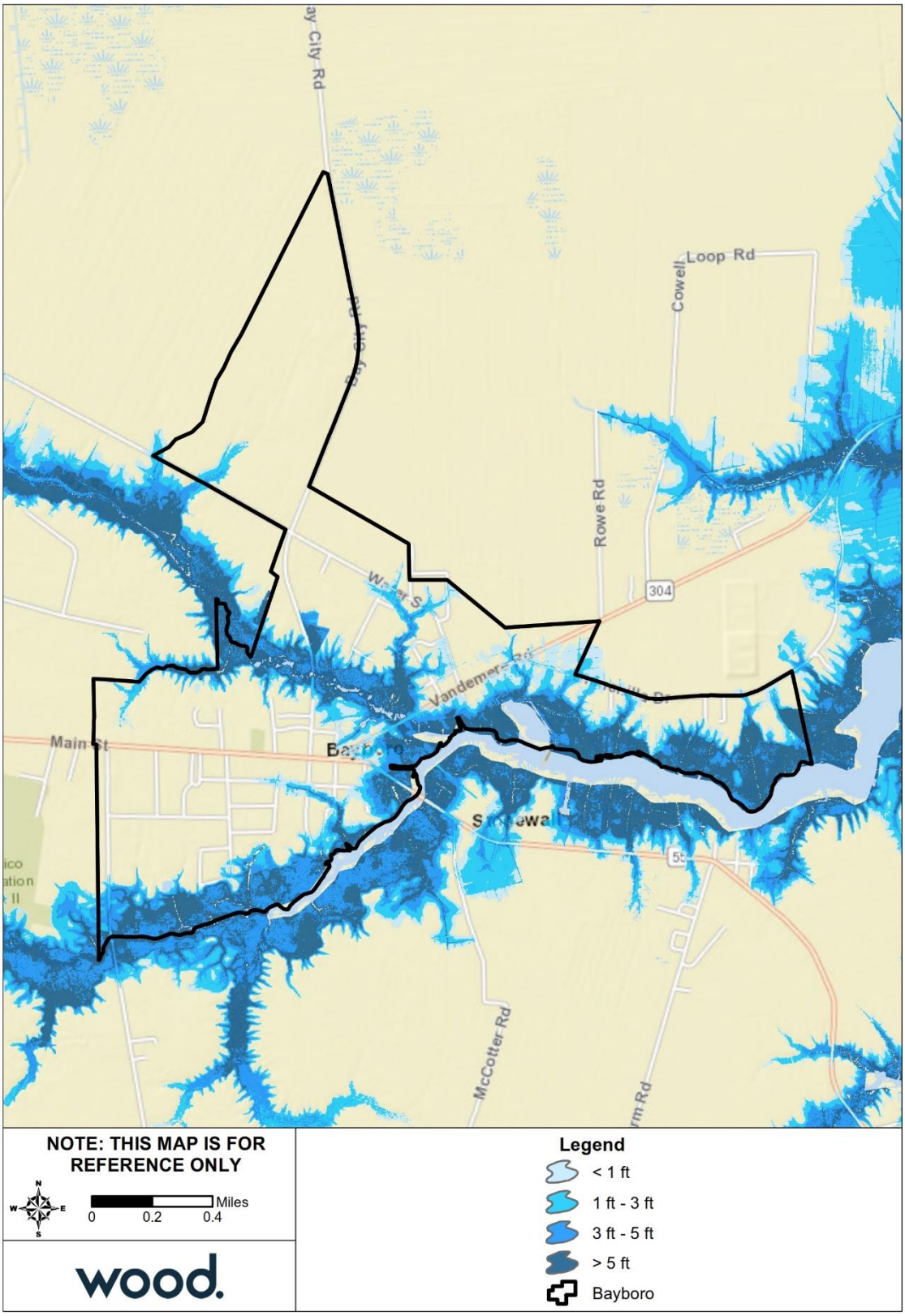
Source: FEMA Effective DFIRM

Figure D.22 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Alliance



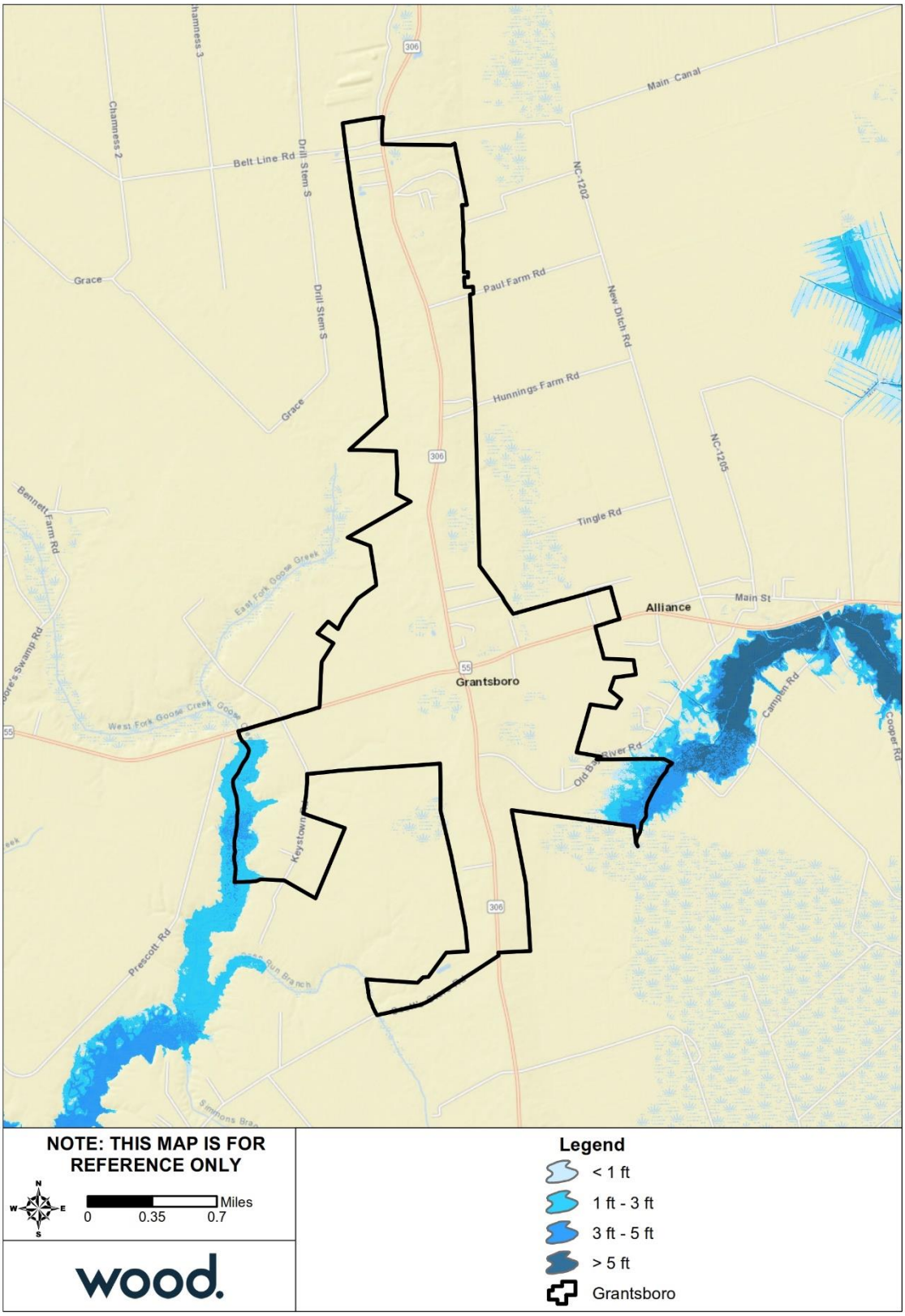
Source: FEMA Effective DFIRM

Figure D.23 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Bayboro



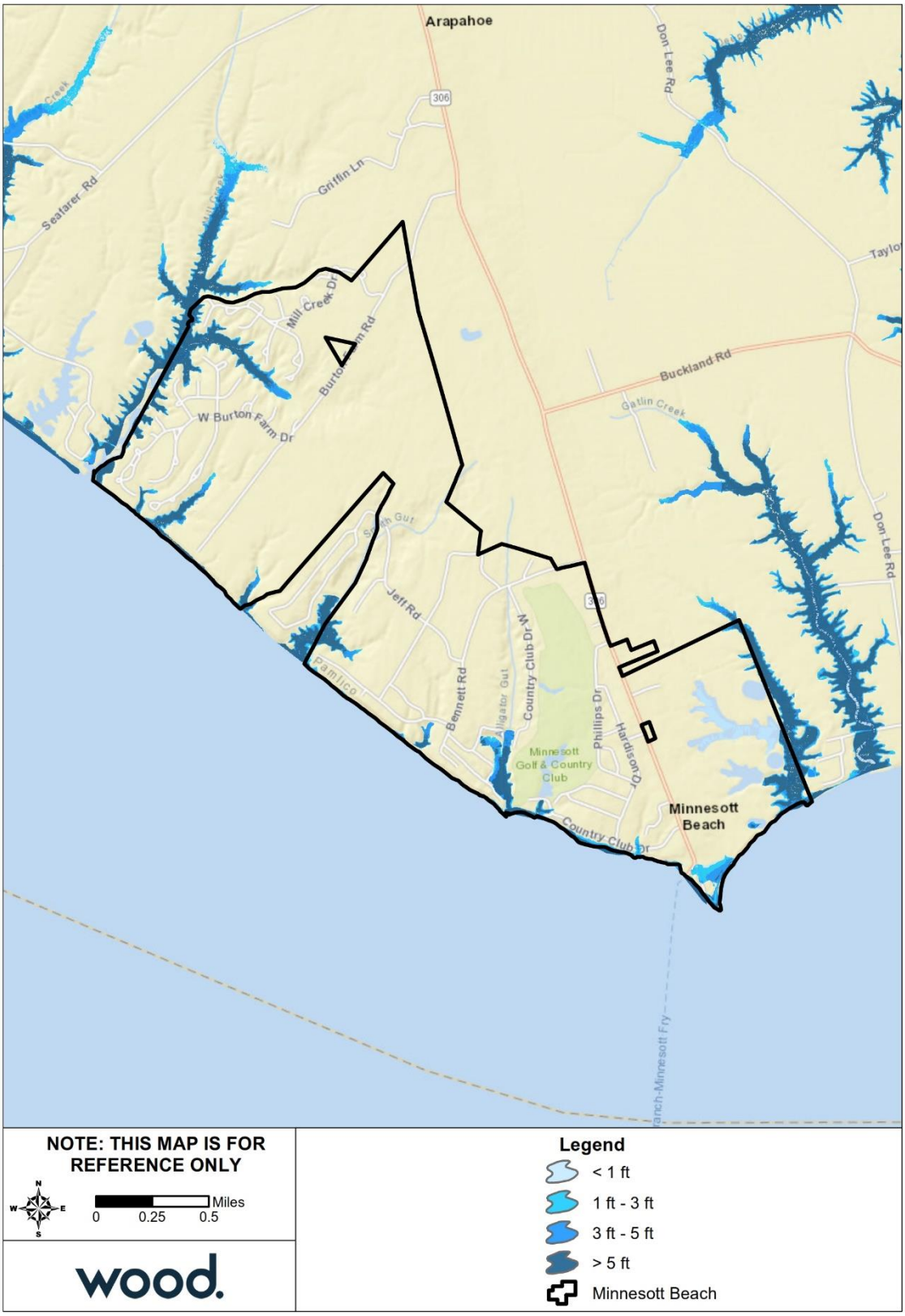
Source: FEMA Effective DFIRM

Figure D.24 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Grantsboro



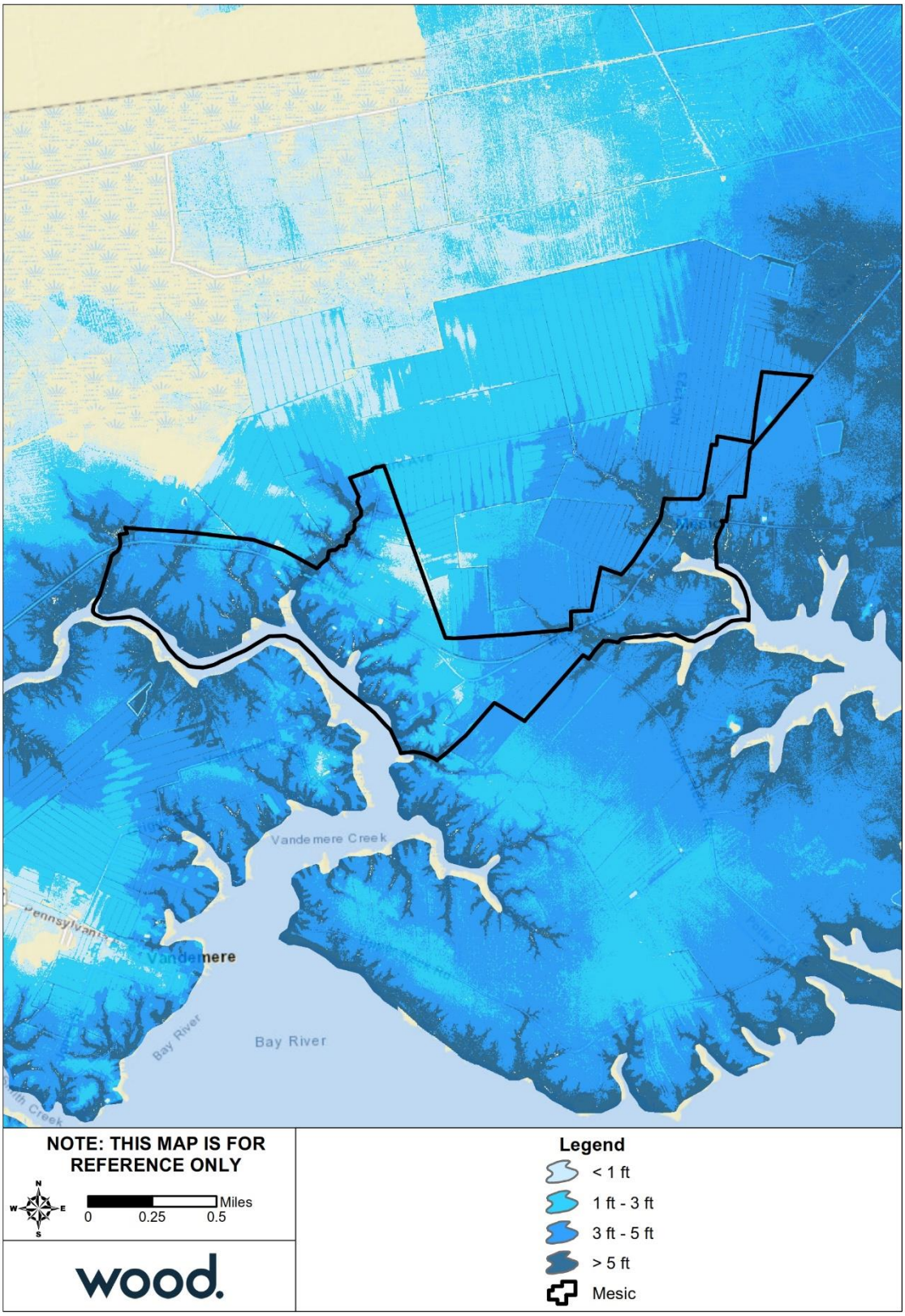
Source: FEMA Effective DFIRM

Figure D.25 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Minnesott Beach



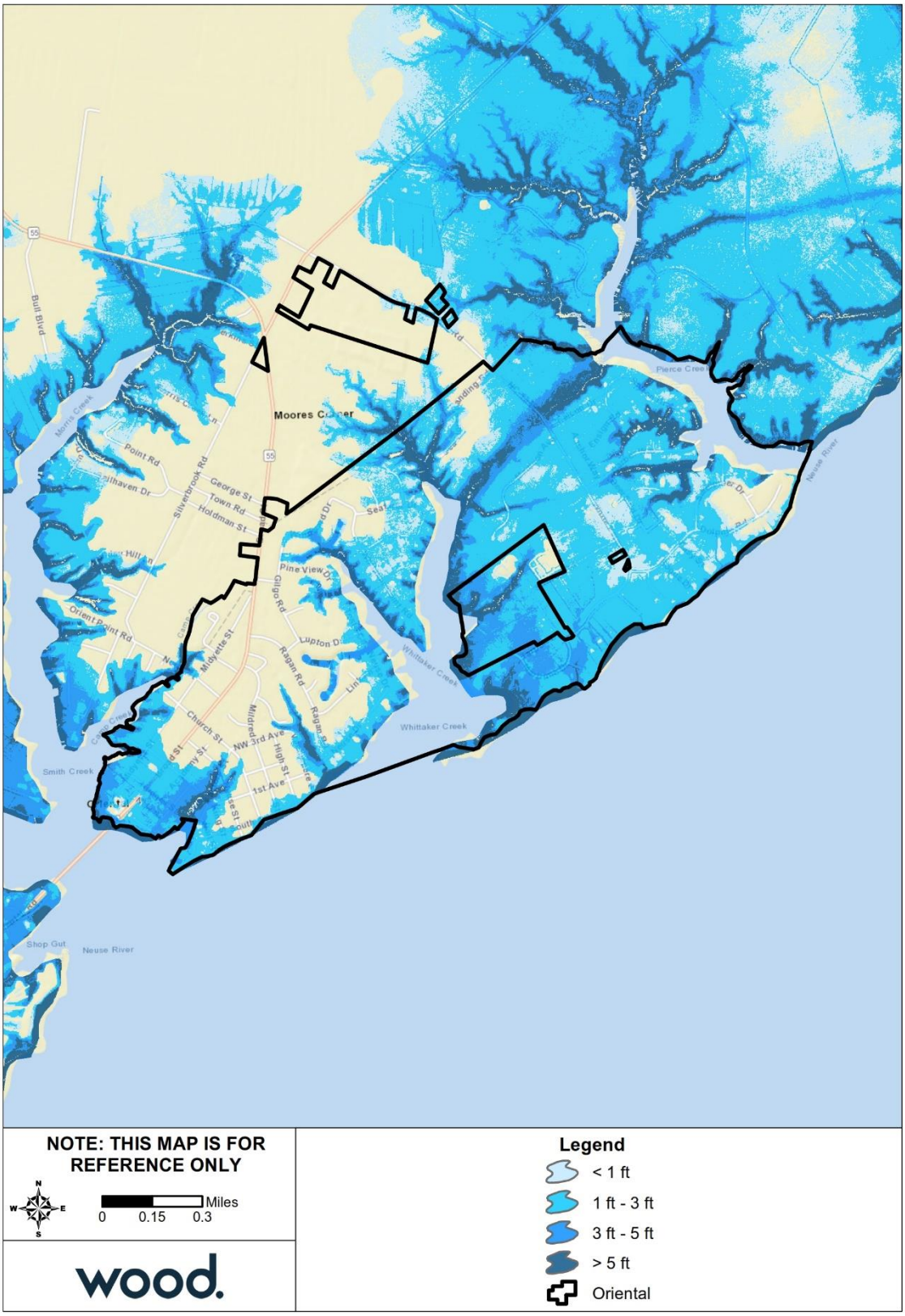
Source: FEMA Effective DFIRM

Figure D.26 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Mesic



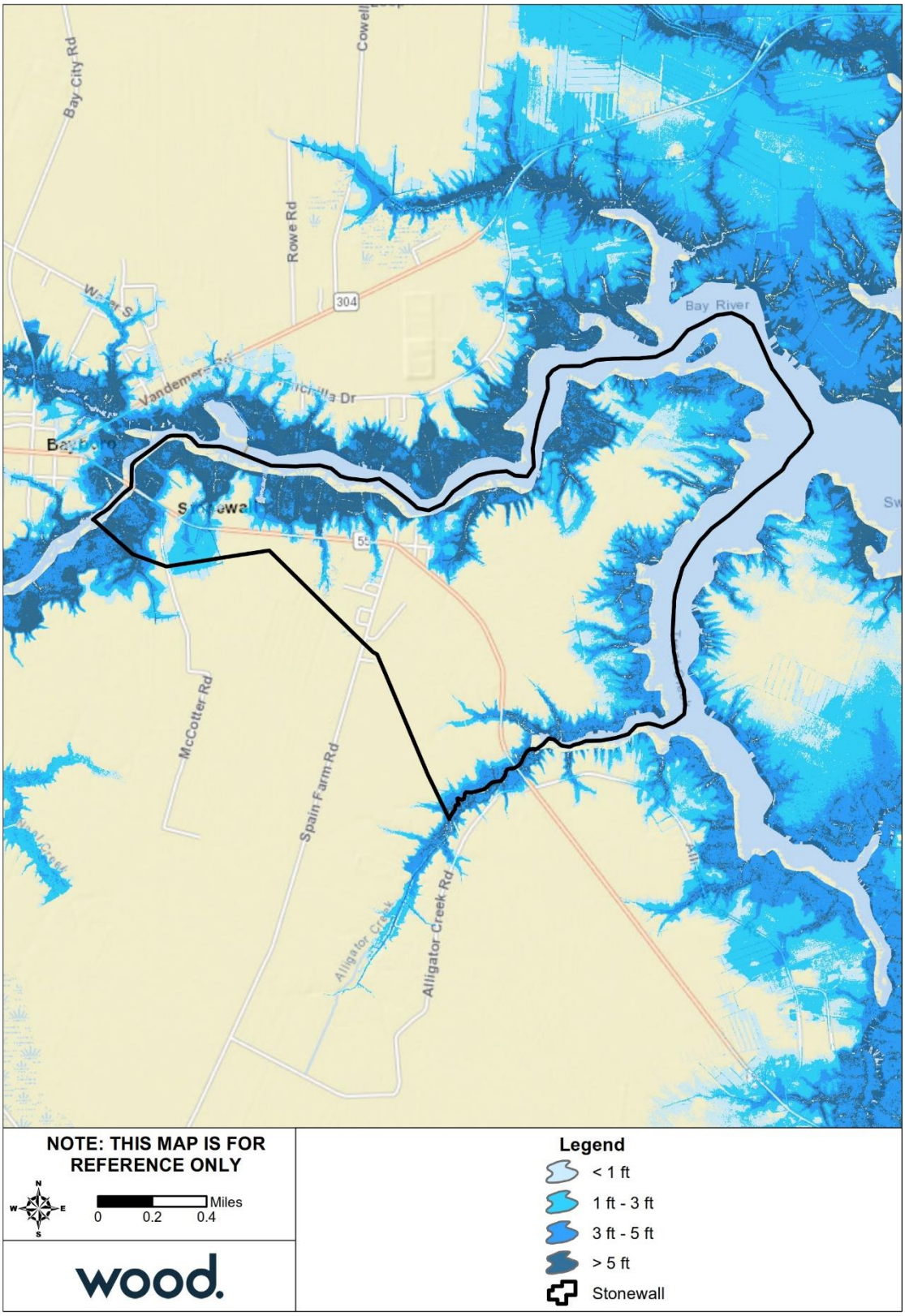
Source: FEMA Effective DFIRM

Figure D.27 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Oriental



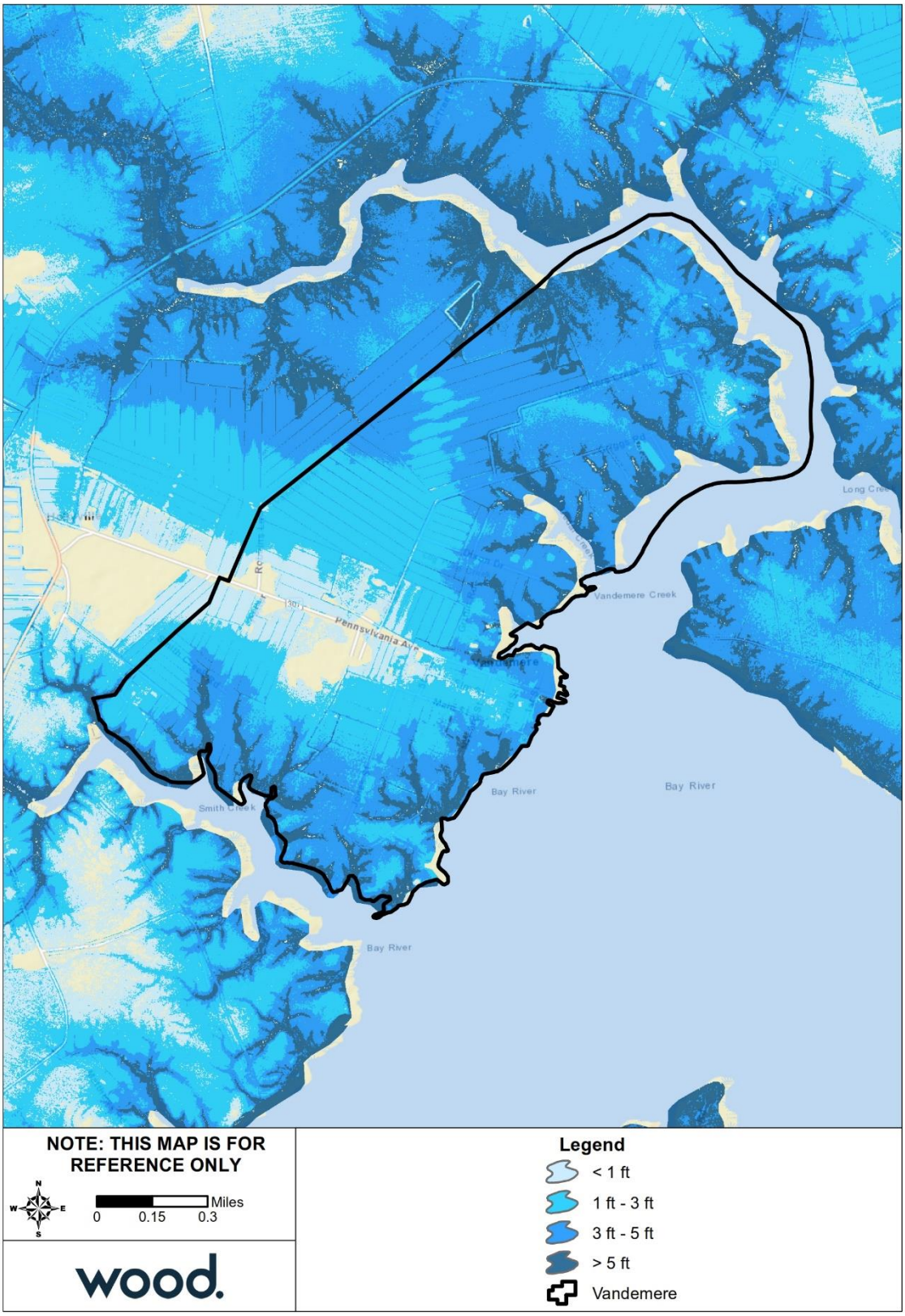
Source: FEMA Effective DFIRM

Figure D.28 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Stonewall



Source: FEMA Effective DFIRM

Figure D.29 – Flood Depth, 1%-Annual-Chance Floodplain, Town of Vandemere



Source: FEMA Effective DFIRM

D.2.2 Wildfire

Table D.12 summarizes the acreage in Pamlico County that falls within the Wildland Urban Interface (WUI), categorized by housing density. Areas in the WUI are those where development may intermix with flammable vegetation. Over 81 percent of Pamlico County is not included in the WUI.

Table D.12 – Wildland Urban Interface Acreage, Pamlico County

	Housing Density	Total Acreage	Percent of Total Acreage
	Not in WUI	*291,222.5*	*81.1%*
	LT 1hs/40ac	22,800.7	6.4%
	1hs/40ac to 1hs/20ac	14,553.1	4.1%
	1hs/20ac to 1hs/10ac	11,985.0	3.3%
	1hs/10ac to 1hs/5ac	9,316.2	2.6%
	1hs/5ac to 1hs/2ac	6,526.3	1.8%
	1hs/2ac to 3hs/1ac	2,419.0	0.7%
	GT 3hs/1ac	46.7	0.0%
	Total	**358,869.6**	

Source: Southern Wildfire Risk Assessment

Figure D.30 depicts the WUI for Pamlico County and all participating jurisdictions. The WUI is the area where housing development is built near or among areas of vegetation that may be prone to wildfire. Figure D.31 depicts the Fire Intensity Scale, which indicates the potential severity of fire based on fuel loads, topography, and other factors. Figure D.33 depicts Burn Probability based on landscape conditions, percentile weather, historical ignition patterns, and historical prevention and suppression efforts.

Potential fire intensity is highest in the unincorporated areas of Pamlico County, particularly in the northwest corner and southcentral portion of the county as well as along the northern border with Beaufort County. Burn probability is highest in the northwestern corner and along the northern border of the county. While the unincorporated area along the northern border and in the northwestern corner of the county has both high potential fire intensity and a high burn probability, much of this area is located outside of the WUI, so a fire here might not pose as high a risk to human settlement and the built environment.

Table D.13 provides building counts and estimated damages for Critical Infrastructure and Key Resources (CIKR) buildings by sector at risk to wildfire hazard in Pamlico County and participating jurisdictions. Table D.14 provides counts and estimated damages for High Potential Loss Properties in these areas.

