ATKINS

Cape Fear
Regional Hazard Mitigation Plan

FINAL











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SECTION 1
INTRODUCTION

This section provides a general introduction to the Cape Fear Regional Hazard Mitigation Plan. It consists of the following five subsections:

- ❑ 1.1 Background
- ❑ 1.2 Purpose
- ❑ 1.3 Scope
- ❑ 1.4 Authority
- ❑ 1.5 Summary of Plan Contents

1.1 BACKGROUND

Natural hazards, such as winter storms, floods, and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety, and property.

The Cape Fear Region is located in the western part of North Carolina and includes the counties of Chatham, Lee, Harnett, Johnston, Moore and the municipal governments within those counties. This area is vulnerable to a wide range of natural hazards such as winter storms, severe thunderstorms, and floods. It is also vulnerable to human-caused hazards, including chemical releases and hazardous material spills. These hazards threaten the life and safety of residents in the Cape Fear Region and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in the region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our communities and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.

FEMA Definition of Hazard Mitigation:
"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural measures (such as the adoption of sound land use policies and the creation of public awareness programs). It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in

the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation of a comprehensive approach to hazard mitigation is to develop, adopt, and update a local hazard mitigation plan. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

Each of the five counties and their municipal jurisdictions participating in the development of the Cape Fear Hazard Mitigation Plan have an existing hazard mitigation plan that has evolved over the years, as described in Section 2: *Planning Process*. This regional plan draws from each of the County plans to document the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the Plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Act

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) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state, local and Tribal 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 or Tribal government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both 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.

Additionally, the Flood Insurance Reform Act of 2004 (P.L. 108-264) created two new grant programs, Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs. However, as of early 2014, these programs have been folded into a single Flood Mitigation Assistance (FMA) program.

This change was brought on by new, major federal flood insurance legislation that was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141). This act made several changes to the way the National Flood Insurance Program is to be run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. The Biggert-Waters Act further emphasizes Congress' focus on mitigating vulnerable structures.

The Cape Fear Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCEM) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. A *Local Mitigation Plan Review Tool*, found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the Cape Fear Regional Hazard Mitigation Plan is to:

- ❑ Merge the existing Chatham, Lee, Harnett, Johnston, and Moore County hazard mitigation plans into one regional plan;
- ❑ Complete update of existing plans to demonstrate progress and reflect current conditions;
- ❑ Increase public awareness and education;
- ❑ Maintain grant eligibility for participating jurisdictions; and
- ❑ Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the Cape Fear Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the Cape Fear Region, as determined through a detailed hazard risk assessment. Other hazards that pose a "low" or "negligible" risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables the participating counties and municipalities to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes the counties of Chatham, Lee, Harnett, Johnston, and Moore as well as their incorporated jurisdictions. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE CAPE FEAR REGIONAL HAZARD MITIGATION PLAN

Chatham County	
Goldston	Siler City
Pittsboro	
Harnett County	
Angier	Erwin
Coats	Lillington
Dunn	
Johnston County	
Archer Lodge	Pine Level
Benson	Princeton
Clayton	Selma

Four Oaks	Smithfield
Kenly	Wilson's Mill
Micro	
Lee County	
Broadway	Sanford
Moore County	
Aberdeen	Robbins
Cameron	Southern Pines
Carthage	Taylortown
Foxfire Village	Vass
Pinebluff	Whispering Pines
Pinehurst	

1.4 AUTHORITY

The Cape Fear Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local mitigation plans and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Final Rule published in the Federal Register, at 44 CFR Part 201 (201.6 for local mitigation planning requirements;
- Flood Insurance Reform Act of 2004 (P.L. 108-264) and Biggert-Waters Flood Insurance Reform Act of 2012 (P.L. 112-141).

1.5 SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plan).

Section 2, ***Planning Process***, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the planning team and describes how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held, along with any associated outcomes.

The ***Community Profile***, located in Section 3, provides a general overview of the Cape Fear region, including prevalent geographic, demographic, and economic characteristics. In addition, building characteristics and land use patterns are discussed. This baseline information provides a snapshot of

the planning area and helps local officials recognize those social, environmental, and economic factors that ultimately play a role in determining the region's vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4, ***Hazard Identification***; Section 5, ***Hazard Profiles***; and Section 6, ***Vulnerability Assessment***. Together, these sections serve to identify, analyze, and assess hazards that pose a threat to the Cape Fear Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the Cape Fear Region.

The Risk Assessment begins by identifying hazards that threaten the region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, FEMA's Hazus®MH loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the participating jurisdictions in the Cape Fear Region seek to determine the most appropriate mitigation actions to pursue and implement—enabling them to prioritize and focus their efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Capability Assessment***, found in Section 7, provides a comprehensive examination of the Cape Fear Region's capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of a detailed survey questionnaire and an inventory and analysis of existing plans, ordinances, and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in programs or activities that may hinder mitigation efforts and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Community Profile*, *Risk Assessment*, and *Capability Assessment* collectively serve as a basis for determining the goals for the Cape Fear Regional Hazard Mitigation Plan, each contributing to the development, adoption, and implementation of a meaningful and manageable *Mitigation Strategy* that is based on accurate background information.

The ***Mitigation Strategy***, found in Section 8, consists of broad goal statements as well as an analysis of hazard mitigation techniques for the jurisdictions participating in the Cape Fear Regional Hazard Mitigation Plan to consider in reducing hazard vulnerabilities. The strategy provides the foundation for a detailed ***Mitigation Action Plan***, found in Section 9, which links specific mitigation actions for each county and municipal department or agency to locally-assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make the Cape Fear Region less vulnerable to the damaging forces of hazards while improving the economic, social, and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with

complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety.

Plan Maintenance, found in Section 10, includes the measures that the jurisdictions participating in the Cape Fear Regional plan will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

County-specific Annexes have been created for each of the Counties participating in this plan. Each Annex contains information relevant to the County and the participating municipal jurisdictions in the County. Information included in each County-level Annex includes Community Profile, Risk Assessment and Capability Assessment information. The Mitigation Actions identified for that County and its municipal jurisdictions are also included in the County's Annex. This allows each County and jurisdiction to quickly locate the information contained in the plan that is most relevant for them.

SECTION 2
PLANNING PROCESS

This section describes the planning process undertaken to develop the Cape Fear Regional Hazard Mitigation Plan. It consists of the following eight subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the Cape Fear Region
- 2.3 Preparing the 2014 Plan
- 2.4 The Cape Fear Regional Hazard Mitigation Planning Team
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress

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44 CFR Requirement
44 CFR Part 201.6(c)(1): The plan shall include 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.

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department, or agency along with a schedule or target completion date for its implementation (see Section 10: *Plan Maintenance*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the Plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision making process.

Communities that participate in hazard mitigation planning have the potential to accomplish many benefits, including:

- saving lives and property,
- saving money,
- speeding recovery following disasters,
- reducing future vulnerability through wise development and post-disaster recovery and reconstruction,

- expediting the receipt of pre-disaster and post-disaster grant funding, and
- demonstrating a firm commitment to improving community health and safety.

Typically, communities that participate in mitigation planning are described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Mitigation measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE CAPE FEAR REGION

Each of the five counties participating in this Plan has a previously adopted hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- *Chatham County Multi-Jurisdictional Hazard Mitigation Plan* (December 2010)
  - Town of Goldston
  - Town of Pittsboro
  - Town of Siler City
- *Harnett County Multi-jurisdictional Hazard Mitigation Plan* (April 2011)
  - Town of Angier
  - Town of Coats
  - City of Dunn
  - Town of Erwin
  - City of Lillington

- *Johnston County Multi-jurisdictional Hazard Mitigation Plan* (May 2011)
  - Town of Archer Lodge
  - Town of Benson
  - Town of Clayton
  - Town of Four Oaks
  - Town of Kenly
  - Town of Micro
  - Town of Pine Level
  - Town of Princeton
  - Town of Selma
  - Town of Smithfield
  - Town of Wilson's Mills
- *Lee County Multi-jurisdictional Hazard Mitigation Plan* (January 2012)
  - Town of Broadway
  - City of Sanford
- *Moore County Hazard Mitigation Plan* (June 2011)
  - Town of Aberdeen
  - Town of Cameron
  - Town of Carthage
  - Village of Foxfire Village
  - Town of Pinebluff
  - Village of Pinehurst
  - Town of Robbins
  - Town of Southern Pines
  - Town of Taylortown
  - Town of Vass
  - Village of Whispering Pines

Each of the county-levels plans was developed using the multi-jurisdictional planning process recommended by the Federal Emergency Management Agency (FEMA). For this plan, all of the aforementioned jurisdictions have joined to form a regional plan. All of the jurisdictions that participated in previous planning efforts have participated in the development of this regional plan. The process of merging all of the above plans into this regional plan is described in more detail below.

2.3 PREPARING THE 2014 PLAN

Jurisdictions are required to update their hazard mitigation plans every five years so the jurisdictions can remain eligible for federal mitigation funding. To simplify planning efforts for the jurisdictions in the Cape Fear Region, Chatham County, Harnett County, Johnston County, Lee County, and Moore County decided to join together to create the *Cape Fear Regional Hazard Mitigation Plan*. This allows resources

to be shared amongst the participating jurisdictions and eases the administrative duties of all of the participants by combining the five existing county plans into one multi-jurisdictional plan.

To prepare the 2014 *Cape Fear Regional Hazard Mitigation Plan*, Atkins was hired as an outside consultant to provide professional mitigation planning services. To meet requirements of the Community Rating System, the region ensured that the planning process was facilitated under the direction of a professional planner. Nathan Slaughter from Atkins served as the lead planner for this project and is a member of the American Institute of Certified Planners (AICP).

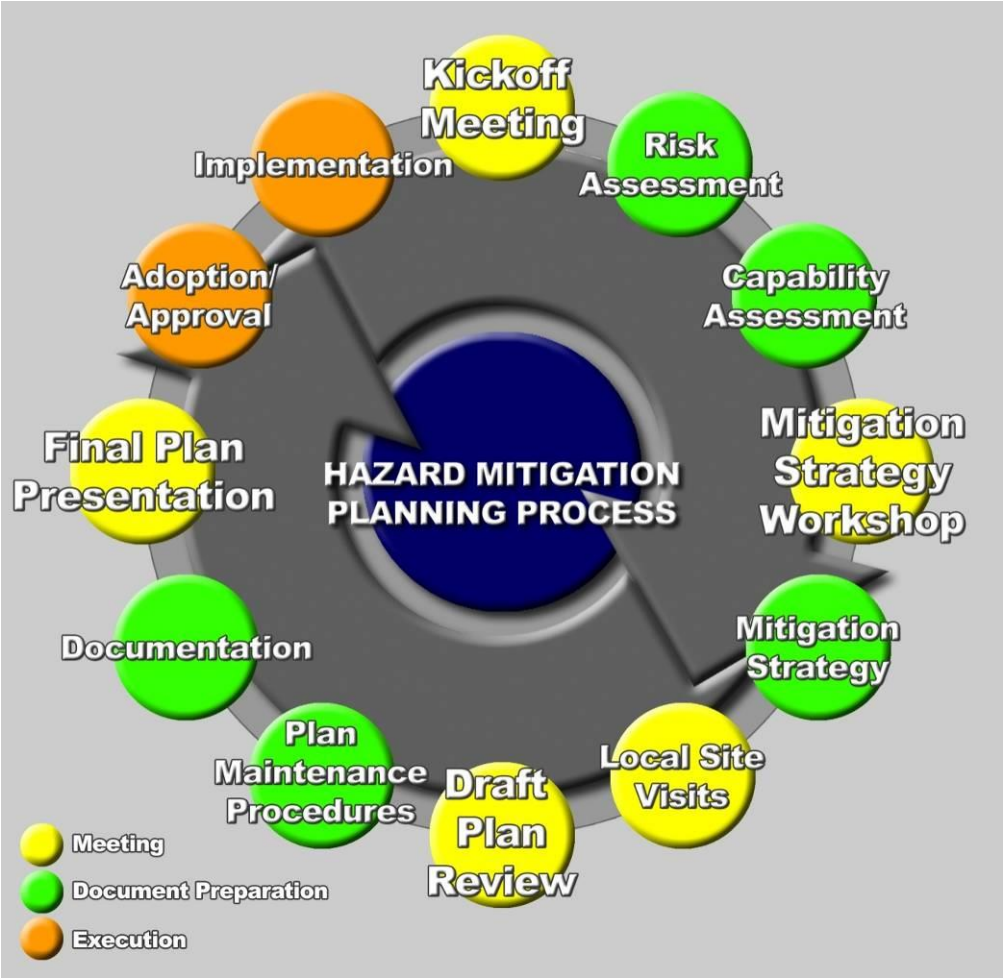
Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386 and Local Mitigation Plan Review Guide) and recommendations provided by North Carolina Division of Emergency Management (NCEM) mitigation planning staff[1]. The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Mitigation Plan Review Guide (October 2011) for reference as they completed the Plan.

Although each participating jurisdiction had already developed a plan in the past, the combination of the five plans into one regional plan still required making some plan update revisions based on FEMA's Local Mitigation Plan Guide. Since all sections of the regional plan are technically new, plan update requirements do not apply. However, since this is the first regional plan among the jurisdictions, key elements from the previous approved plans are referenced throughout the document (e.g., existing mitigation actions) and required a discussion of changes made. For example, all of the risk assessment elements needed to be updated to include most recent information. It was also necessary to formulate a single set of goals for the region, but they were based on previously determined goals (Section 8: *Mitigation Strategy*). The Capability Assessment section includes updated information for all of the participating jurisdictions and the Mitigation Action Plan provides implementation status updates for all of the actions identified in the previous plans.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately ten months beginning in January 2014. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

[1] A copy of the negotiated contractual scope of work between the participating counties and Atkins is available through Harnett County upon request.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE CAPE FEAR REGION



2.4 THE CAPE FEAR REGIONAL HAZARD MITIGATION PLANNING TEAM

In order to guide the development of this Plan, the participating jurisdictions (Chatham County, Harnett County, Johnston County, Lee County, and Moore County and participating municipal jurisdictions) created the Cape Fear Regional Hazard Mitigation Planning Team. The Regional Hazard Mitigation Planning Team represents a community-based planning team made up of representatives from various county departments, municipalities, and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in January 2014, the Regional Hazard Mitigation Planning Team members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

Specifically, the tasks assigned to the Regional Hazard Mitigation Planning Team members included:

- ❑ participate in Regional Hazard Mitigation Planning Team meetings and workshops

- ❑ provide best available data as required for the risk assessment portion of the Plan
- ❑ provide information that will help complete the Capability Assessment section of the plan and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- ❑ support the development of the Mitigation Strategy, including the design and adoption of regional goal statements
- ❑ help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- ❑ review and provide timely comments on all study findings and draft plan deliverables
- ❑ support the adoption of the 2014 *Cape Fear Regional Hazard Mitigation Plan*

Table 2.1 lists the members of the Regional Hazard Mitigation Planning Team who were responsible for participating in the development of the Plan.