Table D.13 – Critical Facilities Exposed to Wildfire by Jurisdiction, Pamlico County

Sector	Number of Buildings at Risk	Estimated Damages
Pamlico County Unincorporated Area		
Commercial Facilities	279	$63,589,903
Critical Manufacturing	42	$7,631,169
Defense Industrial Base	1	$1,614,892
Emergency Services	2	$3,380,046
Energy	4	$561,613
Food and Agriculture	121	$5,556,454
Government Facilities	13	$8,067,908

Sector	Number of Buildings at Risk	Estimated Damages
Healthcare and Public Health	4	$2,559,505
Transportation Systems	16	$3,242,569
Water	4	$3,088,363
All Categories	**486**	**$99,292,422**
Town of Alliance		
Commercial Facilities	66	$16,506,949
Critical Manufacturing	3	$945,394
Energy	1	$473,520
Government Facilities	7	$2,330,673
Healthcare and Public Health	8	$6,228,135
Transportation Systems	8	$1,251,367
All Categories	**93**	**$27,736,038**
Town of Arapahoe		
Commercial Facilities	26	$12,074,120
Critical Manufacturing	4	$429,037
Emergency Services	1	$349,438
Government Facilities	8	$4,395,153
Transportation Systems	3	$425,492
All Categories	**42**	**$17,673,240**
Town of Bayboro		
Banking and Finance	3	$1,045,421
Commercial Facilities	55	$14,670,236
Communications	2	$4,872,688
Critical Manufacturing	2	$240,882
Emergency Services	3	$2,714,309
Energy	1	$172,161
Food and Agriculture	8	$478,597
Government Facilities	18	$19,201,176
Healthcare and Public Health	3	$1,037,466
Transportation Systems	10	$3,108,197
Water	1	$71,305
All Categories	**106**	**$47,612,438**
Town of Grantsboro		
Banking and Finance	1	$1,104,058
Commercial Facilities	40	$21,979,916
Emergency Services	1	$469,943
Energy	1	$10,000,000
Government Facilities	3	$1,254,440
Healthcare and Public Health	2	$3,066,070
Nuclear Reactors, Materials and Waste	1	$75,666
Transportation Systems	1	$2,966,607
All Categories	**50**	**$40,916,700**
Town of Mesic		
Commercial Facilities	7	$664,624
Critical Manufacturing	1	$131,335
Food and Agriculture	3	$20,828
Government Facilities	2	$680,454
All Categories	**13**	**$1,497,241**
Town of Minnesott Beach		

Sector	Number of Buildings at Risk	Estimated Damages
Commercial Facilities	7	$17,848,846
Critical Manufacturing	1	$128,814
Government Facilities	1	$184,664
Transportation Systems	1	$266,305
All Categories	**10**	**$18,428,629**
Town of Oriental		
Banking and Finance	1	$438,521
Commercial Facilities	66	$18,086,966
Critical Manufacturing	4	$1,298,321
Food and Agriculture	6	$463,719
Government Facilities	4	$939,738
Healthcare and Public Health	3	$735,485
Transportation Systems	23	$6,903,662
Water	1	$168,750
All Categories	**108**	**$29,035,162**
Town of Stonewall		
Commercial Facilities	19	$3,524,469
Critical Manufacturing	3	$1,044,159
Food and Agriculture	1	$22,198
Government Facilities	3	$4,650,872
Transportation Systems	1	$74,088
All Categories	**27**	**$9,315,786**
Town of Mesic		
Commercial Facilities	9	$2,358,217
Critical Manufacturing	2	$303,978
Emergency Services	1	$649,801
Government Facilities	3	$574,935
All Categories	**15**	**$3,886,931**

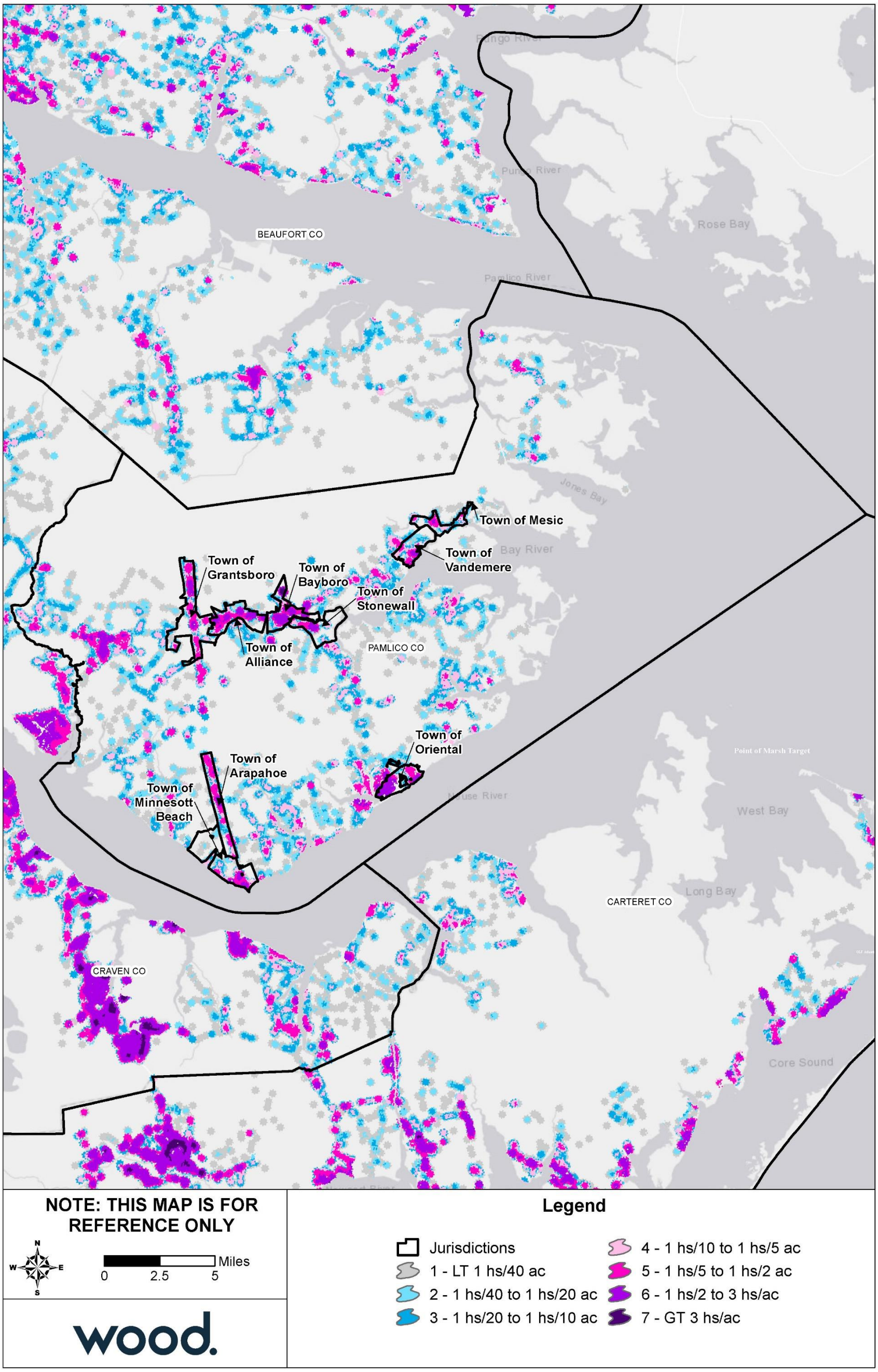
Source: NCEM Risk Management Tool

Table D.14 – High Potential Loss Properties Exposed to Wildfire by Jurisdiction, Pamlico County

Sector	Number of Buildings at Risk	Estimated Damages
Pamlico County Unincorporated Area		
Commercial	1	$2,629,800
Government	2	$5,668,337
Utilities	1	$1,500,000
All Categories	**4**	**$9,798,137**
Town of Arapahoe		
Government	1	$1,548,986
Town of Bayboro		
Government	6	$20,055,122
Town of Grantsboro		
Commercial	1	$3,026,846
Utilities	1	$10,000,000
All Categories	**2**	**$13,026,846**
Town of Stonewall		
Government	1	$3,974,902

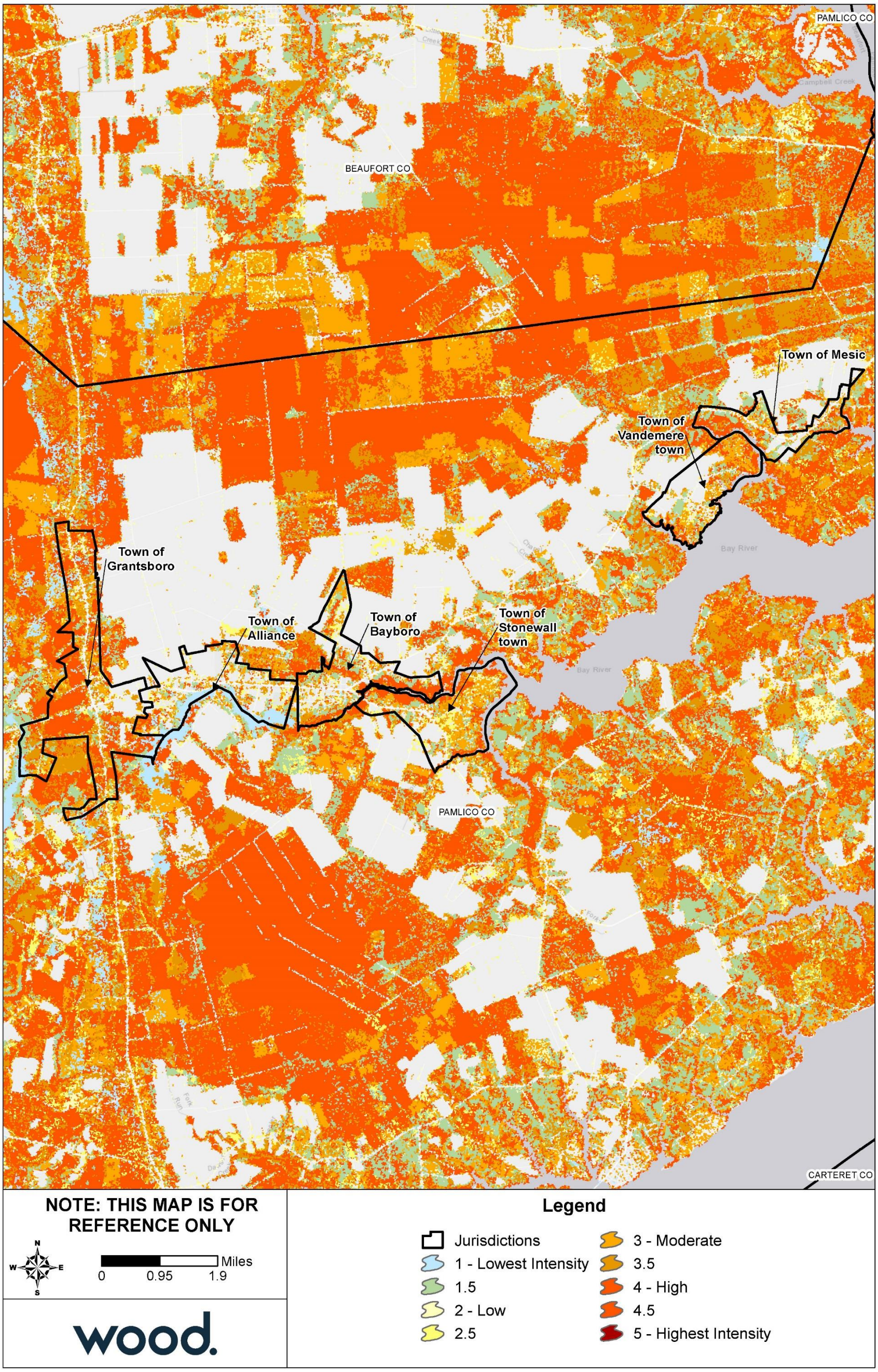
Source: NCEM Risk Management Tool

Figure D.30 – Wildland Urban Interface, Pamlico County



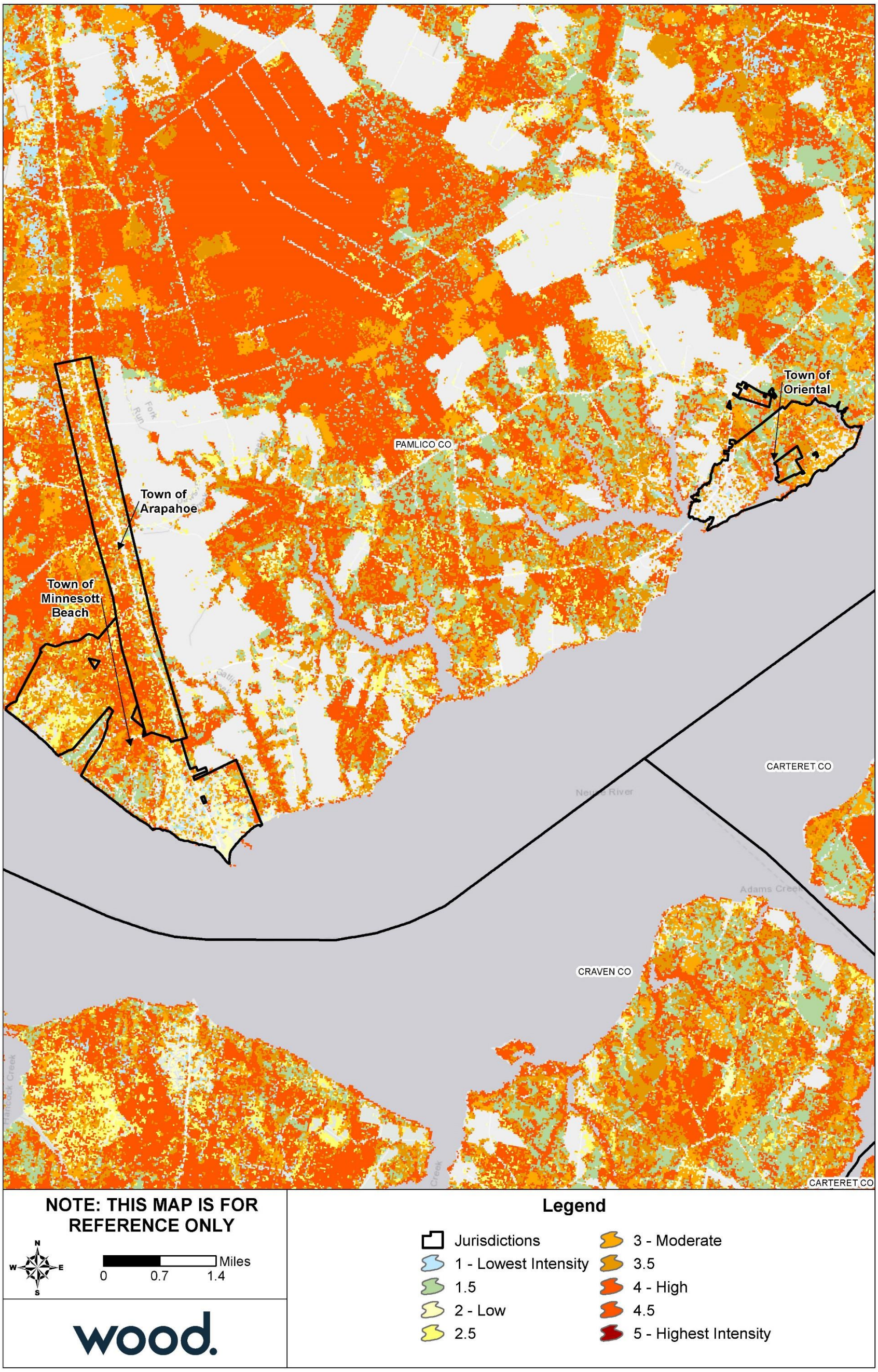
Source: Southern Wildfire Risk Assessment

Figure D.31 – Fire Intensity Scale, Pamlico County (Detail 1)



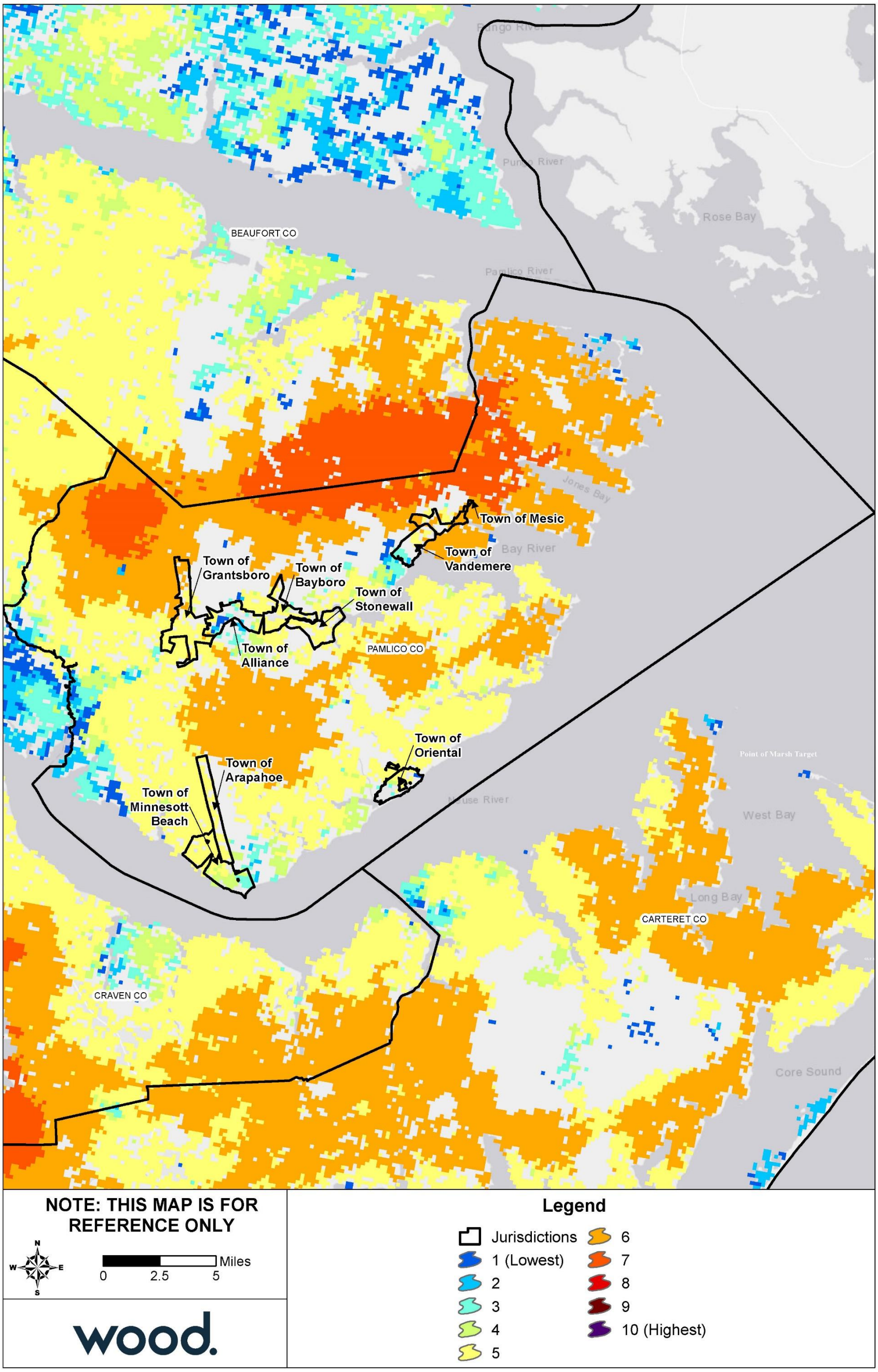
Source: Southern Wildfire Risk Assessment

Figure D.32 – Fire Intensity Scale, Pamlico County (Detail 2)



Source: Southern Wildfire Risk Assessment

Figure D.33 – Burn Probability, Pamlico County



Source: Southern Wildfire Risk Assessment

D.3 CAPABILITY ASSESSMENT

D.3.1 Overall Capability

Details on the tools and resources in place and available to Pamlico County were provided by the County's HMPC representatives and are summarized in Section 5 Capability Assessment. Based on that information and using the scoring methodology detailed in that section, Pamlico County has an overall capability rating of Moderate, however the County self-assessed its overall capability as High. Pamlico County provides many resources for its incorporated jurisdictions and many of the mitigation projects in this plan are regional in nature, with the County serving as the project lead; therefore, the County's capability is also an indicator for its incorporated areas. The County's Self-Assessment of key capability areas is summarized in Table D.15 below.

Table D.15 – Capability Self-Assessment, Pamlico County

Capability Area	Rating
Plans, Ordinances, Codes and Programs	High
Administrative and Technical Capability	High
Fiscal Capability	High
Education and Outreach Capability	High
Mitigation Capability	High
Political Capability	High
Overall Capability	High

D.3.2 Floodplain Management

The following tables reflect NFIP entry dates as well as policy and claims data for Pamlico County and incorporated categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table D.16 – NFIP Program Entry Dates

Community	Regular Entry Date
Pamlico County (Unincorporated Area)	September 4, 1985
Town of Alliance	August 5, 1985
Town of Arapahoe	Not Participating
Town of Bayboro	December 4, 1985
Town of Grantsboro	Not Participating
Town of Mesic	September 4, 1985
Town of Minnesott Beach	September 23, 1985
Town of Oriental	December 4, 1985
Town of Stonewall	December 4, 1985
Town of Vandemere	December 4, 1985

Table D.17 – NFIP Policy and Claims Data by Structure Type

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Pamlico County Unincorporated Area					
Single Family	1,143	$663,758	$266,272,200	2,187	$46,981,824.61
2-4 Family	2	$954	$500,000	3	$44,273.63
All Other Residential	8	$2,428	$1,407,700	4	$63,932.77

Structure Type	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Non-Residential	22	$68,177	$6,327,700	64	$3,071,964.31
Total	**1,175**	**$735,317**	**$274,507,600**	**2,258**	**$50,161,995.32**
Town of Alliance					
Single Family	8	$3,361	$1,508,300	2	$16,130.30
2-4 Family	1	$345	$210,000	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	4	$4,044	$1,101,200	1	$13,503.17
Total	**13**	**$7,750**	**$2,819,500**	**3**	**$29,633.47**
Town of Bayboro					
Single Family	49	$27,972	$9,096,700	55	$949,897.10
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	3	$2,458	$1,319,000	1	$88,822.27
Total	**52**	**$30,430**	**$10,415,700**	**56**	**$1,038,719.37**
Town of Mesic					
Single Family	35	$21,563	$5,580,100	31	$796,795.17
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	13	$13,608	$1,372,500	1	$141,065.68
Total	**48**	**$35,171**	**$6,952,600**	**32**	**$937,860.85**
Town of Minnesott Beach					
Single Family	20	$10,345	$6,017,800	12	$83,769.52
2-4 Family	1	$350	$250,000	1	$7,101.19
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	1	$615	$292,800	0	$0.00
Total	**22**	**$11,310**	**$6,560,600**	**13**	**$90,870.71**
Town of Oriental					
Single Family	612	$360,702	$168,636,100	1,196	$24,838,611.71
2-4 Family	28	$10,142	$4,696,500	18	$311,576.85
All Other Residential	68	$22,666	$11,048,700	20	$827,152.63
Non-Residential	42	$117,496	$12,894,100	100	$5,841,998.60
Total	**750**	**$511,006**	**$197,275,400**	**1,334**	**$31,819,339.79**
Town of Stonewall					
Single Family	20	$8,484	$3,340,300	29	$461,863.44
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	0	$0.00
Non-Residential	5	$17,369	$1,050,000	5	$834,493.14
Total	**25**	**$25,853**	**$4,390,300**	**34**	**$1,296,356.58**
Town of Vandemere					
Single Family	61	$55,140	$11,299,200	158	$4,180,845.15
2-4 Family	0	$0	$0	0	$0.00
All Other Residential	0	$0	$0	2	$20,000.00
Non-Residential	8	$24,171	$2,033,500	24	$1,323,262.51
Total	**69**	**$79,311**	**$13,332,700**	**184**	**$5,524,107.66**

Source: FEMA Community Information System, accessed September 2019

Table D.18 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Pamlico County Unincorporated Area					
A01-30 & AE Zones	1,031	$642,418	$244,642,800	2,065	$45,951,543.15
A Zones	10	$8,234	$2,450,700	88	$2,312,763.91
V01-30 & VE Zones	6	$17,965	$1,520,000	5	$40,914.50
B, C & X Zone					
Standard	10	$13,849	$1,976,500	16	$553,687.14
Preferred	76	$27,651	$20,986,000	52	$1,161,263.29
Total	**1,133**	**$710,117**	**$271,576,000**	**2,226**	**$50,020,171.99**
Town of Alliance					
A01-30 & AE Zones	5	$2,372	$869,900	3	$29,633.47
B, C & X Zone					
Standard	2	$500	$39,800	0	$0.00
Preferred	5	$4,278	$1,840,000	0	$0.00
Total	**12**	**$7,150**	**$2,749,700**	**3**	**$29,633.47**
Town of Bayboro					
A01-30 & AE Zones	40	$25,234	$7,768,000	49	$906,819.54
A Zones	0	$0	$0	1	$35,000.00
B, C & X Zone					
Standard	1	$1,147	$197,900	1	$2,995.44
Preferred	10	$3,449	$2,380,000	5	$93,904.39
Total	**51**	**$29,830**	**$10,345,900**	**56**	**$1,038,719.37**
Town of Mesic					
A01-30 & AE Zones	48	$35,171	$6,952,600	32	$937,860.85
B, C & X Zone					
Standard	0	$0	$0	0	$0.00
Preferred	0	$0	$0	0	$0.00
Total	**48**	**$35,171**	**$6,952,600**	**32**	**$937,860.85**
Town of Minnesott Beach					
A01-30 & AE Zones	8	$3,921	$2,067,400	10	$66,736.56
B, C & X Zone					
Standard	2	$2,613	$503,200	0	$0.00
Preferred	12	$4,776	$3,990,000	3	$24,134.15
Total	**22**	**$11,310**	**$6,560,600**	**13**	**$90,870.71**
Town of Oriental					
A01-30 & AE Zones	618	$433,915	$159,640,400	1,237	$29,708,132.68
B, C & X Zone					
Standard	21	$32,205	$4,840,200	19	$312,187.81
Preferred	110	$44,286	$32,725,000	78	$1,799,019.30
Total	**749**	**$510,406**	**$197,205,600**	**1,334**	**$31,819,339.79**
Town of Stonewall					
A01-30 & AE Zones	18	$23,017	$3,200,700	31	$1,237,226.95
B, C & X Zone					
Standard	0	$0	$0	0	$0.00
Preferred	5	$1,636	$1,050,000	3	$59,129.63
Total	**23**	**$24,653**	**$4,250,700**	**34**	**$1,296,356.58**
Town of Vandemere					

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	66	$77,804	$13,053,100	181	$5,468,186.87
B, C & X Zone					
Standard	0	$0	$0	3	$55,920.79
Preferred	1	$307	$140,000	0	$0.00
Total	**67**	**$78,111**	**$13,193,100**	**184**	**$5,524,107.66**

Source: FEMA Community Information System, accessed September 2019

Table D.19 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Pamlico County Unincorporated Area					
A01-30 & AE Zones	242	$244,939	$42,360,000	981	$27,223,988.46
A Zones	2	$1,820	$617,000	57	$1,539,213.72
B, C & X Zone	34	$15,069	$7,800,500	35	$1,052,989.39
Standard	6	$5,189	$646,500	15	$526,573.93
Preferred	28	$9,880	$7,154,000	20	$526,415.46
Total	**278**	**$261,828**	**$50,777,500**	**1,073**	**$29,816,191.57**
Town of Alliance					
A01-30 & AE Zones	1	$368	$121,500	1	$13,503.17
B, C & X Zone	5	$1,558	$669,800	0	$0.00
Standard	2	$500	$39,800	0	$0.00
Preferred	3	$1,058	$630,000	0	$0.00
Total	**6**	**$1,926**	**$791,300**	**1**	**$13,503.17**
Town of Bayboro					
A01-30 & AE Zones	18	$14,993	$3,100,300	34	$702,330.96
A Zones	0	$0	$0	1	$35,000.00
B, C & X Zone	7	$3,270	$1,702,900	6	$96,899.83
Standard	1	$1,147	$197,900	1	$2,995.44
Preferred	6	$2,123	$1,505,000	5	$93,904.39
Total	**25**	**$18,263**	**$4,803,200**	**41**	**$834,230.79**
Town of Mesic					
A01-30 & AE Zones	17	$15,294	$2,252,500	18	$643,773.44
Town of Minnesott Beach					
A01-30 & AE Zones	4	$1,888	$807,400	5	$50,532.96
B, C & X Zone	3	$1,204	$980,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	3	$1,204	$980,000	0	$0.00
Total	**7**	**$3,092**	**$1,787,400**	**5**	**$50,532.96**
Town of Oriental					
A01-30 & AE Zones	186	$209,452	$44,633,000	521	$16,417,983.29
B, C & X Zone	66	$41,012	$19,022,100	59	$1,195,853.64
Standard	11	$20,164	$2,677,100	13	$165,007.08
Preferred	55	$20,848	$16,345,000	46	$1,030,846.56
Total	**252**	**$250,464**	**$63,655,100**	**580**	**$17,613,836.93**
Town of Stonewall					
A01-30 & AE Zones	13	$21,100	$2,077,000	26	$1,150,578.30
B, C & X Zone	2	$671	$420,000	0	$0.00

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Standard	0	$0	$0	0	$0.00
Preferred	2	$671	$420,000	0	$0.00
Total	**15**	**$21,771**	**$2,497,000**	**26**	**$1,150,578.30**
Town of Vandemere					
A01-30 & AE Zones	34	$58,944	$6,389,100	134	$4,269,540.79
B, C & X Zone	1	$307	$140,000	2	$48,040.35
Standard	0	$0	$0	2	$48,040.35
Preferred	1	$307	$140,000	0	$0.00
Total	**35**	**$59,251**	**$6,529,100**	**136**	**$4,317,581.14**

Source: FEMA Community Information System, accessed September 2019

Table D.20 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Pamlico County Unincorporated Area					
A01-30 & AE Zones	789	$397,479	$202,282,800	1,084	$18,727,554.69
A Zones	8	$6,414	$1,833,700	31	$773,550.19
V01-30 & VE Zones	6	$17,965	$1,520,000	5	$40,914.50
B, C & X Zone	52	$26,431	$15,162,000	33	$661,961.04
Standard	4	$8,660	$1,330,000	1	$27,113.21
Preferred	48	$17,771	$13,832,000	32	$634,847.83
Total	**855**	**$448,289**	**$220,798,500**	**1,153**	**$20,203,980.42**
Town of Alliance					
A01-30 & AE Zones	4	$2,004	$748,400	2	$16,130.30
B, C & X Zone	2	$3,220	$1,210,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	2	$3,220	$1,210,000	0	$0.00
Total	**6**	**$5,224**	**$1,958,400**	**2**	**$16,130.30**
Town of Bayboro					
A01-30 & AE Zones	22	$10,241	$4,667,700	15	$204,488.58
B, C & X Zone	4	$1,326	$875,000	0	$0.00
Standard	0	$0	$0	0	$0.00
Preferred	4	$1,326	$875,000	0	$0.00
Total	**26**	**$11,567**	**$5,542,700**	**15**	**$204,488.58**
Town of Mesic					
A01-30 & AE Zones	31	$19,877	$4,700,100	14	$294,087.41
Town of Minnesott Beach					
A01-30 & AE Zones	4	$2,033	$1,260,000	5	$16,203.60
B, C & X Zone	11	$6,185	$3,513,200	3	$24,134.15
Standard	2	$2,613	$503,200	0	$0.00
Preferred	9	$3,572	$3,010,000	3	$24,134.15
Total	**15**	**$8,218**	**$4,773,200**	**8**	**$40,337.75**
Town of Oriental					
A01-30 & AE Zones	432	$224,463	$115,007,400	716	$13,290,149.39
B, C & X Zone	65	$35,479	$18,543,100	38	$915,353.47
Standard	10	$12,041	$2,163,100	6	$147,180.73
Preferred	55	$23,438	$16,380,000	32	$768,172.74

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
Total	**497**	**$259,942**	**$133,550,500**	**754**	**$14,205,502.86**
Town of Stonewall					
A01-30 & AE Zones	5	$1,917	$1,123,700	5	$86,648.65
B, C & X Zone	3	$965	$630,000	3	$59,129.63
Standard	0	$0	$0	0	$0.00
Preferred	3	$965	$630,000	3	$59,129.63
Total	**8**	**$2,882**	**$1,753,700**	**8**	**$145,778.28**
Town of Vandemere					
A01-30 & AE Zones	32	$18,860	$6,664,000	47	$1,198,646.08
B, C & X Zone	0	$0	$0	1	$7,880.44
Standard	0	$0	$0	1	$7,880.44
Preferred	0	$0	$0	0	$0.00
Total	**32**	**$18,860**	**$6,664,000**	**48**	**$1,206,526.52**

Source: FEMA Community Information System, accessed September 2019

D.4 MITIGATION STRATEGY

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
Pamlico County and Jurisdictions													
P1	In the event of a substantial flooding event, or other natural hazard occurrence, perform damage assessments in coordination with NCEM. These assessments will assist the County in determining the extent of the damage caused by the respective disaster event. This data will be utilized as a tool for land use planning and future hazard mitigation plan updates and to gauge the effectiveness of the County's two-foot freeboard requirement.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	3	3.1	PP	• **Pamlico County Emergency Services** • Pamlico County Administration • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as necessary	In-Progress – Carry Forward	Pamlico County has carried out this process following Hurricanes Matthew and Florence since adoption of the past plan. The impacts of these storms will be factored into decisions regarding land use and development policy through implementation of this plan.
P2	Continue to monitor drainage conditions throughout the County, in particular, issues associated with drainage ditches and agricultural runoff canals situated throughout the County. Once issues are identified, the County will work with municipal jurisdictions and State agencies to identify short- and long-term solutions to these issues.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Wildfire, Dam & Levee Failure	High	1	1.3	NRP	• **Pamlico County Administration** • Pamlico County Emergency Services • Municipal Administrations	Staff Time	GF, NCDENR, NCDOT	Ongoing – In Process	In Progress – Carry Forward	Pamlico County is currently working towards solutions regarding flooding associated with Hurricanes Matthew and Florence. The most substantial of these problems has been identified in the Hurricane Matthew Resiliency Redevelopment Plan.
P3	Continue to proactively seek grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Pamlico County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	3	3.1	PP	• **Pamlico County Planning Department** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF, NCDPS, HMGP, PDM, UHMA	Ongoing – as needed	In Progress – Carry Forward	Pamlico County continues to aggressively seek out grant funding for elevating RLPs and SRLPs and is currently administering a grant program to rehabilitate and mitigate properties during recent hurricanes. The County also maintains an up-to-date list of all RLPs in the County.
P4	Continue to educate County residents about the linkage between flooding (standing water) and the proliferation of mosquitos. These efforts will focus on teaching property owners how to mitigate mosquito issues throughout the County.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Dam & Levee Failure	Med	2	2.2	P, PIO	• **Pamlico County Administration** • Pamlico County Emergency Services • Municipal Administrations	Staff Time	GF, NCDENR, NCDPS	Ongoing – in process	In Progress – Carry Forward	Pamlico County maintains an educational program regarding mosquito abatement and will work to improve these efforts through plan implementation.
P5	Make a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors/realtors familiar with floodproofing and elevation techniques, available through various avenues including: • Placing materials in the local library • Maintaining documents at the County Planning and Economic Development office • Disseminating information to local contractors • Distributing information to churches and other community-based organizations • Establishing a means to distribute information to schoolchildren	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Severe Weather, Dam & Levee Failure	High	2	2.2	PP	• **Pamlico County Planning Department** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF	Ongoing – next 5 years	In Progress – Carry Forward	Pamlico County will continue to provide this service for all County residents, as well as participating municipalities.