TABLE 2.1: MEMBERS OF THE CAPE FEAR REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	DEPARTMENT / AGENCY
Chris Adcock	Kenly PD, Patrolman
Keith Anderson	NCDOT, Engineer
Lee Barbee	Town of Clayton, Fire Chief
Kathy Blake	Town of Erwin, Planner
John Bobbitt	NCSHP, Law Enforcement Officer
Phillip Boles	MCS, Executive Director of Operations
Steve Borden	Moore County Airport, Executive Director
Gary Briggs	Moore County Tax, Division Leader
Scot Brooks*	Moore County, Emergency Manager
Aaron Bullard	Lee County ES, Emergency Management Representative
Chris Butts	Moore County, GIS Analyst
Alan Byrd	NCEM, Area Coordinator
Abby Cameron	American Red Cross, Representative
Landon Chandler	Harnett County Planning, Senior Planner
Joseph Cherry	Lee County General Services, Solid Waste Superintendent
Chandra Coats	Johnston County Utilities, Director
Carlton Cole	Village of Pinehurst, Fire Chief
Andy Conway	Moore County Sheriff's Office, Captain
Bobbie Cox	Moore County Airport, Customer Service Representative
Victor Czar	Sanford, Public Works Director
Matt Day	Triangle J COG, Planner
Brian Dell (replaced by Brian Beck during process)	Vass PD, Patrolman
Johnny Dixon	Town of Micro Fire Department, Fire Chief

NAME	DEPARTMENT / AGENCY
Chuck Dumas	NCDOT - Div 8 – Aberdeen, Engineer
Greg Dunham	Town of Kenly, Town Manager
Jackie Dunlap	NCDOT, Engineer
Debra Ensminger	Moore County, Zoning Administrator
Scott Fish	Angier Fire Department, Captain
Tyrone Fisher	NC Coop Ext – Harnett, Executive Director
Alex Fuller	Selma Public Works, Director
Matt Garner	MCHD/Moore County Med Reserve, MRC Coordinator
Josh Gibson	Kenly PD, Chief
Randy Gould	MC PWD, Director
Jenny Harrop	Harnett County, GIS Analyst
Debbie Hatfield	NCEM, Field Support Team
Joe Haywood	Food Lion, Representative
David Hess	Wilson's Mills Police, Chief
Richie Hines	NCDOT, Engineer
Josh Holloman	Johnston County LEPC, EMS Chief
Kevin Hubbard	Johnston County Emergency Services, Fire Marshal
Richard Johnson	Buies Creek Fire Department, Firefighter
Bethany Johnson (replaced by Barbara Boyd during process)	Town of Vass, Clerk
Chris Johnson	Johnston County Economic Development, Director
Alan Johnson	Benson Fire Department, Firefighter
Yancy King	NCEM, Area Coordinator
Don Kovasckitz	Lee County, GIS Analyst
Rich Lambdin	Village of Whispering Pines, Chief
Carol Ann Lentz	American Red Cross, Representative
Mark Locklear	Harnett County Planning, Director
Carol Lucas	Cameron, Clerk
J Doyle Maness	Randolph Elec. Membership Corporation, Staking Specialist
Lee Marshall	Angier Fire Department, Assistant Chief
Danny Matthews	Food Lion, Representative
Phillip McDaniel	Selma Fire Department, Chief
Charlie McLaurin	Town of Siler City, Building Code Administrator
David McNeill	Duke Energy, Representative
Jack Meadows	Town of Siler City , Planning Director
Dale Medlin	Town of Clayton Electric Department, Public Power Director
Jacob Monroe	Moore County Schools, Maintenance Supervisor
Karen Moore	Harnett County, GIS Analyst
Todd Moore	Pee Dee EMC, Marketing Representative
Ken Murphy	NCDOT - Div 6 – Fayetteville, Engineer

NAME	DEPARTMENT / AGENCY
Brian Parrish	NC Coop Ext – Harnett, Agriculture Agent
Lisa Patterson	Harnett Health, Hospital Emergency Preparedness Coordinator
Betty Pearson	Town of Angier, Planning Technician
Marilyn Pearson	Johnston County Health Department, Medical Director
Greg Percy	Benson Police Department, Captain
Bryan Phillips	MCDPS, Director
Gary Pope	Harnett County, Emergency Services Director
David Register	Dunn Police, Lieutenant
Chris Riggins	Sanford/Lee County Inspections, Permitting Administrator
Frank Ringleberg	Moore County, Animal Control Director
Kim Robertson*	Johnston County, Emergency Management Director
Bill Rogers	Lee County ESO, Deputy Fire Marshal
Johnny Royal	Dunn Police, Captain
Jeremy Rust	Moore County, Planner
Jake Schlieman	Buies Creek Fire Department, Captain
Janet Scott	Chatham County, Director of Emergency Operations
Shane Seagroves*	Lee County, Fire Marshal
Tim Shaw	City of Sanford, General Services Director
Kris Sheffield	Moore County Public Safety, Communications Manager
Jay Sikes	Harnett County Planning, Manager of Planning Services
Tim Simpson	Town of Clayton, Public Works Director
Ken Skipper	Moore County Public Safety, Deputy Director
Larry T. Smith	Harnett County, Emergency Management Coordinator
Russell Spivey	Lee County General Services, Superintendent
Steve Strickland	Johnston County Public Health, Assistant Health Director
Ray Stuckey	Town of Pine Level, Public Works Superintendent
Jason Sullivan	Chatham County Planning, Director
Mike Tatum	Lee County ES, Emergency Services Representative
Althea Thompson	City of Sanford, Zoning Administrator
Scott Tomberlin	Dixie Pipeline Co., Representative
Tony Tucker*	Chatham County, Emergency Services Director
Nancy Veroni	Lee County, Emergency Services Representative
Banks Wallace	Johnston County Emergency Services, Asst. Fire Marshal
Paul Whitehurst	Johnston County Emergency Services, Fire Chief
Beverly Williams*	Harnett County, Emergency Management Coordinator
Robert J. Wilson	Harnett County Sheriff's Office, Lieutenant
Mike Winslow	NC Forest Service, County Ranger
Sandy Wood	Johnston County, Emergency Management Representative
Samantha Wullenwaber	City of Dunn, Planning Director
Matt Zapp	Town of Benson, Town Manager

* Served as the County's main Point of Contact

Table 2.2 lists points of contact for several of the jurisdictions who elected to designate their respective county officials to represent their jurisdiction on the planning team, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the Plan via email and phone conversations. These members are listed in alphabetical order by first name below.

TABLE 2.1: MEMBERS DESIGNATING REPRESENTATIVES TO CAPE FEAR REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	DEPARTMENT / AGENCY / TITLE
Tim Cunnup	Town of Goldston, Mayor
Bryan Gruesbeck	Town of Pittsboro, Town Manager
Kenny Cole	Town of Coats, Town Manager
Bill Summers	City of Lillington, City Manager
Bob Clark	Town of Archer Lodge, Planning and Zoning Administrator
Christy Baker	Town of Four Oaks, Assistant Town Clerk
Sharon Thompson	Town of Pine Level, Town Clerk
Patrick Harris	Town of Smithfield, Fire Chief
Donald Andrews	Town of Broadway, Mayor
Pam Graham	Town of Aberdeen, Planning Director
Karen O'Hara	Town of Carthage, Town Clerk
Lisa Kivett	Village of Foxfire Village, Mayor
Steve Minks	Town of Pinebluff, Chief Building Inspector
Jeff Sheffield	Town of Robbins, Town Manager
Bart Nucklos	Town of Southern Pines, Planning Director
Ulysses Barrett, Jr.	Town of Taylortown, Mayor

2.4.1 Multi-Jurisdictional Participation

The Cape Fear Regional Hazard Mitigation Plan includes five counties and thirty-two incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were required to perform the following tasks:

- ❑ Participate in mitigation planning workshops;
- ❑ Identify completed mitigation projects, if applicable; and
- ❑ Develop (and/or update) and adopt their local Mitigation Action Plan.

Each jurisdiction participated in the planning process and has developed a local Mitigation Action Plan unique to their jurisdiction. Each jurisdiction will adopt their Mitigation Action Plan separately. This provides the means for jurisdictions to monitor and update their Plan on a regular basis.

2.5 COMMUNITY 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. The following is a summary of the key meetings and community workshops held during the development of the plan update.[2] In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.

March 20, 2014
First Regional Hazard Mitigation Planning Team Meeting – Sanford, NC

Mr. Slaughter, Project Manager from Atkins, led the meeting of the Regional Hazard Mitigation Planning Team and began by having attendees introduce themselves. The 22 attendees included representatives from various departments and local jurisdictions within each of the four counties[3] participating in the plan update. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, presentation slides, GIS data inventory, and Public Participation Survey). He then defined mitigation and gave an overview of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

Following the overview, Mr. Slaughter led the group in an "icebreaker" exercise to introduce meeting participants to various mitigation techniques. He briefly explained the six different categories of mitigation techniques: emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection. Each attendee was then given $20 in mock currency and asked to "spend" their mitigation money as they personally deemed appropriate among the six mitigation categories. Money was "spent" by placing it in cups labeled with each of the mitigation techniques. Upon completion of the exercise, Mr. Slaughter stated that the results would be tabulated and shared with the group at the next meeting.

Following the icebreaker exercise, Mr. Slaughter reviewed the key objectives of the project which are to:

- Merge the four County plans into one regional plan;
- Complete update of existing plans to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions; and
- Maintain compliance with State and Federal requirements.

[2] Copies of agendas, sign-in sheets, minutes, and handout materials for all meetings and workshops can be found in Appendix D.
[3] At the time of the first meeting, only four counties were participating in the regional plan. Johnston County was integrated into the plan part way into the planning process, but all necessary integration took place to ensure the county was a full participant in the plan.

Mr. Slaughter discussed the expiration dates for each County's existing plan and presented a list of all the participating jurisdictions. He confirmed the list of participating jurisdictions with the meeting attendees. Mr. Slaughter then explained the mitigation planning process and specific tasks to be accomplished for this project, including the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan and plan maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point person to coordinate the gathering of GIS data required for the analysis. The project schedule was presented and Mr. Slaughter noted that the nine-month schedule provided ample time to produce a quality plan and meet state and federal deadlines.

The project staffing chart was presented to demonstrate the number of experienced individuals that will be working on this project. Mr. Slaughter then reviewed the roles and responsibilities of Atkins, the County's leads, the participating jurisdictions and other stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project development. He encouraged meeting participants to distribute the Public Participation Survey. An online version of the public survey was also made available and each jurisdiction was encouraged to make the link to the survey available on their local websites.

Mr. Slaughter stated that the next Regional Hazard Mitigation Planning Committee meeting would be scheduled for April of 2014 to discuss the findings of the risk and capability assessments and begin proposing mitigation actions. Mr. Slaughter asked each County to review their existing mitigation actions in preparation for the next meeting.

April 17, 2014
Mitigation Strategy Meeting – Pittsboro, NC

Mr. Slaughter initiated the meeting with a review of the meeting handouts, which included an agenda, presentation slides. Mr. Slaughter reviewed the project schedule and stated that a draft of the Hazard Mitigation Plan would be presented to the Regional Hazard Mitigation Planning Team in December.

Ryan Wiedenman with Atkins then presented the findings of the risk assessment. He reviewed the Presidential Disaster Declarations that have impacted the region. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four basic categories: Atmospheric, Hydrologic, Geologic, and Other. He indicated that each hazard must be evaluated and formally ruled out if it is not applicable to the study area, even where it seems obvious (such as in the case of volcano).

Mr. Wiedenman reviewed the Hazard Profiles and the following bullets summarize the information presented[4]:

- DROUGHT. There have been seven years (out of the past fourteen, 2000-2013) where drought conditions have been reported as severe, extreme or exceptional in the Cape Fear Region and future occurrences are likely.

[4] Although Johnston County was participating in the planning process at this time, risk assessment data had not yet been compiled for the county. Therefore, data was only presented for the other four counties at this meeting. It was later updated to include all five counties, but meeting minutes did not include that information.

- EXTREME HEAT. There have only been two recorded extreme heat events reported since 1998 that resulted in one death. Additional significant heat waves were reported in 2000, 2007 and 2012. Future occurrences are likely.

- HAILSTORM. There have been 320 recorded events since 1956. Future occurrences are highly likely.

- LIGHTNING. There have been 16 recorded lightning events since 1997, causing two injuries, 1 death, and $946,000 in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 52 recorded tornado events reported in the region since 1956. $90.9 million in property damages. 3 deaths and 73 injuries have been reported. Future occurrences are likely.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 71 storm tracks have come within 75 miles of the Cape Fear Region since 1850. 42 of these events were tropical storms and 24 were tropical depressions. Future occurrences are likely.

- SEVERE THUNDERSTORM WINDS. There have been 547 severe thunderstorm events reported since 1957 with $3.3 million in reported property damages. 1 death and 14 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 102 recorded winter events in the Cape Fear Region since 1993 resulting in $3.2 million in reported property damages. Future occurrences are likely.

- EARTHQUAKES. There have been 3 recorded earthquake events in the Cape Fear Region since 1886. The strongest had a recorded magnitude of V MMI. Future occurrences are unlikely.

- LANDSLIDE. There have been no recorded landslide events in the Cape Fear Region. Mr. Wiedenman asked the Regional Hazard Mitigation Planning Team to provide local information on landslide events, if available. Future occurrences are unlikely.

- DAM FAILURE. There are 409 dams in the Cape Fear Region, 107 of which are classified as high hazard dams. There have been no reported significant failure but a few smaller breaches have occurred. Future occurrences are unlikely.

- EROSION. Erosion was included in some of the previous County level plans but impacts are minimal. Future occurrences are possible.

- FLOOD. There have been 87 flood events recorded in the Cape Fear Region since 1993, resulting in $473,000 in property damage. There have been 43 NFIP losses since 1978 and approximately $692,000 in claims. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 83 reported hazardous materials events reported in the region. Sixteen were reported as serious incidents. Future occurrences are likely.

- WILDFIRE. There is an average of 395 fires per year reported in the Cape Fear Region. Future occurrences are likely.

- TERROR THREAT. There has been no history of any terrorist events in the region, although several potential structures were identified as being at potential risk. Future occurrences are considered unlikely.

- NUCLEAR ACCIDENT. No major nuclear events have been reported at Shearon Harris Nuclear Station, but 30 emergency declarations were made since 1986. Future occurrences are unlikely.

In concluding the review of Hazard Profiles, Mr. Wiedenman stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email him with their concerns.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Thunderstorm/High Wind, followed by Hurricane and Tropical Storm, Tornado, and Hailstorm. Flood was moved from a moderate risk hazard to a high risk hazard.

Mr. Slaughter presented the Capability Assessment Findings. Atkins has developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, Community Rating System (CRS) participation, and the Local Capability Assessment Survey conducted by Atkins.

Mr. Slaughter reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the limited to moderate range for Planning and Regulatory Capability and for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and staff skilled in GIS. Based upon the scoring methodology developed by Atkins, it was determined that over half of the participating jurisdictions have moderate capability to implement hazard mitigation programs and activities and each county has a high overall capability.

Mr. Slaughter then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Planning Team meeting, where attendees were given “money” to spend on various hazard mitigation techniques. The results were as follows:

Prevention	$158
Emergency Services	$130
Structural Projects	$92
Property Protection	$83
Public Education and Awareness	$74
Natural Resource Protection	$67

Mr. Slaughter then advised the group that the next meeting would involve discussing the mitigation strategy in greater detail, so the planning team should begin to think about actions related to each of the above categories and prioritizing those actions. He then thanked the group for taking the time to attend and the meeting was adjourned.

May 8, 2014
Mitigation Strategy Meeting – Carthage, NC

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 195 responses had been received. Based on preliminary survey results, respondents felt that tornadoes posed the greatest threat to their neighborhood, followed by severe thunderstorm/high wind, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 69 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional Hazard Mitigation Planning Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

May 22, 2014
Mitigation Strategy Meeting – Lillington, NC

NOTE: In order to ensure all stakeholders were involved and to facilitate municipal participation, the counties decided that they would like Atkins to lead a meeting similar to the one held in Carthage at each of the two counties that had not yet hosted a planning meeting (Harnett and Johnston). As a result, the meeting minutes, found below, were very similar for these meetings.

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 195 responses had been received. Based on preliminary survey results, respondents felt that tornadoes posed the greatest threat to their neighborhood, followed by severe thunderstorm/high wind, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 69 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional Hazard Mitigation Planning Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

July 16, 2014
Mitigation Strategy Meeting – Smithfield, NC

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 344 responses had been received. Based on preliminary survey results, respondents felt that severe thunderstorm/high wind posed the greatest threat to their neighborhood, followed by tornadoes, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 72 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional

Hazard Mitigation Planning Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

2.6 INVOLVING THE PUBLIC

44 CFR Requirement
44 CFR Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.

An important component of the mitigation planning process involved 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 city safer from the potential effects of hazards.

Public involvement in the development of the *Cape Fear Regional Hazard Mitigation Plan* was sought using two methods: (1) public survey instruments were made available in hard copy and online; and (2) copies of the draft Plan deliverables were made available for public review on county and municipal websites and at government offices. The public was provided two opportunities to be involved in the development of the regional plan at two distinct periods during the planning process: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption. In addition, a public participation survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout Chatham, Harnett, Johnston, Lee, and Moore Counties and on county and municipal websites.

Each of the participating jurisdictions will hold public meetings before the final plan is officially adopted by the local governing bodies. These meetings will occur at different times once FEMA has granted conditional approval of the Plan. Adoption resolutions will be included in Appendix A.

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Planning Team was successful in getting citizens to provide input to the mitigation planning process through the use of the *Public Participation Survey*. The *Public Participation Survey* was designed to capture data and information from residents of the Cape Fear Region that might not be able to attend public meetings or participate through other means in the mitigation planning process.

Copies of the *Public Participation Survey* were distributed to the Regional Hazard Mitigation Planning Team to be made available for residents to complete at local public offices. A link to an electronic version of the survey was also posted on each county's and municipal websites. A total of 478 survey responses were received, which provided valuable input for the Regional Hazard Mitigation Planning Team to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 50 percent of survey respondents had been impacted by a disaster, mainly hurricanes, tornadoes, and winter/ice storms.
- Respondents ranked Severe Thunderstorm/High Wind as the highest threat to their neighborhood (33 percent), followed by Tornado (27 percent) and Hurricane/Tropical Storm (22 percent).
- Approximately 25 percent of respondents have taken actions to make their homes more resistant to hazards and 82 percent are interested in making their homes more resistant to hazards.
- 74 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services and Public Education and Awareness were ranked as the most important activities for communities to pursue in reducing risks.

A copy of the survey is provided in Appendix B and a detailed summary of the survey results are provided in Appendix D.

2.7 INVOLVING THE STAKEHOLDERS

44 CFR Requirement
44 CFR Part 201.6(b)(2): The planning process shall include 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 non-profit interests to be involved in the planning process.

The Regional Hazard Mitigation Planning Team encouraged more open and widespread participation in the mitigation planning process. The region also went above and beyond in its local outreach efforts through the design and distribution of the *Public Participation Survey*. This opportunity was provided for local officials, residents, businesses, academia, and other private interests in the Cape Fear in Region to be involved and offer input throughout the local mitigation planning process.

2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the Cape Fear Region is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating counties with the development of the initial Hazard Mitigation Plans in the late 1990s and early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to natural hazards for the people and property in the Cape Fear Region. The actions that have been completed are documented in the Mitigation Action Plan found in Section 9.

In addition, 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 7: *Capability Assessment*. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard mitigation planning and have proven this by developing the Regional Hazard Mitigation Planning Team to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3
COMMUNITY PROFILE

This section of the Plan provides a general overview of the Cape Fear Region. It consists of the following four subsections:

- 3.1 Geography and the Environment
- 3.2 Population and Demographics
- 3.3 Housing, Infrastructure, and Land Use
- 3.4 Employment and Industry

The jurisdiction-specific annexes provide more detailed community profile information about each county.

3.1 GEOGRAPHY AND THE ENVIRONMENT

The Cape Fear Region is located in central North Carolina, mostly in the Piedmont region but also partially in the Inner Coastal Plain region. The region is also situated between the Triad and Triangle, two of the state's three largest centers of population and commerce. For the purposes of this plan, the Cape Fear Region includes Chatham, Harnett, Johnston, Lee, and Moore Counties and their respective municipalities. An orientation map is provided as **Figure 3.1**.

The Cape Fear Region offers many recreational opportunities and tourist attractions including the Cape Fear River, Jordan Lake Recreation Area, Raven Rock State Park, regional parks, and numerous golf courses and resorts and horse farms. Residents are able to enjoy the predominately rural character of the region and small-town atmosphere while still being able to access the conveniences of being located close two major metropolitan areas. Over the past 30 years, there has also been steady growth in the retiree population as retirees, attracted to the quality of life through golf, horse country, and recreation, choose to relocate to the Cape Fear Region.

The total land area of each of the participating counties is presented in **Table 3.1**.

TABLE 3.1: TOTAL LAND AREAS OF PARTICIPATING COUNTIES

County	Total Land Area
Chatham County	682 square miles
Harnett County	595 square miles
Johnston County	791 square miles
Lee County	255 square miles
Moore County	698 square miles

Source: United States Census Bureau

According to the State Climate Office of North Carolina, the Cape Fear Region enjoys a moderate climate that is characterized by short winters and hot, humid summers. Precipitation is generally well distributed throughout the year and annual totals average 48 inches.

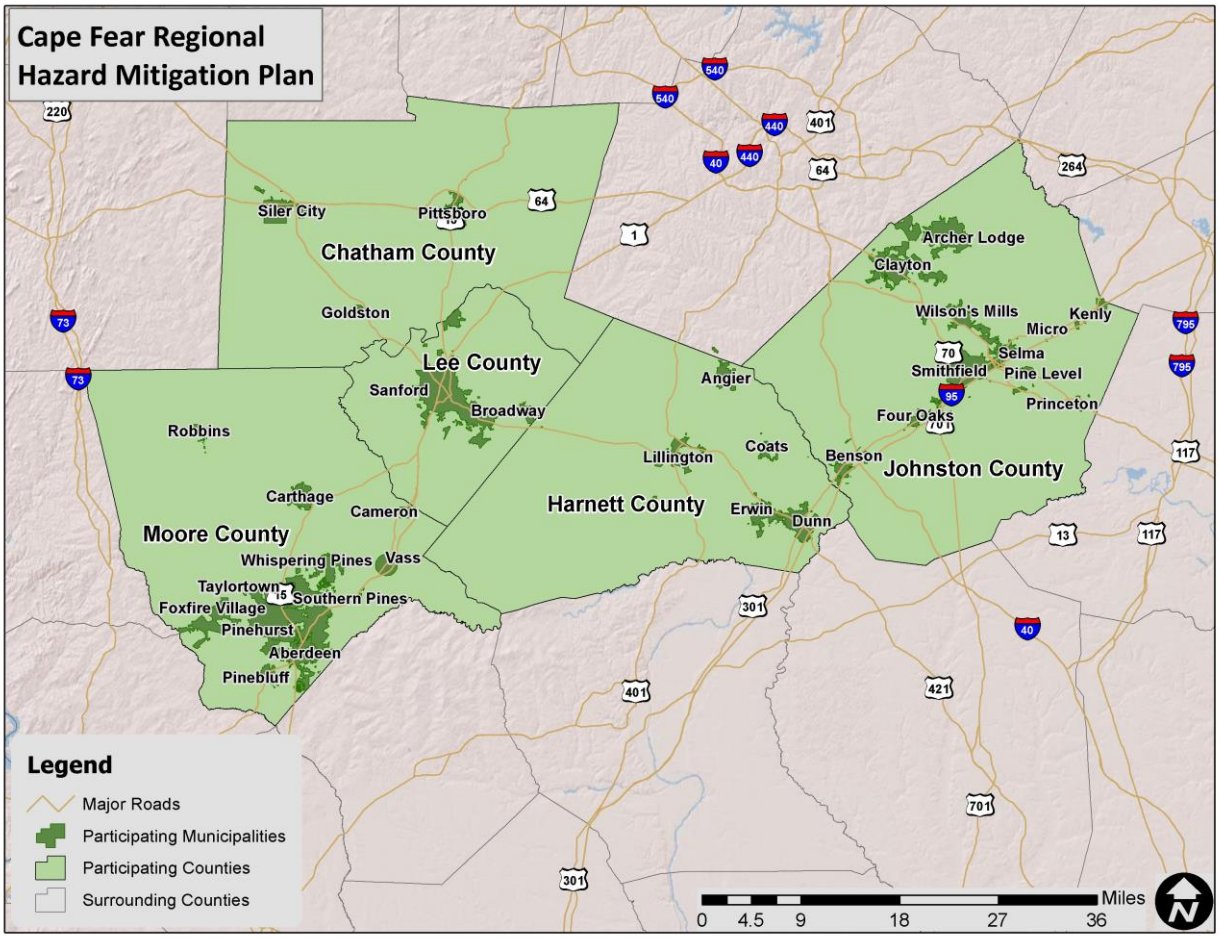
The region is partially protected by mountain ranges from masses of cold air, which flow southward from Canada during winter. From December to February, the average high temperature ranges from the lower to upper 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter over central North Carolina. The mountains also act as a barrier preventing most wintery precipitation from entering the region, and snow and sleet is usually light and occurs on average once or twice per year.

In spring, temperatures begin to rise and the increase in average temperature is greater in May than in any other month. In general, the days are warm and the nights are cool during the spring months. Average high temperatures increase from the 60s in March to the upper 70s and lower 80s in May. There is a similar increase in average low temperatures, which are in the upper 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring, however North Carolina is outside the principal tornado area of the United States.

Tropical air over the region brings warm temperatures and rather high humidity during the summer. Average high temperatures range from the mid 80s to lower 90s and low temperatures average in the 60s. Summer precipitation is normally the greatest and July is the wettest month. Summer rainfall is also the most variable, and daily showers as well as periods of one to two weeks without rain are both common. Thunderstorms are also common events in the region during the summer months.

Autumn is the season typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the lower 80s in September and fall to the low to mid 60s by November. Average lows also drop significantly from 60°F to about 38°F from September to November. Autumn is the driest season and November is the driest month in the region.

FIGURE 3.1: CAPE FEAR REGION ORIENTATION MAP



3.2 POPULATION AND DEMOGRAPHICS

Moore County is the largest participating county in the region by land area, and Harnett County is the largest county by population. Between 2000 and 2010, all of the participating counties experienced population growth. Johnston County had the most significant growth with a 38.5% increase. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for each of the participating counties are presented in **Table 3.2**.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING COUNTIES

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Chatham County	38,759	49,329	63,505	28.7%
Harnett County	67,822	91,025	114,678	26.0%
Johnston County	81,306	121,965	168,878	38.5%
Lee County	41,374	49,040	57,866	18.0%
Moore County	59,013	74,769	88,247	18.0%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of the participating counties ranges from 33.5 to 45.0 years. The racial characteristics of the participating counties are presented in **Table 3.3**. Generally, whites make up the majority of the population in the region accounting for over two-thirds of the population.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Chatham County	76.0%	13.2%	0.5%	1.1%	0.0%	7.3%	1.9%	13.0%
Harnett County	68.3%	20.9%	1.2%	0.9%	0.1%	5.5%	3.1%	10.8%
Johnston County	74.2%	15.1%	0.6%	0.6%	0.0%	7.5%	2.0%	12.9%
Lee County	66.9%	20.0%	0.7%	0.8%	0.0%	9.1%	2.4%	18.3%
Moore County	80.4%	13.4%	0.8%	0.9%	0.1%	2.7%	1.7%	6.0%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the 2010 U.S. Census, there were 211,242 housing units in the Cape Fear Region, the majority of which are single family homes or mobile homes. Housing information for the four participating counties is presented in **Table 3.4**. As shown in the table, Moore County has a slightly higher percentage of seasonal housing units compared to the other counties.

TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Chatham County	21,358	28,753	1.1%	$193,900
Harnett County	38,605	46,731	0.6%	$123,500
Johnston County	50,196	67,682	0.6%	$136,200
Lee County	19,909	24,136	0.6%	$127,800
Moore County	35,151	43,940	4.3%	$186,900

Source: United States Census Bureau

3.3.2 Infrastructure

Transportation

There are several major highways that cross the Cape Fear Region. Interstate 95 is one of two interstates that pass directly through the Cape Fear Region, traversing northeast to southwest through Dunn, Benson, Four Oaks, Smithfield, Selma, Kenly, and the easternmost corner of the region. The second interstate that passes through the region is Interstate 40, which travels northwest to southwest

along the southwest edge of Johnston County. Interstate 73 also serves the region and runs north to south along the westernmost border of the region. US Route 1 connects the region to Wake County and the Triangle, passing northeast to southwest through Chatham, Lee, and Moore Counties. US-70 also connects the region to Wake County and the Triangle, traversing northwest to southeast through Johnston County. US-421 is another important highway which links the region to the Triad, crossing northwest to southeast through Chatham, Lee, and Harnett Counties. The major north-south thoroughfare in the region is US-15 which enters Chatham County and runs through Lee County on into Moore County. The major east-west thoroughfare is US-64 which traverses Chatham County, again connecting the region to the Triangle. Additionally, in Harnett County, Highway 210 runs between Angier and Lillington and south into Fayetteville. There are also several designated scenic byways in the Cape Fear Region, including Devil's Stompin' Ground Road in Chatham and Moore Counties, Pottery Road and Sandhills Scenic Drive in Moore County, Averasboro Battlefield Scenic Byway in Harnett County, and Blue-Gray Scenic Byway in Johnston County.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to the Cape Fear Region. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 50 miles from the center region. An additional relief airport, Raleigh Exec, is also located a few miles northeast of Sanford in Lee County to provide additional capacity to the RDU airport. Additional general aviation airports servicing the Cape Fear Region include the Harnett Regional Jetport, Johnston County Airport, Moore County Airport, and Siler City Municipal Airport.

Utilities

Electrical power in the Cape Fear Region is provided by one public utility, several electricity cooperatives, and several municipalities in Johnston County. Duke Energy Progress serves major portions of all five counties in the region. The electricity cooperatives servicing the region include Central Electric Membership Corporation in Chatham, Harnett, Lee, and Moore Counties; Randolph Electric Membership Corporation in both Chatham and Moore Counties; South River Electric Membership Corporation in Harnett County; South River Electric Membership Corporation, Tri-County Electric Membership Corporation, and Wake Electric Membership Corporation in Johnston County; and Pee Dee Electric Membership Corporation in Moore County. The Towns of Benson, Clayton, Selma, and Smithfield are all members of the North Carolina Eastern Municipal Power Association and are affiliated with ElectriCities of North Carolina; as such, they provide municipally-owned and operated electric service to their residents.

Water and sewer service is provided by many of the municipalities as well as Chatham, Harnett, Johnston, and Moore Counties in the Cape Fear Region. Although some areas do require the use of wells and septic systems, much of the region is covered under either municipal or county providers.

Community Facilities

There are a number of public buildings and community facilities located throughout the Cape Fear Region. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 91 fire stations, 44 police stations, and 194 public schools located within the study area.

There are several medical care facilities located in the Cape Fear Region. The largest is Moore Regional Hospital, a 395-bed acute care hospital, in Pinehurst which serves as the referral center for a 15-county region in North Carolina. The Johnston Medical Center in Smithfield, the Central Carolina Hospital in Sanford, and the Betsy Johnson Hospital in Dunn are three additional acute care hospitals with 199 beds, 137 beds, and 101 beds, respectively. There are also four smaller hospitals; Good Hope Hospital located

in Erwin, Central Harnett Hospital located outside of Lillington, Johnston Health in Clayton, and Chatham Hospital located in Siler City.

There are also numerous parks and recreational areas in the Cape Fear Region. These include the Cape Fear River Trail Park, the Neuse River Greenway Trail, Jordan Lake Recreation Area, Raven Rock State Park, White Pines Nature Preserve, Weymouth Woods-Sandhills Nature Preserve, and Clemmons Educational State Forest, as well as numerous other parks, golf courses and resorts, and horse farms. These facilities offer recreational opportunities to the region's residents and many visitors each year.

3.3.3 Land Use

The Cape Fear Region is experiencing growth and development due to its proximity to the major metropolitan areas in the Triangle and Triad. As shown in **Figure 3.1** above, there are many incorporated municipalities located throughout the study area which make up most of the area's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with agricultural and recreational uses in the more rural unincorporated areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

Local land use (and associated regulations) is further discussed in *Section 7: Capability Assessment.*

3.4 EMPLOYMENT AND INDUSTRY

The Cape Fear Region's proximity to the Triangle and Triad continues to promote population and economic growth, especially in the northwestern portion of Johnston County and the northern and eastern parts of Chatham County. However, despite the urban growth that has occurred across the region, agriculture continues to play a critical role in the local economy.

According to the North Carolina Employment Security Commission, in 2012, Chatham County had an average annual employment of 31,537 workers and an average unemployment rate of 7.3 percent (compared to 8.0 percent for the state). In 2012, the Health Care and Social Assistance industry employed 17.4 percent of the county's workforce followed by Manufacturing (16.0%); Retail Trade (11.9%); and Education Services (11.3%). The American Community Survey (ACS) found the average annual median household income in Chatham County was $57,793 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

In 2012, Harnett County had an average annual employment of 44,724 workers and an average unemployment rate of 10.6 percent. In 2012, according to NCESC, the Educational Services industry employed the most people, with 17.4 percent of the workforce, followed by Retail Trade (16.8%); Health Care and Social Assistance (14.4%); and Accommodation and Food Services (10.2%). The average annual median household income in Harnett County, according to the ACS, was $44,242 from 2008 to 2012.

Johnston County had an average annual employment of 74,971 workers and an average unemployment rate of 8.2 percent in 2012. According to NCESC, the Manufacturing industry employed 14.8 percent of the county's workforce followed closely by Retail Trade (14.3%) then Health Care and Social Assistance

(12.2%) and Educational Services (11.8%) in 2012. The ACS found the average median household income was $50,132 in Johnston County from 2008 to 2012.

Lee County had an average annual employment of 23,626 workers and an average unemployment rate of 11.6 percent in 2012. According to NCESC, in 2012, the Manufacturing industry was the largest employment sector by fare with 33.3 percent of the county's workforce. The other leading industries were Retail Trade (11.8%); Health Care and Social Assistance (11.8%); and Educational Services (8.3%). From 2008 to 2012, the average annual median household income in Lee County was $45,284 according to the ACS.

The NCES reported Moore County had an average annual employment of 34,909 workers and an average unemployment rate of 8.6 percent in 2012. In 2012, the Health Care and Social Assistance industry was the largest employment sector with 25.8 percent of the county's workforce. The other leading industries were Accommodation and Food Services (14.0%); Retail Trade (13.1%); and Educational Services (8.8%). According to the ACS, the average annual median household income in Moore County was $48,238 from 2008 to 2012.

SECTION 4
HAZARD IDENTIFICATION

This section describes how the planning team identified the hazards to be included this plan. It consists of the following five subsections:

- 4.1 Overview
- 4.2 Description of Full Range of Hazards
- 4.3 Disaster Declarations
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

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

4.1 OVERVIEW

The Cape Fear Region is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused hazards (i.e., technological hazards, terrorism, etc.) is encouraged, though not required, for plan approval. The Cape Fear Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the Cape Fear Region (Chatham, Harnett, Lee, and Moore) have identified a number of hazards that are to be addressed in its Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Cape Fear Regional Hazard Mitigation Planning Team members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2010). Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

Table 4.1 lists the full range of natural hazards initially identified for inclusion in the Plan and provides a brief description for each. This table includes 24 individual hazards. Some of these hazards are considered to be interrelated or cascading, but for preliminary hazard identification purposes these individual hazards are broken out separately.