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
P6	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate and that all jurisdictions are adequately prepared.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	3	3.2	P	• **Pamlico County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS	Ongoing – as needed	In Progress – Carry Forward	The County EOP is reviewed annually and updated as necessary.
P7	Continue to work with the North Carolina Department of Environmental Quality to enforce standards outlined within the statewide stormwater management program. Currently, this program generally addresses stormwater management for projects disturbing an area equal to or greater than one acre. Additionally, the County will monitor localized flooding issues and, where feasible, address these issues through the installation of stormwater best management practices (BMP's).	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	Med	1	1.3	P	• **Pamlico County Administration** • Municipal Administration	Staff Time	GF, NCDPS, NCDENR	Ongoing – In Process	In Progress – Carry Forward	Pamlico County provides development review services throughout the County and works with NCDEQ to enforce state stormwater regulations.
P8	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Pamlico County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc., in making determinations relating to need and capacity.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Tornado, Severe Winter Storm, Extreme Heat, Earthquake, Wildfire, Dam & Levee Failure	High	2	2.1	P	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Elected Boards	Staff Time	GF, NCDPS, American Red Cross	2 to 3 years	In Progress – Carry Forward	Pamlico County in coordination with all participating municipal jurisdictions, will work through this exercise annually, as well as following the effects of a natural hazard event through the corrective action planning process.
P9	Ensure that there is adequate capacity for snow and ice removal in the event of a major snowstorm. The County will work with the North Carolina Department of Transportation (NCDOT) and North Carolina Emergency Management (NCEM) to ensure that all resources necessary are available to carry out this effort. Additionally, the County will work closely with the County school system, as well as other entities, to make determinations regarding closures and delays.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Severe Winter Storm	Med	1	1.1	P	• **Pamlico County Emergency Services** • Municipal Administrations	Staff Time	GF, NCDPS, NCDOT	Ongoing – In Process	In Progress – Carry Forward	Pamlico County continues to improve upon its capacity to address snow and ice removal. The County will continue these efforts through equipment acquisition and mutual aid agreements.
P10	Continue to maintain all development regulations, emergency and land use related plans, and applications for permits on the respective jurisdictions' website. This information will be maintained and updated as deemed necessary. If a local website does not exist, municipal jurisdictions will consider developing one through implementation of this plan.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	High	1	1.3	PP	• **Pamlico County Administration** • Municipal Administrations	Staff Time/ $3,500	GF	3 to 5 years	In Progress – Carry Forward	Pamlico County, as well as all participating municipal jurisdictions, will consider review of land development policies and regulations through implementation of this plan.
P11	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Wildfire	High	4	4.1	PP	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Administrations	Staff Time	GF, NC Forestry Service, NCDPS	Other - Annually	New	N/A

Action #	Description	Applicable Jurisdictions	Hazards Addressed	Priority	Goal	Objective	Category	Lead/Participating Agencies (Lead Agency is in bold)	Estimated Cost	Potential Funding Sources	Implementation Schedule	2019 Status	Status Comments/Explanation
P12	Maintain reciprocal mutual aid agreements with all neighboring communities to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	High	4	4.2	ES	• **Pamlico County Emergency Services** • Municipal Administrations • Volunteer Fire Departments	Staff Time	GF, NCDPS	Ongoing – next 5 years	New	N/A
P13	Maintain Debris Removal and Monitoring Services Contracts for post disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	All Hazards	Med	1	1.1	PP	• **Pamlico County Emergency Services** • Pamlico County Board of Commissioners • Municipal Administrations	To Be Determined	GF, NCDPS, FEMA	Ongoing – As needed	New	N/A
P14	Maintain all property acquired through annual and post disaster mitigation funding as open space in perpetuity. Additionally, appropriate reuse strategies will be developed regarding this dedicated open space.	Pamlico County, Alliance, Arapahoe, Bayboro, Grantsboro, Mesic, Minnesott Beach, Oriental, Stonewall, Vandemere	Flood, Hurricane & Tropical Storm, Coastal Hazards, Dam & Levee Failure	High	1	1.2	PP	• **Pamlico County Administration** • Municipal Administrations	To Be Determined	GF, NCDPS	Ongoing – in process	New	N/A
Town of Oriental													
OR1	Annual outreach to residents for hurricane season preparations, quarterly meetings with Church reps to disseminate prep materials, instructions for before, during, and following disasters. Keep seasonal information in Town Hall and disseminate to businesses. Distribute through mailings (newsletter), social media, traditional media materials. Disseminate info on elevation for new construction, restrict building in floodplain.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	2	2.2	PIO	• **Town of Oriental Administration**	$2,000	General fund	Ongoing	New	N/A
OR2	Annual outreach to realtors to make sure most updated building restrictions in GMO are disseminated to all potential buyers.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	2	2.2	PIO	• **Town of Oriental Administration**	$100	General fund	Ongoing	New	N/A
OR3	Annual review by Planning Board and Town Board and make changes to GMO that prevent recurrent flooding and enhance drainage capacity.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	1	1.3	P	• **Town of Oriental Administration**	$500	General fund	Ongoing annually	New	Recently tightened drainage reqs by preventing covered culverts other than driveways and requiring stamped engineered drawings of alternative drainage to flow to existing open culverts associated with elevating property grade. Signed onto Pamlico County Flood Prevention Ordinance to require elevation.
OR4	Annual ditch clearing and assessment of town-maintained open and covered culverts. Annual education of residents/businesses about the flow of drainage (culverts not there to take water away, but to settle solids), Priority list established and reviewed for clearing/blockage of street culverts, education about ownership of land vs. rights-of-way, necessity of clearing residentially maintained ditches.	Oriental	Coastal Hazards, Flood, Hurricane & Tropical Storm	High	1	1.3	PP	• **Town of Oriental Administration**	$16,000-$20,000 annually	General fund	Ongoing annually	New	

Appendix A Plan Review Tool

This page intentionally left blank

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: **Pamlico Sound Region (Beaufort County, Carteret County, Craven County, Pamlico County, and incorporated jurisdictions)**	**Title of Plan: Pamlico Sound Regional Hazard Mitigation Plan**	**Date of Plan:** **February 2020**
Local Point of Contact: **David Stroud**	**Address:** **4021 Stirrup Creek Drive, Suite 100** **Durham, NC 27703**	
Title:		
Agency:		
Phone Number: **919-856-6485**	**E-Mail:** **David.stroud@woodplc.com**	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	
Date Received in FEMA Region ***(insert #)***		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2 (p. 5-17); Appendix B		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2 (p. 8-16); Appendix B (p.B.35-B.36)		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2 (p. 14-15); Appendix B (p.B.16-B.34)		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 2 (p. 8-9)		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 8 (p. 312-313)		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 8 (p. 307-313)		
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4.5 (p. 84-262; Hazard Description, Location, Extent, Hazard Summary by Jurisdiction), Annexes		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4.5 (p. 84-262; Past Occurrences, Probability of Future Occurrence, Hazard Summary by Jurisdiction),		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 4.5 (p. 84-262; Vulnerability Assessment, Hazard Summary by Jurisdiction), Annexes		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 4.5.6 (p.162-163)		
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 5 (p. 263-285)		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5 (p. 271-273)		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 6 (p.286-289)		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 6 (p. 288-289), Section 7 (p. 290-306), Appendix C		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 6 (p. 288-289), Section 7 (p. 290-306)		

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 8 (p.307-310)		
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 3 (p. 24-63), Section 4 (p. 64-252; Asset Inventory, Vulnerability Assessment), Annexes		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 2 (p. 6, 16-23), Section 5 (p.263-285)		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 6 (p. 286-289), Section 7 (p. 290-306)		
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Plan will be adopted pending APA letter from FEMA; Adoption resolutions will be added to Section 9		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Plan will be adopted pending APA letter from FEMA; Adoption resolutions will be added to Section 9		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Beaufort County	County										
2	Washington	City										
3	Aurora	Town										
4	Bath	Town										
5	Belhaven	Town										
6	Chocowinity	Town										
7	Pantego	Town										
8	Washington Park	Town										
9	Carteret County	County										

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
10	Atlantic Beach	Town										
11	Beaufort	Town										
12	Bogue	Town										
13	Cape Carteret	Town										
14	Cedar Point	Town										
15	Emerald Isle	Town										
16	Indian Beach	Town										
17	Morehead City	Town										
18	Newport	Town										
19	Peletier	Town										
20	Pine Knoll Shores	Town										
21	Craven County	County										
22	Havelock	City										
23	New Bern	City										

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
24	Bridgeton	Town										
25	Cove City	Town										
26	Dover	Town										
27	River Bend	Town										
28	Trent Woods	Town										
29	Vanceboro	Town										
30	Pamlico County	County										
31	Alliance	Town										
32	Arapahoe	Town										
33	Bayboro	Town										
34	Grantsboro	Town										
35	Mesic	Town										
36	Minnesott Beach	Town										
37	Oriental	Town										

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
38	Stonewall	Town										
39	Vandemere	Town										

Appendix B Planning Process Documentation

PLANNING STEP 1: ORGANIZE TO PREPARE THE PLAN

Table B.1 – HMPC Meeting Topics, Dates, and Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
HMPC Mtg. #1 – Project Kickoff	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	February 12, 2019	Craven County Cooperative Extension, 300 Industrial Drive, New Bern, NC
HMPC Mtg. #2	1) Review and update plan goals 2) Brainstorm a vision statement 3) Report on status of actions from the 2015 plan 4) Complete the capability assessment	February 28, 2019	Emerald Isle Commissioners Board, Room 7500, Emerald Drive, Emerald Isle, NC
HMPC Mtg. #3	1) Review draft Hazard Identification & Risk Assessment (HIRA) 2) Review draft goals and objectives 3) Draft Mitigation Strategies	June 20, 2019	Beaufort County Community College 5337 US Highway 264 East, Washington, NC
HMPC Mtg. #4	1) Review the Draft Hazard Mitigation Plan 2) Solicit comments and feedback	December 4, 2019	Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC

Note: All HMPC Meetings were open to the public.

Meeting agendas, minutes, and sign in sheets are provided on the following pages. Presentations referenced in the minutes can be provided upon request.

HMPC Meeting Agendas, Minutes, and Sign-in Sheets

HMPC Meeting 1: February 12, 2019

Agenda

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting
February 12, 2019, 2:00 PM
Craven County Agricultural Cooperative Extension

- Introductions
- Project Overview
  - Participants
  - What is Hazard Mitigation?
  - Requirement for Update
  - Trends in Disasters
  - Disaster Mitigation Act of 2000
    - Federal and State Requirements
    - Planning Requirements
    - Planning Process Review
  - Scope of Work
  - Risk Management Tool (RMT)
- Project Schedule
- Plan Website
- Next Steps
  - Review and Update Mitigation Goals & Objectives
  - Review Existing Mitigation Projects
  - Complete Plan Survey
  - Share Link to Plan Website on Local Community Websites
- Questions

Pamlico Sound Regional Hazard Mitigation Plan

Hazard Mitigation Planning Committee Meeting

Tuesday, February 12, 2019-2:00 PM
Meeting Minutes

Landin Holland called the meeting to order at 2:00 pm in the Craven County Cooperative Extension Building.

Present

Refer to the attached sign in sheet.

Introduction

Mr. Holland introduced himself and provided an explanation of the overall project, as well as the project team that will be working through the Planning Process.

Presentation

Mr. Holland provided a presentation that detailed project partners, project schedule, and plan content. The presentation has been attached as a component of these minutes. An overview of the project schedule was discussed, including the date and location for the second HMPC meeting.

Questions

Several questions were asked regarding the makeup/composition of the Hazard Mitigation Planning Committee at the County and municipal level. Mr. Holland advised everyone that there needed to be a primary and secondary staff member for non-Community Rating System (CRS) communities. Mr. Holland went on to say that local units of government that are participants in the CRS program must identify the primary and secondary staff members, as well as two citizen stakeholders. The defined stakeholders should not be elected officials.

Adjourn

There being no further business to conduct, Mr. Holland adjourned the meeting at 3:26 PM.

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Kick-Off Meeting

Thursday, February 12, 2019, 2:00 PM

	Name	Organization	Phone	E-Mail
1.	Morgan Potts	City of NewBern	252-639-7583	pottsm@newbernnc.gov
2.	Nadia Abdul-Hadi	City of New Bern	252-639-7585	hadin@newbernnc.gov
3.	Matt Boswell	City of New Bern	252-639-2945	boswellm@newbernnc.gov
4.	Delane Jackson	Town of River Bend	252-638-3870	Manager@riverbendnc.org
5.	Katrina Marshall	City of Havelock	252-444-6411	Kmarshall@havelocknc.us
6.	Gene Foxworth	Carteret County	252-728-8545	eugene.foxworth@carteretcountync.gov
7.	Zach Steffey	Town of Cape Carteret	252-393-3483	zsteffey@capecarteret.org
8.	William McKinney, Jr	Town of Cape Carteret	910-467-2828	police-department@capecarteret.org
9.	Don Baumgardner	Craven County	252-636-6618	dbaumgardner@cravencountync.gov
10.	Chad Strawn	Craven County	252-636-6618	cstrawn@cravencountync.gov
11.	Greggory Hartman	Carteret County	252-728-8545	gregg.hartman@carteretcounty.gov
12.	Sam Burdick	Eastern Carolina Council	252-571-3328	sburdick@eccog.org
13.	Elizabeth Sweeney	Town of Bogue	252-393-3055	bogue town@bizec.rr.com
14.	Jayne Calhaun	Town of Cedar Point	252-393-7898	jcalhaun@cedarpointnc.org
15.	Denise Dale	Town of Washington Park	252-946-3157	ddwashpark@suddenlinkmail.com
16.	Fred Mitchell Jr	Town of Cove City	252-633-1595	dcmitchelljr@gmail.com
17.	EGON LIPPERT	RIVER BEND	252-617-0179	egonlippert@yahoo.com
18.	Jacazza Jones	NCEM Hazard Mitigation	919825 2592	jacazza.jones@ncdps.gov
19.	CHAD MACAVERY	TOWN OF EMERALD ISLE	252-723-0003	chad@yardworkslandscapes.com
20.	KEVIN B. REEDS	TOWN OF PINE KNOLL SHORES	252-247-4353	kreed@townofpks.com

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Kick-Off Meeting

Thursday, February 12, 2019, 2:00 PM

21.	RICHARD PORTER	MAYOR PRO TEM ATLANTIC BEACH	RPORTER@ATLANTICBEACH-NC.com	
22.	Nick Krelos	Town Planner	planner1@atlanticbeach-nc.com	
23.	AUSTIN WATERS	TOWN COUNCIL	awaters@atlanticbeach-NC.com	
24.	MacKenzie Todd	Planner, Morehead City	mackenzie.todd@moreheadcitync.org	
25.	Sandi Watkins	Director of Planning & Inspections, Morehead City	sandi.watkins@moreheadcitync.org	(252) 726-6848 x140
26.	Tim Buck	Pamlico County Manager	tim.buck@pamlicocounty.org	(252) 745-3133
27.	Jim Spain	Stonewall	Jim spain@embarqmail.com	
28.	Marie Spain	Stonewall	"	
29.	Beverly Drake	Town Clerk	beverlyd@vanceboronc.com	252-244-0919
30.	Lynn Davis	Town Manager/Belhaven	ldavis@belhavennc.us	252-943-3055
31.	Carolyn Braly	Town Manager/Minnesott Beach	minnesottbeach.gov@gmail.com	252-249-1755
32.	Chris Venters	Town of Vandemere		Vandemereclerk@live.com
33.	Judy H. Thaanum	Town of Vandemere	Mayor	" "
34.	Ray Lewis	Town of Grantsboro	Clerk grantsboronc@embarqmail.com	252-745-6511
35.	Liz Williams	Mayor of Aurora		liz.williams@aurora.com
36.	JOAN ARNETTE	ZONING COMM. Bayboro	ALTERNATE	JOAN.ARNETTE@GMAIL.COM
37.	Diane Miller	Town Mgr, Town of Oriental	manager@townoforiental.com	252-249-0555
38.	Tammy Cox	Dep. Fin. Dir. / Town of Oriental	Finance@townoforiental.com	252-249-0555
39.	Heidi ARTLey	Admin Asst Town of Bayboro	Townofbayboro@gmail.com	252-745-4238
40.	Daniel Hill	Craven Co. Planning Board		hilld@newbernnc.gov
41.				

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Kick-Off Meeting

Thursday, February 12, 2019, 2:00 PM

42.	Josh Edmondson	Town of Emerald Isle	252-354-8549	jedmondson@emeraldisle-nc.org
43.	Kate Allen	Town of Beaufort	252 728 2141 ext. 225	k.allen@beaufortnc.org
44.	ROBERT WILL	TOWN OF NEWPORT	252-223-3733	RWILL@TOWNOFNEWPORT.com
45.	JOHN KIRKLAND	TOWN OF RIVER BEND	252-638-3870 EXT 212	Jkirkland@riverbendnc.org
46.	Joy McRoy	Town of Chocowinity	252-946-6568	jmcroy@suddenlinkmail.com
47.	Rodman L. Williams	TOWN of BRIDGETON	252-637-3697	
48.	David L. Cuthrell	TOWN of Bridgeton	229-9245	
49.	Daniel Allen	Town of Oriental	919-621-8782	danall@msn.com
50.	Robert Edwards	Town of Riverbend	(248) 321-5721	edw1858@gmail.com
51.				
52.				
53.				
54.				
55.				
56.				
57.				
58.				
59.				
60.				
61.				
62.				

HMPC Meeting 2: February 28, 2019

Agenda

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting
February 28, 2019, 2:00 PM
Emerald Isle Commissioners Board Room

- Participants/Attendance
- Community Rating System
  - What is CRS?
  - CRS in Pamlico Sound Region
  - CRS Goals
- Mitigation Goals
  - Existing Goals from 2015 Plan
  - Recommended Revisions
  - Recommended Goals
- Update Mitigation Strategies
  - Existing Mitigation Strategies
  - Mitigation Action Reporting Form
- Community Capability Assessment
- Project Schedule
- Housekeeping
- Next Steps
  - Complete strategy exercise by March 28, 2019
  - Review and return capability assessment by March 28, 2019
- Questions

Pamlico Sound Regional Hazard Mitigation Plan

Hazard Mitigation Planning Committee Meeting

Wednesday, February 28, 2019-2:00 PM
Meeting Minutes

Landin Holland called the meeting to order at 2:00 at the Town of Emerald Isle Commissioners Board Room.

Present

Refer to the attached sign in sheet.

Introduction

Mr. Holland introduced himself and provided an overview of the topics to be covered at the second meeting.

Presentation

Mr. Holland presented a presentation that focused on the community's participation in the planning process. In particular, Mr. Holland discussed a review of mitigation strategies and county/municipal capability outlined in the 2015 Plan at the local level. This presentation has been attached as a component of these minutes.

Questions

Mr. Holland was asked if all communities should provide a status for each existing strategy. Mr. Holland explained to the group that the County will provide the status for strategies that affect all communities. He went on to state that if there were strategies specific to a certain local jurisdiction, then that community should assign status and fill out a strategy worksheet, if a respective strategy is going to be maintained within the current update.

Additionally, concerns were voiced regarding participation in the planning process. Mr. Holland provided a solution for these communities that are currently operating with limited resources. It was determined that if participation is not possible through the HMPC meetings, that the consultant will work with those local units of government to ensure compliance with state and federal standards. It was also stated that this could present a problem for CRS communities.

Adjourn

There being no further business to conduct, Mr. Holland adjourned the meeting at 3:23 PM.

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, February 28, 2019, 2:00 PM

	Name	Organization	Phone	E-Mail
1.	Ray Lewis	Town of Grantsboro	252-229-2590	grantsboronc@embarqmail.com
2.	Chris Venters	Town of Vandemere	252-745-5473	vandemereclerk@live.com
3.	Sue Britt	Town of Vandemere	252-745-5473	vandemereclerk@live.com
4.	Booker T Jones	Town of Mesic	252-671 4171	
5.	Heidi ARTLEY	Town of Bayboro	252-745-4238	Townofbayboro@gmail.com.
6.	Dan Allen	Town of Oriental	919-621-8982	danall@msn.com
7.	Tammy Cox	Town of Oriental	252-249-0555	Financeetownoforiental.com
8.	Diane Miller	Town of Oriental	252-249-0555	manager@townoforiental.com
9.	Martis Barrow	Town of Oriental	252 249-0555	Leo380@att.net
10.	Iris Wooliever	City of Havelock	252-447-8865	Iwooliever@ec.rr.com
11.	Katrina Marshall	City of Havelock	252-444-6411	Kmarshall@havelockenc.us
12.	Elizabeth Sweeney	Bogue	252-393-3055	bogue town@bizec.rr.com
13.	Brittany Mumford	Town of Vanceboro	252-244-0919	beverlyd@vanceboronc.com
* 14.	Douglas Doubleday	Town of Beaufort	252-729-2259	DougDouble@AOL.com
15.	Steve Fuchs	City of Washington	252-943-8200	
16.	Donna Pittman	City of Washington	252-412-3835	Donnapittman@yahoo.com
17.				
18.				
19.				
20.				

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, February 28, 2019, 2:00 PM

21.	Jim Spain	Stonewall		
22.	Marie Spain	Stonewall		
23.	Lynn Davis	Belhaven	252-943-3055	ldavis@belhavennc.us
24.	Denise Dale	Washington Park	252-947-0340	ddwashpark@suddenlinkmail.com
25.	Dylan Bowen	Washington Park		
26.	Neil Foose Jr	Cedar Point	585-413-6100	neil.foose@gmail.com
27.	Joshua Reilly	Cedar Point	(910) 478-5589	AtTheCrystalCoast@Gmail.com
28.	Jayne Calhoun	Cedar Point	252-393-7898	jcalhoun@cedarpointnc.org
29.	Matt Boswell	New Bern	252-639-2945	boswellm@newbernnc.gov
30.	Chad Strawn	Craven County	(252) 636-6618	cstrawn@cravencountync.gov
31.	Chad Kroll	Pantego	(252) 943-8989	C.Kroll@NCDPS.Gov
32.	Daniel Hill	Craven County	(252) 639 2960	hilld@newbernnc.gov
33.	BILL NORRIS	PELETIER	(910) 358-3000	FBLANDTNS@GMAIL.COM
34.	BEA Cunningham	Peletier	252-393-8666	townofpeletier@gmail.com
35.	Kate Allen	Beaufort	252-728-2142	k.allen@beaufortnc.org
36.	Sandi Watkins	Morehead city	252-726-6848 x 140	sandi.watkins@moreheadcitync.org
37.	MacKenzie Todd	Morehead city	252-726-6848 x 121	mackenzietodd@moreheadcitync.org
38.	Sam Burdick	Eastern Carolina Council	252-571-3328	sburdick@eccog.org
39.	Nadia Abdul-Hadi	City of New Bern	252 639 7585	abdulhadin@newbernnc.gov
40.	Zach Steffey	Town of Cape Carteret	252-393-8183	Zsteffey@capecarteret.org
41.	Bill McKinney	Town of Cape Carteret	910-467-2828	policedepartment@capecarteret.org

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, February 28, 2019, 2:00 PM

42.	Gene Foxwell	Carteret County		252-728-8545
43.	Josh Edmundson	Town of Emerald Isle		252-354-8548
44.	Michelle Eltner	Atlantic Beach		252 726 4456
45.	GREGG HARTMAN	CARTERET COUNTY		252-728-8545
46.	Bruce Rogers	Carteret County		252 424 8941
47.	Tom Outlaw	Morehead City		252-241-5089
48.	L E Beauchard	Morehead City		252. 222. 0474
49.	Robert WILL	NEWPORT, NC	RWill@TownofNewport.com	252-223-3733
50.	Dominick L. Spadaro	Newport	DSBCPA@hotmail.com	252-342-0614
51.	DAVID HEATH	CARTERET COUNTY PC NEWPORT NC	TOWNOFNEWPORT.COM DAVID @	252-622-5271
52.	Robert Edwards	River Bend	edw1858@gmail.com	248 321 5121
53.	JOHN KIRKLAND	River Bend	Jkirkland@riverbendnc.org	252 259 8053
54.	EGON LIPPERT	RIVER BEND	egonlippert@yahoo.com	252-617-0179
55.	Delane Jackson	River Bend		
56.	Randy Martin	Emerald Isle	rmartin@emeraldisle-nc.org	252-354-3424
57.	Marvella Jones	Pamlico County - Citizen	marvelbjones@hotmail.com	252-635-7905
58.	Linda Marshall	Alliance	townofalliance@centurylink.com	252-745-7049
59.	Tim Buck	Pamlico County - Primary	tim.buck@pamlicocounty.org	252-745-3133
60.	Paul Slobodian	Pamlico County (Arapahoe)	slobodian@yahoo.com	252-244-4150
61.	CHRIS NEWKIRK	BEAUFORT COUNTY	chris.newkirk@co.beaufort.nc.us	252-940-6521
62.	Allen Pittman	City of Washington	APittman@washingtonnc.gov	252975-9334

HMPC Meeting 3: June 20, 2019

Agenda

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting
June 20, 2019, 3:00 PM
Beaufort County Community College

- Participants/Attendance
- Project Update
  - Schedule
  - Participation
  - Repetitive Loss Data
- Mitigation Goals
  - Review of Goals and Objectives
  - Overview of Draft Mitigation Strategies
- Presentation of Hazard Identification and Risk Assessment (HIRA)
  - Hazard identification
  - Asset Inventory
  - Hazard Profile
- Housekeeping
- Public Comment
- Questions

Pamlico Regional Hazard Mitigation Plan

Hazard Mitigation Planning Committee Meeting

Thursday, June 20, 2019-3:00 PM

Meeting Minutes

Landin Holland called the meeting to order at 3:00 pm in the Beaufort County Community College Auditorium.

Present

Refer to the attached sign in sheet.

Introduction

Mr. Holland introduced himself and provided an update regarding the project status, and attendance at the previous meetings.

Presentation

Mr. Holland provided a presentation that detailed project elements. This discussion provided a review of the Plan's existing as well as updated strategies. Mr. Holland requested that each jurisdiction review draft strategies to be forwarded via email. All comments should be received by 7/26/2019. Mr. Holland went on to provide an explanation of the Hazard Identification Risk Analysis developed through the North Carolina Department of Public Safety's Risk Management Tool (RMT). Communities were asked to review this information in an effort to ensure accuracy regarding each community's potential vulnerability.

Questions

Mr. Holland was asked about the Community Rating System, and what potential impacts participation could have on the programmatic requirements. Mr. Holland assured the HMPC that attendance issues would be cleared up through completion of the planning process.

Adjourn

There being no further business to conduct, Mr. Holland adjourned the meeting at 4:10 PM.

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, June 20, 2019, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	Ray Lewis	Town of Grantsboro	252-745-6511	grantsboronc@embarqmail.com
2.	Tim Buck	Pamlico County	252 745 3133	tim.buck@pamlicocounty.org
3.	Marvella Jones	Pamlico County	252-635-7915	marvellajones@hotmail.com
4.	Linda Marshall	Town of Alliance	252-745-9260 252-745-7049	townofalliance@centurylink.net
5.	Lynn Davis	Town of Belhaven	252-943-3055	ldavis@belhavennc.us
6.	Denise Dale	Town of Washington Park	252-946-3157	ddwashpark@suddenlinkmail.com
7.	Allen Pittman	City of Washington	252-945-2509	apittman@washingtonnc.gov
8.	Alan Bowen	Town of Washington Park		
9.	Diane Miller	Town of Oriental	252-249-0555	manager@townoforiental.com
10.	Tammy Coy	Town of Oriental	252-249-0555	Finance@townoforiental.com
11.	Heidi Artley	Town of Bayboro	252-745-4238	Townofbayboro@gmail.com
12.	Daniel Allen	Town of Oriental	919-621-8982	dan_all@msn.com
13.	Mark Barron	Town of Oriental	252 249 0555	leo380@att.net
14.	Belinda Barrow	Town of Oriental	919-819-2053	barrowbc@att.net
15.	Carolyn Braly	Town of Minnesott Beach	252-249-1755	minnesottebeachgov@gmail.com
16.				
17.				
18.				
19.				
20.				

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, June 20, 2019, 3:00 PM

	Name	Organization	Phone	E-Mail
1.	Delane Jackson	River Bend	252-638-3870	manager@riverbendnc.org
2.	EGON LIPPERT	RIVER BEND	252-617-0179	egonlippert@yahoo.com
3.	JOHN KIRKLAND	RIVER BEND	252-259-8033	jkirkland@riverbend.org
4.	ROBERT EDWARDS	RIVER BEND	248-321-5721	edw1858@gmail.com
5.	Ryan Stoebler	Carteret County	252-269-7433	ryanstoebler@carteretcounty.gov
6.	Brittany Mumford	Vanceboro	252-244-0919	brittanys@vanceboronc.com
7.	Kate Allen	Town of Beaufort	252-728-2142	k.allen@beaufortnc.org
8.	MASON MORGAN	City of Havelock	407 716 2674	WAdist1@yahoo.com
9.	Katrina Marshall	City of Havelock	252-444-6411	Kmarshall@havelocknc.us
10.	IRIS WOOLIEVER	CITY OF HAVELOCK	252-447-8865	IWOOLIEVER@ECRR.COM
11.	Nick Krebs	Town of Atlantic Beach	252-726-4456	planner1@atlanticbeach-nc.com
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Thursday, June 20, 2019, 3:00 PM

42.	Chris Newkirk	Beaufort County Emergency Services	252-378-5352	chris.newkirk@co.beaufort.nc.us
43.	Tom Outlaw	Morehead City Planning Board	252-241-5089	outlawt@ec.rr.com
44.	Mackenzie Todd	Morehead city planner	704-575-3347	mackenzie.todd@moreheadcitync.org
45.	Jacazza Jones	jacazza.jones@ncdps.gov	919825 2592	NCEM/HM
46.	William McKinney	Cape Carteret Police Dept	252-241-6355	policedepartment@capecarteret.org.
47.	Zach Steffey	Town of Cape Carteret	252-393-8483	zsteffey@capecarteret.org
48.	Donald Baumgardner	Craven County Planning	252-636-6618	dbaumgardner@cravencountygov.nc.
49.	Kevin B. Reed	Town of Pine Knoll Shores	252-247-4353	kreed@townofpks.com
50.				
51.				
52.				
53.				
54.				
55.				
56.				
57.				
58.				
59.				
60.				
61.				
62.				

HMPC Meeting 4: December 4, 2019

Agenda

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting
December 4, 2019, 3:00 PM
Pamlico County Human Services Center Conference Room

- Planning Process
- Structure of the Plan
  - Introduction
  - Planning Process
  - Planning Area Profile
  - Risk Assessment
  - Capability Assessment
  - Mitigation Strategy
  - Mitigation Action Plan
  - Plan Maintenance
  - Plan Adoption
- Community Annexes
- Hazards Profiled
- Goals and Objectives
- Mitigation Action Plans
- Plan Implementation and Maintenance
- Completing the Planning Process
- Next Steps
  - Review the Draft Plan
  - Provide Comments
- Questions

Pamlico Sound Regional Hazard Mitigation Plan

Hazard Mitigation Planning Committee Meeting

Wednesday, December 4, 2019-3:00 PM

Meeting Minutes

Landin Holland called the meeting to order at 3:00 pm in the Pamlico County Human Services Center Conference Room.

Present

Refer to the attached sign in sheet.

Introduction

Mr. Holland introduced himself and provided an update on the overall project, including the fact that the draft plan has been completed and is available for review on the project website.

Presentation

Mr. Holland provided an overview of the project status and explained the overall structure of the plan, including a review of each plan section. Mr. Holland went on to provide an explanation of the remaining steps of the planning process and what will be required of each community to ensure adoption and certification of the document moving forward through the adoption phase of the project. Mr. Holland requested that communities provide any necessary modifications to the draft plan no later than December 20, 2019, so that edits may be incorporated into the plan prior to submittal to the North Carolina Department of Public Safety.

Questions

Following completion of the presentation, Mr. Holland was asked if comments could be provided later than the December 20th deadline. Mr. Holland stated that this will more than likely be acceptable, but that he will confirm with the principal contractor, WOOD, prior to submittal of the draft plan to NCDPS.

Adjourn

There being no further business to conduct, Mr. Holland adjourned the meeting at 3:50 PM.

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Wednesday, December 4, 2019, 3:00 PM

21.	Joshua Reilly	(910)478-5589	AFTheCrystalCoast@gmail	CEDAR POINT
22.	Violet W Ollison	(252) 571-8655	Town Mesic Councilperson	MESIC
23.	Booker T. Jones	(252) 671-4111	Mayor, Town of Mesic	Mesic, NC 28515
24.	Sue Britt	252-745-5473	Vandemere, Town Clerk	Vandemere clerk@live.com ~~Vandemere NC 28587~~
25.	Judy Thaanum	252-670-8784	Vandemere, Mayor	Vandemere NC 28587
26.	Gregory Hartman	252-728-8545	Assistant Director Carteret County Planning	Carteret County, NC
27.	Katrina Marshall	252-444-6433	City of Havelock Plan. Director	City of Havelock.
28.	IRIS WOOLIEVER	252-447-8865	CITY OF HAVELOCK PLANNING MEMBER	CITY OF HAVELOCK
29.	Joy McRay	252-946-6568	jmcroy@suddenlinkmail.com	Town of Chocowinity
30.	Daniel Allen	252-249-2242	Citizen Rep	Oriental
31.	MARK BARROW	252-249-0143	Citizen Rep Oriental	Oriental
32.	Diane Miller	252-249-0555	manager@townoforiental.com	Oriental
33.	Stuart Ricks, Mayor	252-943-7779	{thetownofpantego@	Pantego
34.	Bobbie Jo Ricks, Clerk	252-944-8809	gmail.com	Pantego
35.	Tammy Cox	252-249-0555	Finance@townoforiental.com	Oriental
36.	Lynn Davis	252-943-3055	ldavis@townofbelhaven.com	*New email, Belhaven
37.	Jason Frederick	252-636-6618	jfrederick@cravencountync.gov	Craven County
38.	Denise Dale	252-946-3157	ddwashpark@suddenlinkmail.com	Washington Park
39.	Dylan Bowen	252-947-0340	washington park resident	Washington Park
40.	Allen Pittman	252-412-5400	~~City Of Washington~~ a.p.pittman@washingtonnc.gov	WASHINGTON
41.	DONNA PITTMAN	252-412-3635	donnapittman63@yahoo.com	WASHINGTON
42	CAROLYN BRALY	252-249-1755	Minnesott Beach Manager	Minnesott Beach, NC 28510
43	Linda Marshall	252-671-1846	Town Clerk	

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Committee Meeting

Wednesday, December 4, 2019, 3:00 PM

42.	Melissa Beacham	Beaufort County EM	252-940-6510	mbeacham@co.beaufort.nc.us
43.	JOAN ARNETTE	PAM. Cty At Lg. Bayboro	847-323-8607	JOAN.ARNETTE@GMAIL.COM
44.	Chad Strawn	Craven County Planning	252 636-6618	cstrawn@cravencountync.gov
45.	Paul Slobodian	Pamlico County At Large	252 214-4150	slobodian@yahoo.com
46.	David M. Rief	Town of Cedar Point	252-393-7898	drief@cedarpointnc.org
47.	Kate Allen	Town of Beaufort	252-728-2142	k.Allen@beaufortnc.org
48.	Autumn Hardison	Pamlico EM	252-745-4131	pc911@pamlicocounty.org
49.	Tim Buck	Pamlico County	252-745-3133	tim.buck@pamlicocounty.org
50.	Mackenzie Todd	Morehead City	252-726-6848	mackenzie.todd@moreheadcitync.org
51.	Nick Krebs	Town of Atlantic Beach	252-726-4456	planner1@atlanticbeach-nc.com
52.	Tom Outlaw	Morehead City Planning Bd	252-241-5089	outlawt@ec.rr.com
53.	Josh Edmondson	Town of Emerald Isle	252-354-8548	jedmondson@emeraldisle-nc.org
54.	Tim White	Town of Indian Beach	252-247-3344	twhite@indianbeach.org
55.	Bill McKinney	Town of Cape Carteret	252-241-6355	policedepartment@capecarteret.org
56.	John P Ritchie	Town of Cape Carteret	252-393-2159	JRitchie@ec.rr.com
57.	David M. Figowy	Town of Cape Carteret	252-393-2092	dfigowy@ec.rr.com
58.	Zachary Steffey	Town of Cape Carteret	252-393-8483	zsteffey@capecarteret.org
59.	Elizabeth Sweeney	Town of Bogue	252-393-3055	boguetown@bizec.rr.com
60.	ROBERT EDWARDS	TOWN OF RIVER BEND	252-321-5721	ebw1858@gmail.com
61.	JOHN KIRKLAND	TOWN OF RIVER BEND	252-259-8033	jkirkland@riverbend.com
62.	EGON LIPPERT	TOWN OF RIVER BEND	252-617-0179	egonlippert.yahoo.com
63.	Delane Jackson	Town of River Bend	252-638-3870	manager@riverbendnc.org

Jurisdictional Participation Agreements

The following letters detail participation agreements and acknowledgements for jurisdictions that were unable to attend formal HMPC meetings or required County support for the planning process.