Next, **Table 4.2** lists the disaster declarations in the Cape Fear Region

[1] A complete list of disaster declarations for the Cape Fear Region can be found below in Section 4.3.

Next, **Table 4.3** documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the Regional Hazard Mitigation Planning Team during the plan update process.

Lastly, **Table 4.4** provides a summary of the hazard identification and evaluation process noting that 17 of the 24 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

4.2 DESCRIPTION OF FULL RANGE OF HAZARDS

TABLE 4.1: DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS

Hazard	Description
ATMOSPHERIC HAZARDS	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Hailstorm	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing.
Heat Wave	A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community.

Hurricane and Tropical Storm	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 with a diameter averaging 10 to 30 miles across. 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. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. 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 extends from June through November.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Nor'easter	Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated 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.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.
Severe Thunderstorm	Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines.

Winter Storm and Freeze	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
GEOLOGIC HAZARDS	
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.
Expansive Soils	Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor, or can be severe enough for the home to be structurally unsafe.
Landslide	The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Land Subsidence	The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.

Volcano	A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
HYDROLOGIC HAZARDS	
Dam and Levee Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning.
Erosion	Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.
Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). 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. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.

OTHER HAZARDS	
Hazardous Materials Incident	Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. HAZMAT incidents consist of solid, liquid and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind and possibly wildlife as well.
Terror Threat	Terrorism is defined by FEMA as, "the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom." Terrorist acts may include assassinations, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons.
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.
Nuclear Accident	The International Atomic Energy Agency (IAEA) classifies a nuclear incident or accident as an event that leads to significant consequences for people, the environment, or the facility. Typically the effects of an incident are the release of radioactive substances that can cause damaging impacts. The IAEA uses a scale known as the International Nuclear and Radiological Event Scale (INES) to classify the level of impact that an event has on people and the environment.

4.3 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the Cape Fear Regional planning area. Since 1968, nine presidential disaster declarations have been reported in the Cape Fear Region. This includes four events related to winter storms, four storms related to hurricanes and tropical storms, and one event related to tornadoes and severe storms.

TABLE 4.2: CAPE FEAR REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Chatham County	Harnett County	Johnston County	Lee County	Moore County
1968	234	SEVERE ICE STORM		X	X	X	X
1996	1087	BLIZZARD OF 96	X	X	X	X	X
1996	1134	HURRICANE FRAN	X	X	X	X	X
1999	1292	HURRICANE FLOYD	X	X	X	X	X
2000	1312	SEVERE WINTER STORM	X	X	X	X	X

Year	Disaster Number	Description	Chatham County	Harnett County	Johnston County	Lee County	Moore County
2002	1448	SEVERE ICE STORM	X	X	X	X	X
2003	1490	HURRICANE ISABEL		X	X		
2011	1969	SEVERE STORMS, TORNADOES, AND FLOODING		X	X	X	
2011	4019	HURRICANE IRENE			X		

4.4 HAZARD EVALUATION

TABLE 4.3: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
ATMOSPHERIC HAZARDS			
Avalanche	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of US Forest Service National Avalanche Center website	• The United States avalanche hazard is limited to mountainous western states including Alaska as well as some areas of low risk in New England. • Avalanche hazard was removed from the North Carolina State Hazard Mitigation Plan after determining the mountain elevation in Western North Carolina did have enough snow not produce this hazard. • Avalanche is not included in any of the previous Cape Fear hazard mitigation plans. • There is no risk of avalanche events in North Carolina.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Drought	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of the North Carolina Drought Monitor website	• Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. • Droughts are discussed in the NC State Hazard Mitigation Plan as a lesser hazard. • The NC State Hazard Mitigation Plan lists drought as a top hazard for the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), and the Coastal Plain 7 Region (includes Johnston County). • Drought is included in all of the previous Cape Fear hazard mitigation plans. • There are reports of drought conditions in each of the last fourteen years in the Cape Fear Region, according to the North Carolina Drought Monitor.
Hailstorm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Although hailstorms occur primarily in the Midwestern states, they do occur in every state on the mainland U.S. Most inland regions experience hailstorms at least two or more days each year. • Hailstorm events are discussed in the state plan under the severe thunderstorm hazard. • Hail is addressed under the thunderstorm hazard in four of the five previous Cape Fear hazard mitigation plans and as a standalone hazard in one plan. Given the frequency of the event, individual analysis is warranted. • NCDC reports 475 hailstorm events (0.75 inch size hail to 2.75 inches) for the Cape Fear Region since 1956. For these events, there was nearly $1.4 million (2013 dollars) in property damages reported.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Heat Wave	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the North Carolina State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Many areas of the United States are susceptible to heat waves, including North Carolina. • The NC State Hazard Mitigation Plan does not include Heat Wave as a top hazard for the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), the Coastal Plain 6 Region (includes Harnett County), or the Coastal Plain 7 Region (includes Johnston County). • The NC State Hazard Mitigation Plan reports the Piedmont Region as having moderate vulnerability compared to the rest of the state and the Coastal Plain Region as having the highest vulnerability compared to the rest of the state. • Heat wave was included in three of the previous hazard mitigation plans in tandem with the drought hazard and as a standalone hazard in one plan. • NCDC reports three excessive heat events for the Cape Fear counties. These events resulted in three fatalities.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Hurricane and Tropical Storm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations • FEMA Hazus-MH storm return periods	• The Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. • Hurricane and tropical storm events are discussed in the state plan and are listed as a top hazard in the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), the Coastal Plain 6 Region (includes Harnett County), and the Coastal Plain 7 Region (includes Johnston County). • Hurricane and tropical storm was addressed in all of the previous Cape Fear hazard mitigation plans. • NOAA historical records indicate 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on maximum storm category reached) have come within 75 miles of the Cape Fear Region since 1851. • NCDC reports seven hurricane or tropical storm events for the cape Fear Region. These events resulted in almost $807 million dollars (2013 dollars) in property damage. • Four out of nine disaster declarations in the Cape Fear Region are directly related to hurricane and tropical storm events. • The 50-year return period peak gust for hurricane and tropical storm events in the Cape Fear Region is between 72-83 mph.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Lightning	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map	• The central region of the Florida has the highest density of lightning strikes in the mainland U.S.; however, lightning events are experienced in nearly every region. • Lightning events are discussed in the state plan as part of the severe thunderstorm hazard. • Although lightning is addressed under the thunderstorm hazard in all of the previous hazard mitigation plans, given the damage and reported death and injuries, individual analysis is warranted. • NCDC reports 24 lightning events for the Cape Fear Region since 1997. These events have resulted in 1 recorded death, 8 injuries, and $1.2 million (2013 dollars) in property damage. • According to Vaisala's U.S. National Lightning Detection Network, the Cape Fear Region is located in an area that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Nor'easter	NO	• Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Nor'easters are discussed in the state plan. The Piedmont Region (includes Chatham, Lee, and Moore Counties) has relatively low vulnerability compared to the state. The Coastal Plain Region (includes Harnett and Johnston Counties) has slightly higher vulnerability but nor'easter is not identified as a top hazard. • Nor'easter was included in two of the previous Cape Fear hazard mitigation plans under the hurricane or winter storm hazard. • NCDC does not report any nor'easter activity for the Cape Fear Region. However, nor'easters may have affected the region as severe winter storms. In this case, the activity would be reported under winter storm events.
Tornado	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations.	• From 1953 to 1993, North Carolina averaged 10 to 25 tornadoes per year. • Tornado events are discussed in the NC State Hazard Mitigation Plan. The Piedmont Region (includes Chatham, Lee, and Moore Counties) and the Coastal Plain Region (includes Harnett and Johnston Counties) are the regions with the highest vulnerability in the state. • Tornado events were addressed in all of the previous Cape Fear hazard mitigation plans. • NCDC reports 72 tornado events in Cape Fear Region counties since 1956. These events have resulted in 4 deaths, 154 injuries, and $122 million (2013 dollars) in property damage with the most severe being an F3. • One of the region's nine disaster declarations was related to tornado events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Severe Thunderstorm	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations.	• Over 100,000 thunderstorms are estimated to occur each year on the U.S. mainland, and they are experienced in nearly every region. • Severe thunderstorm events are discussed in the NC State Hazard Mitigation Plan and are identified a top hazard in the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), the Coastal Plain 6 Region (includes Harnett County), and the Coastal Plain 7 Region (includes Johnston County). • Thunderstorm events were addressed in all of the previous Cape Fear hazard mitigation plans. • NCDC reports 797 thunderstorm/high wind events in the Cape Fear Region counties since 1957. These events have resulted in 1 death, 15 injuries, and $4.0 million (2013 dollars) in property damage. • One of the region's nine disaster declarations was related to severe storm events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Winter Storm and Freeze	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical presidential disaster declarations.	• Winter storms affect every state in the continental U.S. and Alaska. • Severe winter storms, including snow storms and ice storms, are discussed in the state plan. They are listed as a top hazard in the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), and the Coastal Plain 7 Region (includes Johnston County). • Winter storm events were addressed in all of the previous Cape Fear hazard mitigation plans. • NCDC reports that the Cape Fear counties have been affected by 132 winter storm events since 1993. These events resulted in $3.2 million (2013 dollars) in damages. Two deaths and ten injuries were reported with these events, but they may have occurred outside of the study region. • Four of the region's nine disaster declarations were directly related to winter storm events.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
GEOLOGIC HAZARDS			
Earthquake	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of the National Geophysical Data Center • USGS Earthquake Hazards Program website	• Although the zone of greatest seismic activity in the United States is along the Pacific Coast, eastern regions have experienced significant earthquakes. • Earthquake events are discussed in the state plan but none of the participating Cape Fear counties are in the region with the highest vulnerability to an earthquake event in the state. • Earthquakes have occurred in and around the State of North Carolina in the past. The state is affected by the Charleston and the New Madrid (near Missouri) Fault lines which have generated a magnitude 8.0 earthquake in the last 200 years. • All of the previous hazard mitigation plans in the Cape Fear Region address earthquake. • 4 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a 5. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Cape Fear Region is approximately 2 to 4%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Expansive Soils	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of USDA Soil Conservation Service's Soil Survey	• The effects of expansive soils are most prevalent in parts of the Southern, Central, and Western U.S. • Expansive soils are identified in the state plan. The Piedmont Region has the highest vulnerability compared to the rest of the state. • None of the previous Cape Fear hazard mitigation plans identifies expansive soils as a potential hazard. • According to FEMA and USDA sources, parts of the Cape Fear Region are located in an area that consists of some clay having "slight to moderate" clay swelling potential (generally less than 50%).

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Landslide	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides	• Landslides occur in every state in the U.S, and they are most common in the coastal ranges of California, the Colorado Plateau, the Rocky Mountains, and the Appalachian Mountains. • Landslide/debris flow events are discussed in the state plan but are not listed as a top hazard for the Piedmont 4 Region (includes Chatham and Lee Counties), the Piedmont 5 Region (includes Moore County), the Coastal Plain Region (includes Harnett County), or the Coastal Plain 7 Region (includes Johnston County). • One of the previous Cape Fear hazard mitigation plans addresses landslides. • USGS landslide hazard maps indicate "moderate susceptibility" is found throughout the northern half of the Cape Fear Region. There is also "moderate incidence" (between 1.5 and 15% of the area is involved in landsliding) in parts of Chatham, Lee, and Moore Counties and "low incidence" in the remainder of the region. • Data provided by NCGS indicate zero recorded landslide events in the Cape Fear Region.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Land Subsidence	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans	• Land subsidence affects at least 45 states, including North Carolina. However, because of the broad range of causes and impacts, there has been limited national focus on this hazard. • The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina and subsidence is a top hazard for the Coastal Plain 6 Region (includes Harnett County) and Coastal Plain 7 Region (includes Johnston County). In addition, the Coastal Plain Region has the highest vulnerability compared to the state and the Piedmont Region has moderate vulnerability compared to the state. • None of the previous Cape Fear hazard mitigation plans identify land subsidence as a potential hazard.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tsunami	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses).	• No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. • Tsunamis are discussed in the state plan and described as a "greater" hazard for the state. However, the Piedmont Region (includes Chatham, Lee, and Moore Counties) and the Coastal Plain Region (includes Harnett and Johnston Counties) scored a zero for tsunami hazard risk. • Tsunami was not analyzed as a hazard in any of the previous Cape Fear hazard mitigation plans. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program website	• More than 65 potentially active volcanoes exist in the United States and most are located in Alaska. The Western states and Hawaii are also potentially affected by volcanic hazards. • There are no active volcanoes in North Carolina. • There has not been a volcanic eruption in North Carolina in over 1 million years. • No volcanoes are located near the Cape Fear Region.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
HYDROLOGIC HAZARDS			
Dam and Levee Failure	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of North Carolina Division of Land Management website	• The National Inventory of Dams shows dams are located in every state. • Dam failure is discussed in the state plan and is listed as a top hazard for Piedmont 5 Region (includes Moore County). • All of the previous Cape Fear hazard mitigation plans address dam failure. • Of the 498 dams reported on the North Carolina Inventory of Dams, 113 are high hazard (23%). (High hazard is defined as "where failure or mis-operation will probably cause loss of human life.")
Erosion	YES	• Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans	• Coastal erosion is discussed in the state plan but only for coastal areas (there is no discussion of riverine erosion). Cape Fear is not located in a coastal area. • Riverine erosion is discussed in three of the previous Cape Fear hazard mitigation plans. However, it was found to be a lesser hazard. • Although erosion was not previously identified as a top hazard, it remains a natural, dynamic, and continuous process in the Cape Fear Region that warrants inclusion as a potential hazard.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Flood	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database • Review of historical disaster declarations • Review of FEMA DFIRM data • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)	• Floods occur in all 50 states and in the U.S. territories. • The flood hazard is thoroughly discussed in the state plan. The Cape Fear Region was found to have relatively moderate vulnerability compared to the state. • All of the previous hazard mitigation plans in the Cape Fear Region address flood hazard. • NCDC reports that the Cape Fear Region counties have been affected by 121 flood events since 1993. These events in total caused 3 deaths, 1 injury, and an estimated $519,000 (2013 dollars) in property damages. • One of the nine Presidential Disaster Declarations was flood-related and an additional four were hurricane or tropical storm-related which caused flooding issues. • Roughly 11.5% of the Cape Fear Region is located in an identified floodplain (100 or 500 year). • 33 of the 37 municipalities in the Cape Fear Region participate in the NFIP; however, no jurisdictions currently participate in the CRS.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Storm Surge	NO	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation plans • Review of NOAA NCDC Storm Events Database	• Given the inland location of the Cape Fear Region, storm surge would not affect the area. • Storm surge is discussed in the state plan under the hurricane hazard. The Piedmont Region (includes Chatham, Lee, and Moore Counties) and the Coastal Plain region (includes Harnett and Johnston Counties) have zero vulnerability to storm surge. • None of the previous hazard mitigation plans in the Cape Fear Region identify storm surge as a potential hazard. • No historical events were reported by NCDC
OTHER HAZARDS			
Hazardous Materials Incident	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of previous Cape Fear county hazard mitigation plans	• Cities, counties, and towns where hazardous materials fabrication, processing, and storage sites are located, and those where hazardous waste treatment, storage or disposal facilities operate are at risk for hazardous materials events. • Two of previous Cape Fear Region hazard mitigation plans include hazardous materials incident.
Terror Threat	NO	• Review of previous Cape Fear county hazard mitigation plans • Review of local official knowledge	• Terrorism was not included in any of the previous Cape Fear hazard mitigation plans. • There are some potential targets in the areas.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Wildfire	YES	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous Cape Fear county hazard mitigation • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Division of Forest Resources website	• Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. • Wildfires are discussed in the state plan as a "greater" hazard of concern and is identified as a top hazard in the Coastal Plain 6 Region (includes Harnett County). However, the Piedmont Region (includes Chatham, Lee, and Moore Counties) shares the lowest vulnerability in the state. • All of the previous hazard mitigation plans in the Cape Fear Region address wildfire. • A review of SWRA data indicates that there are some areas of elevated concern in the Cape Fear Region, particularly in the southern half of the region. • According to the North Carolina Division of Forest Resources, the Cape Fear Region experiences an average of 431 fires each year which burn a combined average of 1,216 acres.
Nuclear Accident	YES	• Review of IAEA list of fixed nuclear power stations in the United States • Review of previous Cape Fear county hazard mitigation • Discussion with local officials about location of nuclear power stations	• The Shearon Harris Nuclear Power Station is located in Wake and Chatham County. • Three of the previous Cape Fear hazard mitigation plans address the Shearon Harris Nuclear Power Station; however, none included it as a hazard. • Local officials expressed a desire to address it in this plan. • Nuclear events can sometimes be caused by natural hazards and deserve some attention in this plan due to some areas of the region being located in the 10 mile evacuation zone for the Shearon Harris Nuclear Power Station.