The Historic Town of Bath
P O Drawer 6A, 109 S Main Street
Bath, North Carolina 27808
(p) 252-923-0212 (f) 252-923-0313

October 25, 2019

Landon Holland
Holland Consulting Planners Inc.
3329 Wrightsville Ave, Suite F
Wilmington, NC 28403

Dear Landon,

I spoke with Cindy Anderson in your office today to discuss the Pamlico Sound Regional Hazard Mitigation Plan update. I explained that the Town of Bath is an extremely small municipality with no full time administrative staff.

I attend briefings and meetings at the Beaufort County Emergency Management office where the Town of Bath coordinates action with Beaufort County. This is our routine procedure that is carried out in each incident.

I have reviewed the material presented and action taken at the meetings. The Town of Bath will continue to participate in the planning process with the total support of the elected officials.

We intend to adopt the plan through the formal steps of public hearings, etc. Once adopted, the Town of Bath will follow the adopted plan as in the past.

Thank you for your assistance in this process.

Sincerely,

M.E. Carson / Elna Lewis

M. E. "Bubs" Carson
Town Administrator

MEC/ecl

TOWN OF BRIDGETON

RODMAN L. WILLIAMS, HONORABLE MAYOR
Melba A. Bolton, TOWN CLERK/FINANCE OFFICER

BOARD OF COMMISSIONERS
PEGGY WILSON, MAYOR PROTEM
RAYMOND PARKER
KEITH L. TYNDALL
DAVID L.. CUTHRELL

Landin Holland
Senior Planner
Holland Consulting Planners, Inc
3329 Wrightsville Avenue
Suite F
Wilmington, NC 28403

Dear Mr. Holland,

The Town of Bridgeton would like to continue our participation with the Pamlico Sound Regional Hazard Mitigation Plan. We have attended one of the regional meetings but unfortunately were not been able to attend all of the meetings due to scheduling conflicts. I have worked with Chad Strawn the Assistant Director of Planning for Craven County who has kindly shared his knowledge on the matter.

Additionally I have reviewed the meeting minutes published on the www.pamlicohmp.com website as well as the documentation contained on the website.

I have asked our Town Clerk, Melba Bolton, to attend future meetings in the event that I'm not available to insure our continued participation.

Additionally, I have kept our Town Board informed on the overall process involved with the Hazard Mitigation Plan and will continue to do so with all future meetings. We have every intention to adopt a community plan following our receipt of the Certification Adoption Letter from FEMA.

Thanks for your help in addressing our HMP Plans for Bridgeton,

Sincerely,

Rodman L. Williams

Rodman Williams
Mayor, Town of Bridgeton
December 19, 2019

ADDRESS:
P. O. BOX 570, 202 "N" B Street
BRIDGETON, NC 28519-0570

townofbridgeton@earthlink.net
PHONE: 252-637-3697
FAX: 252-637-9844

Town of Cove City
PO Box 8
Cove City, NC 28523
(252)633-1595

Dred C. Mitchell Jr., Mayor
Barbara H Jones, Mayor Pro-Tem

Commissioner Roy D. McCoy
Commissioner Evelyn E. Brown
Commissioner Linda McCoy
Commissioner Blenda Hargett

Holland Consulting Planners, Inc.
3329 Wrightsville Avenue, Suite F
Wilmington, NC 28403

Attention: Landin Holland MPA, AICP, CZO, Senior Planner

Dear Mr. Holland,

The Town of Cove City is a participant in the Pamlico Sound Regional Hazard Mitigation Planning Process. We coordinate with the County Planning Office on a monthly basis. The Town of Cove City has reviewed the plan on the project website.

Our Board of Commissioners is aware of the planning process and project website. The Town of Cove City intends to adopt the plan by scheduling a public hearing when we receive a certification pending adoption letter from FEMA.

Upon receipt of the of the certification pending adoption letter, public hearing, and adoption of the plan the Town of Cove City fully plans to implement all aspects of the plan.

Sincerely,

Dred C Mitchell Jr

Dred C. Mitchell, Jr., Mayor
Town of Cove City

DCM/shh

TOWN OF INDIAN BEACH

October 22, 2019

Holland Consulting Planners, INC
3329 Wrightsville Avenue, Suite F
Wilmington, NC 28403
Attn: Landin Holland

RE: Pamlico Sound Regional Hazard Mitigation Plan

Indian Beach has been reviewing the plan through the project website and by communications with the Carteret County Emergency management office on the progress. Our Town Commissioners are aware and have been updated.

Our board has all intentions of adopting and implementing the plan.

If you have any questions, please do not hesitate to contact me.

Respectfully,

Tim White
Town Manager

Stewart Pickett
Mayor Town of Indian Beach

Town of Trent Woods
898 Chelsea Road
Trent Woods, NC 28562-7146
(252) 637-9810
townhall@trentwoodsnc.org

October 22, 2019

Landin Holland, Senior Planner
Holland Consulting Planners, Inc.
3329 Wrightsville Avenue, Suite F
Wilmington, NC 28403

Dear Mr. Holland,

The Town of Trent Woods Board of Commissioners has received the draft of the Pamlico Sound Regional Hazard Mitigation Plan and a review of the planning process and plan is scheduled for the November Board of Commissioners meeting. If there are any questions or changes to be made, we will notify your office. We do intend on adopting the plan through a formal public hearing following receipt of a certification pending adoption letter from FEMA. Mr. Haber, Trent Woods Zoning Administrator has been in contact with Mr. Chad Strawn, Craven County Planning Administrator often about this plan. As in the past, the Town of Trent Woods will implement the Pamlico Sound Regional Hazard Mitigation Plan.

Respectfully,

Charles F. Tyson, Jr.
Mayor of Trent Woods

PLANNING STEP 2: INVOLVE THE PUBLIC

Table B.2 – Public Meeting Topics, Dates, Locations

Meeting Title	Meeting Topic	Meeting Date	Meeting Location
Public Meeting #1	1) Introduction to DMA, CRS, and FMA requirements and the planning process 2) Review of HMPC responsibilities and the project schedule.	February 28, 2019	Emerald Isle Commissioners Board, Room 7500, Emerald Drive, Emerald Isle, NC
Public Meeting #2	1) Review "Draft" Hazard Mitigation Plan 2) Solicit comments and feedback	December 4, 2019	Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC

Public Meeting Agendas, Minutes, Sign-in Sheets, and Announcements

Public Meeting 1: February 28, 2019

Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Public Meeting #1

Thursday, February 28, 2019, 6:00 PM

	Name	Organization (resident)	Phone	E-Mail
1.	Jennifer Allen	Coastal Review Online	252-393-8185	jennifer@nccoast.org
2.	Cathy Tomon	Newport Planning Board	252-241-1586	ctomon@ec.rr.com
3.	Kate Allen	Town of Beaufort	252-728 2142	k.allen@beaufortnc.org
4.	Kyle Garner	Town of Beaufort	252-728-2142	k.garner@beaufortnc.org
5.	Bob Dillard	Oriental Resident	704 236 4716	bbdodillard@gmail.com
6.	Cecily Lohmar	"	704 236 0965	cecily.lohmar@gmail.com
7.	Jim Blackerby	Town of Oriental	281-770 5671	james.blackerby@gmail.com
8.	Cheryl Blackerby	Oriental	713-542-4663	cheryl.blackerby@gmail.com
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

EAT SHOP STAY PLAY Atlantic BEACH GOVERNMENT & SERVICES SEARCH

NEWS

Hazard Mitigation Plan

PAMLICO SOUND REGIONAL HAZARD MITIGATION PLAN PUBLIC INPUT MEETING

The Pamlico Sound Region of NC is updating its 2015 Hazard Mitigation Plan to better protect the people and property of the region from the effects of natural and human-caused hazards and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). Public input on hazards and mitigation strategies is welcomed and encouraged during this process. The first Public Input Meeting will be conducted **THURSDAY, FEBRUARY 28, 2019 AT 6:00 PM** at the **TOWN OF EMERALD ISLE COMMISSIONERS BOARD ROOM, 7500 EMERALD DRIVE IN EMERALD ISLE**. For more information on this program, please visit the project website at http://www.pamlicohmp.com/

ATLANTIC BEACH WOULD LIKE YOUR INPUT!

The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!

Information regarding the overall planning process is available at http://www.pamlicohmp.com/.

NEWS

THE TOWN OF BOGUE NORTH CAROLINA

Search this website

Home About Us Meeting Minutes And Agendas Helpful Links Calendar News Contact Us

Hazard Mitigation Plan Update and Survey

February 14, 2019 by Town Clerk — Leave a Comment

Bogue would like your input!

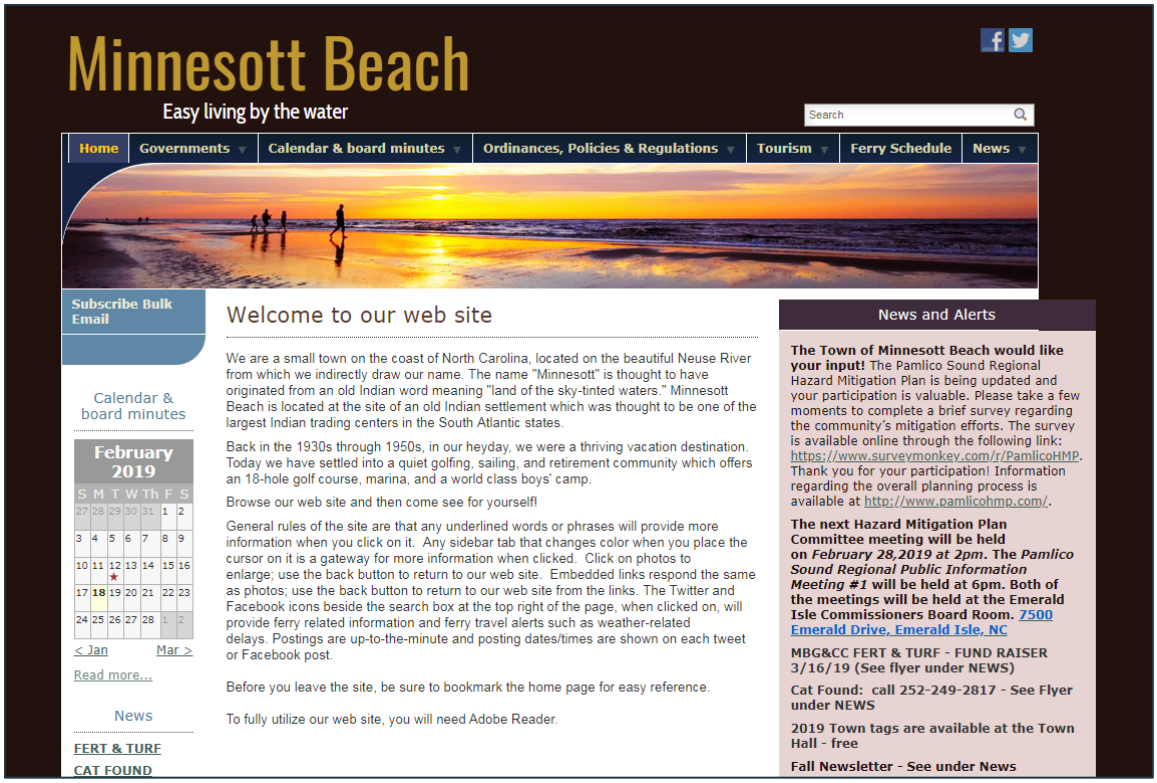
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!

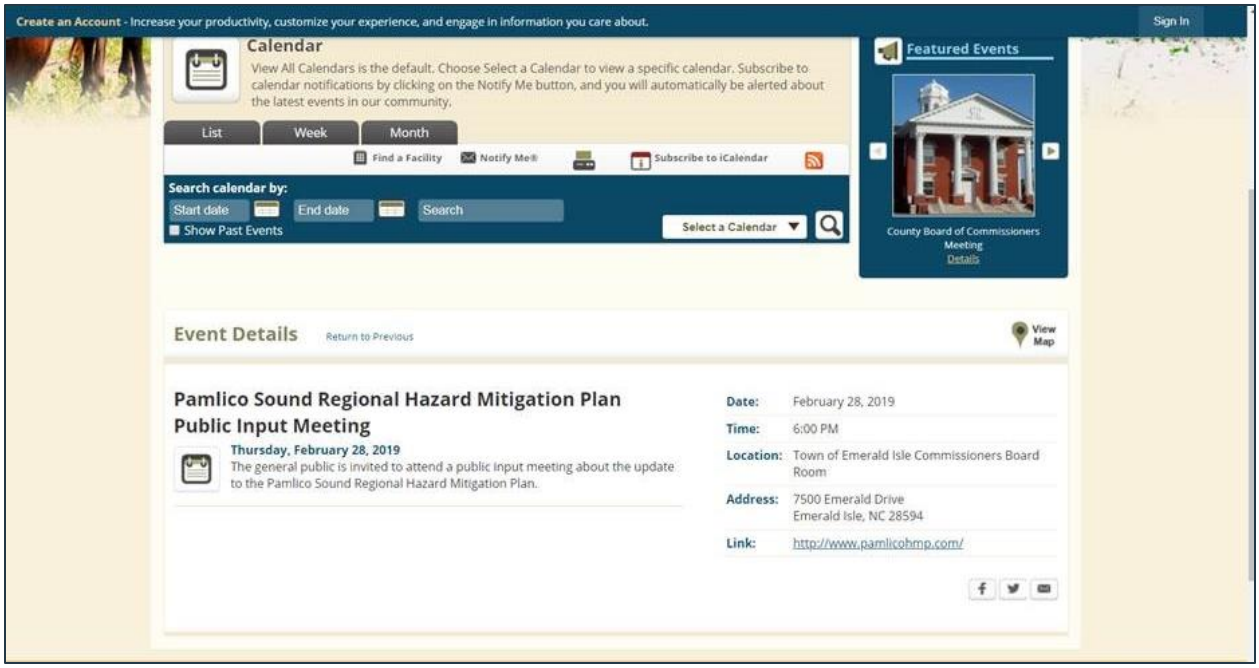
Information regarding the overall planning process is available at http://www.pamlicohmp.com/

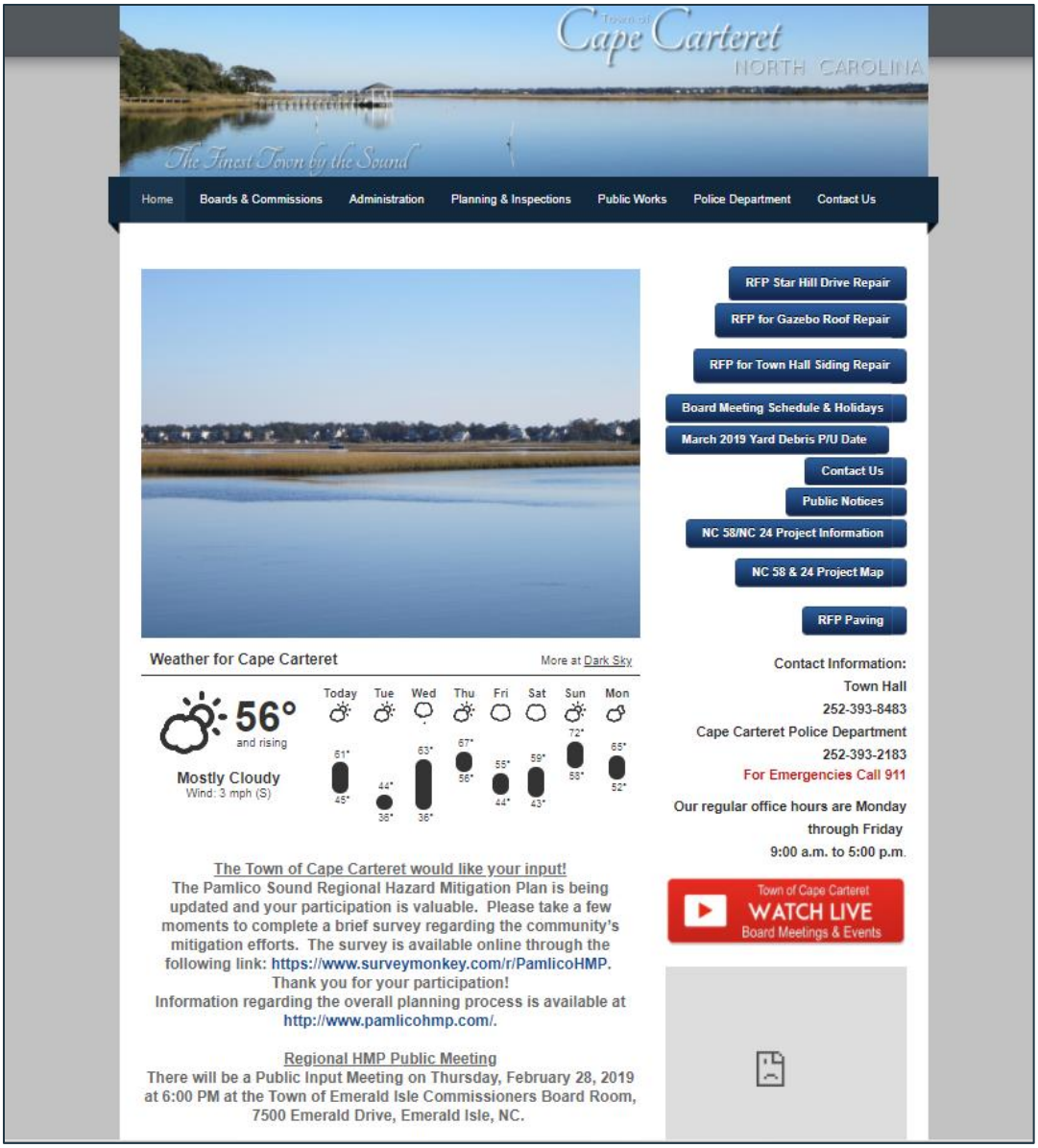
The first **Public Input Meeting** will be conducted **Thursday, February 28, 2019, at 6:00 PM**, at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC. Your attendance and participation is greatly appreciated.

Share this:

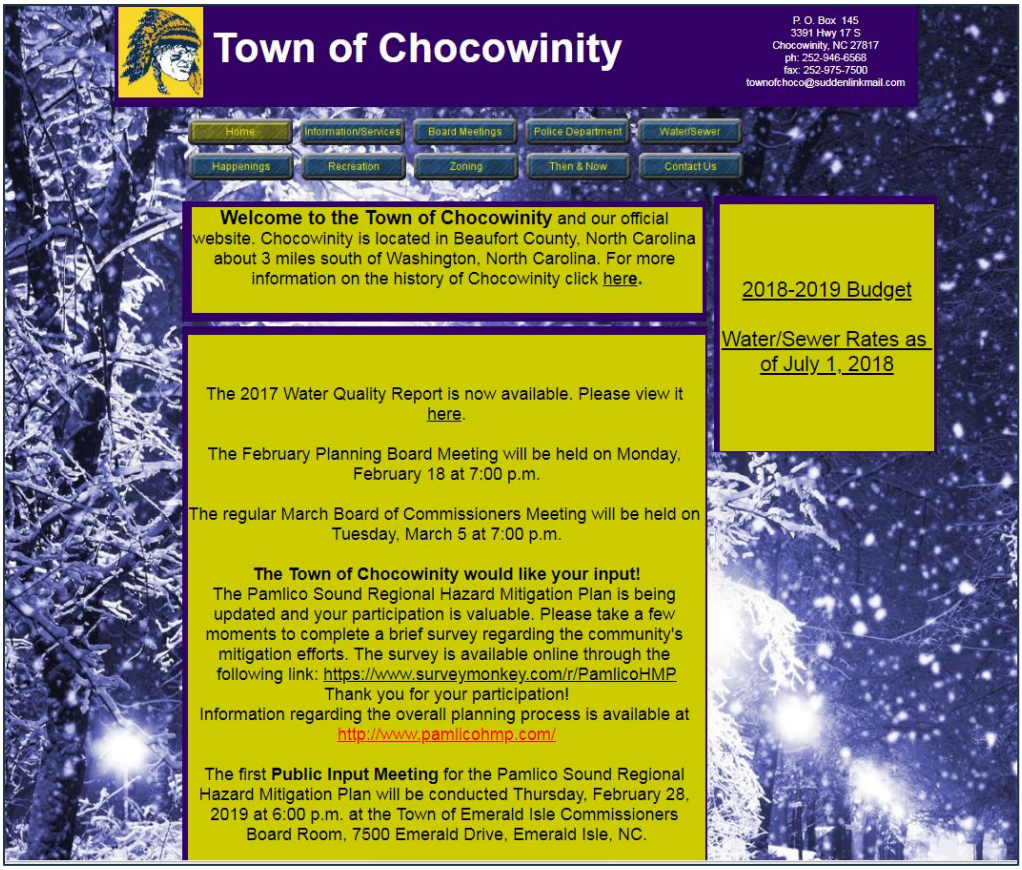
Share 0 Tweet Save Share Email

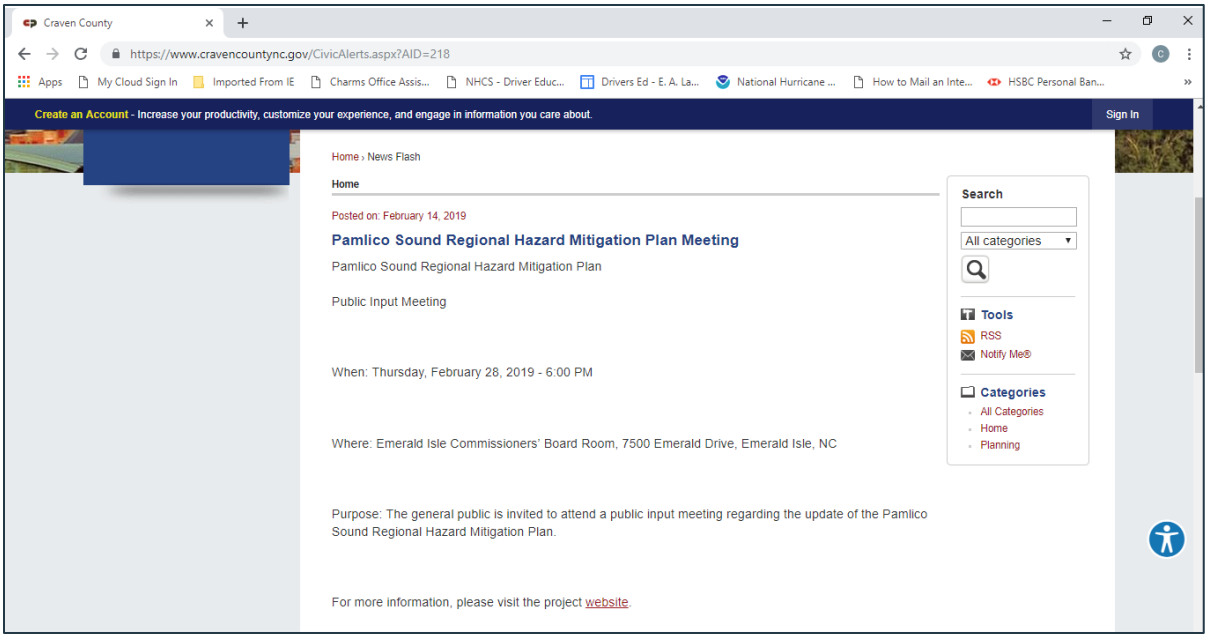

Minnesott Beach
Easy living by the water
Search
Home
Governments
Calendar & board minutes
Ordinances, Policies & Regulations
Tourism
Ferry Schedule
News
Subscribe Bulk Email
Calendar & board minutes
February 2019
< Jan
Mar >
Read more...
News
FERT & TURF
CAT FOUND
Welcome to our web site
We are a small town on the coast of North Carolina, located on the beautiful Neuse River from which we indirectly draw our name. The name "Minnesott" is thought to have originated from an old Indian word meaning "land of the sky-tinted waters." Minnesott Beach is located at the site of an old Indian settlement which was thought to be one of the largest Indian trading centers in the South Atlantic states.
Back in the 1930s through 1950s, in our heyday, we were a thriving vacation destination. Today we have settled into a quiet golfing, sailing, and retirement community which offers an 18-hole golf course, marina, and a world class boys' camp.
Browse our web site and then come see for yourself!
General rules of the site are that any underlined words or phrases will provide more information when you click on it. Any sidebar tab that changes color when you place the cursor on it is a gateway for more information when clicked. Click on photos to enlarge; use the back button to return to our web site. Embedded links respond the same as photos; use the back button to return to our web site from the links. The Twitter and Facebook icons beside the search box at the top right of the page, when clicked on, will provide ferry related information and ferry travel alerts such as weather-related delays. Postings are up-to-the-minute and posting dates/times are shown on each tweet or Facebook post.
Before you leave the site, be sure to bookmark the home page for easy reference.
To fully utilize our web site, you will need Adobe Reader.
News and Alerts
The Town of Minnesott Beach would like your input! The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation! Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
The next Hazard Mitigation Plan Committee meeting will be held on February 28,2019 at 2pm. The Pamlico Sound Regional Public Information Meeting #1 will be held at 6pm. Both of the meetings will be held at the Emerald Isle Commissioners Board Room. 7500 Emerald Drive, Emerald Isle, NC
MBG&CC FERT & TURF - FUND RAISER 3/16/19 (See flyer under NEWS)
Cat Found: call 252-249-2817 - See Flyer under NEWS
2019 Town tags are available at the Town Hall - free
Fall Newsletter - See under News

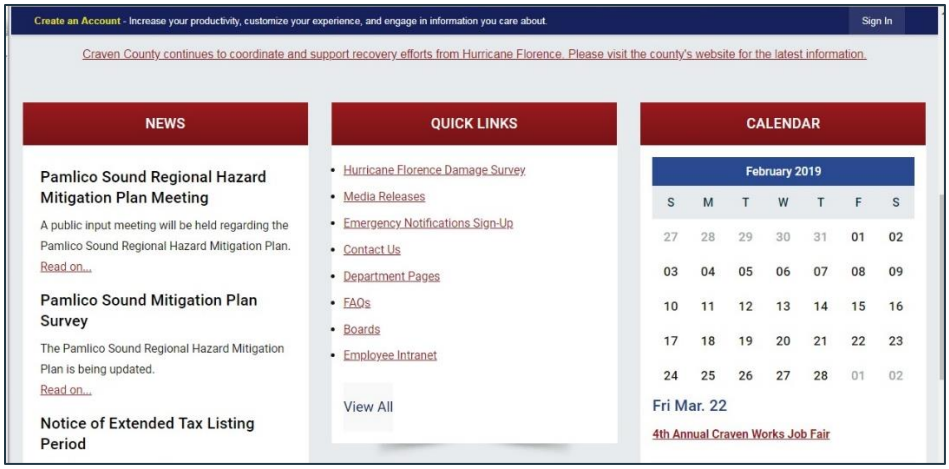

Create an Account - Increase your productivity, customize your experience, and engage in information you care about.
Sign In
Calendar
View All Calendars is the default. Choose Select a Calendar to view a specific calendar. Subscribe to calendar notifications by clicking on the Notify Me button, and you will automatically be alerted about the latest events in our community.
List
Week
Month
Find a Facility
Notify Me®
Subscribe to iCalendar
Search calendar by:
Start date
End date
Search
Show Past Events
Select a Calendar
Featured Events
County Board of Commissioners Meeting
Details
Event Details
Return to Previous
View Map
Pamlico Sound Regional Hazard Mitigation Plan Public Input Meeting
Thursday, February 28, 2019
The general public is invited to attend a public input meeting about the update to the Pamlico Sound Regional Hazard Mitigation Plan.
Date: February 28, 2019
Time: 6:00 PM
Location: Town of Emerald Isle Commissioners Board Room
Address: 7500 Emerald Drive Emerald Isle, NC 28594
Link: http://www.pamlicohmp.com/


Town of Cape Carteret
NORTH CAROLINA
The Finest Town by the Sound
Home
Boards & Commissions
Administration
Planning & Inspections
Public Works
Police Department
Contact Us
RFP Star Hill Drive Repair
RFP for Gazebo Roof Repair
RFP for Town Hall Siding Repair
Board Meeting Schedule & Holidays
March 2019 Yard Debris P/U Date
Contact Us
Public Notices
NC 58/NC 24 Project Information
NC 58 & 24 Project Map
RFP Paving
Weather for Cape Carteret
More at Dark Sky
56°
and rising
Mostly Cloudy
Wind: 3 mph (S)
Today Tue Wed Thu Fri Sat Sun Mon
Contact Information:
Town Hall
252-393-8483
Cape Carteret Police Department
252-393-2183
For Emergencies Call 911
Our regular office hours are Monday through Friday
9:00 a.m. to 5:00 p.m.
The Town of Cape Carteret would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP.
Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
Town of Cape Carteret
WATCH LIVE
Board Meetings & Events
Regional HMP Public Meeting
There will be a Public Input Meeting on Thursday, February 28, 2019 at 6:00 PM at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC.

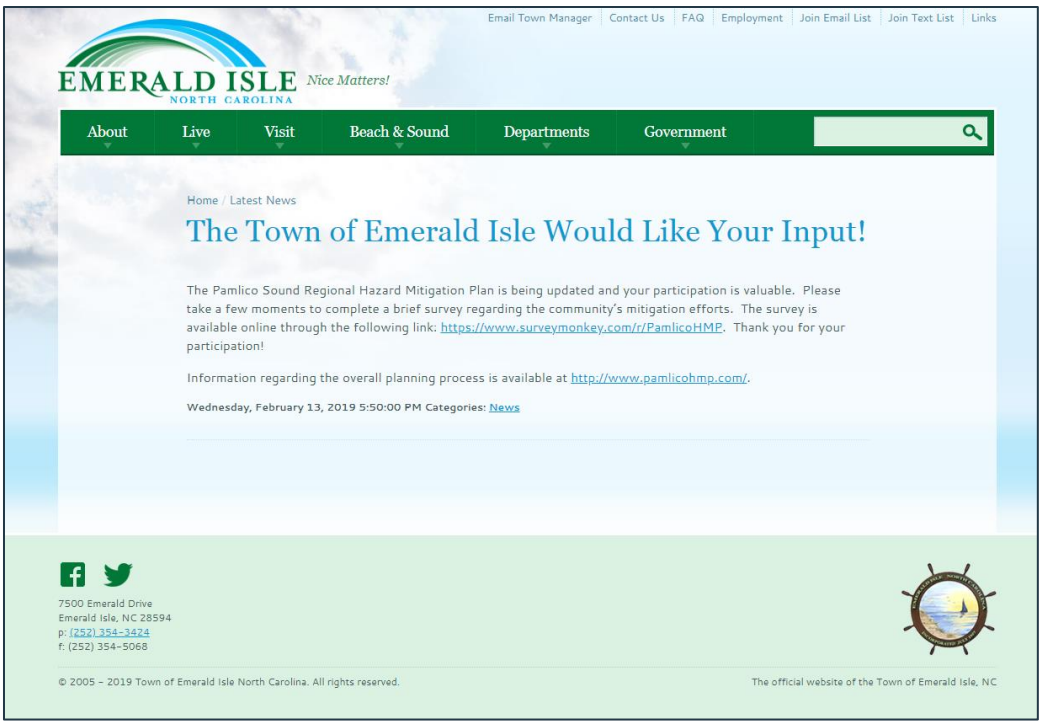

Home
Government
Departments
Agenda & Minutes
Town
Business
Churches
Pamlico Sound Regional Hazard Mitigation Plan Update
Published: Tuesday, March 5th, 2019 @ 2:01 pm
By: Lynn Davis (More Entries)
Pamlico Sound Regional Hazard Mitigation Plan Survey
Belhaven would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
Enter your search term...
Members
Account
Logout
Receive notifications by
Call
Email
Text
And more
SIGN UP NOW
For one-step notifications
SIGN UP TODAY.
Get local news and alerts instantly.
CIVICREADY
Account Menu

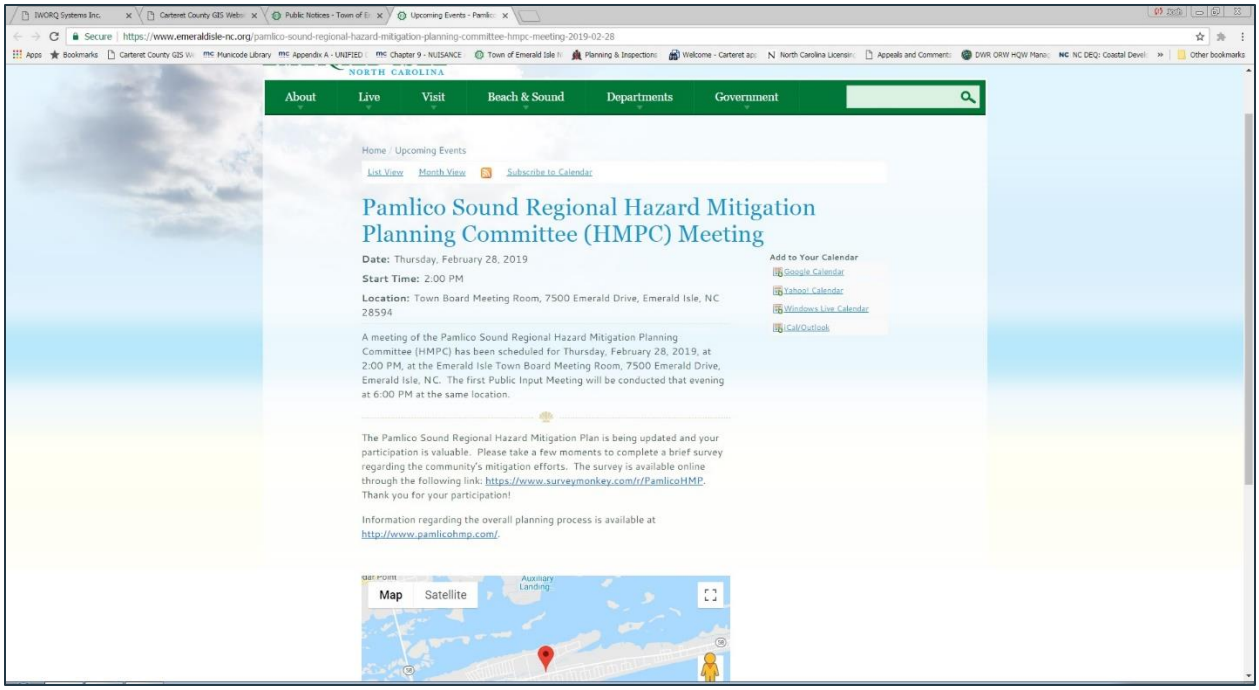

Town of Chocowinity
P. O. Box 145
3391 Hwy 17 S
Chocowinity, NC 27817
ph: 252-946-6568
fax: 252-975-7500
townofchoco@suddenlinkmail.com
Home
Information/Services
Board Meetings
Police Department
Water/Sewer
Happenings
Recreation
Zoning
Then & Now
Contact Us
Welcome to the Town of Chocowinity and our official website. Chocowinity is located in Beaufort County, North Carolina about 3 miles south of Washington, North Carolina. For more information on the history of Chocowinity click here.
2018-2019 Budget
Water/Sewer Rates as of July 1, 2018
The 2017 Water Quality Report is now available. Please view it here.
The February Planning Board Meeting will be held on Monday, February 18 at 7:00 p.m.
The regular March Board of Commissioners Meeting will be held on Tuesday, March 5 at 7:00 p.m.
The Town of Chocowinity would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP
Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/
The first Public Input Meeting for the Pamlico Sound Regional Hazard Mitigation Plan will be conducted Thursday, February 28, 2019 at 6:00 p.m. at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC.

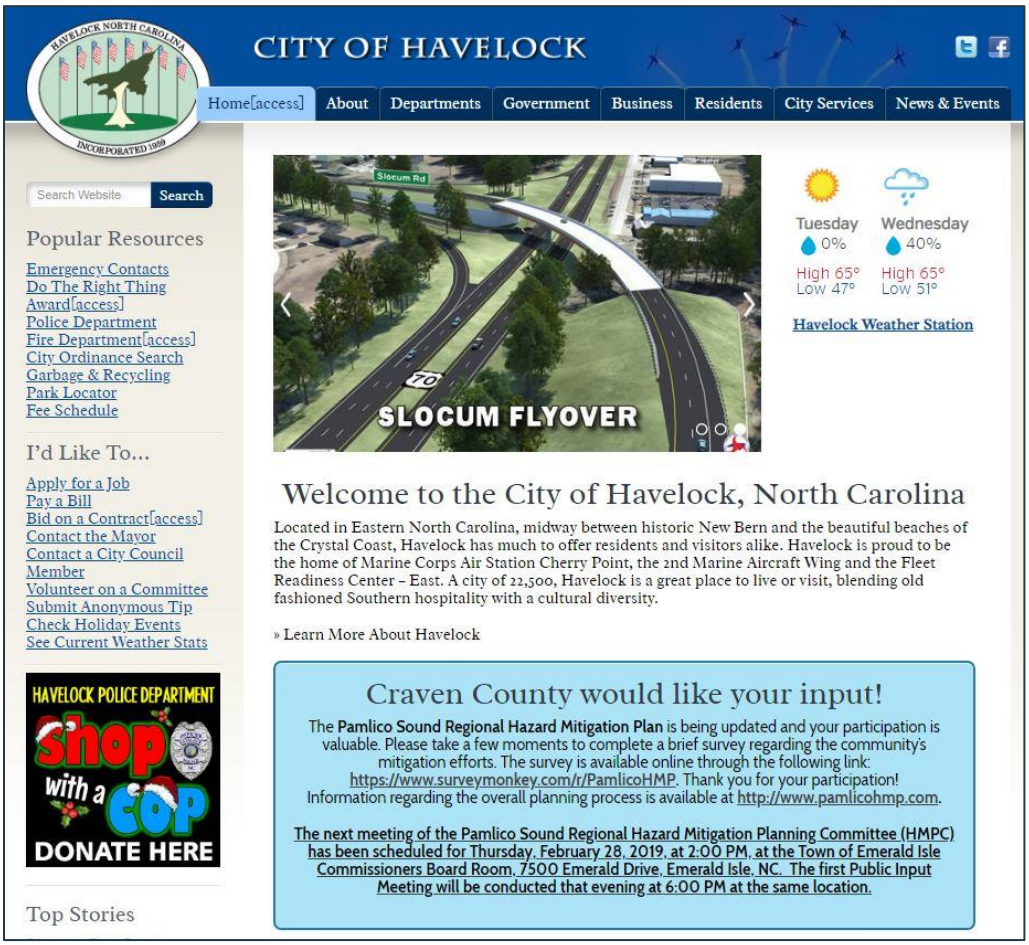

Craven County
https://www.cravencountync.gov/CivicAlerts.aspx?AID=218
Create an Account - Increase your productivity, customize your experience, and engage in information you care about.
Sign In
Home › News Flash
Home
Posted on: February 14, 2019
Pamlico Sound Regional Hazard Mitigation Plan Meeting
Pamlico Sound Regional Hazard Mitigation Plan
Public Input Meeting
When: Thursday, February 28, 2019 - 6:00 PM
Where: Emerald Isle Commissioners' Board Room, 7500 Emerald Drive, Emerald Isle, NC
Purpose: The general public is invited to attend a public input meeting regarding the update of the Pamlico Sound Regional Hazard Mitigation Plan.
For more information, please visit the project website.
Search
All categories
Tools
RSS
Notify Me®
Categories
All Categories
Home
Planning

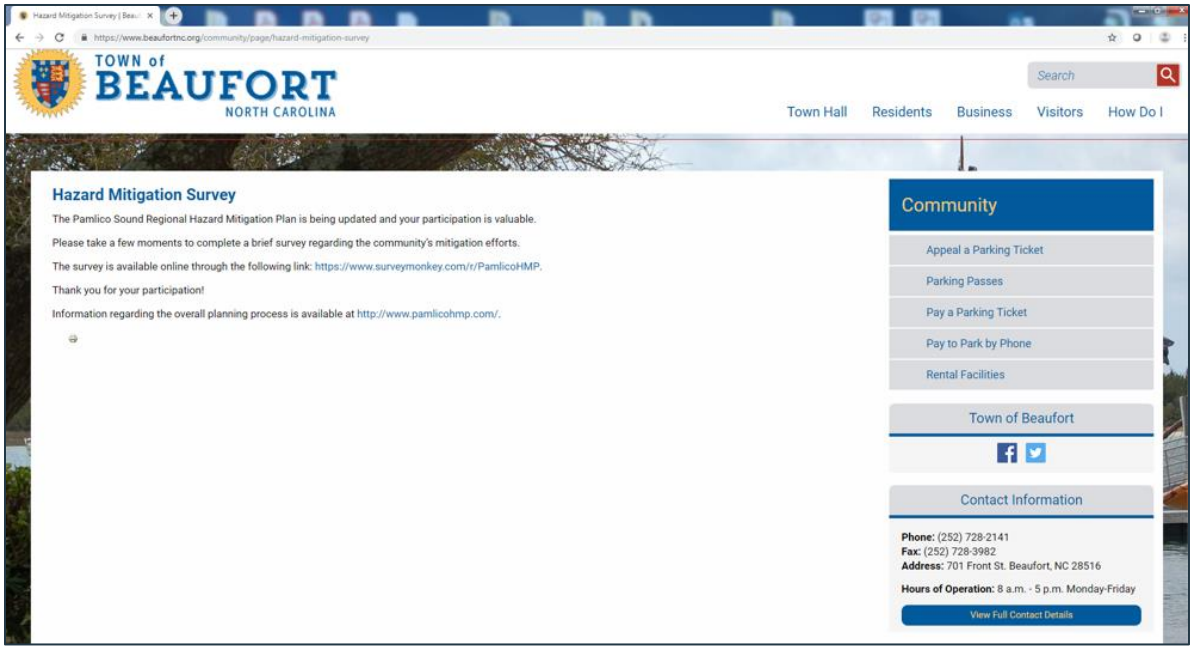

Create an Account - Increase your productivity, customize your experience, and engage in information you care about.
Sign In
Craven County continues to coordinate and support recovery efforts from Hurricane Florence. Please visit the county's website for the latest information.
NEWS
Pamlico Sound Regional Hazard Mitigation Plan Meeting
A public input meeting will be held regarding the Pamlico Sound Regional Hazard Mitigation Plan.
Read on...
Pamlico Sound Mitigation Plan Survey
The Pamlico Sound Regional Hazard Mitigation Plan is being updated.
Read on...
Notice of Extended Tax Listing Period
QUICK LINKS
Hurricane Florence Damage Survey
Media Releases
Emergency Notifications Sign-Up
Contact Us
Department Pages
FAQs
Boards
Employee Intranet
View All
CALENDAR
February 2019
Fri Mar. 22
4th Annual Craven Works Job Fair

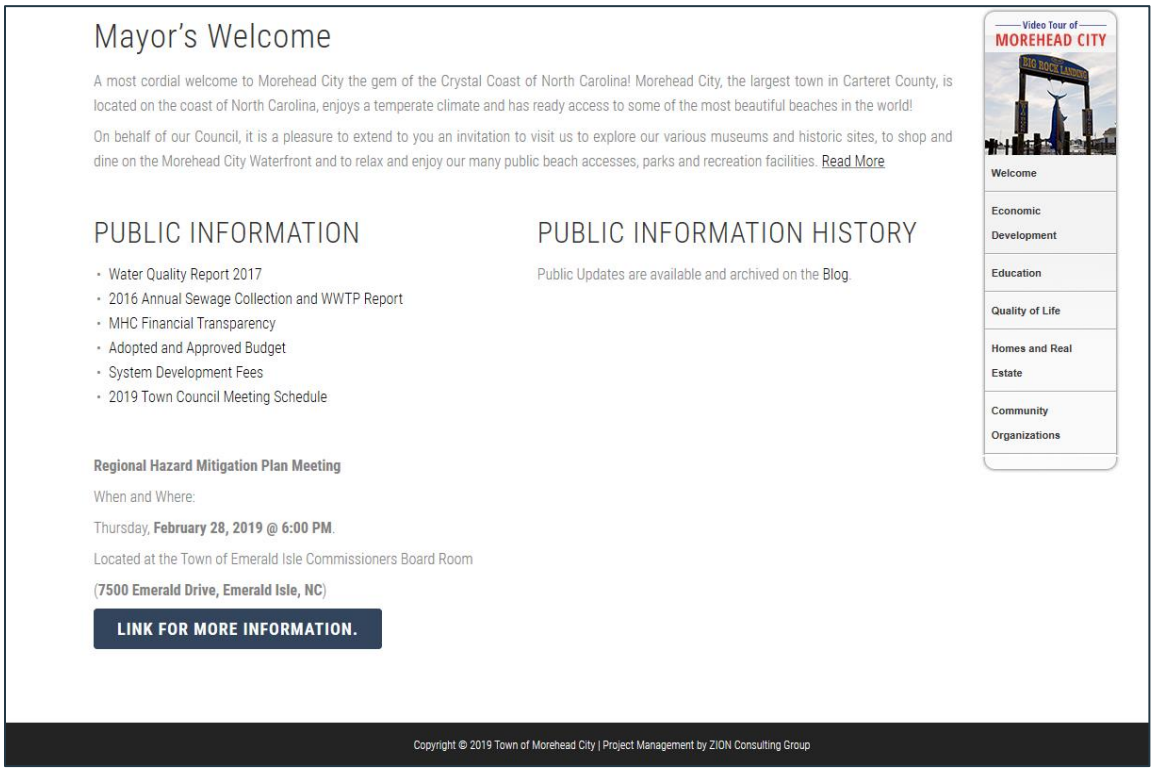

Create an Account - Increase your productivity, customize your experience, and engage in information you care about.
Sign In
Divisions & Staff Listing
2019 Plan Review Schedule
Technical Review Committee
Planning Board
Ordinances & Plans
Permitting Process
Permit Applications
Home › Departments › Planning & Inspections
Planning & Inspections
NEWS FLASH
Pamlico Sound Mitigation Plan Survey
The Pamlico Sound Regional Hazard Mitigation Plan is being updated.
Read on...
Pamlico Sound Regional Hazard Mitigation Plan Meeting
A public input meeting will be held regarding the Pamlico Sound Regional Hazard Mitigation Plan.
Read on...
Contact Us
Craven County
Don Baumgardner
Director
Email Don Baumgardner
Planning & Inspections
Physical Address
View Map
2828 Neuse Boulevard
New Bern, NC 28562

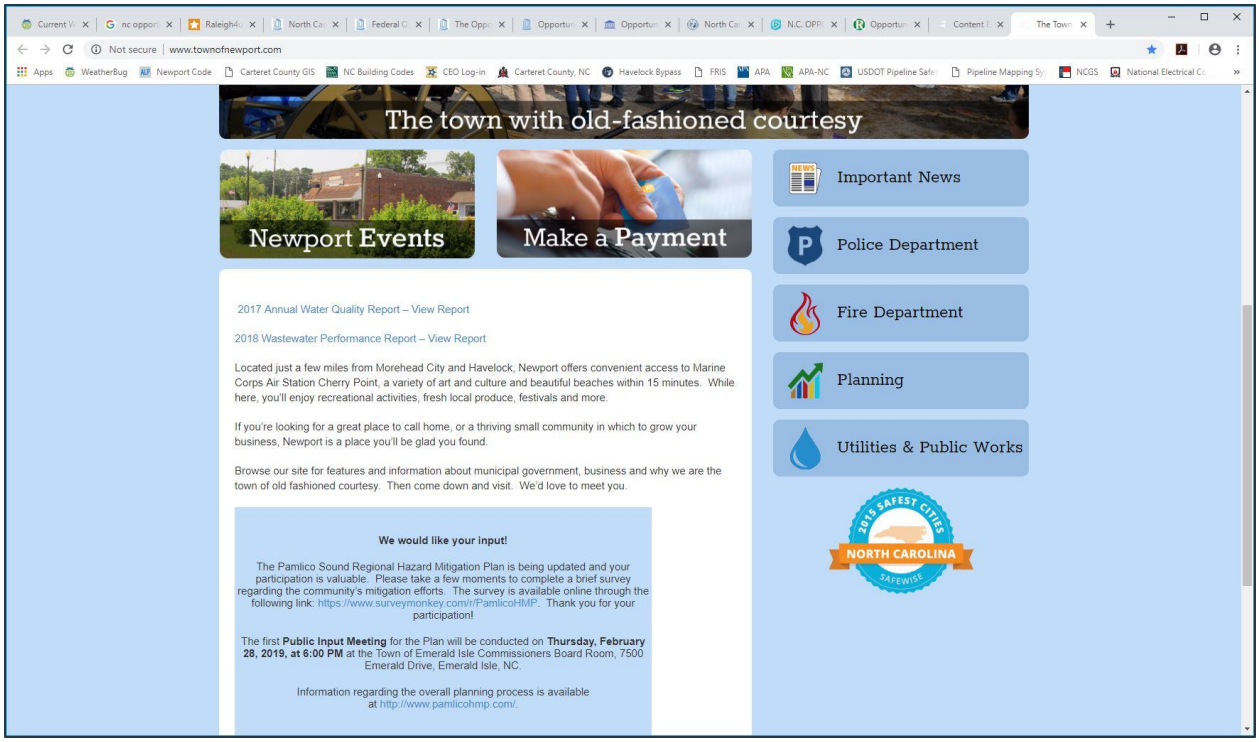

Email Town Manager | Contact Us | FAQ | Employment | Join Email List | Join Text List | Links
EMERALD ISLE
NORTH CAROLINA
Nice Matters!
About
Live
Visit
Beach & Sound
Departments
Government
Home / Latest News
The Town of Emerald Isle Would Like Your Input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
Wednesday, February 13, 2019 5:50:00 PM Categories: News
7500 Emerald Drive
Emerald Isle, NC 28594
p: (252) 354-3424
f: (252) 354-5068
© 2005 - 2019 Town of Emerald Isle North Carolina. All rights reserved.
The official website of the Town of Emerald Isle, NC

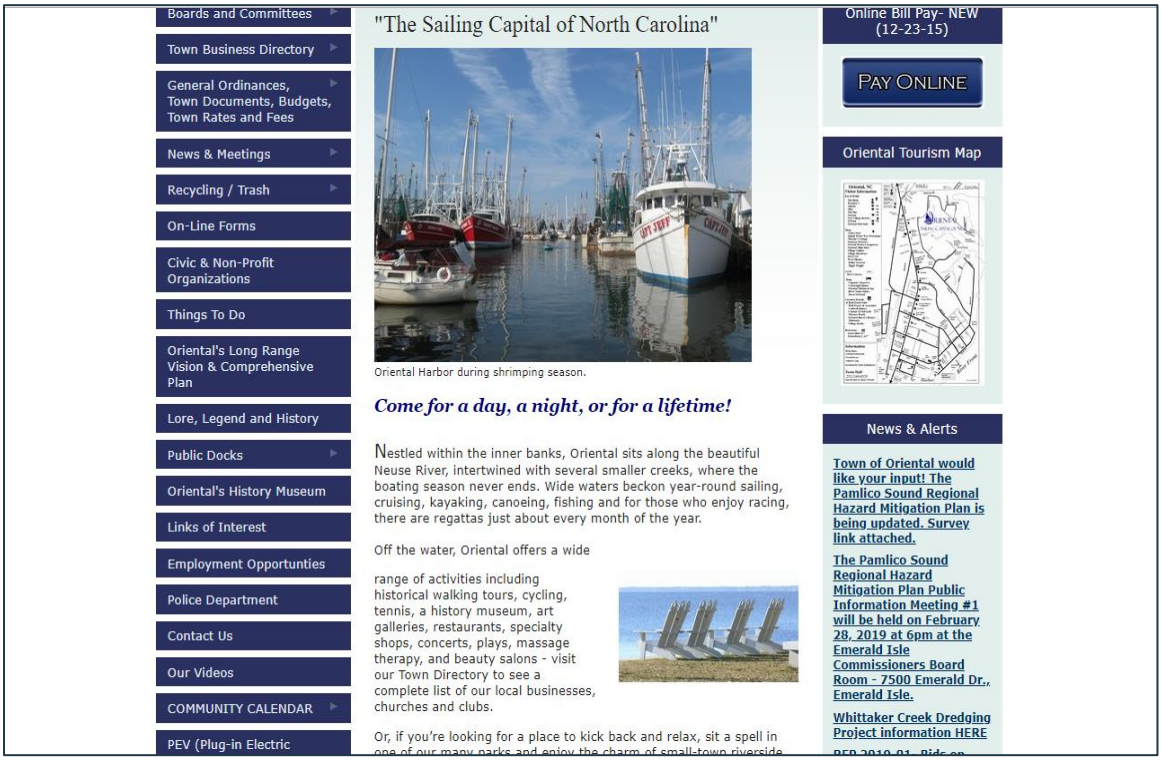

https://www.emeraldisle-nc.org/pamlico-sound-regional-hazard-mitigation-planning-committee-hmpc-meeting-2019-02-28
NORTH CAROLINA
About
Live
Visit
Beach & Sound
Departments
Government
Home / Upcoming Events
List View
Month View
Subscribe to Calendar
Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) Meeting
Date: Thursday, February 28, 2019
Start Time: 2:00 PM
Location: Town Board Meeting Room, 7500 Emerald Drive, Emerald Isle, NC 28594
A meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Thursday, February 28, 2019, at 2:00 PM, at the Emerald Isle Town Board Meeting Room, 7500 Emerald Drive, Emerald Isle, NC. The first Public Input Meeting will be conducted that evening at 6:00 PM at the same location.
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
Add to Your Calendar
Google Calendar
Yahoo! Calendar
Windows Live Calendar
iCal/Outlook
Map
Satellite


HAVELOCK NORTH CAROLINA
INCORPORATED 1959
CITY OF HAVELOCK
Home[access]
About
Departments
Government
Business
Residents
City Services
News & Events
Search Website
Search
Popular Resources
Emergency Contacts
Do The Right Thing Award[access]
Police Department
Fire Department[access]
City Ordinance Search
Garbage & Recycling
Park Locator
Fee Schedule
I'd Like To...
Apply for a Job
Pay a Bill
Bid on a Contract[access]
Contact the Mayor
Contact a City Council Member
Volunteer on a Committee
Submit Anonymous Tip
Check Holiday Events
See Current Weather Stats
HAVELOCK POLICE DEPARTMENT
Shop with a Cop
DONATE HERE
Top Stories
Slocum Rd
70
SLOCUM FLYOVER
Tuesday
0%
High 65°
Low 47°
Wednesday
40%
High 65°
Low 51°
Havelock Weather Station
Welcome to the City of Havelock, North Carolina
Located in Eastern North Carolina, midway between historic New Bern and the beautiful beaches of the Crystal Coast, Havelock has much to offer residents and visitors alike. Havelock is proud to be the home of Marine Corps Air Station Cherry Point, the 2nd Marine Aircraft Wing and the Fleet Readiness Center – East. A city of 22,500, Havelock is a great place to live or visit, blending old fashioned Southern hospitality with a cultural diversity.
» Learn More About Havelock
Craven County would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation! Information regarding the overall planning process is available at http://www.pamlicohmp.com.
The next meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Thursday, February 28, 2019, at 2:00 PM, at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC. The first Public Input Meeting will be conducted that evening at 6:00 PM at the same location.

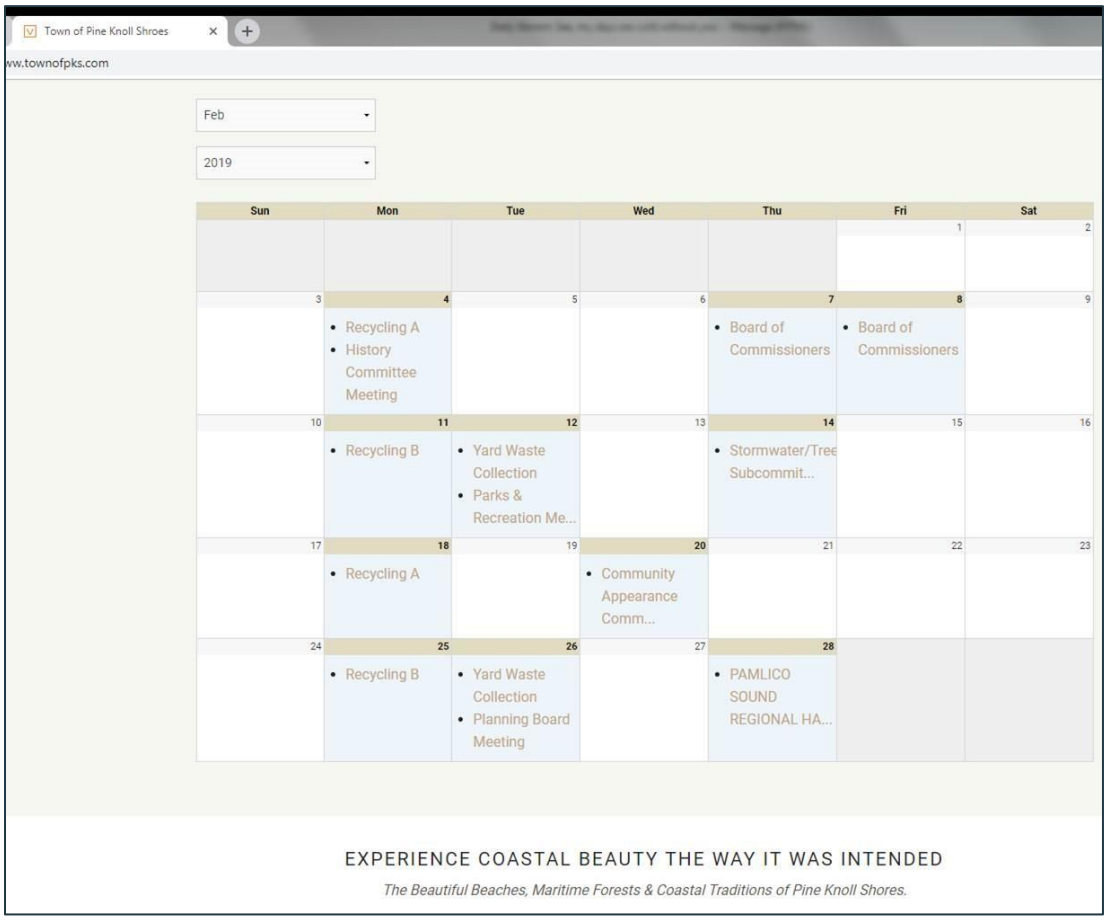

TOWN of
BEAUFORT
NORTH CAROLINA
Search
Town Hall
Residents
Business
Visitors
How Do I
Hazard Mitigation Survey
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable.
Please take a few moments to complete a brief survey regarding the community's mitigation efforts.
The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP.
Thank you for your participation!
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
Community
Appeal a Parking Ticket
Parking Passes
Pay a Parking Ticket
Pay to Park by Phone
Rental Facilities
Town of Beaufort
Contact Information
Phone: (252) 728-2141
Fax: (252) 728-3982
Address: 701 Front St. Beaufort, NC 28516
Hours of Operation: 8 a.m. - 5 p.m. Monday-Friday
View Full Contact Details


Mayor's Welcome
A most cordial welcome to Morehead City the gem of the Crystal Coast of North Carolina! Morehead City, the largest town in Carteret County, is located on the coast of North Carolina, enjoys a temperate climate and has ready access to some of the most beautiful beaches in the world!
On behalf of our Council, it is a pleasure to extend to you an invitation to visit us to explore our various museums and historic sites, to shop and dine on the Morehead City Waterfront and to relax and enjoy our many public beach accesses, parks and recreation facilities. Read More
PUBLIC INFORMATION
Water Quality Report 2017
2016 Annual Sewage Collection and WWTP Report
MHC Financial Transparency
Adopted and Approved Budget
System Development Fees
2019 Town Council Meeting Schedule
PUBLIC INFORMATION HISTORY
Public Updates are available and archived on the Blog.
Regional Hazard Mitigation Plan Meeting
When and Where:
Thursday, February 28, 2019 @ 6:00 PM.
Located at the Town of Emerald Isle Commissioners Board Room
(7500 Emerald Drive, Emerald Isle, NC)
LINK FOR MORE INFORMATION.
Video Tour of
MOREHEAD CITY
Welcome
Economic Development
Education
Quality of Life
Homes and Real Estate
Community Organizations
Copyright © 2019 Town of Morehead City | Project Management by ZION Consulting Group


www.townofnewport.com
The town with old-fashioned courtesy
Newport Events
Make a Payment
Important News
Police Department
Fire Department
Planning
Utilities & Public Works
2017 Annual Water Quality Report – View Report
2018 Wastewater Performance Report – View Report
Located just a few miles from Morehead City and Havelock, Newport offers convenient access to Marine Corps Air Station Cherry Point, a variety of art and culture and beautiful beaches within 15 minutes. While here, you'll enjoy recreational activities, fresh local produce, festivals and more.
If you're looking for a great place to call home, or a thriving small community in which to grow your business, Newport is a place you'll be glad you found.
Browse our site for features and information about municipal government, business and why we are the town of old fashioned courtesy. Then come down and visit. We'd love to meet you.
We would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts. The survey is available online through the following link: https://www.surveymonkey.com/r/PamlicoHMP. Thank you for your participation!
The first Public Input Meeting for the Plan will be conducted on Thursday, February 28, 2019, at 6:00 PM at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC.
Information regarding the overall planning process is available at http://www.pamlicohmp.com/.
2015 SAFEST CITIES
NORTH CAROLINA
SAFEWISE


Boards and Committees
Town Business Directory
General Ordinances, Town Documents, Budgets, Town Rates and Fees
News & Meetings
Recycling / Trash
On-Line Forms
Civic & Non-Profit Organizations
Things To Do
Oriental's Long Range Vision & Comprehensive Plan
Lore, Legend and History
Public Docks
Oriental's History Museum
Links of Interest
Employment Opportunties
Police Department
Contact Us
Our Videos
COMMUNITY CALENDAR
PEV (Plug-in Electric
"The Sailing Capital of North Carolina"
Oriental Harbor during shrimping season.
Come for a day, a night, or for a lifetime!
Nestled within the inner banks, Oriental sits along the beautiful Neuse River, intertwined with several smaller creeks, where the boating season never ends. Wide waters beckon year-round sailing, cruising, kayaking, canoeing, fishing and for those who enjoy racing, there are regattas just about every month of the year.
Off the water, Oriental offers a wide
range of activities including historical walking tours, cycling, tennis, a history museum, art galleries, restaurants, specialty shops, concerts, plays, massage therapy, and beauty salons - visit our Town Directory to see a complete list of our local businesses, churches and clubs.
Or, if you're looking for a place to kick back and relax, sit a spell in
Online Bill Pay- NEW (12-23-15)
PAY ONLINE
Oriental Tourism Map
News & Alerts
Town of Oriental would like your input! The Pamlico Sound Regional Hazard Mitigation Plan is being updated. Survey link attached.
The Pamlico Sound Regional Hazard Mitigation Plan Public Information Meeting #1 will be held on February 28, 2019 at 6pm at the Emerald Isle Commissioners Board Room - 7500 Emerald Dr., Emerald Isle.
Whittaker Creek Dredging Project information HERE


Pamlico County Government
County Pamlico NC
WORK or PLAY · VISIT or STAY
Search
County Government
Minutes & Agendas
Departments
Online Services
Residents
Business
Pamlico Sound Regional Hazard Mitigation Plan
The first Public Input Meeting regarding the Pamlico Sound Regional Hazard Mitigation Plan Update will be conducted Thursday, February 28, 2019, at 6:00 PM at Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC. Information regarding the plan can be found at the Regional Hazard Mitigation Plan website (http://www.pamlicohmp.com/).
Posted by Courtney N. Monday, February 18, 2019 8:34:00 AM
Contact Us
Employment
Privacy Policy
Site Map
CODERED
weather WARNING


Town of Pine Knoll Shroes
ww.townofpks.com
Feb
2019
Sun
Mon
Tue
Wed
Thu
Fri
Sat
Recycling A
History Committee Meeting
Board of Commissioners
Board of Commissioners
Recycling B
Yard Waste Collection
Parks & Recreation Me...
Stormwater/Tree Subcommit...
Recycling A
Community Appearance Comm...
Recycling B
Yard Waste Collection
Planning Board Meeting
PAMLICO SOUND REGIONAL HA...
EXPERIENCE COASTAL BEAUTY THE WAY IT WAS INTENDED
The Beautiful Beaches, Maritime Forests & Coastal Traditions of Pine Knoll Shores.