4.5 HAZARD IDENTIFICATION RESULTS

TABLE 4.4: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

ATMOSPHERIC HAZARDS	GEOLOGIC HAZARDS
☐ Avalanche	☑ Earthquake
☑ Drought	☐ Expansive Soils
☑ Hailstorm	☑ Landslide
☑ Heat Wave	☐ Land Subsidence
☑ Hurricane and Tropical Storm	☐ Tsunami
☑ Lightning	☐ Volcano
☐ Nor'easter	**HYDROLOGIC HAZARDS**
☑ Tornado	☑ Dam and Levee Failure
☑ Severe Thunderstorm	☑ Erosion
☑ Winter Storm and Freeze	☑ Flood
	☐ Storm Surge
	OTHER HAZARDS
	☑ Hazardous Materials Incident
	☑ Terror Threat
	☑ Wildfire
	☑ Nuclear Accident

☑ = Hazard considered significant enough for further evaluation in the Cape Fear Region hazard risk assessment.

SECTION 5
HAZARD PROFILES

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the Cape Fear Regional Hazard Mitigation Plan. It contains the following subsections:

- ❑ 5.1 Overview
- ❑ 5.2 Study Area
- ❑ 5.3 Drought
- ❑ 5.4 Extreme Heat
- ❑ 5.5 Hailstorm
- ❑ 5.6 Hurricane and Tropical Storm
- ❑ 5.7 Lightning
- ❑ 5.8 Thunderstorm Wind/High Wind
- ❑ 5.9 Tornado
- ❑ 5.10 Winter Storm and Freeze
- ❑ 5.11 Earthquake
- ❑ 5.12 Landslide
- ❑ 5.13 Dam and Levee Failure
- ❑ 5.14 Erosion
- ❑ 5.15 Flood
- ❑ 5.16 Hazardous Materials Incident
- ❑ 5.17 Wildfire
- ❑ 5.18 Nuclear Accident
- ❑ 5.19 Terror Threat
- ❑ 5.20 Conclusions on Hazard Risk
- ❑ 5.21 Final Determinations

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

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the Cape Fear Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard, its location and extent, notable historical occurrences, and the probability of future occurrences. Each profile also includes specific items noted by members of the Cape Fear Regional Hazard Mitigation Planning Team as it relates to unique historical or anecdotal hazard information for the counties in the Cape Fear Region, or a participating municipality within them.

The following hazards were identified:

- ❑ **Atmospheric**
  - ❑ Drought
  - ❑ Extreme Heat
  - ❑ Hailstorm
  - ❑ Hurricane and Tropical Storm

- Lightning
- Severe Thunderstorm (including straight-line winds)
- Tornado
- Winter Storm and Freeze

- **Geologic**
  - Earthquake
  - Landslide
- **Hydrologic**
  - Dam and Levee Failure
  - Erosion
  - Flood
- **Other**
  - Hazardous Materials Incident
  - Wildfire
  - Nuclear Accident
  - Terror Threat

5.2 STUDY AREA

The Cape Fear Region includes five counties: Chatham, Harnett, Johnston, Lee, and Moore. **Table 5.1** provides a summary table of the participating jurisdictions within each county. In addition, **Figure 5.1** provides a base map, for reference, of the Cape Fear Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE CAPE FEAR REGIONAL HAZARD MITIGATION PLAN

Chatham County	
Goldston	Siler City
Pittsboro	
Harnett County	
Angier	Erwin
Coats	Lillington
Dunn	
Johnston County	
Archer Lodge	Pine Level
Benson	Princeton
Clayton	Selma
Four Oaks	Smithfield
Kenly	Wilson's Mills
Micro	

Lee County	
Broadway	Sanford
Moore County	
Aberdeen	Robbins
Cameron	Southern Pines
Carthage	Taylortown
Foxfire Village	Vass
Pinebluff	Whispering Pines
Pinehurst	

FIGURE 5.1: CAPE FEAR REGION BASE MAP

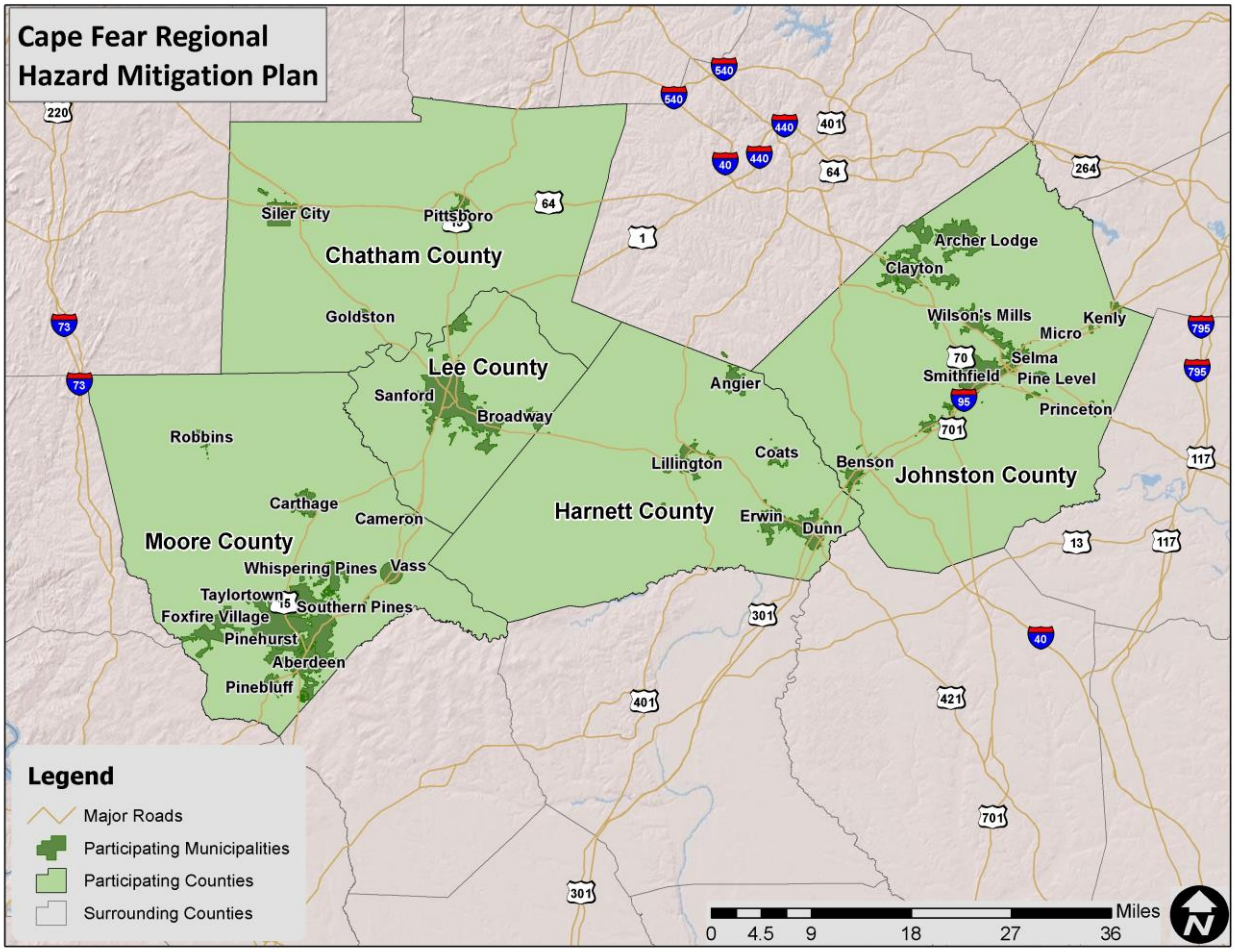


Table 5.2 lists each significant hazard for the Cape Fear Region and identifies whether or not it has been determined to be a specific hazard of concern for the twenty-one municipal jurisdictions and each of the four county's unincorporated areas. This is the based on the best available data and information from the Cape Fear Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE CAPE FEAR REGION

Jurisdiction	Atmospheric								Geologic		Hydrologic			Other			
	Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm	Earthquake	Landslide	Dam and Levee Failure	Erosion	Flood	HAZMAT	Wildfire	Nuclear	Terror Threat
Chatham County																	
Goldston	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pittsboro	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Siler City	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Harnett County																	
Angier	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Coats	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dunn	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Erwin	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lillington	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Johnston County																	
Archer Lodge	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Benson	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Clayton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Four Oaks	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Kenly	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Micro	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pine Level	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Princeton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Selma	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Smithfield	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Wilson's Mills	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lee County																	
Broadway	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sanford	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Moore County																	
Aberdeen	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Cameron	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Cartage	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Foxfire Village	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pinebluff	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pinehurst	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Robbins	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Southern Pines	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Jurisdiction	Atmospheric								Geologic		Hydrologic			Other			
	Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm	Earthquake	Landslide	Dam and Levee Failure	Erosion	Flood	HAZMAT	Wildfire	Nuclear	Terror Threat
Taylortown	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vass	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Whispering Pines	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Atmospheric Hazards

5.3 DROUGHT

5.3.1 Background

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts. Drought may also lead to more severe wildfires.

Droughts are typically classified into one of four types: 1) meteorological, 2) hydrologic, 3) agricultural, or 4) socioeconomic. **Table 5.3** presents definitions for these types of drought.

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

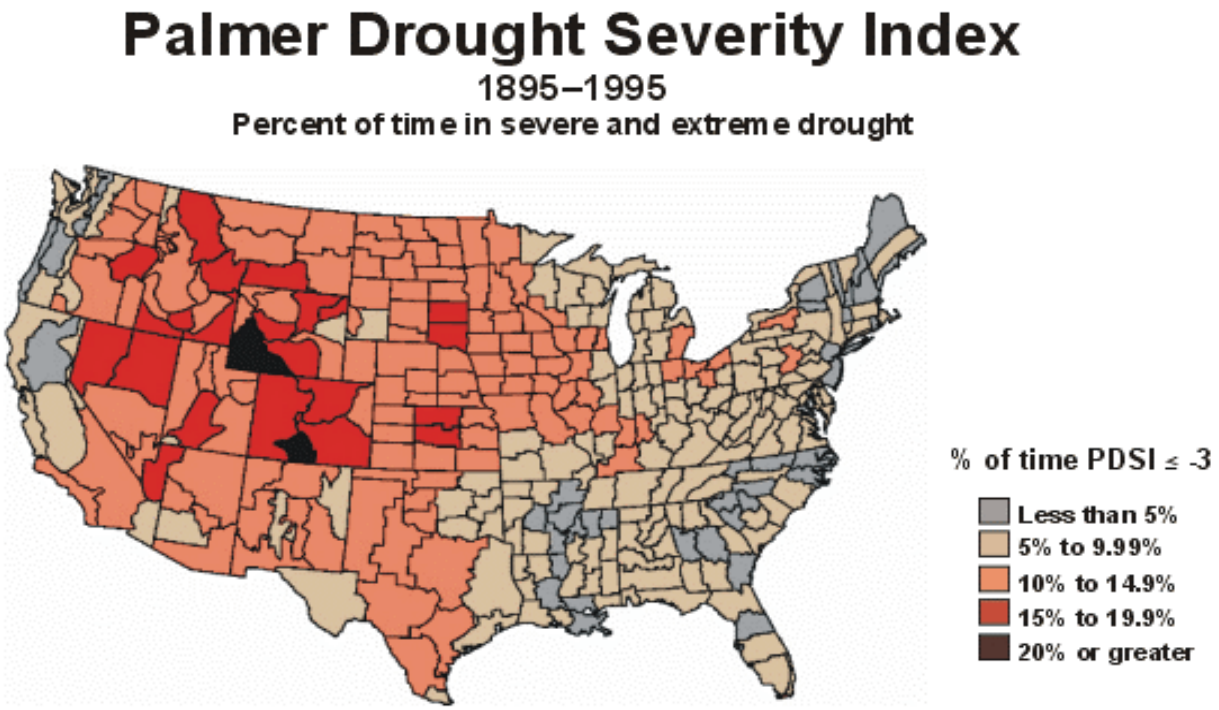
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Droughts are slow-onset hazards, but, over time, can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impact can be significant.

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United Stated, drought affects most areas of the United States, but is less severe in the Eastern United States.

FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (**Figure 5.2**), Central North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Furthermore, it is assumed that the Cape Fear Region would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

5.3.3 Historical Occurrences

Data from the North Carolina Drought Management Advisory Council and National Climatic Data Center (NCDC) were used to ascertain historical drought events in the Cape Fear Region. The North Carolina Drought Management Advisory Council reports data on North Carolina drought conditions from 2000 to 2013 through the North Carolina Drought Monitor. It classifies drought conditions by county on a scale of D0 to D4:

- D0: Abnormally Dry
- D1: Moderate Drought
- D2: Severe Drought

- D3: Extreme Drought
- D4: Exceptional Drought

According to the North Carolina Drought Monitor, all of the counties in the Cape Fear Region had drought occurrences (including abnormally dry) in all of the last 14 years (2000-2013) (**Table 5.4**). In addition, the most severe drought classification reported for each year in each county, according to North Carolina Drought Monitor classifications, is listed in the jurisdiction-specific annexes. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional, but a majority of the county may actually be in a less severe condition.

TABLE 5.4: SUMMARY OF DROUGHT OCCURRENCES IN THE CAPE FEAR REGION

Location	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Chatham County	14	3
Harnett County	14	3
Johnston County	14	2
Lee County	14	3
Moore County	14	3

Source: North Carolina Drought Monitor

5.3.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Cape Fear Region has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

5.4 EXTREME HEAT

5.4.1 Background

Extreme heat, like drought, poses little risk to property. However, extreme heat can have devastating effects on health. Extreme heat is often referred to as a "heat wave." According to the National Weather Service, there is no universal definition for a heat wave, but the standard U.S. definition is any event lasting at least three days where temperatures reach ninety degrees Fahrenheit or higher. However, it may also be defined as an event at least three days long where temperatures are ten degrees greater than the normal temperature for the affected area. Heat waves are typically accompanied by humidity but may also be very dry. These conditions can pose serious health threats causing an average of 1,500 deaths each summer in the United States[1].

According to the National Oceanic and Atmospheric Administration, heat is the number one weather-related killer among natural hazards, followed by frigid winter temperatures[1]. The National Weather

[1] http://www.noaawatch.gov/themes/heat.php

Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in **Figure 5.3**, uses air temperature and humidity to determine the heat index or apparent temperature. **Table 5.5** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly and young, are more susceptible to heat danger than other segments of the population.

FIGURE 5.3: HEAT INDEX CHART

Air Temp (in F) \ Relative Humidity (in percent)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
140	125																				
135	120	128																			
130	117	122	131																		
125	111	116	123	131	141																
120	107	111	116	123	130	139	148														
115	103	107	111	115	120	127	135	143	151												
110	99	102	105	108	112	117	123	130	137	143	150										
105	95	97	100	102	105	109	113	118	123	129	135	142	149								
100	91	93	95	97	99	101	104	107	110	115	120	126	132	138	144						
95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136				
90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113	117	122		
85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97	99	102	105	108
80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86	87	88	89	91
75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80
70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	70	71	71	71	71	72

Source: National Oceanic and Atmospheric Administration

TABLE 5.5: HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

Heat Index Temperature (Fahrenheit)	Description of Risks
80°- 90°	Fatigue possible with prolonged exposure and/or physical activity
90°- 105°	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105°- 130°	Sunstroke, heat cramps, and heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity
130° or higher	Heatstroke or sunstroke is highly likely with continued exposure

Source: National Weather Service; National Oceanic and Atmospheric Administration

In addition, NOAA has seventeen metropolitan areas participating in the Heat HealthWatch/Warning System in order to better inform and warn the public of heat dangers. A Heat HealthWatch is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Heat Warning is issued when an excessive heat event is expected in the next 36 hours. Furthermore, a warning is issued when the conditions are occurring, imminent, or have a high likelihood of occurrence. Urban areas participate in the Heat Health Watch/Warning System because urban areas are at greater risk to heat affects. Stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to excessively hot

temperatures. In addition, the "urban heat island effect" can produce significantly higher nighttime temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

5.4.2 Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. The entire Cape Fear Region is susceptible to extreme heat conditions.

5.4.3 Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in the Cape Fear Region. Three events were reported, the first of which affected all four counties in the region:

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

July 23, 1999 – *Excessive Heat* – A farm worker was overcome by heat exhaustion. He was taken to the local hospital where his body temperature was measured at 108. A 3 year old boy died after he apparently got into his parents car and could not get out.