Home Contact Us 2017 Water Quality Report

PINE KNOLL SHORES | About | Town Departments | Resources | The Shoreline | Beach Safety

PAMLICO SOUND REGIONAL HAZARD MITIGATION PLANNING COMMITTEE (HMPC)

Date: 28-Feb-2019

DETAILS

PAMLICO SOUND REGIONAL HAZARD MITIGATION PLANNING COMMITTEE (HMPC)

WHERE:

Town of Emerald Isle Commissioners Board Room

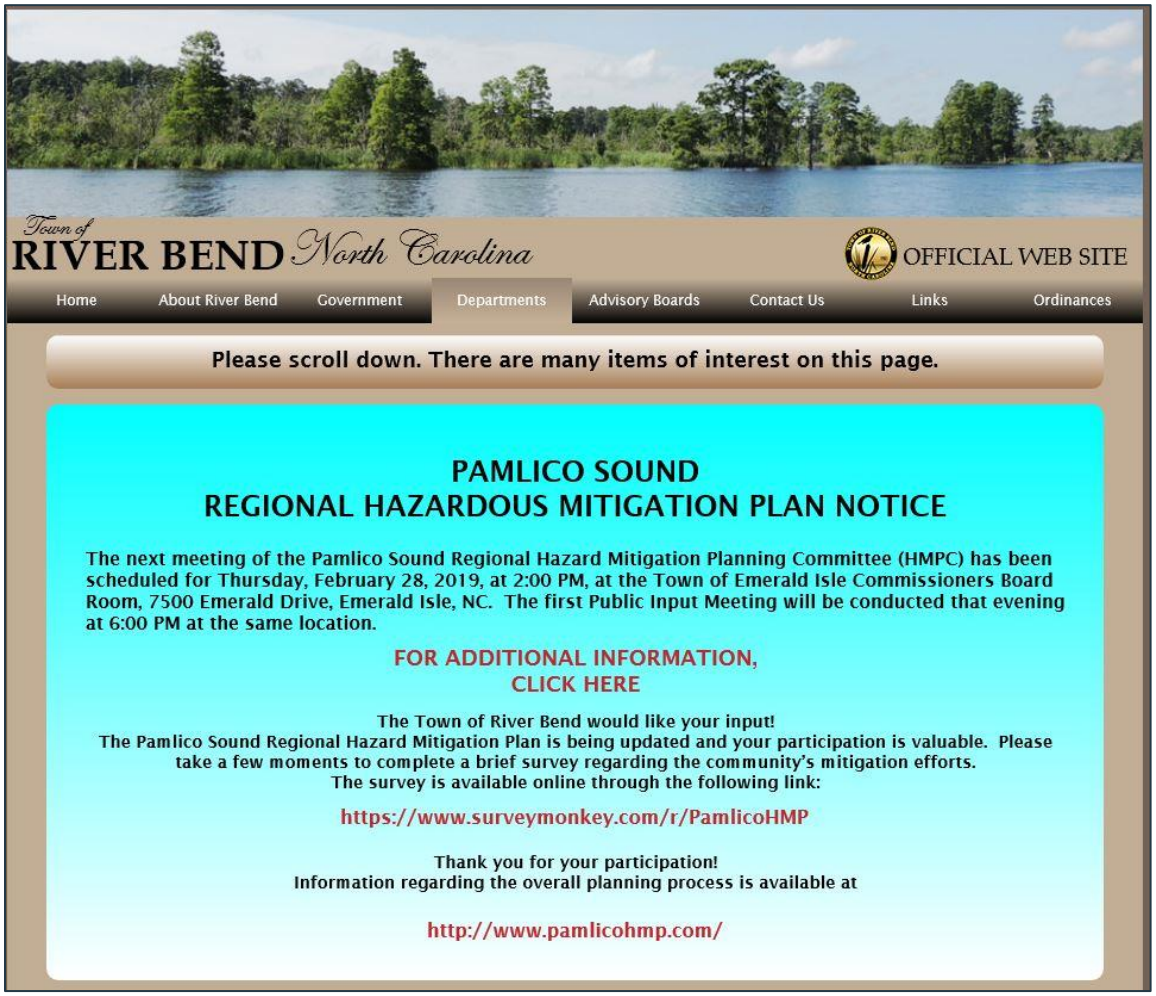
WHEN:

2:00 PM

The next meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for **Thursday, February 28, 2019, at 2:00 PM**, at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC. The first **Public Input Meeting** will be conducted that evening at 6:00 PM at the same location. If your community has an active website, please post notification of the public input meeting AND a link to the Regional HMP website (http://www.pamlicohmp.com/).

Go Back

TOWN OF PINE KNOLL SHORES | ADDRESS | FOLLOW US



Town of RIVER BEND North Carolina — OFFICIAL WEB SITE

Home | About River Bend | Government | Departments | Advisory Boards | Contact Us | Links | Ordinances

Please scroll down. There are many items of interest on this page.

PAMLICO SOUND
REGIONAL HAZARDOUS MITIGATION PLAN NOTICE

The next meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Thursday, February 28, 2019, at 2:00 PM, at the Town of Emerald Isle Commissioners Board Room, 7500 Emerald Drive, Emerald Isle, NC. The first Public Input Meeting will be conducted that evening at 6:00 PM at the same location.

FOR ADDITIONAL INFORMATION,
CLICK HERE

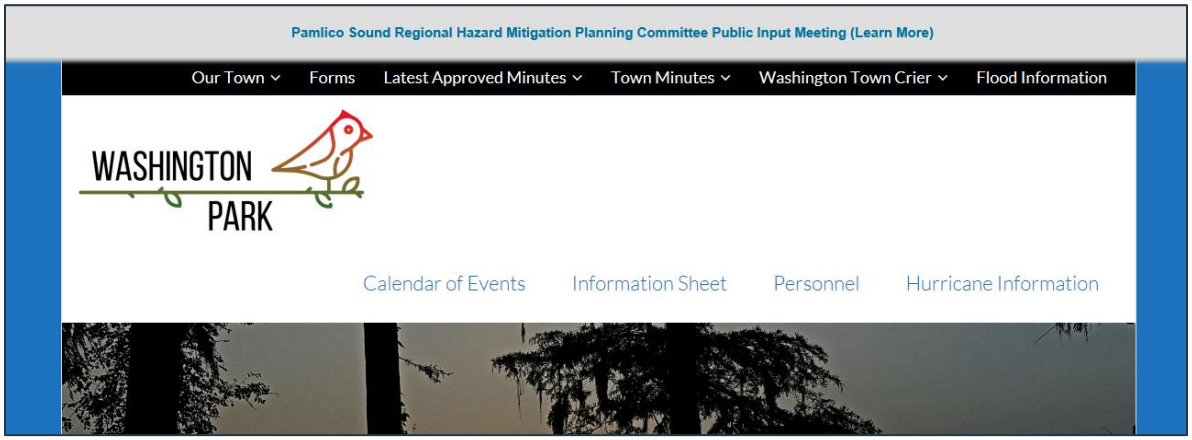
The Town of River Bend would like your input!
The Pamlico Sound Regional Hazard Mitigation Plan is being updated and your participation is valuable. Please take a few moments to complete a brief survey regarding the community's mitigation efforts.
The survey is available online through the following link:

https://www.surveymonkey.com/r/PamlicoHMP

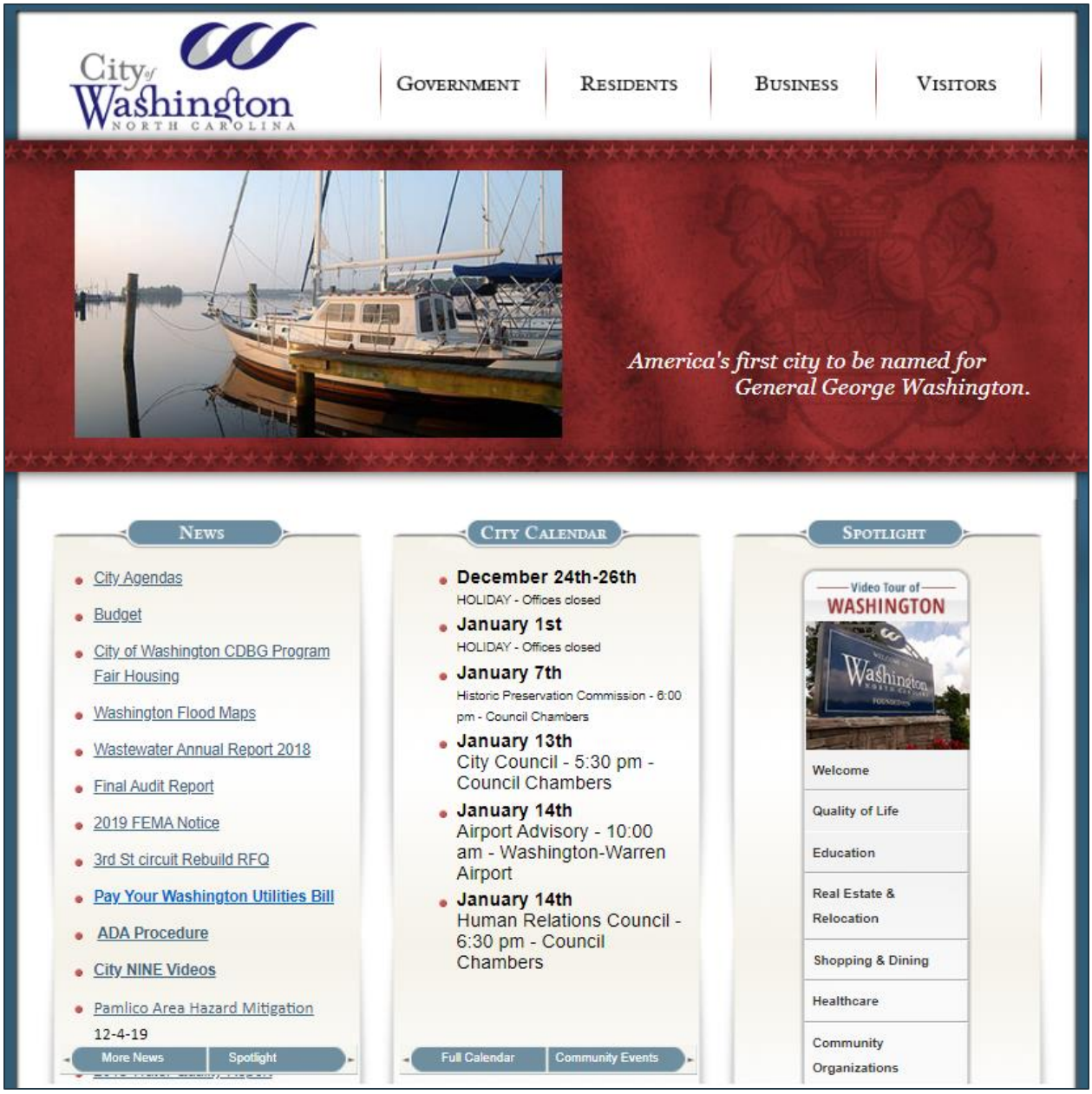
Thank you for your participation!
Information regarding the overall planning process is available at

http://www.pamlicohmp.com/


Town of
RIVER BEND North Carolina
OFFICIAL WEB SITE
Home
About River Bend
Government
Departments
Advisory Boards
Contact Us
Links
Ordinances
PAMLICO SOUND REGIONAL HAZARDOUS MITIGATION PLAN NOTICE - FEBRUARY 28, 2019
SPECIAL MEETING NOTIFICATION - BUS - MARCH 14, 2019
HURRICANE FLORENCE EXCEPTIONS DEADLINES
INFORMATION ABOUT THE TOWN'S PERMITTING PROCESS
INFORMATION ABOUT NATURAL GAS IN RIVER BEND
Mayor's Welcome


Pamlico Sound Regional Hazard Mitigation Planning Committee Public Input Meeting (Learn More)
Our Town
Forms
Latest Approved Minutes
Town Minutes
Washington Town Crier
Flood Information
WASHINGTON PARK
Calendar of Events
Information Sheet
Personnel
Hurricane Information


Pamlico Sound Regional Hazard Mitigation Planning Committee Public Input Meeting (Learn More)
HOME / PAMLICO SOUND REGIONAL HAZARD MITIGATION PLANNING COMMITTEE PUBLIC INPUT MEETING
PAMLICO SOUND REGIONAL HAZARD MITIGATION PLANNING COMMITTEE PUBLIC INPUT MEETING
PAMLICO SOUND REGIONAL HAZARD MITIGATION PLANNING COMMITTEE PUBLIC INPUT MEETING
February 13, 2019
Uncategorized
Pamlico Sound Regional Hazard Mitigation Planning Committee Public Input Meeting
Thursday, February 28, 2019 at 6:00 pm at the Town of Emerald Isle Commissioner Board Room, 7500 Emerald Drive, Emerald Isle, NC
Learn More
http://www.pamlicohmp.com/

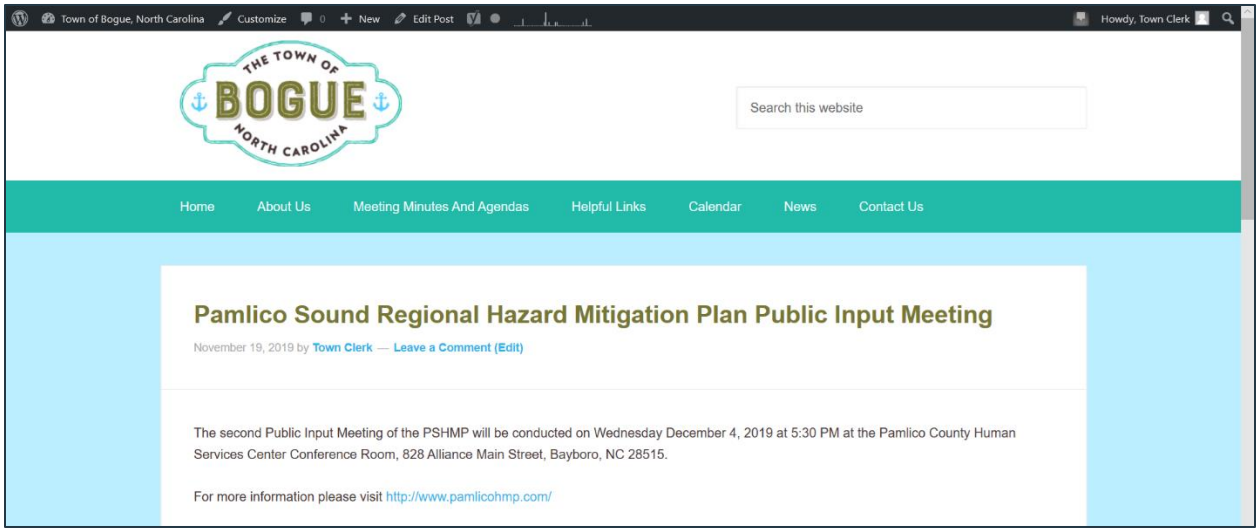

City of Washington
NORTH CAROLINA
GOVERNMENT
RESIDENTS
BUSINESS
VISITORS
America's first city to be named for General George Washington.
NEWS
City Agendas
Budget
City of Washington CDBG Program Fair Housing
Washington Flood Maps
Wastewater Annual Report 2018
Final Audit Report
2019 FEMA Notice
3rd St circuit Rebuild RFQ
Pay Your Washington Utilities Bill
ADA Procedure
City NINE Videos
Pamlico Area Hazard Mitigation
12-4-19
More News
Spotlight
CITY CALENDAR
December 24th-26th
HOLIDAY - Offices closed
January 1st
HOLIDAY - Offices closed
January 7th
Historic Preservation Commission - 6:00 pm - Council Chambers
January 13th
City Council - 5:30 pm - Council Chambers
January 14th
Airport Advisory - 10:00 am - Washington-Warren Airport
January 14th
Human Relations Council - 6:30 pm - Council Chambers
Full Calendar
Community Events
SPOTLIGHT
Video Tour of
WASHINGTON
Welcome
Quality of Life
Education
Real Estate & Relocation
Shopping & Dining
Healthcare
Community Organizations

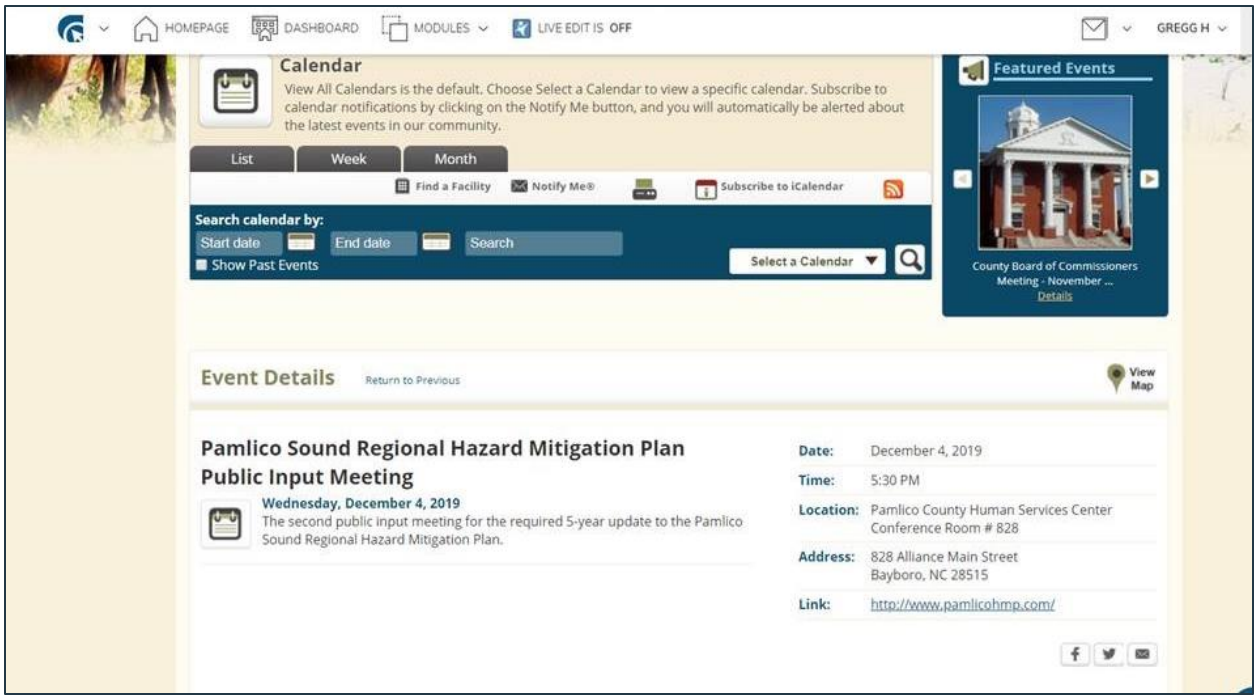
Public Meeting 2: December 4, 2019

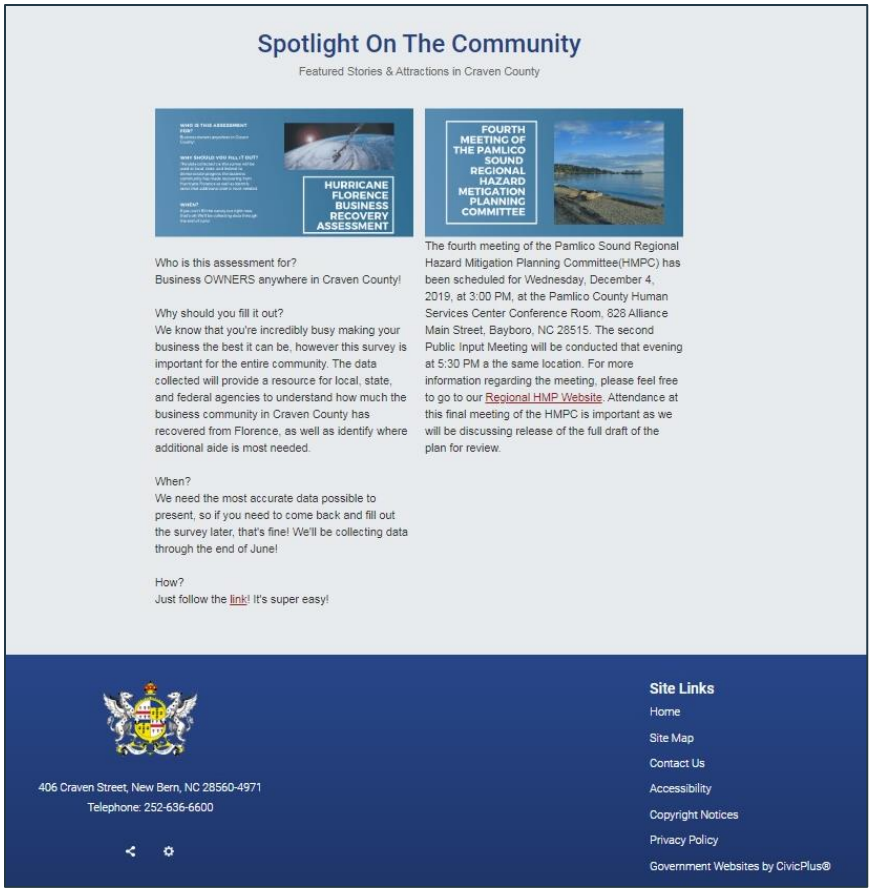
Pamlico Sound Regional Hazard Mitigation Plan
Hazard Mitigation Planning Public Meeting #2
Wednesday, December 4, 2019, 5:30 PM

	Name	Organization (resident)	Phone	E-Mail
1.	Jillian Howell	Pamlico Tar River/Neuse Sound Rivers	781 307 1534	jill@soundrivers.org
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				


NEWS
Pamlico Sound Hazard Mitigation Plan Public Input Meeting
PAMLICO SOUND REGIONAL HAZARD MITIGATION PLAN PUBLIC INPUT MEETING
The Pamlico Sound Region of NC is updating its 2015 Hazard Mitigation Plan to better protect the people and property of the region from the effects of natural and human-caused hazards and to maintain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). Public input on hazards and mitigation strategies is welcomed and encouraged during this process. The second Public Input Meeting will be conducted DECEMBER 4, 2019, AT 5:30PM, at the PAMLICO COUNTY HUMAN SERVICES CENTER CONFERENCE ROOM, 828 ALLIANCE MAIN STREET, BAYBORO, NC 28515. For more information on this program, please visit the project website at http://www.pamlicohmp.com/.


Town of Bogue, North Carolina
Customize
New
Edit Post
Howdy, Town Clerk
THE TOWN OF BOGUE NORTH CAROLINA
Search this website
Home
About Us
Meeting Minutes And Agendas
Helpful Links
Calendar
News
Contact Us
Pamlico Sound Regional Hazard Mitigation Plan Public Input Meeting
November 19, 2019 by Town Clerk — Leave a Comment (Edit)
The second Public Input Meeting of the PSHMP will be conducted on Wednesday December 4, 2019 at 5:30 PM at the Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515.
For more information please visit http://www.pamlicohmp.com/


HOMEPAGE
DASHBOARD
MODULES
LIVE EDIT IS OFF
GREGG H
Calendar
View All Calendars is the default. Choose Select a Calendar to view a specific calendar. Subscribe to calendar notifications by clicking on the Notify Me button, and you will automatically be alerted about the latest events in our community.
List
Week
Month
Find a Facility
Notify Me®
Subscribe to iCalendar
Search calendar by:
Start date
End date
Search
Show Past Events
Select a Calendar
Featured Events
County Board of Commissioners Meeting - November ...
Details
Event Details
Return to Previous
View Map
Pamlico Sound Regional Hazard Mitigation Plan Public Input Meeting
Wednesday, December 4, 2019
The second public input meeting for the required 5-year update to the Pamlico Sound Regional Hazard Mitigation Plan.
Date: December 4, 2019
Time: 5:30 PM
Location: Pamlico County Human Services Center Conference Room # 828
Address: 828 Alliance Main Street Bayboro, NC 28515
Link: http://www.pamlicohmp.com/



Spotlight On The Community

Featured Stories & Attractions in Craven County

Who is this assessment for?
Business OWNERS anywhere in Craven County!

Why should you fill it out?
We know that you're incredibly busy making your business the best it can be, however this survey is important for the entire community. The data collected will provide a resource for local, state, and federal agencies to understand how much the business community in Craven County has recovered from Florence, as well as identify where additional aide is most needed.

When?
We need the most accurate data possible to present, so if you need to come back and fill out the survey later, that's fine! We'll be collecting data through the end of June!

How?
Just follow the link! It's super easy!

The fourth meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee(HMPC) has been scheduled for Wednesday, December 4, 2019, at 3:00 PM, at the Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515. The second Public Input Meeting will be conducted that evening at 5:30 PM a the same location. For more information regarding the meeting, please feel free to go to our Regional HMP Website. Attendance at this final meeting of the HMPC is important as we will be discussing release of the full draft of the plan for review.

406 Craven Street, New Bern, NC 28560-4971
Telephone: 252-636-6600

Site Links
Home
Site Map
Contact Us
Accessibility
Copyright Notices
Privacy Policy
Government Websites by CivicPlus®

2:25 100%
emeraldisle-nc.org/pan

Home / Upcoming Events

List View Month View Subscribe to Calendar

Pamlico Sound Regional Hazard Mitigation Planning Committee

Date: Wednesday, December 4, 2019

Start Time: 3:00 PM

Location: Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515.

CITY OF HAVELOCK

Home | About | Departments | Government | Business | Residents | City Services | News & Events

Search Website Search

GODADDY VERIFIED & SECURED

Popular Resources

Emergency Contacts
Do The Right Thing Award
Police Department
Fire Department
City Ordinance Search
Garbage & Recycling
Park Locator
Fee Schedule

I'd Like To...

Pamlico Sound Hazard Mitigation Meeting

The fourth meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Wednesday, December 4, 2019, at 3:00 PM, at the Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515.

The second Public Input Meeting will be conducted that evening at 5:30 PM at the same location. Attendance at this final meeting of the HMPC is important as we will be discussing release of the full draft of the plan for review.

http://www.pamlicohmp.com

Home › Government › Departments › Planning & Inspections › Special Meetings

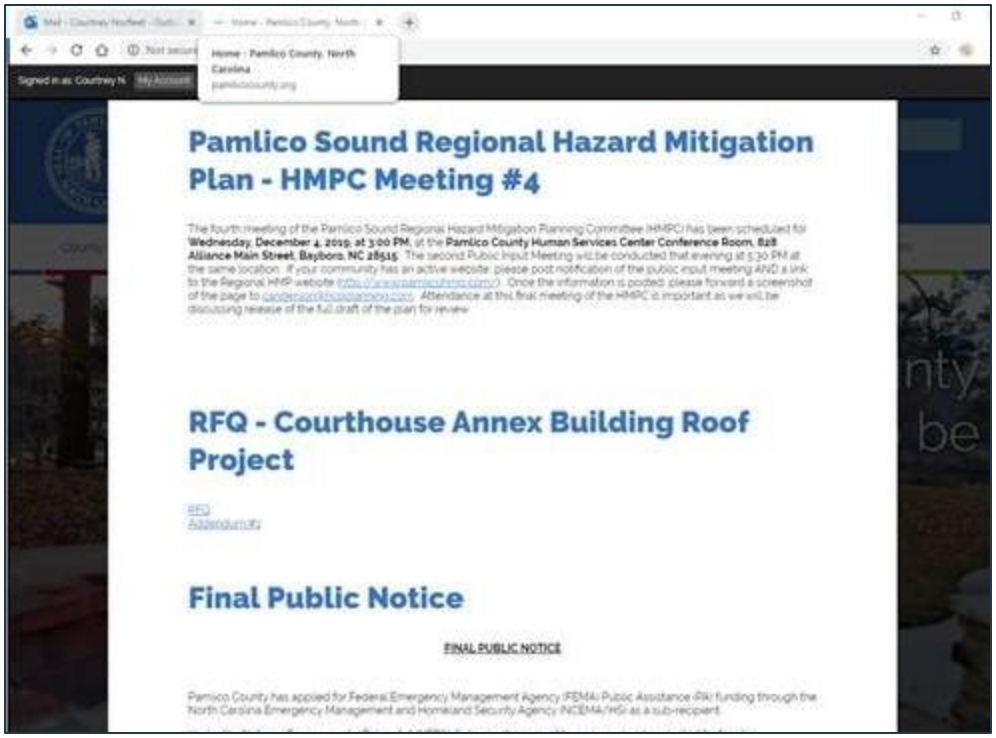
Special Meetings

Pamlico Sound Regional Hazard Mitigation Plan Meeting

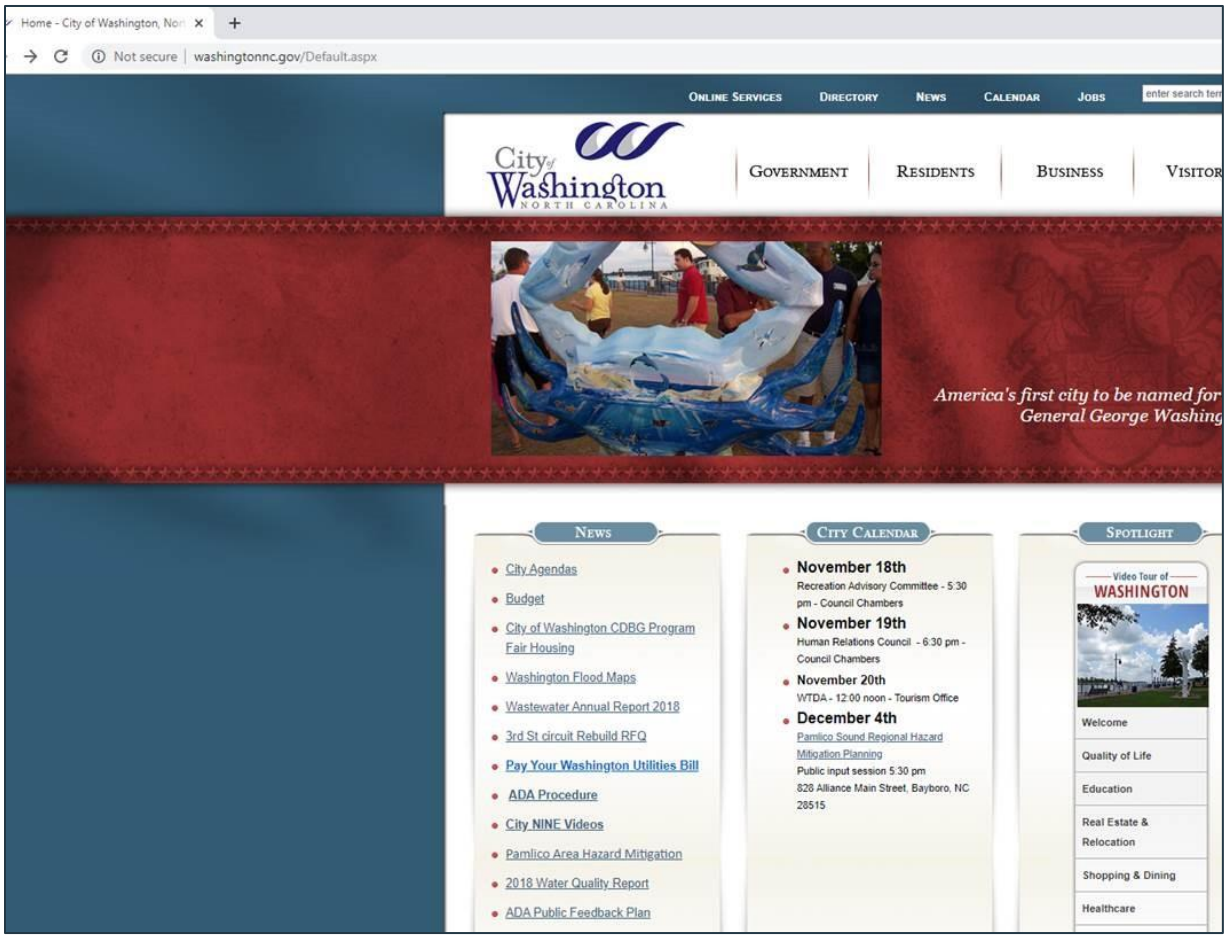
The fourth meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Wednesday, December 4, 2019, at 3:00 PM, at the Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515. The second Public Input Meeting will be conducted that evening at 5:30 PM at the same location.

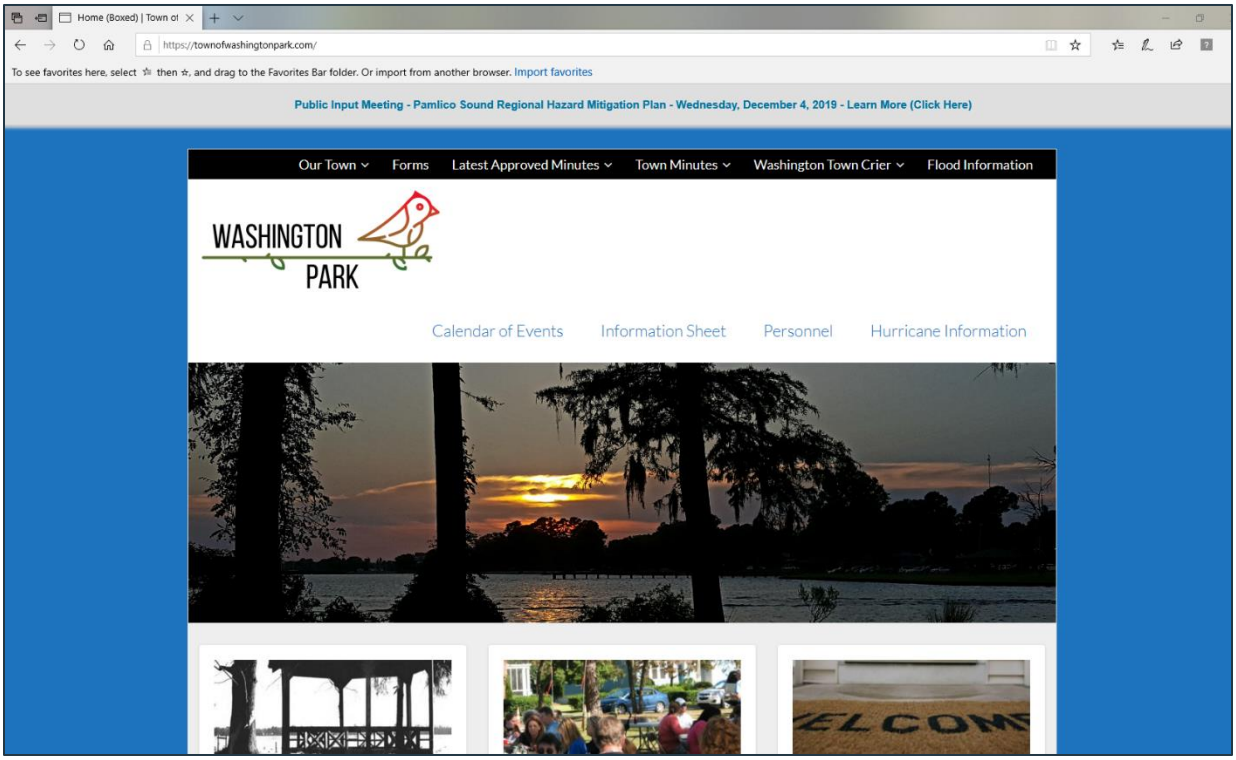
A link to the Regional HMP website can be found here: http://www.pamlicohmp.com/


News & Meetings
Recycling / Trash
On-Line Forms
Civic & Non-Profit Organizations
Things To Do
Oriental's Long Range Vision & Comprehensive Plan
Lore, Legend and History
Public Docks
Oriental's History Museum
Links of Interest
Employment Opportunities
Police Department
Contact Us
Our Videos
COMMUNITY CALENDAR
Community Events Calendar
Oriental Harbor during shrimping season.
Come for a day, a night, or for a lifetime!
Nestled within the inner banks, Oriental sits along the beautiful Neuse River, intertwined with several smaller creeks, where the boating season never ends. Wide waters beckon year-round sailing, cruising, kayaking, canoeing, fishing and for those who enjoy racing, there are regattas just about every month of the year.
Off the water, Oriental offers a wide range of activities including historical walking tours, cycling, tennis, a history museum, art galleries, restaurants, specialty shops, concerts, plays, massage therapy, and beauty salons - visit our Town Directory to see a complete list of our local businesses, churches and clubs.
Or, if you're looking for a place to kick back and relax, sit a spell in one of our many parks and enjoy the charm of small-town riverside living.
Oriental Tourism Map
News & Alerts
Christmas Schedule: Town Hall will be closed Dec 24, 25, 26, Open Dec 23, 27 with smaller staff.
The Pamlico Sound Regional Hazard Mitigation Plan Public Information Final Meeting will be held on December 4, 2019 at 5:30pm at the Pamlico Co. Human Services Conference Rm.# B28, Alliance Main St., Bayboro, NC
Spoils Site Prep-RFQ (See attached document)- Bids due Dec 2, 2PM
Spirit of Christmas-PARADE, Dec 14, 2:30PM-forms online at


Home - Pamlico County, North Carolina
Pamlico Sound Regional Hazard Mitigation Plan - HMPC Meeting #4
The fourth meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Wednesday, December 4, 2019, at 3:00 PM, at the Pamlico County Human Services Center Conference Room, B28 Alliance Main Street, Bayboro, NC 28515. The second Public Input Meeting will be conducted that evening at 5:30 PM at the same location. If your community has an active website, please post notification of the public input meeting AND a link to the Regional HMP website (http://www.pamlicohmp.com/). Once the information is posted, please forward a screenshot of the page to courtenaynh@pamlicoinnovation.com. Attendance at this final meeting of the HMPC is important as we will be discussing release of the full draft of the plan for review.
RFQ - Courthouse Annex Building Roof Project
RFQ
Addendum #2
Final Public Notice
FINAL PUBLIC NOTICE
Pamlico County has applied for Federal Emergency Management Agency (FEMA) Public Assistance (PA) funding through the North Carolina Emergency Management and Homeland Security Agency (NCEMA/HS) as a sub-recipient.


Town of
RIVER BEND North Carolina
OFFICIAL WEB SITE
Home
About River Bend
Government
Departments
Advisory Boards
Contact Us
Links
Ordinances
PUBLIC NOTICE- A Public Input Meeting of the Pamlico Sound Regional Hazard Mitigation Planning Committee (HMPC) has been scheduled for Wednesday, December 4, 2019, at 5:30 PM, at the Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515.
For more information about the HMPC visit at http://www.pamlicohmp.com/
FINAL PUBLIC NOTICE
BUS CONSTRUCTION INFORMATION - OCTOBER 28, 2019
Mayor's Welcome


Not secure | washingtonnc.gov/Default.aspx
Online Services
Directory
News
Calendar
Jobs
City of Washington
North Carolina
Government
Residents
Business
Visitor
America's first city to be named for General George Washing
News
City Agendas
Budget
City of Washington CDBG Program Fair Housing
Washington Flood Maps
Wastewater Annual Report 2018
3rd St circuit Rebuild RFQ
Pay Your Washington Utilities Bill
ADA Procedure
City NINE Videos
Pamlico Area Hazard Mitigation
2018 Water Quality Report
ADA Public Feedback Plan
City Calendar
November 18th
Recreation Advisory Committee - 5:30 pm - Council Chambers
November 19th
Human Relations Council - 6:30 pm - Council Chambers
November 20th
WTDA - 12:00 noon - Tourism Office
December 4th
Pamlico Sound Regional Hazard Mitigation Planning
Public input session 5:30 pm
828 Alliance Main Street, Bayboro, NC 28515
Spotlight
Video Tour of WASHINGTON
Welcome
Quality of Life
Education
Real Estate & Relocation
Shopping & Dining
Healthcare


Home (Boxed) | Town of
https://townofwashingtonpark.com/
To see favorites here, select then , and drag to the Favorites Bar folder. Or import from another browser. Import favorites
Public Input Meeting - Pamlico Sound Regional Hazard Mitigation Plan - Wednesday, December 4, 2019 - Learn More (Click Here)
Our Town
Forms
Latest Approved Minutes
Town Minutes
Washington Town Crier
Flood Information
WASHINGTON PARK
Calendar of Events
Information Sheet
Personnel
Hurricane Information

Mitigation Flyer

PAMLICO SOUND REGIONAL HAZARD MITIGATION PLAN

What Is a Hazard Mitigation Plan? Why is it Important to Me?

A Hazard Mitigation Plan is the result of a planning process to identify hazards, develop strategies to reduce the loss of life and property damage resulting from these hazards, and educate community members about these hazards and loss reduction strategies. This planning process is structured around the four phases of the Disaster Mitigation Act of 2000, which the Region's planning consultant has aligned with the ten steps of the Community Rating System (CRS). Having an adopted Hazard Mitigation Plan ensures a community is eligible for federal disaster funding. The planning team, with the community and stakeholders, has identified priority hazards, set goals, and developed mitigation actions. Now we need your feedback!

Phase 1
1. Organize Planning Team
2. Plan for Public Involvement
3. Coordinate with Other Agencies

Phase 2
4. Identify the Hazards
5. Estimate Losses

Phase 3
6. Identify Goals & Objectives
7. Develop Potential Mitigation Actions
8. Draft the Mitigation Plan

Phase 4
9. Adopt the Plan
10. Implement and Maintain the Plan

What is the Community Rating System?

The CRS is a national program developed by the Federal Emergency Management Agency (FEMA) to encourage communities to reduce their flood hazard risks. The CRS rewards the efforts communities take to exceed minimum requirements of the National Flood Insurance Program (NFIP) by providing discounts on flood insurance premiums. Specifically, the CRS encourages communities to reduce flood damage to existing buildings, manage development, protect new buildings, preserve and/or restore natural floodplain functions, help insurance agents obtain flood data, and help individuals obtain flood insurance.

What Hazards are Included in the Plan?

The planning committee included the following hazards in the Pamlico Sound Regional Hazard Mitigation Plan and prioritized them as shown to the right.

High Risk	Hurricane Extreme Heat Severe Winter Storm Wildfire Flood Tornado Severe Weather Drought
Moderate Risk	Dam Failure Coastal Hazards
Low Risk	Earthquake

Why is it Important to Me?

The mitigation actions and the action plan for implementation will be the framework for progress towards risk reduction and hazard mitigation in the Pamlico Sound Region. It is important for residents, business owners, property owners, and other stakeholders to become involved in this process to ensure that mitigation actions will be feasible, effective, and supported by the community. The planning team needs your input on these actions to prevent or lessen the impacts of hazards.

What Can I Do to Participate?

Visit the website. Get more information and follow the planning process at PamlicoHMP.com. The website contains announcements for upcoming meetings, minutes and presentations from past planning meetings, information on the identified hazards, draft planning documents for review, and more.

Send us information or comments. If you have information to share, contact the planning consultants at lholland@hcpplanning.com and abigail.moore@woodplc.com. Additionally, the draft plan will be available for public review. You can provide comments on draft documents via the plan website.

WE NEED YOUR INPUT

Public Survey

The Pamlico Sound Region distributed a public survey, shown below, that requested public input into the Hazard Mitigation Plan planning process and the identification of mitigation activities that could lessen the risk and impact of future flood hazard events. The survey was announced at the first public meeting, provided via a link on participating jurisdictions web and social media accounts, and made available online on the plan website.

Pamlico Sound Regional Hazard Mitigation Plan Public Survey

Online version can be found at: https://www.surveymonkey.com/r/PamlicoHMP

Beaufort, Carteret, Craven, and Pamlico Counties, along with their local jurisdictions, are updating the Pamlico Sound Regional Hazard Mitigation Plan to assess and minimize risk to natural hazards. Your participation in this process is important to us. Your input will help us to better understand the vulnerabilities within the region and decide on how to best mitigate or reduce the impacts of these hazards. **Please help us by completing this survey by Friday, May 10th and returning it to:**

Abby Moore, Wood
4021 Stirrup Creek Drive, Suite 100, Durham, NC 27703
Or by email to: abigail.moore@woodplc.com

This survey can also be completed online at: https://www.surveymonkey.com/r/PamlicoHMP

If you have any questions about this survey or want to learn about more ways to participate in the Pamlico Sound Regional Hazard Mitigation Plan update, please contact one of the planning consultants for the project: Landin Holland with Holland Consulting Planners at lholland@hcpplanning.com, or Abby Moore with Wood at abigail.moore@woodplc.com. You can also visit the project website at www.PamlicoHMP.com.

BACKGROUND INFORMATION

1. Where do you live?
   - ☐ Beaufort County
   - ☐ Carteret County
   - ☐ Craven County
   - ☐ Pamlico County
   - ☐ Other: _____
2. Do you rent or own your home?
   - ☐ Rent
   - ☐ Own
3. How prepared do you feel for a hazard event?
   - ☐ Not at all prepared ☐ Somewhat prepared ☐ Very prepared
4. Do you know where evacuation centers or storm shelters are?
   - ☐ Yes
   - ☐ No
5. Are you able to evacuate or take shelter if necessary?
   - ☐ Yes
   - ☐ No
6. Do you know where/how to get more information on hazard risk and preparedness?
   - ☐ Yes
   - ☐ No

1

HAZARD INFORMATION

7. The hazards addressed in the Hazard Mitigation Plan are listed below. Please indicate the level of significance that you perceive for each hazard. Please rate these hazards 1 through 3 as follows: 1=low, 2=moderate, 3=high.

____ Coastal Erosion	____ Hurricane
____ Dam/Levee Failure	____ Severe Weather (Thunderstorm/Lightning/Hail)
____ Drought	____ Severe Winter Storm
____ Earthquake	____ Tornado
____ Extreme Heat	____ Wildfire
____ Flood	____ Other_____

8. Describe specific hazard issues/problem areas that you would like the planning committee to consider.

9. Describe any actions you have taken to mitigate hazard risk for your family, home, or neighborhood.

10. Which categories of mitigation actions do you feel would be most effective?
    - ☐ Preventive activities (e.g. planning and zoning, building codes)
    - ☐ Property protection (e.g. retrofitting, insurance, flood prone property buyout)
    - ☐ Natural resource protection (e.g. wetlands protection, erosion control, forest health protection)
    - ☐ Emergency services (e.g. hazard threat recognition, hazard warning systems, critical facilities protection)
    - ☐ Structural projects (e.g. storm drain improvements, hazardous tree removal,
    - ☐ Public information (e.g. outreach projects, environmental education, public education)

11. What is the best way for you to receive information about how to make your family, home, or neighborhood more resilient to hazards? Please check all that apply.

☐ Television News/Advertisements	☐ County/Local website
☐ Radio News/Advertisements	☐ County/Local social media
☐ Public Forums/Workshops	☐ Email
☐ Public Library	☐ Text messages
☐ Print Media – newspaper, phone book, informational brochures	☐ Other _____

Thank you for your input!

Please provide your name and email below if you would like to be informed of future meetings related to the planning process.

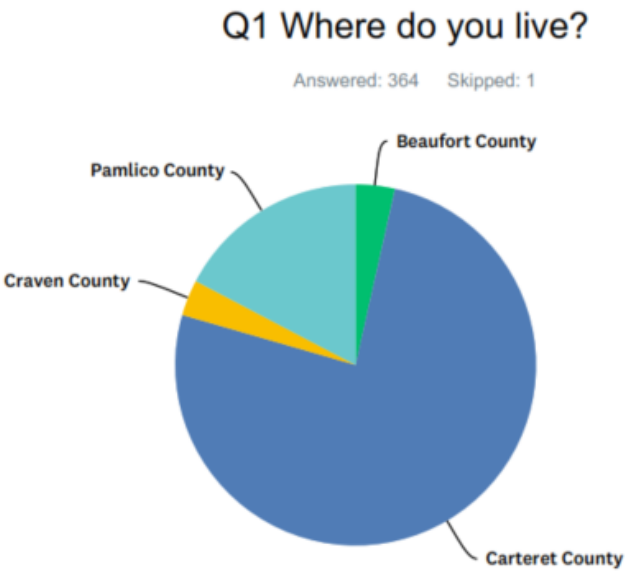
Name: _____ Email: _____

2

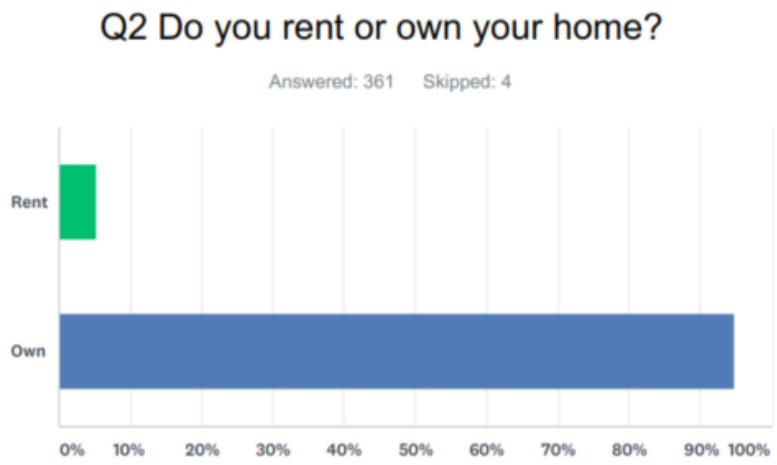
The County received 365 responses to the survey. The following bullet points summarize significant findings from the survey. Key questions and responses are detailed in Figure B.1 through Figure B.10.

- 71% of responses were from Carteret County, 16% were from Pamlico County, 3% were from Beaufort County, and 3% were from Craven County.
- Only 5.8% of respondents say they feel not at all prepared for a hazard event; 62.9% feel somewhat prepared and 31.3% feel very prepared.
- 44% of respondents do not know where evacuation centers or storm shelters are located; however, 98.6% of respondents say they are able to evacuate or take shelter if necessary, which indicates that most people manage evacuating or taking shelter through their own resources. It is possible that these results skew toward those with more awareness of hazard risk and resources to respond.
- 27% of respondents do not know where to get more information on hazard risk and preparedness.
- Hurricane was by far rated the most significant hazard, followed by flood, severe weather, rip current, tornado and erosion. Dam failure was rated the least significant hazard, followed by earthquake, and drought.
- Many respondents reported having taken steps to mitigate risk at home; these efforts include prevention, property protection, and preparedness measures.
- Respondents largely favored structural projects, prevention, and natural resource protection options for mitigation.

Figure B.1 – Survey Response, County of Residence

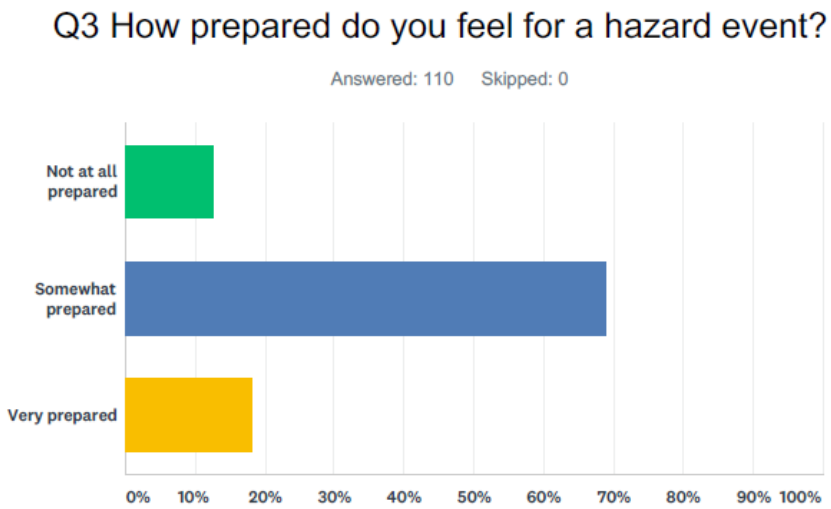


ANSWER CHOICES	RESPONSES	
Beaufort County	3.30%	12
Carteret County	71.15%	259
Craven County	3.02%	11
Pamlico County	16.21%	59
TOTAL		364



ANSWER CHOICES	RESPONSES	
Rent	5.26%	19
Own	94.74%	342
TOTAL		361

Figure B.2 – Survey Response, Preparedness

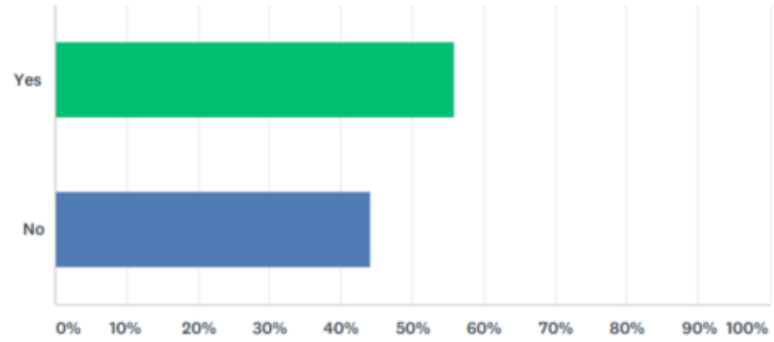


ANSWER CHOICES	RESPONSES	
Not at all prepared	12.73%	14
Somewhat prepared	69.09%	76
Very prepared	18.18%	20
TOTAL		110

Figure B.3 – Survey Response, Evacuation Center/Shelter Awareness

Q4 Do you know where evacuation centers or storm shelters are?

Answered: 363 Skipped: 2

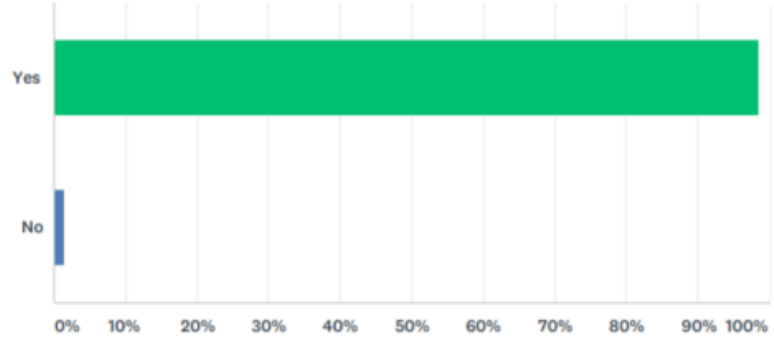


ANSWER CHOICES	RESPONSES	
Yes	55.92%	203
No	44.08%	160
TOTAL		363

Figure B.4 – Survey Response, Ability to Evacuate/Take Shelter

Q5 Are you able to evacuate or take shelter if necessary?

Answered: 363 Skipped: 2

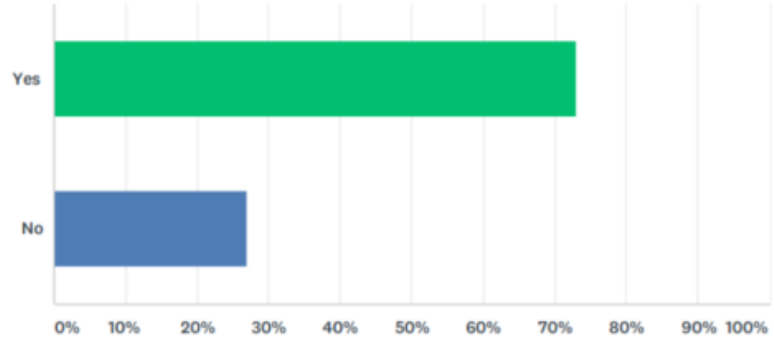


ANSWER CHOICES	RESPONSES	
Yes	98.62%	358
No	1.38%	5
TOTAL		363

Figure B.5 – Survey Response, Knowledge of Where to Find Hazard Information

Q6 Do you know where/how to get more information on hazard risk and preparedness?

Answered: 364 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	73.08%	266
No	26.92%	98
TOTAL		364

Figure B.6 – Survey Response, Hazard Significance Ratings

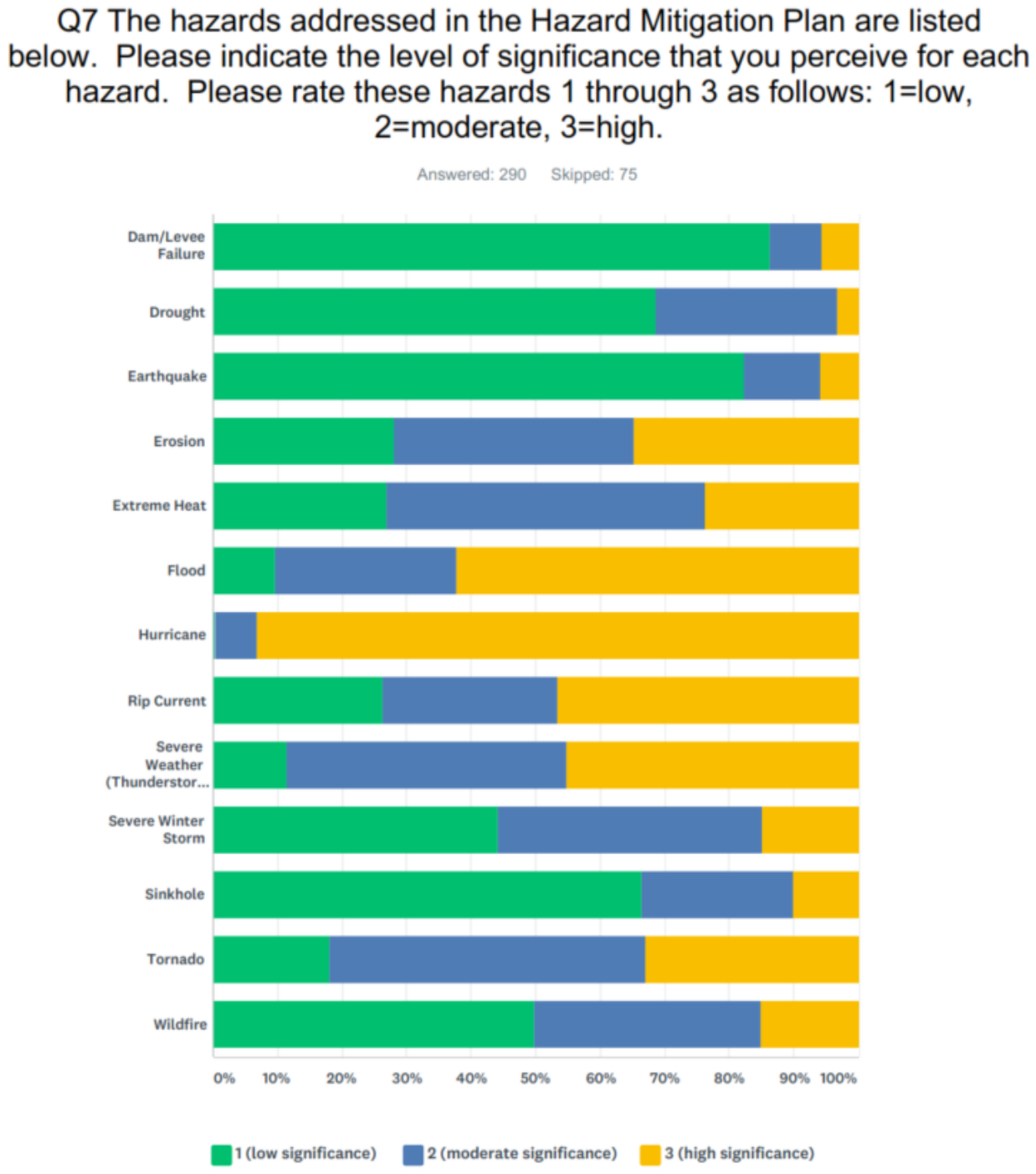
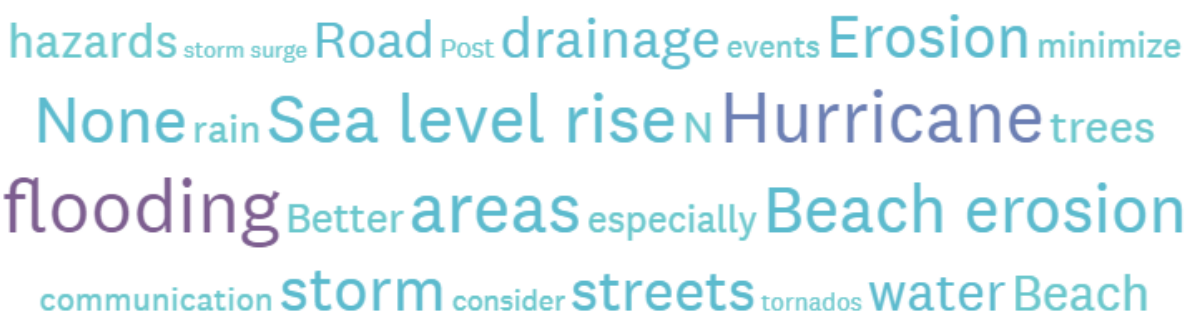


Figure B.7 – Survey Response, Key Hazard Issues/Concerns

Q8 Describe specific hazard issues/problem areas that you would like the planning committee to consider.

Answered: 177 Skipped: 188



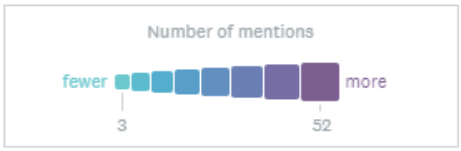


Figure B.8 – Survey Response, Personal Actions Taken for Mitigation

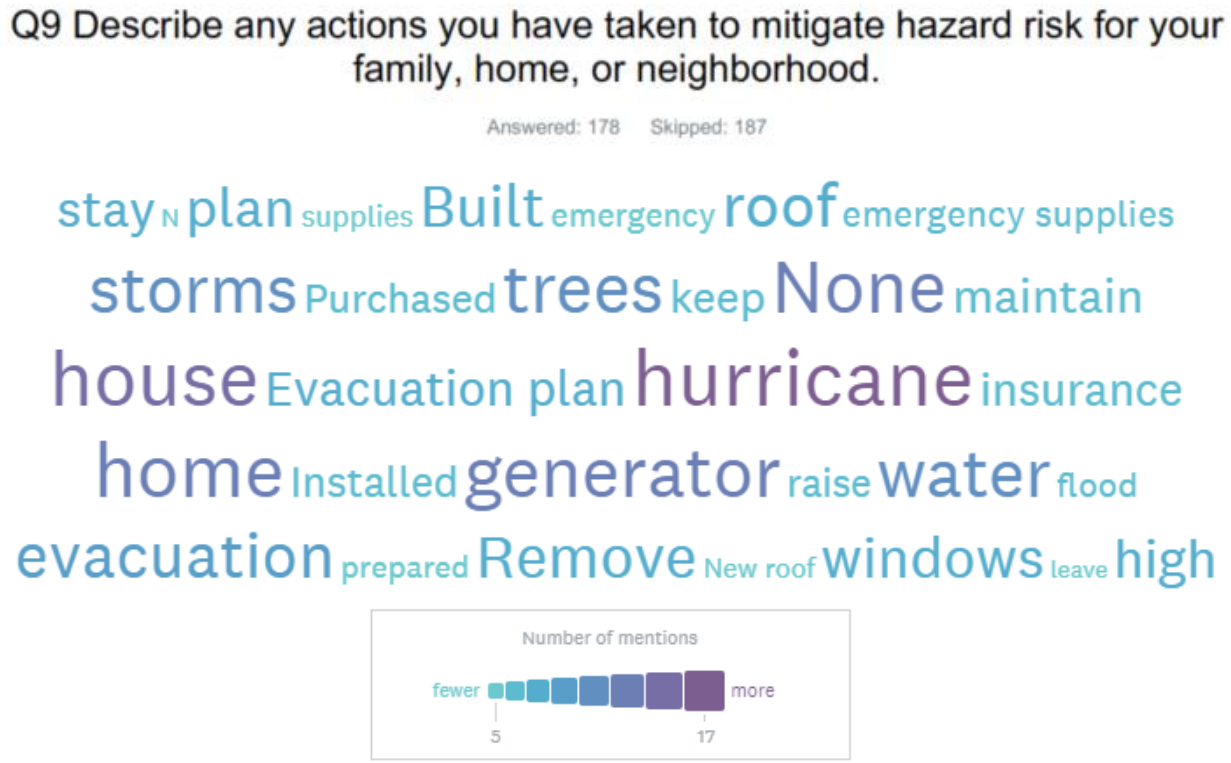
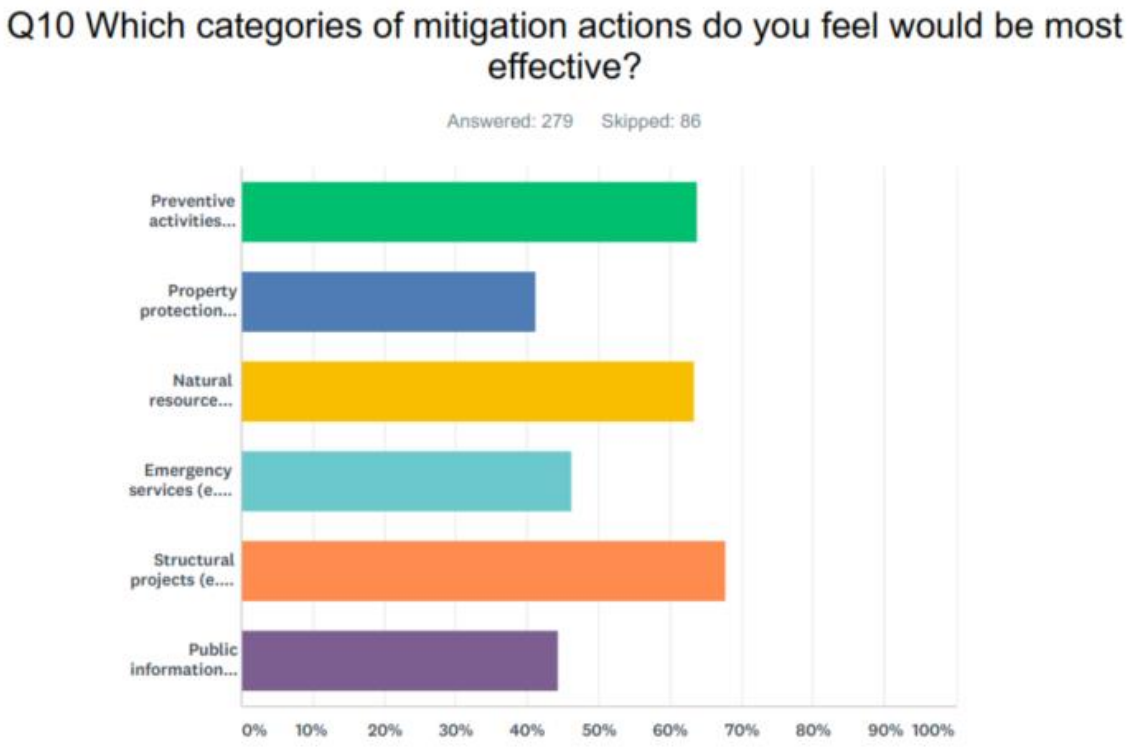
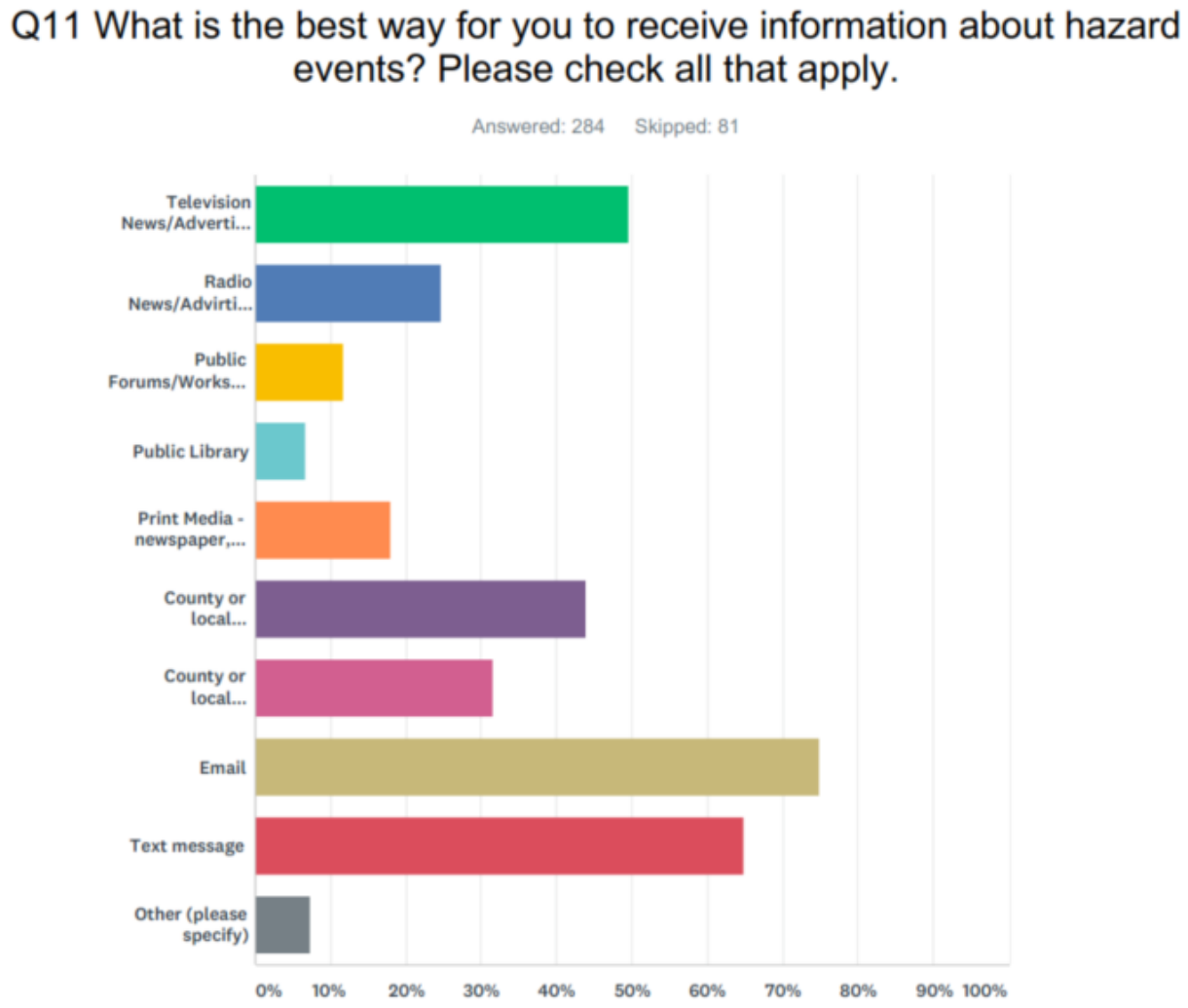


Figure B.9 – Survey Response, Preferred Mitigation Categories



ANSWER CHOICES	RESPONSES	
Preventive activities (e.g. planning and zoning, building codes)	63.80%	178
Property protection (e.g. retrofitting, insurance, flood prone property buyout)	41.22%	115
Natural resource protection (e.g. wetlands protection, erosion control, forest health protection)	63.44%	177
Emergency services (e.g. hazard threat recognition, hazard warning systems, critical facilities protection)	46.24%	129
Structural projects (e.g. storm drain improvements, hazardous tree removal,	67.74%	189
Public information (e.g. outreach projects, environmental education, public education)	44.44%	124
Total Respondents: 279		

Figure B.10 – Survey Response, Preferred Public Outreach Methods



PLANNING STEP 3: COORDINATE

This planning step credits the incorporation of other plans and other agencies' efforts into the development of the Hazard Mitigation Plan. Other agencies and organizations must be contacted to determine if they have studies, plans and information pertinent to the Hazard Mitigation Plan, to determine if their programs or initiatives may affect the community's program, and to see if they could support the community's efforts. To incorporate stakeholder input into the plan, a variety of stakeholders were identified by the HMPC and sent an email inviting them to attend a public meeting, review the draft plan, and provide feedback and comments. The coordination letter sent via email is provided below. A list of stakeholders detailing their involvement is provided in Table B.3.