July 20, 2005 – *Excessive Heat* – A migrant worker collapsed and died from heat stroke in Harnett County near Erwin. The man collapsed on a tobacco farm and was transported to UNC Hospital where he later died.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the region. Temperature information has been reported since 1892. The recorded maximum for each county can be found below in **Table 5.6**:

TABLE 5.6: HIGHEST RECORDED TEMPERATURE IN THE CAPE FEAR REGION

Location	Date	Temperature (°F)
Chatham County	7/27/1940	108
Harnett County	8/22/1983	108
Johnston County	8/18/1988	107
Lee County	8/18/1988	107
Moore County	6/23/1981	107
CAPE FEAR REGION MAXIMUM	--	**108**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the region. The most centralized location is in Sanford (Lee County). **Table 5.7** shows the average maximum temperatures from 1971 to 2000 at the Sanford observation station which can be used as a general comparison for the region.

TABLE 5.7: AVERAGE MAXIMUM TEMPERATURE IN SANFORD, LEE COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	52.4	57.3	65.9	75.3	81.8	87.8	91.0	88.9	83.8	74.1	64.2	55.2

Source: State Climate Office of North Carolina

5.4.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Cape Fear Region has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the region.

5.5 HAILSTORM

5.5.1 Background

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed separately in Section 5.8). Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.8** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.8: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 - 0.2	No damage
H1	Potentially Damaging	5-**15**	>20	0.2 - 0.6	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	0.4 - 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	0.8 - 1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	1.0 - 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	1.2 - 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H6	Destructive	40-**60**		1.6 - 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		2.0 - 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		1.6 - 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		3.0 - 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: http://www.torro.org.uk/site/hscale.php

5.5.2 Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that the Cape Fear Region is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hail which may be produced by such storms.

5.5.3 Historical Occurrences

According to the National Climatic Data Center, 475 recorded hailstorm events have affected the Cape Fear Region since 1956.[2] **Table 5.9** is a summary of the hail events in the Cape Fear Region. Detailed information about each event that occurred in the region is provided in the jurisdiction-specific annexes. In all, hail occurrences resulted in nearly $1.4 million (2013 dollars) in property damages, all of which was reported in Harnett and Johnston Counties. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Furthermore, high losses in Harnett and Johnston Counties indicate that neighboring counties may also be subject to additional, unreported losses. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

TABLE 5.9: SUMMARY OF HAIL OCCURRENCES IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**66**	**0/0**	**$0**
Goldston	8	0/0	$0
Pittsboro	15	0/0	$0
Siler City	5	0/0	$0

[2] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected the Cape Fear Region. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Unincorporated Area	38	0/0	$0
Harnett County	**108**	**0/0**	**$105,165**
Angier	3	0/0	$72,567
Coats	5	0/0	$0
Dunn	8	0/0	$0
Erwin	9	0/0	$0
Lillington	15	0/0	$0
Unincorporated Area	68	0/0	$32,598
Johnston County	**155**	**0/0**	**$1,250,123**
Archer Lodge	3	0/0	$0
Benson	16	0/0	$290,268
Clayton	21	0/0	$5,075
Four Oaks	11	0/0	$0
Kenly	6	0/0	$890,783
Micro	0	0/0	$0
Pine Level	2	0/0	$0
Princeton	16	0/0	$0
Selma	2	0/0	$0
Smithfield	13	0/0	$8,069
Wilson's Mills	8	0/0	$0
Unincorporated Area	57	0/0	$55,928
Lee County	**47**	**0/0**	**$0**
Broadway	7	0/0	$0
Sanford	16	0/0	$0
Unincorporated Area	24	0/0	$0
Moore County	**99**	**0/0**	**$0**
Aberdeen	5	0/0	$0
Cameron	2	0/0	$0
Carthage	8	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	1	0/0	$0
Pinehurst	2	0/0	$0
Robbins	12	0/0	$0
Southern Pines	6	0/0	$0
Taylortown	0	0/0	$0
Vass	2	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	61	0/0	$0
CAPE FEAR REGIONAL TOTAL	**475**	**0/0**	**$1,355,288**

Source: National Climatic Data Center

5.5.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire Cape Fear Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region.

5.6 HURRICANE AND TROPICAL STORM

5.6.1 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.

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 intensity is further classified by the Saffir-Simpson Scale (**Table 5.10**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

TABLE 5.10: SAFFIR-SIMPSON SCALE

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (Millibars)
1	74–95	Greater than 980
2	96–110	979–965
3	111–129	964–945
4	130–156	944–920
5	157 +	Less than 920

Source: National Hurricane Center (2012)

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 5.11** 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 5.11: 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

5.6.2 Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect the Cape Fear Region. All areas in the Cape Fear Region are equally susceptible to hurricanes and tropical storms.

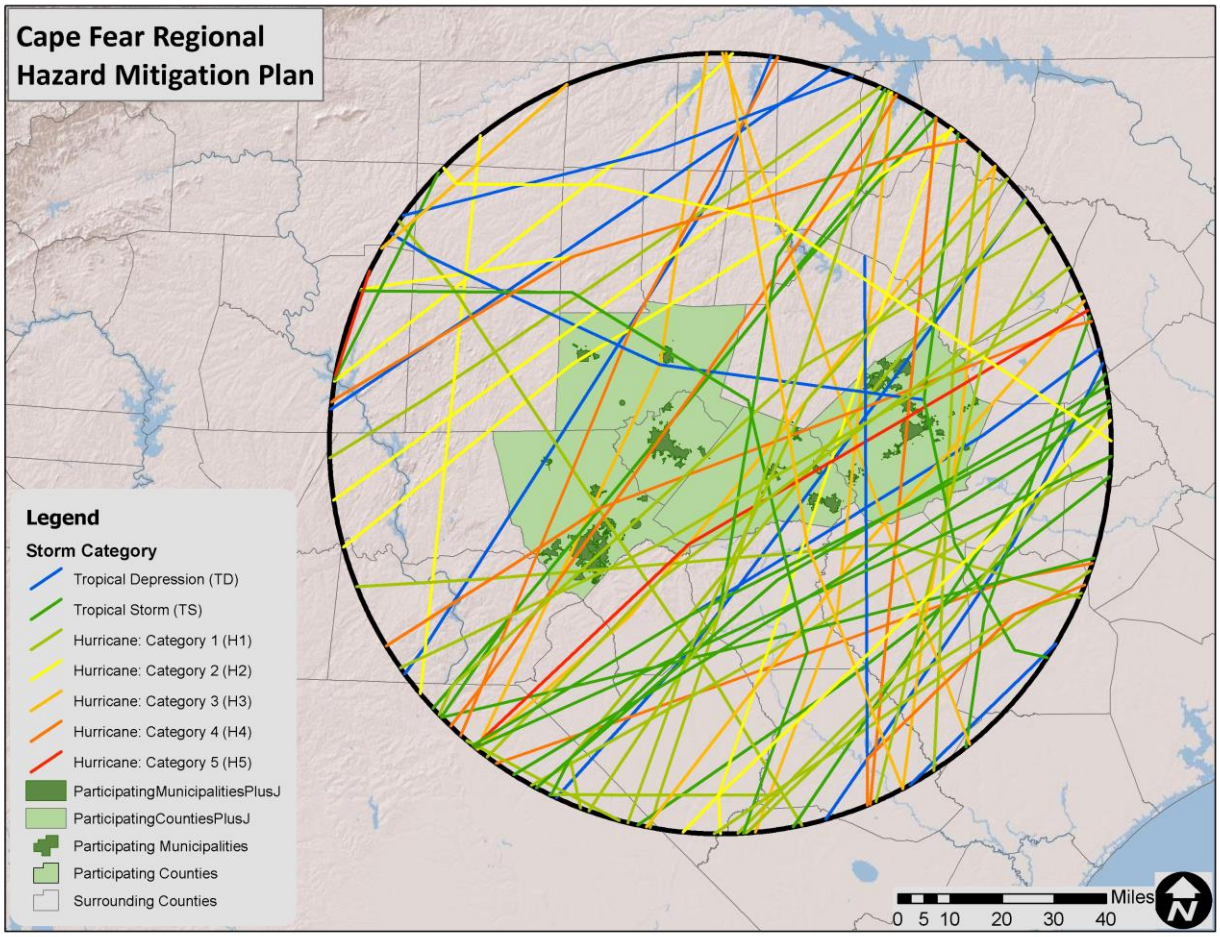
5.6.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[3] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

[3] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

Of the recorded storm events, 40 have traversed directly through the Cape Fear Region as shown in **Figure 5.4**. **Table 5.12** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cape Fear Region) and Maximum Category of the storm (based on the Saffir-Simpson Scale) for each event.

FIGURE 5.4: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center reported seven events associated with a hurricane or tropical storm in the Cape Fear Region since 1996. These storms are listed in **Table 5.13** and are generally representative of storms with the greatest impact on the region over that time period.

TABLE 5.13: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN THE CAPE FEAR REGION

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
8/27/1998	Hurricane Bonnie	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$645,322,144
8/30/2004	Tropical Depression Gaston	0/0	$0
9/1/2006	Tropical Storm Ernesto	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that four disaster declarations were made in 1996 (Hurricane Fran), 1999 (Hurricane Floyd), 2003 (Hurricane Isabel), and 2011 (Hurricane Irene) for the region.[4]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in the Cape Fear region as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout

[4] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Hurricane Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

5.6.4 Probability of Future Occurrences

Given the inland location of the region, the Cape Fear counties are less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the region's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historical evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas are equally exposed to this hazard. When the region is impacted, the damage could be significant, threatening lives and property throughout the planning area.

5.7 LIGHTNING

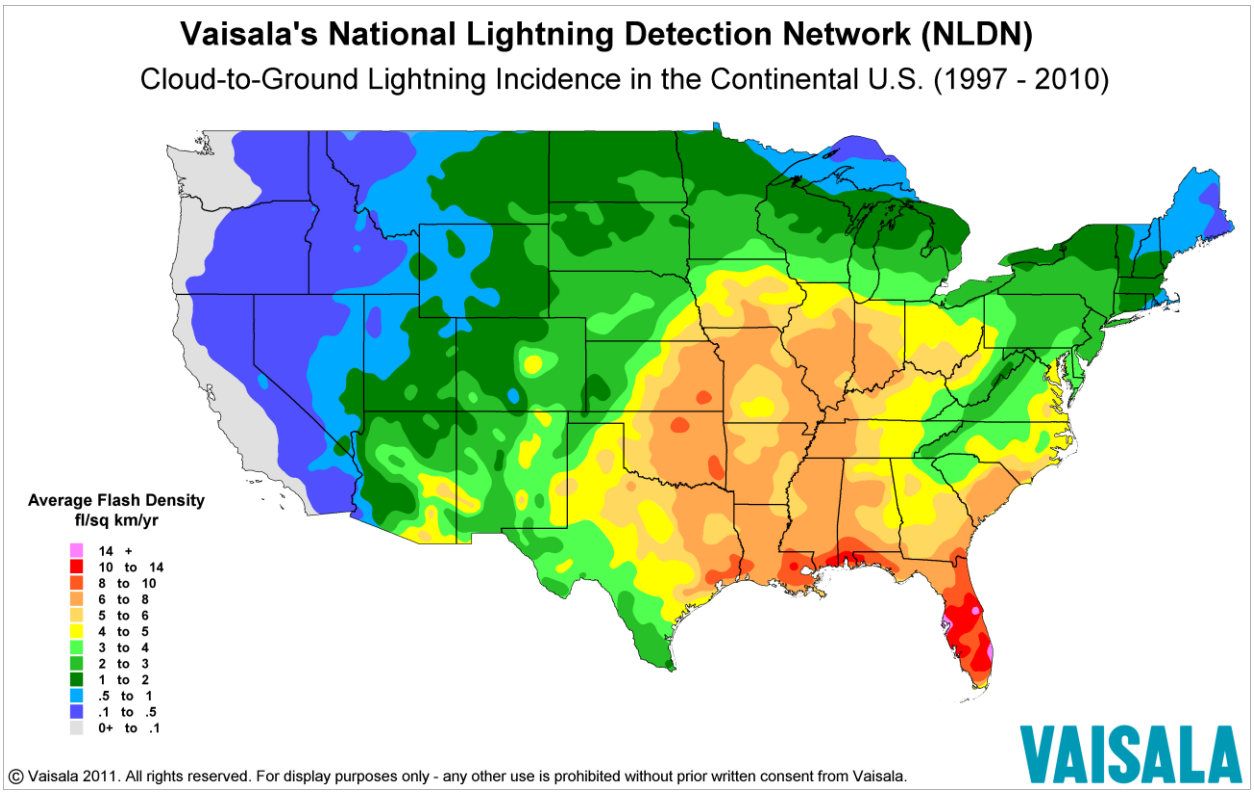
5.7.1 Background

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

Figure 5.5 shows a lightning flash density map for the years 1997-2010 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.5: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala United States National Lightning Detection Network

5.7.2 Location and Spatial Extent

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the Cape Fear Region is uniformly exposed to lightning.

5.7.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of 24 recorded lightning events in the Cape Fear Region since 1997.[5] These events resulted in nearly $1.2 million (2013 dollars) in damages, as listed in summary **Table 5.14**. Furthermore, lightning caused 1 death and 8 injuries throughout the Cape Fear Region. Detailed information on historical lightning events can be found in the jurisdiction-specific annexes**.**

[5] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in the Cape Fear Region. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

It is certain that more than 16 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.14: SUMMARY OF LIGHTNING OCCURRENCES IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**1**	**0/0**	**$50,750**
Goldston	0	0/0	$0
Pittsboro	0	0/0	$0
Siler City	0	0/0	$0
Unincorporated Area	1	0/0	$50,750
Harnett County	**4**	**0/1**	**$117,581**
Angier	0	0/0	$0
Coats	0	0/0	$0
Dunn	1	0/0	$1,087
Erwin	0	0/0	$0
Lillington	1	0/0	$36,283
Unincorporated Area	2	0/1	$80,211
Johnston County	**8**	**0/6**	**$1,250,123**
Archer Lodge	1	0/0	$0
Benson	1	0/2	$290,268
Clayton	3	0/1	$5,075
Four Oaks	0	0/0	$0
Kenly	0	0/0	$890,783
Micro	0	0/0	$0
Pine Level	0	0/0	$0
Princeton	0	0/0	$0
Selma	2	0/2	$0
Smithfield	0	0/0	$8,069
Wilson's Mills	0	0/0	$0
Unincorporated Area	1	0/1	$55,928
Lee County	**2**	**0/0**	**$140,568**
Broadway	0	0/0	$0
Sanford	1	0/0	$119,178
Unincorporated Area	1	0/0	$21,390
Moore County	**9**	**1/1**	**$636,722**
Aberdeen	0	0/0	$0
Cameron	2	0/0	$1,069
Carthage	1	0/0	$427,791
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	1	0/0	$0
Robbins	1	0/1	$0
Southern Pines	3	1/0	$197,167
Taylortown	0	0/0	$0
Vass	0	0/0	$0

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Whispering Pines	0	0/0	$0
Unincorporated Area	1	0/0	$10,695
CAPE FEAR REGIONAL TOTAL	**24**	**1/8**	**$1,162,084**

Source: National Climatic Data Center

5.7.4 Probability of Future Occurrences

Although there was not a high number of historical lightning events reported throughout the Cape Fear Region via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), the Cape Fear Region is located in an area of the country that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

5.8 THUNDERSTORM WIND / HIGH WIND

5.8.1 Background

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning.[6] Although thunderstorms generally affect a small area, they are very dangerous and may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail at least one inch in diameter, 2) a tornado, or 3) winds of at least 58 miles per hour.

Thunderstorm events have the capability of producing straight-line winds that can cause severe destruction to communities and threaten the safety of a population. Such wind events, sometimes separate from a thunderstorm event, are common throughout the Cape Fear Region. Therefore, high winds are also reported in this section.

[6]Lightning and hail hazards are discussed as separate hazards in this section.

High winds can form due to pressure of the Northeast coast that combines with strong pressure moving through the Ohio Valley. This creates a tight pressure gradient across the region, resulting in high winds which increase with elevation. It is common for gusts of 30 to 60 miles per hour during the winter months.

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

5.8.2 Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, the Cape Fear Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the Cape Fear Region has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

5.8.3 Historical Occurrences

Severe storms were at least partially responsible for one disaster declaration in the Cape Fear Region in 2011.[7] According to NCDC, there have been 796 reported thunderstorm wind and high wind events since 1957 in the Cape Fear Region.[8] These events caused over $4.0 million (2013 dollars) in damages. There were also reports of 15 injuries and 1 fatality. **Table 5.15** summarizes this information. Detailed thunderstorm wind and high wind event reports, including date, magnitude, and associated damages for each event, are presented in the jurisdiction-specific annexes. [9]

TABLE 5.15: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**142**	**0/3**	**$527,049**
Goldston	8	0/0	$761
Pittsboro	19	0/0	$171,445
Siler City	24	0/0	$232,982

[7] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[8] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional thunderstorm events have occurred in the Cape Fear Region. As additional local data becomes available, this hazard profile will be amended.
[9] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Unincorporated Area	91	0/3	$121,861
Harnett County	**158**	**1/6**	**$1,086,189**
Angier	6	0/0	$0
Coats	7	0/0	$7,864
Dunn	11	0/0	$39,736
Erwin	4	0/0	$0
Lillington	21	0/0	$40,515
Unincorporated Area	109	1/6	$1,086,189
Johnston County	**250**	**0/1**	**$716,431**
Archer Lodge	7	0/0	$16,876
Benson	15	0/1	$77,228
Clayton	29	0/0	$6,109
Four Oaks	9	0/0	$10,363
Kenly	6	0/0	$15,497
Micro	5	0/0	$0
Pine Level	2	0/0	$4,587
Princeton	11	0/0	$13,982
Selma	7	0/0	$47,671
Smithfield	28	0/0	$160,478
Wilson's Mills	3	0/0	$0
Unincorporated Area	128	0/0	$363,640
Lee County	**86**	**0/1**	**$364,056**
Broadway	7	0/0	$0
Sanford	27	0/0	$313,413
Unincorporated Area	52	0/1	$50,643
Moore County	**160**	**0/4**	**$190,883**
Aberdeen	5	0/0	$0
Cameron	1	0/0	$0
Carthage	19	0/1	$12,725
Foxfire Village	1	0/0	$0
Pinebluff	4	0/0	$510,900
Pinehurst	4	0/0	$496,918
Robbins	11	0/0	$2,173
Southern Pines	9	0/0	$508
Taylortown	3	0/0	$0
Vass	7	0/0	$6,974
Whispering Pines	0	0/0	$0
Unincorporated Area	96	0/3	$190,883
CAPE FEAR REGIONAL TOTAL	**796**	**1/15**	**$4,002,921**

Source: National Climatic Data Center

5.8.4 Probability of Future Occurrences

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire planning area.

5.9 TORNADO

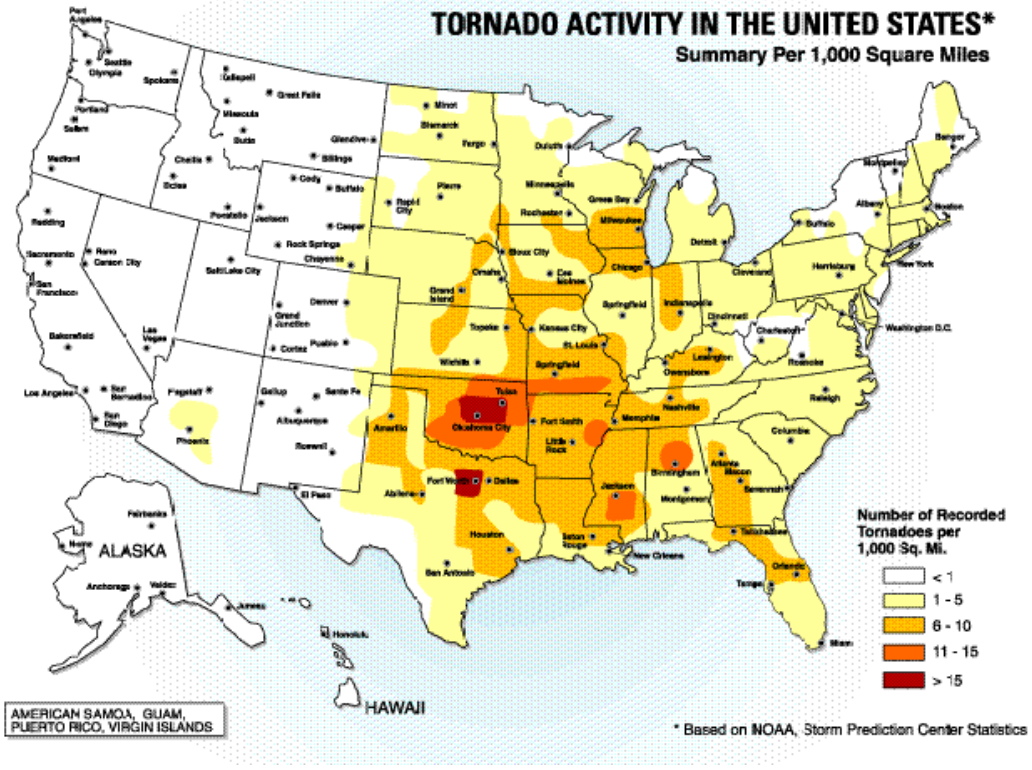
5.9.1 Background

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.[10] 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). **Figure 5.6** shows tornado activity in the United States based on the number of recorded tornadoes per 1,000 square miles.

[10] NOAA, 2009.

FIGURE 5.6: TORNADO ACTIVITY IN THE UNITED STATES



Source: Federal Emergency Management Agency

Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.16**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.17**).

TABLE 5.16: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-SCALE NUMBER	INTENSITY	WIND SPEED	TYPE OF DAMAGE DONE
F0	GALE TORNADO	40–72 MPH	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE TORNADO	73–112 MPH	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT TORNADO	113–157 MPH	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE TORNADO	158–206 MPH	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING TORNADO	207–260 MPH	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE TORNADO	261–318 MPH	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	INCONCEIVABLE TORNADO	319–379 MPH	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies.

Source: National Weather Service

TABLE 5.17 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

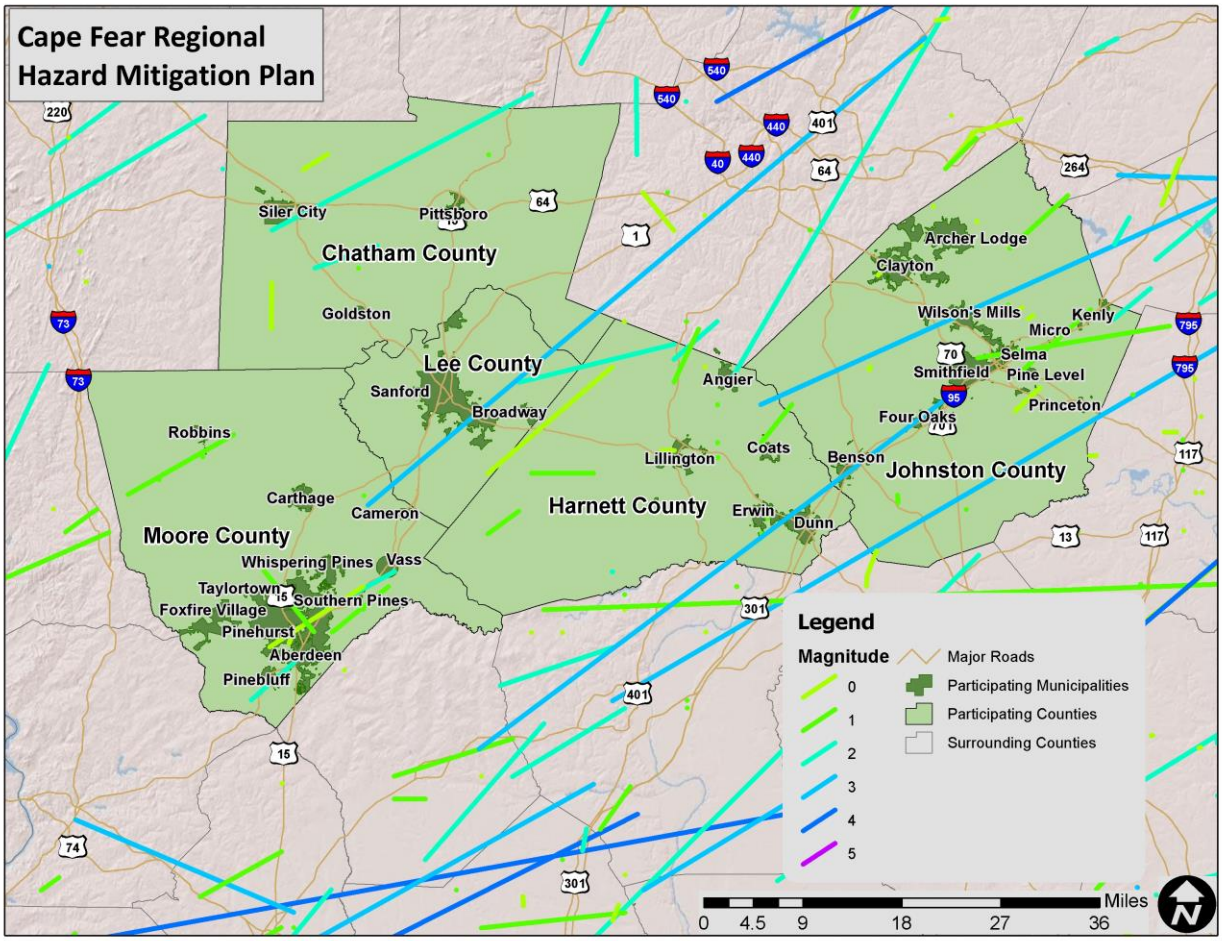
EF-SCALE NUMBER	INTENSITY PHRASE	3 SECOND GUST (MPH)	TYPE OF DAMAGE DONE
F0	GALE	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
F1	MODERATE	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	SIGNIFICANT	111–135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	SEVERE	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
F4	DEVASTATING	166–200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	INCREDIBLE	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

5.9.2 Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in the Cape Fear Region. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that the Cape Fear Region is uniformly exposed to this hazard. With that in mind, **Figure 5.7** shows tornado track data for many of the major tornado events that have impacted the region. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE 5.7: HISTORICAL TORNADO TRACKS IN THE CAPE FEAR REGION



Source: National Weather Service Storm Prediction Center

5.9.3 Historical Occurrences

Tornadoes were at least partially responsible for one disaster declaration in the Cape Fear Region in 2011.[11] According to the National Climatic Data Center, there have been a total of 72 recorded tornado events in the Cape Fear Region since 1956 (**Table 5.18**), resulting in just over $122.1 million (2013 dollars) in property damages.[12] In addition, 4 deaths and 154 injuries were reported. The magnitude of these tornadoes ranges from F0 to F3 in intensity, although an F4 or F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 57 years. Detailed information on historical tornado events can be found in the jurisdiction-specific annexes.

[11] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[12] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in the Cape Fear Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.18: SUMMARY OF TORNADO OCCURRENCES IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**10**	**0/0**	**$874,984**
Goldston	0	0/0	$0
Pittsboro	1	0/0	$0
Siler City	0	0/0	$0
Unincorporated Area	9	0/0	$874,984
Harnett County	**23**	**1/34**	**$21,809,098**
Angier	1	0/0	$0
Coats	1	0/0	$0
Dunn	0	0/0	$0
Erwin	0	0/0	$0
Lillington	1	0/0	$0
Unincorporated Area	20	1/34	$21,809,098
Johnston County	**20**	**1/81**	**$31,193,506**
Archer Lodge	1	0/0	$0
Benson	2	0/67	$25,907,875
Clayton	1	0/0	$0
Four Oaks	0	0/0	$0
Kenly	2	1/2	$541,121
Micro	1	0/0	$30,424
Pine Level	1	0/0	$0
Princeton	1	0/0	$0
Selma	0	0/0	$0
Smithfield	0	0/0	$0
Wilson's Mills	0	0/0	$0
Unincorporated Area	11	0/12	$4,714,086
Lee County	**4**	**2/36**	**$59,284,498**
Broadway	1	0/0	$0
Sanford	0	0/0	$0
Unincorporated Area	3	2/36	$59,284,498
Moore County	**15**	**0/3**	**$8,963,418**
Aberdeen	1	0/0	$0
Cameron	1	0/0	$0
Carthage	0	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	0	0/0	$0
Robbins	0	0/0	$0
Southern Pines	1	0/0	$0
Taylortown	0	0/0	$0
Vass	2	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	10	0/3	$8,963,418
CAPE FEAR REGIONAL TOTAL	**72**	**4/154**	**$122,125,504**

Source: National Climatic Data Center

5.9.4 Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the region. However, given the region's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should the Cape Fear Region experience a direct tornado strike. The probability of future tornado occurrences affecting the Cape Fear Region is likely (10 to 100 percent annual probability).

5.10 WINTER STORM AND FREEZE

5.10.1 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 of 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.

5.10.2 Location and Spatial Extent

Nearly the entire continental United States 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 Cape Fear Region is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

5.10.3 Historical Occurrences

Winter weather has resulted in four disaster declarations in the Cape Fear Region. This includes ice storms in 1968 and 2002, the Blizzard of 1996, and one 2000 winter storm.[13] According to the National Climatic Data Center, there have been a total of 132 recorded winter storm events in the Cape Fear Region since 1993 (**Table 5.19**).[14] These events resulted in over $4.0 million (2013 dollars) in damages.[15] Detailed information on the recorded winter storm events can be found in the jurisdiction-specific annexes.

TABLE 5.19: SUMMARY OF WINTER STORM EVENTS IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	29	0/0	$806,869
Harnett County	28	0/0	$812,486
Johnston County	30	0/0	$812,486
Lee County	23	0/0	$806,869
Moore County	22	0/0	$806,869
CAPE FEAR REGION TOTAL	**102**	**2/10[16]**	**$3,233,093**

Source: National Climatic Data Center

There have been several severe winter weather events in the Cape Fear Region. The text below describes two of the major events and associated impacts on the region. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

[13] Not all of the participating counties were declared disaster areas for these events. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Profiles*.
[14] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional winter storm conditions have affected the Cape Fear Region. In addition, the 102 are reported by county, so many of these storms likely affected all of the counties.
[15] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.
[16] No deaths/injuries were reported at the county level for any events, however the winter storm of 1993 caused 2 deaths and 10 injuries across the state, so these totals were included in the analysis.

2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

5.10.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the Cape Fear Region. According to historical information, the Cape Fear Region generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

Geologic Hazards

5.11 EARTHQUAKE

5.11.1 Background

An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

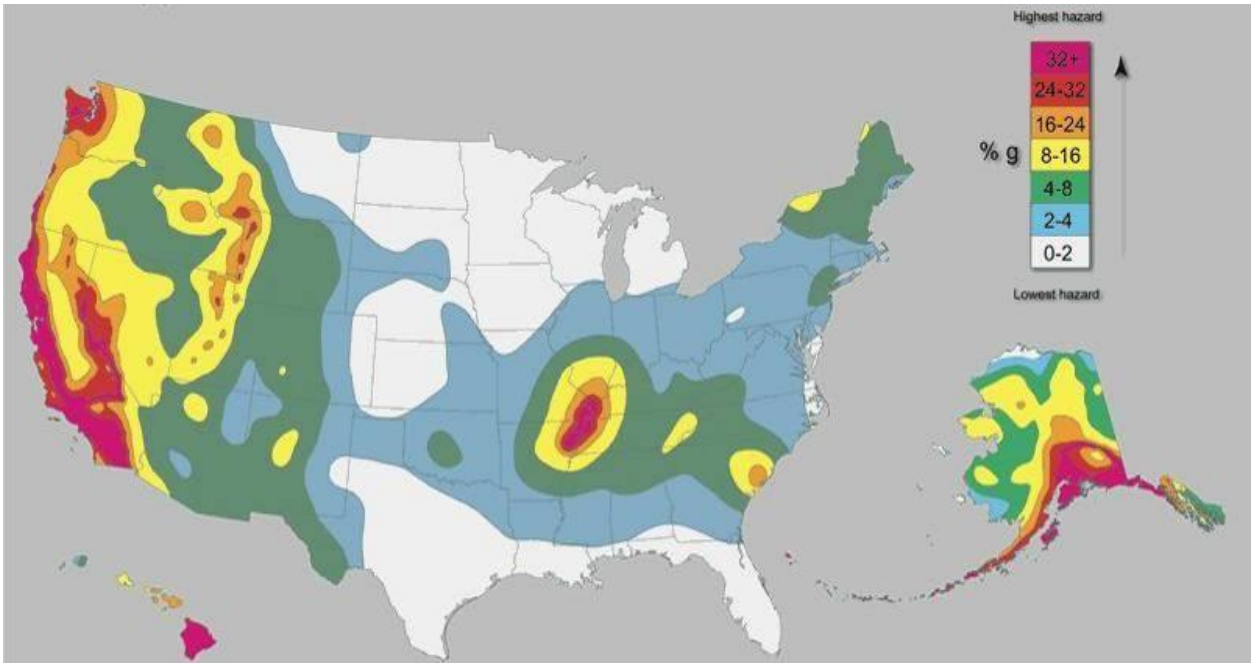
Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

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.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate

risk to less frequent, less intense earthquake events. **Figure 5.8** shows relative seismic risk for the United States.

FIGURE 5.8: UNITED STATES EARTHQUAKE HAZARD MAP



Source: United States Geological Survey

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 (**Table 5.20**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.21**.