Stakeholders were also involved through specific requests for data to support the development of the plan.

From: Cindy M. Anderson <canderson@hcpplanning.com>
Sent: Monday, November 25, 2019 2:50 PM
To: janice@coastallandtrust.org; james.jarvis3@redcross.org; sandra@unitedwaycoastalnc.org; heather@soundrivers.org; ljackson@mail.pamlico.k12.nc.us; meghan.doyle@cravenk12.org; daniel.skinner@cravenk12.org; superintendent@carteretk12.org; mcheeseman@beaufort.k12.nc.us; jross@pamlicocc.edu; damicop@cravencc.edu; abellr@carteret.edu; dave.loope@beaufortccc.edu; smdavis@email.unc.edu; stacie_miles@onslowcountync.gov; tpike@jonescountync.gov; jking@co.lenoir.nc.us; james.rhodes@pittcountync.gov; jgriffin@martincountyncgov.com; akeyes@washconc.org; justin.gibbs@hydecountyems.co; roy.mcclure@fema.dhs.gov; Edwardine.Marrone@fema.dhs.gov; ktodd@ISO.com; jbratcher@iso.com; sharper@iso.com; ewstrom@usgs.gov; Etta.lucas.ctr@usmc.mil; Dan.Brubaker@ncdps.gov; jcrew@ncem.org; john.holley@ncdenr.gov; linda.culpepper@ncdenr.gov; tim.baumgartner@ncdenr.gov; Hannah.thompson@ncagr.gov; wendycard@nclifemedia.com; vail.rumley@thewashingtondailynews.com; sroach@newbernchamber.com; tom@nccoastchamber.com; cglover@wbcchamber.com; pamlicochamber@gmail.com
Cc: Moore, Abigail; Stroud, David A
Subject: Pamlico Sound Regional Hazard Mitigation Plan

Good afternoon,

The Counties of Beaufort, Carteret, Craven, and Pamlico are in the process of developing an update to the 2015 Pamlico Sound Regional Hazard Mitigation Plan. To assist with this process, the Counties and the Hazard Mitigation Planning Committee are seeking your input and expertise to support our planning effort.

We invite you to attend a public information meeting on the draft plan on **Wednesday, December 4, 2019, at 5:30 PM,** at the **Pamlico County Human Services Center Conference Room, 828 Alliance Main Street, Bayboro, NC 28515.** Additionally, soon after the public meeting we will be releasing the full draft of the plan for review. The draft will be posted on the plan website at http://www.pamlicohmp.com/draftDocuments.html. The website already contains information on the risk assessment findings and the planning process, which we encourage you to review. We appreciate any input you may have! Please email any comments or feedback on the draft plan to Abigail Moore at abigail.moore@woodplc.com.

Thank you for your assistance in this important effort to make our communities safer and more resilient to hazards!

HOLLAND CONSULTING PLANNERS

Cindy M. Anderson
Office Manager
3329 Wrightsville Ave, Ste F
Wilmington, NC 28403
Phone: 910/392-0060
Email: canderson@hcpplanning.com

Table B.3 – Stakeholder List

First Name	Last Name	Organization
Non-Profit Organizations		
Janice	Allen	NC Coastal Land Trust, Deputy Director
James	Jarvis	Red Cross Cape Fear Chapter, Executive Director
Sandra	Phelps	United Way of Coastal Carolina, Executive Director
Heather	Jacobs Deck	Sound Rivers Executive Director
Educational Institutions		
Lisa	Jackson	Pamlico County Public Schools Superintendent
Meghan	Doyle	Craven County Public Schools Superintendent
Daniel	Skinner	Craven County Director of Facilities Services
Mat	Bottoms	Carteret County Public Schools Superintendent
Matthew	Cheeseman	Beaufort County Public Schools Superintendent
Jim	Ross	Pamlico Community College, President
Paul	Damico	Craven Community College, Executive Director of Emergency Management
Richard	Abell	Carteret Community College Security & Emergency Preparedness, Director
Dave	Loope	Beaufort County Community College, President
Stacy	Davis	UNC-CH Institute of Marine Sciences, Facilities Manager
Surrounding Municipalities		
Stacie	Miles	Onslow County Emergency Services Deputy Director
Tim	Pike	Jones County Emergency Services Director
Jerri	King	Lenoir County Division of Emergency Management Director
James	Rhodes	Pitt County Planning Director
Jody	Griffin	Martin County Emergency Management, Director
Ann	Keyes	Washington County Planning Director (EM)
Justin	Gibbs	Hyde County Emergency Services Director
Federal Government		
Roy	McClure	FEMA NFIP/CRS Specialist
Edwardine	Marrone	FEMA Mitigation Planning Specialist
Mandy	Todd	ISO/CRS Specialist
Mike	Bratcher	ISO/CRS Specialist
Sherry	Harper	ISO/CRS Technical Coordinator
Eric	Strom	USGS - Raleigh Field Office
Etta	Lucas	MCAS Cherry Point Installation Emergency Manager
State Government		
Dan	Brubaker	State NFIP Coordinator
Chris	Crew	State Hazard Mitigation Officer
John	Holley	NCDENR - Land Quality Section Regional Office
Linda	Culpepper	DEQ Division of Water Resources, Director
Tim	Baumgartner	DEQ Division of Mitigation Services, Director
Hannah	Thompson-Welch	NC Forest Service, Wildfire Mitigation Specialist
Business Community		
Wendy	Card	New Bern Now, Editor-in-Chief
Vail	Stewart Rumley	Washington Daily News Author
Sharon	Roach	New Bern Area Chamber of Commerce; Membership Engagement Coordinator
Tom	Kies	Carteret County Chamber of Commerce, President
Catherine	Glover	Washington Beaufort County Chamber of Commerce, Executive Director
Paul	Slobodian	Pamlico County Chamber of Commerce, President

Appendix C Mitigation Alternatives

44 CFR Subsection D §201.6(c)(3)(ii): [The mitigation strategy section shall include] a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

As part of the process of developing the mitigation action plans found in Section 7, the HMPC reviewed and considered a comprehensive range of mitigation options before selecting the actions identified for implementation. This section summarizes the full range of mitigation measures evaluated and considered by the HMPC, including a review of the categories of mitigation measures outlined in the 2017 CRS Coordinator's Manual, a discussion of current local implementation and CRS credits earned for those measures, and a list of the specific mitigation projects considered and recommended for implementation.

Mitigation alternatives identified for implementation by the HMPC were evaluated and prioritized using the criteria discussed in Section 6 of this plan.

C.1 CATEGORIES OF MITIGATION MEASURES CONSIDERED

Once it was determined which flood hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of mitigation categories which are utilized as part of the CRS planning process.

- Prevention
- Property Protection
- Natural Resource Protection
- Structural Projects
- Emergency Services
- Public Information and Outreach

C.2 ALTERNATIVE MITIGATION MEASURES PER CATEGORY

Note: the CRS Credit Sections are based on the 2017 CRS Coordinator's Manual.

C.2.1 Preventative and Regulatory Measures

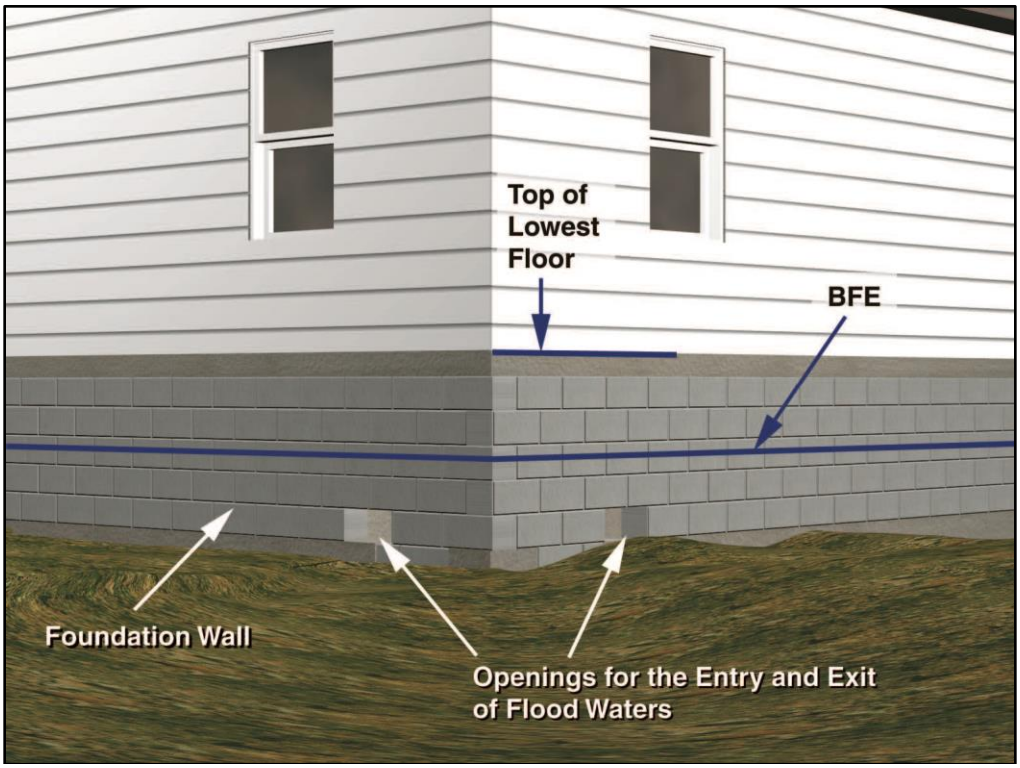
Preventative measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventative measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventative measures. Some examples of types of preventative measures include:

- Building codes
- Zoning ordinance
- Comprehensive or land use plan
- Open space preservation
- Floodplain regulations
- Subdivision regulations
- Stormwater management regulations

Building Codes

Building codes provide one of the best methods for addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure B.1.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step.



Source: FEMA Publication: *Above the Flood: Elevating Your Floodprone House, 2000*

Figure B.1 – Building Codes and Flood Elevations

ASCE 24 is a referenced standard in the International Building Code. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24. Freeboard is required as a function of the nature of occupancy and the flood zone. Dwellings and most other buildings have 1-foot of freeboard; certain essential facilities have 2-3 feet; only agricultural facilities, temporary facilities and minor storage facilities are allowed to have their lowest floors at the BFE.

Comprehensive or Land Use Plan

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open

space or recreation. Communities in the Pamlico Sound Region prepare land use plans in compliance with North Carolina Coastal Area Management Act (CAMA) requirements.

Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes.

Zoning Ordinance

Zoning enables a community to designate what uses are acceptable on a given parcel. Zoning can ensure compatibility of land use with the land's level of suitability for development. Planning and zoning activities can also provide benefits by allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach. Zoning regulations describe what type of land use and specific activities are permitted in each district, and how to regulate how buildings, signs, parking, and other construction may be placed on a lot. Zoning regulations also provide procedures for rezoning and other planning applications. The zoning map and zoning regulations provide properties with certain rights to development.

Floodplain Regulations

A Flood Damage Prevention Ordinance sets development standards for Special Flood Hazard Areas (SFHAs). Communities participating in the National Flood Insurance Program (NFIP) are required to adopt a flood damage prevention ordinance that meets at least the minimum standards of the NFIP; however, a community can incorporate higher standards for increased protection. For example, communities can adopt higher regulatory freeboard requirements, cumulative substantial damage definitions, fill restrictions, and other standards.

Another important consideration in floodplain regulations is the protection of natural and beneficial functions and the preservation of natural barriers such as vegetation. Vegetation along a stream bank is extremely beneficial for the health of the stream. Trees and other plants have an extensive root system that strengthen stream banks and help prevent erosion. Vegetation that has sprouted up near streams should remain undisturbed unless removing it will significantly reduce a threat of flooding or further destruction of the stream channel.

Stormwater Management Regulations

Stormwater runoff is increased when natural ground cover is replaced by urban development. Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality. There are three ways to prevent flooding problems caused by stormwater runoff:

1) Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties;

2) Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions; and
3) Set construction standards so buildings are protected from shallow water.

Reducing Future Flood Losses

Zoning and comprehensive planning can work together to reduce future flood losses by directing development away from hazard prone areas. Creating or maintaining open space is the primary way to reduce future flood losses.

Planning for open space must also be supplemented with development regulations to ensure that stormwater runoff is managed and that development is protected from flooding. Enforcement of the flood damage prevention ordinance and the flood protection elevation requirement provides an extra level of protection for buildings constructed in the planning area.

Stormwater management and the requirement that post-development runoff cannot exceed pre-development conditions is one way to prevent future flood losses. Retention and detention requirements also help to reduce future flood losses.

CRS Credit

The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's Building Code Effectiveness Grading Schedule (BCEGS) classification and points are awarded for adopting the International Code series. In North Carolina, communities are limited by the State Building Code Council which has not implemented the most current version of the International Building Code.

CRS credits are available for regulations that encourage developers to preserve floodplains or other hazardous areas away from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Communities in the Pamlico Sound Region could receive credit for Activity 430 – Higher Regulatory Standards and for Activity 420 – Open Space Preservation for preserving parcels within the SFHA as open space. Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. The credits in the 2017 manual have doubled for OSP (Open Space Preservation). The participating communities could also receive credit for Activity 450 – Stormwater Management for enforcing regulations for stormwater management and soil and erosion control. Several prevention actions considered by the HMPC are detailed below.

Table C.1 – Prevention Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Continue to utilize the NC Department of Corrections Community Service Program to assist and leverage efforts to snag and clear ditches and canals located throughout the County.	This service is no longer available to the County.	n/a
-	Update building codes to require that the first floor of all new construction be raised a minimum of two feet above the base flood elevation.	The County already has a building elevation requirement. Limited political support for more elevation.	n/a
-	Review all land use planning and regulatory documents pertinent to hazard mitigation in an effort to: (1) Reduce exposure to natural hazards (2) Promote resource protection	This strategy is adequately addressed through other strategies included in the updated plan.	n/a

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
	(3) Encourage the use of best management practices		
Prevention Measures and Funding Recommended for Implementation			
P1	In the event of a substantial flooding event, or other natural hazard occurrence, perform damage assessments in coordination with NCEM. These assessments will assist the County in determining the extent of the damage caused by the respective disaster event. This data will be utilized as a tool for land use planning and future hazard mitigation plan updates and to gauge the effectiveness of the County's two-foot freeboard requirement.	Pamlico County has carried out this process following Hurricanes Matthew and Florence since adoption of the past plan. The impacts of these storms will be factored into decisions regarding land use and development policy through implementation of this plan.	GF, NCDPS
P8	Continue to work with the North Carolina Department of Environmental Quality to enforce standards outlined within the statewide stormwater management program. Currently, this program generally addresses stormwater management for projects disturbing an area equal to or greater than one acre. Additionally, the County will monitor localized flooding issues and, where feasible, address these issues through the installation of stormwater best management practices (BMP's).	Pamlico County provides development review services throughout the County and works with NCDEQ to enforce state stormwater regulations.	GF, NCDPS, NCDENR
P9	Develop a formal system and plan for evaluating and assessing the availability and effectiveness of all critical facilities outlined within this plan. Pamlico County will coordinate with NCEM, Red Cross, local animal shelters, local care homes etc., in making determinations relating to need and capacity.	Pamlico County in coordination with all participating municipal jurisdictions, will work through this exercise annually, as well as following the effects of a natural hazard event through the corrective action planning process.	GF, NCDPS, American Red Cross

C.2.2 Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building;
- Modify the building (retrofit) so it can withstand the impacts of the hazard; and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

Flooding

There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the flood-prone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

The latter three approaches are the most effective types to consider for the planning area.

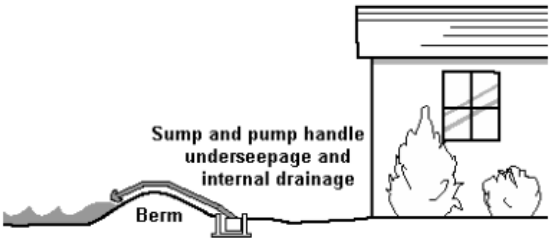
This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.

Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL



Small barriers can be effective against shallow flooding.

Relocation

Moving a building out of a flood prone area to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.

Demolishing a repetitively flooded home

Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

- ***Dry Floodproofing***

  Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

  Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

- ***Wet Floodproofing***

  The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, so long as the policy is in force, without requiring human intervention for the measure to work.

- ***Private Property***

  Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is

provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

- ***Public Property***
  Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Local Implementation/CRS Credit

The CRS provides the most credit points for acquisition and relocation under Activity 520, because this measure permanently removes insurable buildings from the floodplain. Communities in the Pamlico Sound Region could receive credit for Activity 520 – Acquisition and Relocation, for acquiring and relocating buildings from the SFHA. The HMPC recommended that communities pursue the purchase of repetitive loss buildings and other buildings which are subject to flood damage in order to return this land to open space.

The CRS also credits barriers and elevating existing buildings under Activity 530. The credit for Activity 530 is based on the combination of flood protection techniques used and the level of flood protection provided. Points are calculated for each protected building. Bonus points are provided for the protection of repetitive loss buildings and critical facilities. Communities could receive credit for Activity 360 – Flood Protection Assistance by providing advice and assistance to homeowners who may want to flood proof their home or business. Advice is provided both on property protection techniques and on financial assistance programs to help fund mitigation.

Flood insurance information for each community is provided in Section 5 and in greater detail in Annex B. There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that, among other topics, explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage. Communities in the Pamlico Sound Region could receive credit for Activity 330 – Outreach Projects. Property protection mitigation options considered by the HMPC are described below.

Table C.2 – Property Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Prevention Measures Considered by HMPC and Not Recommended			
-	Provide a fund for residents to update their sites and buildings to prevent future hazard damages.	No money to create this fund and would likely not gain political support.	n/a
Prevention Measures and Funding Recommended for Implementation			

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
P3	Continue to proactively seek grant funding through NCEM and FEMA for mitigation of repetitive loss properties (RLP's) from future flooding events. The County will maintain a list of RLP's, and on an annual basis, will apply for funding for all structures that meet cost-benefit thresholds as defined by FEMA. Pamlico County will assist all municipal jurisdictions in working through the structural mitigation grant funding process.	Pamlico County continues to aggressively seek out grant funding for elevating RLPs and SRLPs and is currently administering a grant program to rehabilitate and mitigate properties during recent hurricanes. The County also maintains an up-to-date list of all RLPs in the County.	GF, NCDPS, HMGP, PDM, UHMA
P5	Continue to coordinate annually with the NC Forestry Division to address the threat of wildfire throughout the County. These efforts will involve posting of the daily fire risk present within the County on the County website daily. Additionally, the County will distribute and make information available regarding County methods for mitigating fire hazards.	This strategy will be completed through implementation of this update.	GF, NC Forestry Service, NCDPS
P6	Make a range of materials related to flood insurance, flood protection, floodplain management, information on floodplains, and listings of qualified contractors/realtors familiar with floodproofing and elevation techniques, available through various avenues including: • Placing materials in the local library • Maintaining documents at the County Planning and Economic Development office • Disseminating information to local contractors • Distributing information to churches and other community-based organizations • Establishing a means to distribute information to schoolchildren	Pamlico County will continue to provide this service for all County residents, as well as participating municipalities.	GF

C.2.3 Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and stormwater in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. This section covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Six areas were reviewed:

- Wetland protection
- Erosion and sedimentation control
- Stream/River restoration
- Best management practices
- Dumping regulations
- Farmland protection

Wetland Protection

Wetlands are often found in floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

Stream/River Restoration

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion

- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Communities are required by state and federal regulations to monitor storm water drainage outfalls and control storm water runoff.

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how re-grading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Farmland Protection

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot

afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

Local Implementation/CRS Credit

There is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Communities in the Pamlico Sound Region could receive credit for Activity 420 – Open Space Preservation for preserving a portion of the SFHA as open space.

Additionally, credit is available for Activity 540 – Drainage System Maintenance. Having a portion of the drainage system inspected regularly throughout the year and maintenance performed as needed would earn a community credit. Communities could also get credit under this activity for providing a listing of problem sites that are inspected more frequently, and for implementing an ongoing Capital Improvements Program.

Table C.3 – Natural Resource Protection Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Natural Resource Protection Measures Considered by HMPC and Not Recommended			
-	Create a Best Management Practices guideline to collect several techniques into one plan.	Not enough administrative or fiscal resources to complete.	n/a
Natural Resource Protection Measures and Funding Recommended for Implementation			
P2	Continue to monitor drainage conditions throughout the County, in particular, issues associated with drainage ditches and agricultural runoff canals situated throughout the County. Once issues are identified, the County will work with municipal jurisdictions and State agencies to identify short- and long-term solutions to these issues.	Pamlico County is currently working towards solutions regarding flooding associated with Hurricanes Matthew and Florence. The most substantial of these problems has been identified in the Hurricane Matthew Resiliency Redevelopment Plan.	GF, NCDENR, NCDOT
CA10	Maintain all property acquired within the Special Flood Hazard Area (SFHA) as undisturbed open space in perpetuity. Continue to proactively establish open space within the floodplain and floodway as HMGP grant funds become available to carry out this initiative.	Carteret County will maintain property within the SFHA acquired with FMA or HMGP funding as undisturbed open space.	GF, NCDPS
CR3	Continue to support NCDENR in efforts to enforce the Neuse River Basin-wide Water Quality Management Rules.	These rules are currently being enforced. Changes in standards will coincide with amendments established by NCDEQ.	GF

C.2.4 Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Warning

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

StormReady

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Evacuation and Shelter

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a

specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation /CRS Credit

Flash flood warnings are issued by National Weather Service Offices, which have the local and county warning responsibility. Flood warnings are forecasts of coming floods, are distributed to the public by the NOAA Weather Radio, commercial radio and television, and through local emergency agencies. The warning message tells the expected degree of flooding, the affected river, when and where flooding will begin, and the expected maximum river level at specific forecast points during flood crest.

Communities in the Pamlico Sound Region could receive credit for Activity 610 – Flood Warning Program for maintaining a program that provides timely identification of impending flood threats, disseminates warnings to appropriate floodplain residents, and coordinates flood response activities. Community Rating System credits are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more credits for additional measures, like telephone trees. Being designated as a StormReady community also provides additional credits.

Table C.4 – Emergency Services Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Emergency Services Measures Considered by HMPC and Not Recommended			
-	Ensure that emergency routes are adequately marked and clear.	This work is already managed by NCDOT and does not require further local action.	n/a
Emergency Services Measures and Funding Recommended for Implementation			
P7	Review and update the County Emergency Operations Plan on an annual basis. This update will involve coordination with all municipalities to ensure that all emergency contacts are accurate and that all jurisdictions are adequately prepared.	The County EOP is reviewed annually and updated as necessary.	GF, NCDPS
P13	Maintain reciprocal mutual aid agreements with all neighboring communities to ensure adequate fire protection throughout the County. Additionally, all jurisdictions will provide preventive maintenance efforts to ensure the fire hydrants and equipment are working properly.	Joint commitment from all participating municipalities will ensure adequate fire protection.	GF, NCDPS
P14	Maintain Debris Removal and Monitoring Services Contracts for post disaster response. These services should focus on preparing documentation necessary to ensure full reimbursement of cost associated with community cleanup and immediate infrastructure restoration.	Post disaster debris removal will be critical so the county should be prepared.	GF, NCDPS, FEMA

C.2.5 Structural Projects

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings.
- Many projects can be built without disrupting citizens' homes and businesses.

- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures also have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

- Advantages
  - They may provide the greatest amount of protection for land area used
  - Because of land limitations, they may be the only practical solution in some circumstances
  - They can incorporate other benefits into structural project design, such as water supply and recreational uses
  - Regional detention may be more cost-efficient and effective than requiring numerous small detention basins
- Disadvantages
  - They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat
  - They require regular maintenance
  - They are built to a certain flood protection level that can be exceeded by larger floods
  - They can create a false sense of security
  - They promote more intensive land use and development in the floodplain

Levees and Floodwalls

Probably the best-known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Retention pond

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During

normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Local Implementation /CRS Credit

Structural flood control projects that provide at least 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS so as not to duplicate the larger premium reduction provided by removing properties from the mapped floodplain. Other flood control projects can be accepted by offering a 25-year flood protection.

Table C.5 – Structural Projects Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Structural Project Measures Considered by HMPC and Not Recommended			
-	Modify channels for water diversion to other areas. This will reduce flooding in existing areas.	The County has determined this to be a low priority because channelization can significantly increase runoff.	n/a
-	Mitigate flooding and erosion with breakwater and bulkheads.	The County already recommends breakwater and bulkheads as effective mitigation strategies.	n/a
Structural Project Measures and Funding Recommended for Implementation			
B15	Integrate new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with all local certified CAMA Land Use Plans).	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.	GF, NCDENR
B24	Monitor natural and man-made drainage structures to ensure they are clear and functioning properly; prioritize needed drainage projects and review funding alternatives annually.	The County will continue to monitor drainage conditions to identify flooding hot spots and system deficiencies. Once identified engineered solutions will be established.	GF, NCDPS, NCDOT
CA11	Integrate, when feasible, new greenway and public park improvements into comprehensive planning and capital improvement efforts (including coordination with the County's certified CAMA Land Use Plans).	The County is currently updating its certified CAMA Land Use plan this year and will incorporate these items into the updated plan.	GF, NCDENR

C.2.6 Public Information

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for floods or a website about floods for children.

Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions
- Recommend or identify qualified or licensed contractors
- Inspect homes for anchoring of roofing and the home to the foundation
- Explain when building permits are needed for home improvements.

Public Information Program

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- The local flood hazard
- The property protection measures appropriate for the flood hazard
- Flood safety measures appropriate for the local situation
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies
- Goals for the community's public information program
- The outreach projects that will be done each year to reach the goals
- The process that will be followed to monitor and evaluate the projects

Local Implementation /CRS Credit

Communities in the Pamlico Sound Region could receive credit under Activity 330 – Outreach Projects as well as Activity 350 – Flood Protection Information. Credit is available for targeted and general outreach projects. Credit is also provided for making publications relating to floodplain management available in the reference section of the local library.

Table C.6 – Public Information and Outreach Mitigation Options and Recommended Projects

Action #	Mitigation Action	Reason for Pursuing / Not Pursuing	Funding
Public Information and Outreach Measures Considered by HMPC and Not Recommended			
-	Provide flood-related information on the County's website.	The County's website already has flood-related information posted.	n/a
Public Information and Outreach Measures and Funding Recommended for Implementation			
P4	Continue to educate County residents about the linkage between flooding (standing water) and the proliferation of mosquitos. These efforts will focus on teaching property owners how to mitigate mosquito issues throughout the County.	Pamlico County maintains an educational program regarding mosquito abatement and will work to improve these efforts through plan implementation.	GF, NCDENR, NCDPS
B10	Hold an annual public hazard mitigation meeting, attended by the HMPC and participating jurisdictions, to educate the public and elected officials and receive comments about the location of high-risk facilities/development, the jurisdictions' overall vulnerability to natural and man-made hazards, and the jurisdictions' hazards mitigation efforts.	Beaufort County Emergency Services holds a public officials conference at least annually to educate decision makers on the vulnerability to hazards and mitigation efforts.	GF
CA16	Mail a notice annually to all property owners in an effort to educate citizens about dangers associated with flooding in low-lying coastal areas.	Carteret County mails all property owners a flood tips brochure each year with their tax bill regardless of flood zone. 100% of property owners receive this flood tips brochure. Additionally, property owners in Repetitive Loss Areas receive annual notification on their susceptibility to flooding and grant opportunities.	GF, NCDPS

Appendix D References

- Chernet, Haregewoin Haile. 2013. The Impact of Climate Change on Dam Safety and Hydropower.
- https://www.carinsurance.com/Articles/top-states-hail-damage-claims.aspx
- FEMA Disaster Declarations Summary, Updated December 20, 2018.
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. 2013.
- FEMA. Beaufort County and Incorporated Areas Flood Insurance Study. Revised July 7, 2014.
- FEMA. Carteret County and Incorporated Areas Flood Insurance Study. July 2, 2004.
- FEMA. Craven County and Incorporated Areas Flood Insurance Study. Revised April 16, 2013.
- FEMA. Pamlico County and Incorporated Areas Flood Insurance Study. July 2, 2004.
- FEMA. Community Information System, 2018.
- FEMA, ISO. Beaufort County Repetitive Loss Data. March 31, 2019.
- FEMA, ISO. Carteret County Repetitive Loss Data. March 31, 2019.
- FEMA, ISO. Craven County Repetitive Loss Data. March 31, 2019.
- FEMA, ISO. Pamlico County Repetitive Loss Data. March 31, 2019.
- James B. Elsner, Svetoslava C. Elsner, and Thomas H. Jagger. The increasing efficiency of tornadoes in the United States. Climate Dynamics/vol. 45 issue 3-4, pp 651-659.
- National Climate Assessment, 2014.
- National Drought Mitigation Center, Drought Impact Reporter.
- National Integrated Drought Information System, U.S. Drought Portal.
- National Weather Service.
- NOAA, National Centers for Environmental Information, Storm Events Database.
- NOAA, National Hurricane Center.
- NOAA, Office of Coastal Management.
- North Carolina Department of Environmental Quality. Dam Inventory, July 2018.
- North Carolina Emergency Management. IRISK Database
- North Carolina Emergency Management. Risk Management Tool.
- North Carolina Forest Service. Annual Reports. 2009-2018.
- North Carolina Geological Survey. October 2018.
- North Carolina State Climate Office. Climate Tools.
- Pamlico Sound Regional Hazard Mitigation Plan. June 2015.
- Southern Wildfire Risk Assessment, 2018.
- State of North Carolina Hazard Mitigation Plan, February 2018.
- U.S. Army Corps of Engineers, National Inventory of Dams.
- U.S. Census Bureau. American Community Survey 2013-2017 5-Year Estimates.
- U.S. Census Bureau. 2010 Decennial Census.
- U.S. Census Bureau. 2000 Decennial Census.
- U.S. Department of Agriculture, Farm Service Agency, Disaster Designation Information, 2012-2018.
- U.S. Department of Agriculture, Risk Management Agency, Cause of Loss Historical Data Files, 2007-2018.
- U.S. Drought Monitor. February 5, 2019.
- U.S. Geological Survey Earthquake Hazards Program, Earthquake Catalog.
- U.S. Global Change Research Program, 2016: The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. http://dx.doi.org/10.7930/J0R49NQX

- USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp., doi: 10.7930/J0J964J6.
- VAISALA, National Lightning Detection Network.
- Mentaschi, L., Vousdoukas, M., Pekel, J., Voukouvalas, E., and Feyen, L. Global long-term observations of coastal erosion and accretion. Scientific Reports Volume 8, Article number: 12876 (2018).