TABLE 5.20: RICHTER SCALE

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 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 about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

TABLE 5.21: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

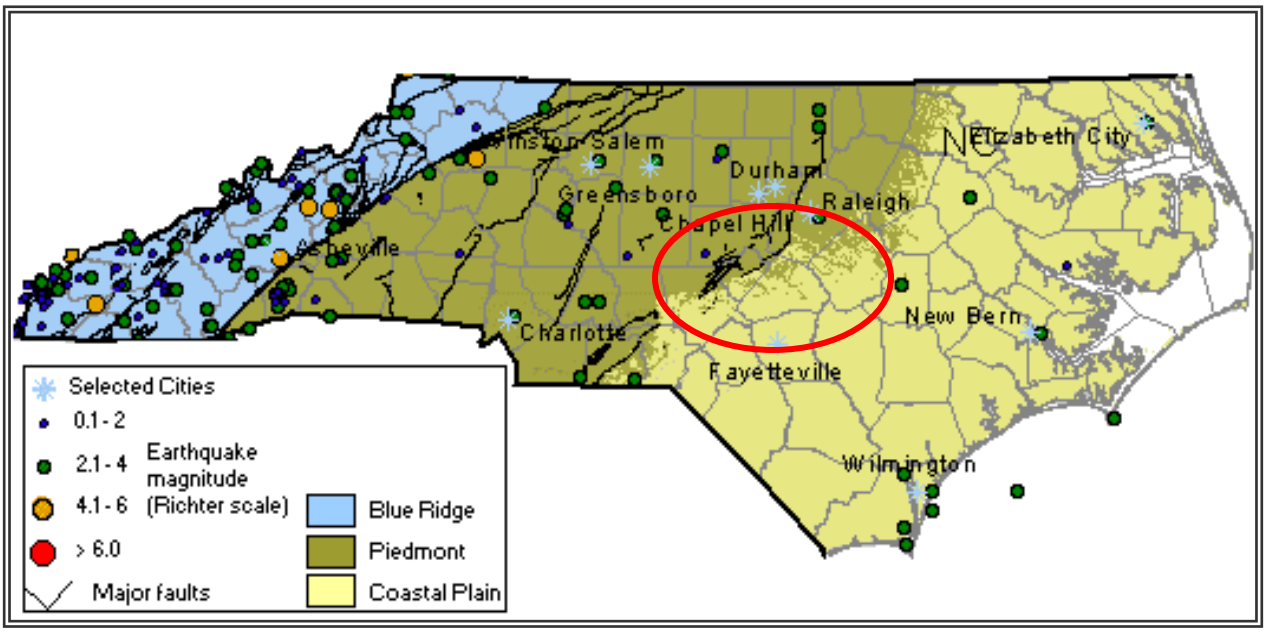
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

5.11.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.9** is a map showing geological and seismic information for North Carolina.

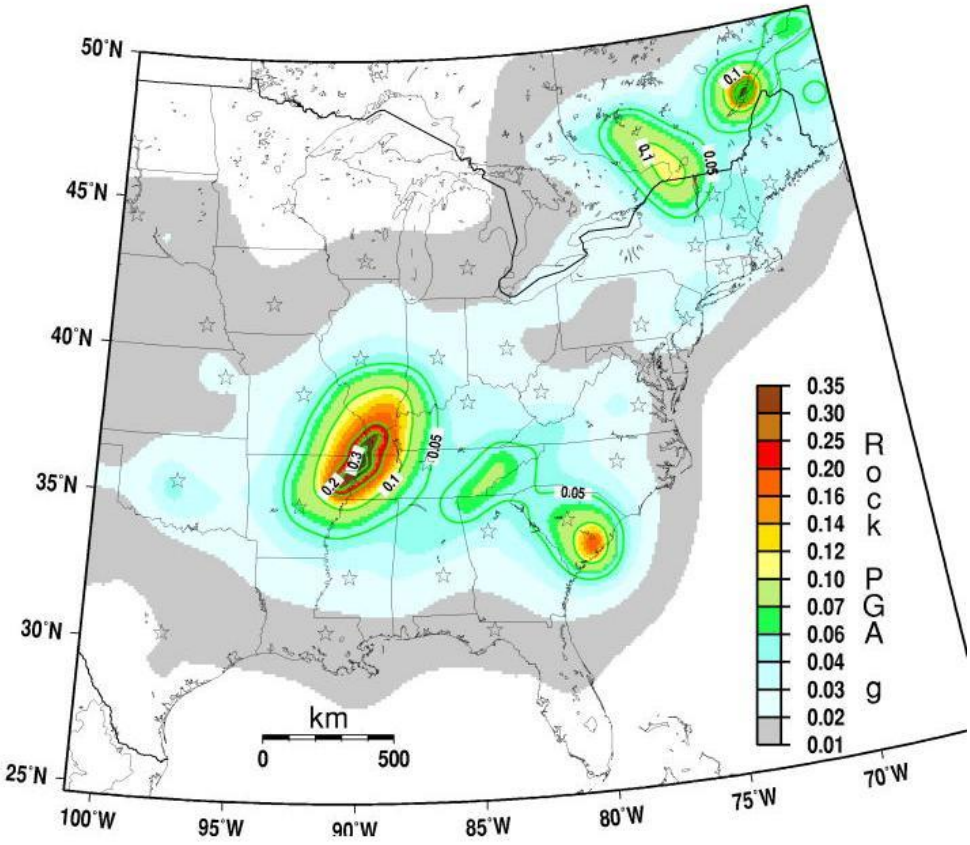
FIGURE 5.9: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.10 shows the intensity level associated with the Cape Fear Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, all of the Cape Fear Region lies within an approximate zone of level "2" to "4" ground acceleration. This indicates that the region as a whole exists within an area of low to moderate seismic risk.

FIGURE 5.10: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

5.11.3 Historical Occurrences

At least three earthquakes are known to have affected the Cape Fear Region since 1886. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. **Table 5.22** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. A detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known) can be found in the jurisdiction-specific annexes.[17]

TABLE 5.22: SUMMARY OF SEISMIC ACTIVITY IN CAPE FEAR REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Chatham County	**0**	**--**	**--**
Goldston	0	--	--
Pittsboro	0	--	--
Siler City	0	--	--
Unincorporated Area	0	--	--

[17] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Harnett County	**0**	**--**	**--**
Angier	0	--	--
Coats	0	--	--
Dunn	0	--	--
Erwin	0	--	--
Lillington	0	--	--
Unincorporated Area	0	--	--
Johnston County	**1**	**IV**	< 4.8
Archer Lodge	0	--	--
Benson	0	--	--
Clayton	0	--	--
Four Oaks	0	--	--
Kenly	0	--	--
Micro	0	--	--
Pine Level	0	--	--
Princeton	0	--	--
Selma	1	IV	< 4.8
Smithfield	0	--	--
Wilson's Mills	0	--	--
Unincorporated Area	0	--	--
Lee County	**1**	**V**	< 4.8
Broadway	0	--	--
Sanford	0	--	--
Unincorporated Area	1	V	< 4.8
Moore County	**2**	**V**	**--**
Aberdeen	0	--	--
Cameron	0	--	--
Carthage	1	V	< 4.8
Foxfire Village	0	--	--
Pinebluff	0	--	--
Pinehurst	1	II	< 4.2
Robbins	0	--	--
Southern Pines	0	--	--
Taylortown	0	--	--
Vass	0	--	--
Whispering Pines	0	--	--
Unincorporated Area	0	--	--
CAPE FEAR REGIONAL TOTAL	**4**	**V**	**< 4.8**

Source: National Geophysical Data Center

In addition to those earthquakes specifically affecting the Cape Fear Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.23.**

TABLE 5.23: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/071812	New Madrid, MO	8.7	XII	VI
04/29/1852	Wytheville, VA	5.0	VI	VI
08/31/1861	Wilkesboro, NC	5.1	VII	VII
12/23/1875	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII
05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913*	Union County, SC	4.8	VII	VI
02/21/1916*	Asheville, NC	5.5	VII	VII
07/08/1926	Mitchell County, NC	5.2	VII	VII
11/03/1928*	Newport, TN	4.5	VI	VI
05/13/1957*	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 **	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973*	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI

*This event is accounted for in the Cape Fear occurrences.

** Conflicting reports on this event, intensity in North Carolina could have been either V or VI

Source: This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERI, Memphis State University (1983).

5.11.4 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Cape Fear Region is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region. The annual probability level for the region is estimated less than 1 percent (unlikely).

5.12 LANDSLIDE

5.12.1 Background

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry." Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Among the most destructive types of debris flows are those that accompany volcanic eruptions. A spectacular example in the United States was a massive debris flow resulting from the 1980 eruptions of Mount St. Helens, Washington. Areas near the bases of many volcanoes in the Cascade Mountain Range of California, Oregon, and Washington are at risk from the same types of flows during future volcanic eruptions.

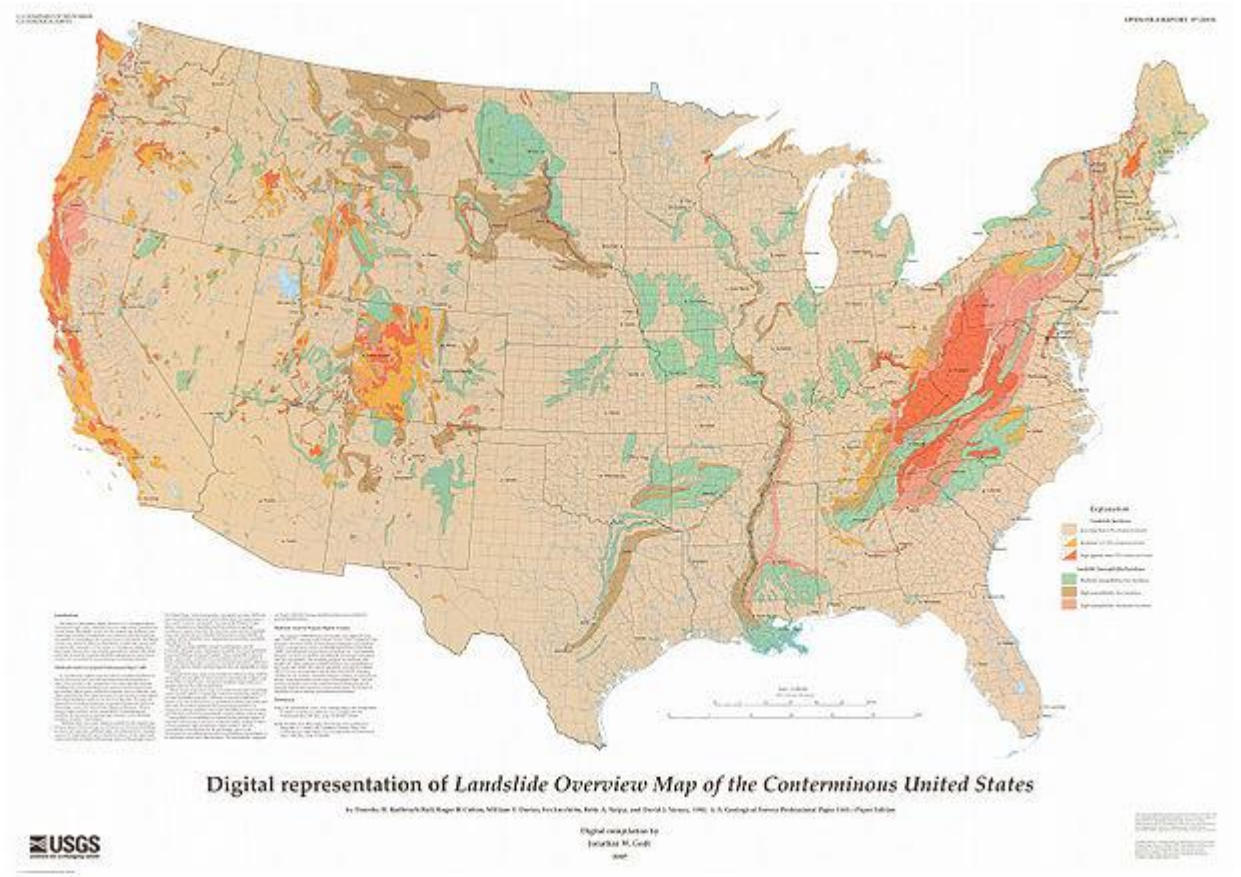
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat-lying areas away from sudden changes in slope, and areas at the top or along ridges set back from the tops of slopes.

According to the United States Geological Survey, each year landslides cause $5.1 billion (2009 dollars) in damage and between 25 and 50 deaths in the United States.[18] **Figure 5.11** delineates areas where large numbers of landslides have occurred and areas that are susceptible to landsliding in the conterminous United States.[19]

[18] United States Geological Survey (USGS). United States Department of the Interior. "Landslide Hazards – A National Threat." 2005.

[19] This map layer is provided in the U.S. Geological Survey Professional Paper 1183, Landslide Overview Map of the Conterminous United States, available online at: http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html.

FIGURE 5.11: LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES[20]



Landslide Incidence		Landslide Susceptibility/Incidence	
	Low Incidence (less than 1.5% of area involved)		Moderate susceptibility/low incidence
	Moderate Incidence (1.5%-15% of area involved)		High susceptibility/low incidence
	High Incidence (greater than 15% of area involved		High susceptibility/moderate incidence

Source: United States Geological Survey

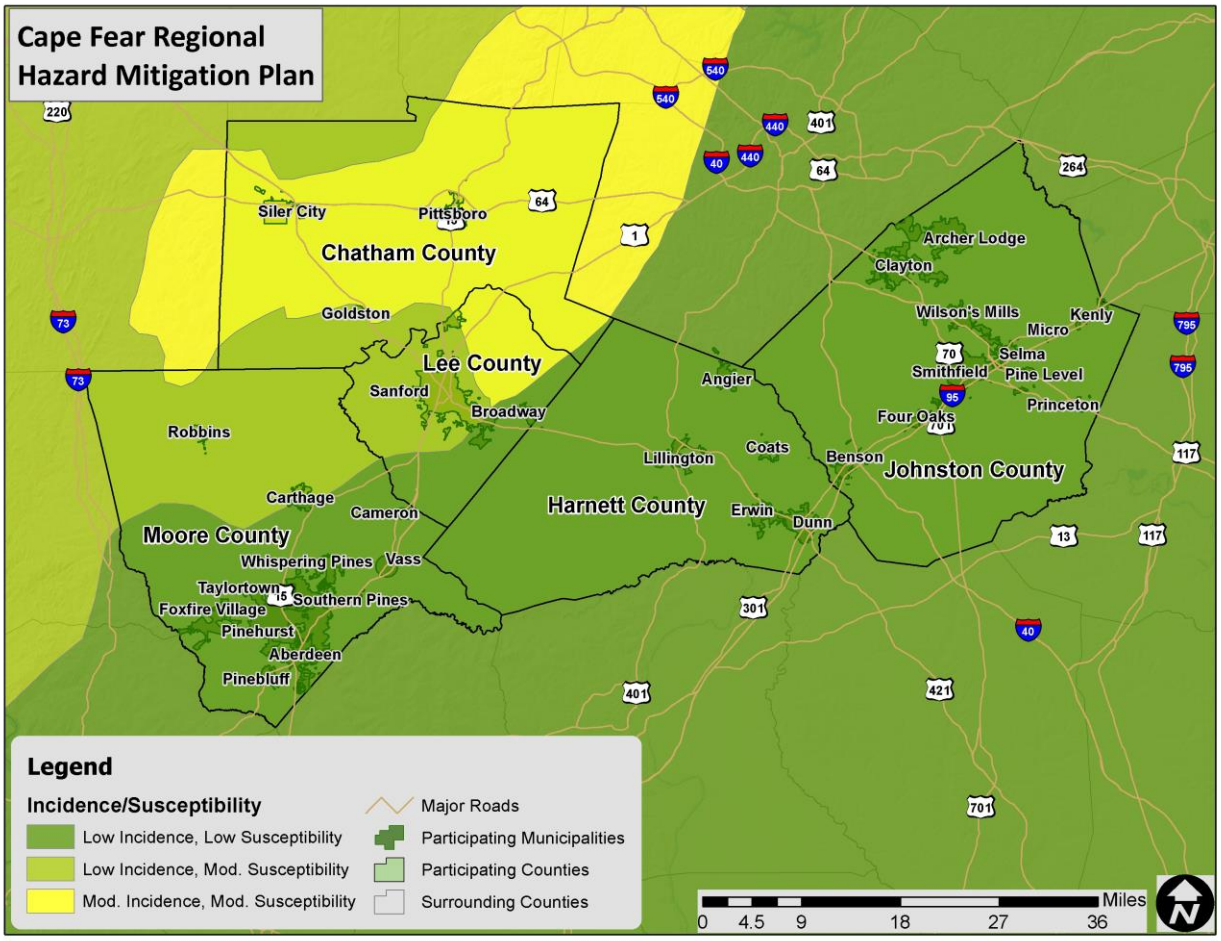
5.12.2 Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout the northeastern Cape Fear Region.

[20] Susceptibility not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

According to **Figure 5.12** below, the majority of the region, has low landslide activity. However, there is a sizable portion of the region that has moderate landslide incidence, covering much of Chatham County as well as smaller parts of Lee and Moore Counties.

FIGURE 5.12: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF THE CAPE FEAR REGION

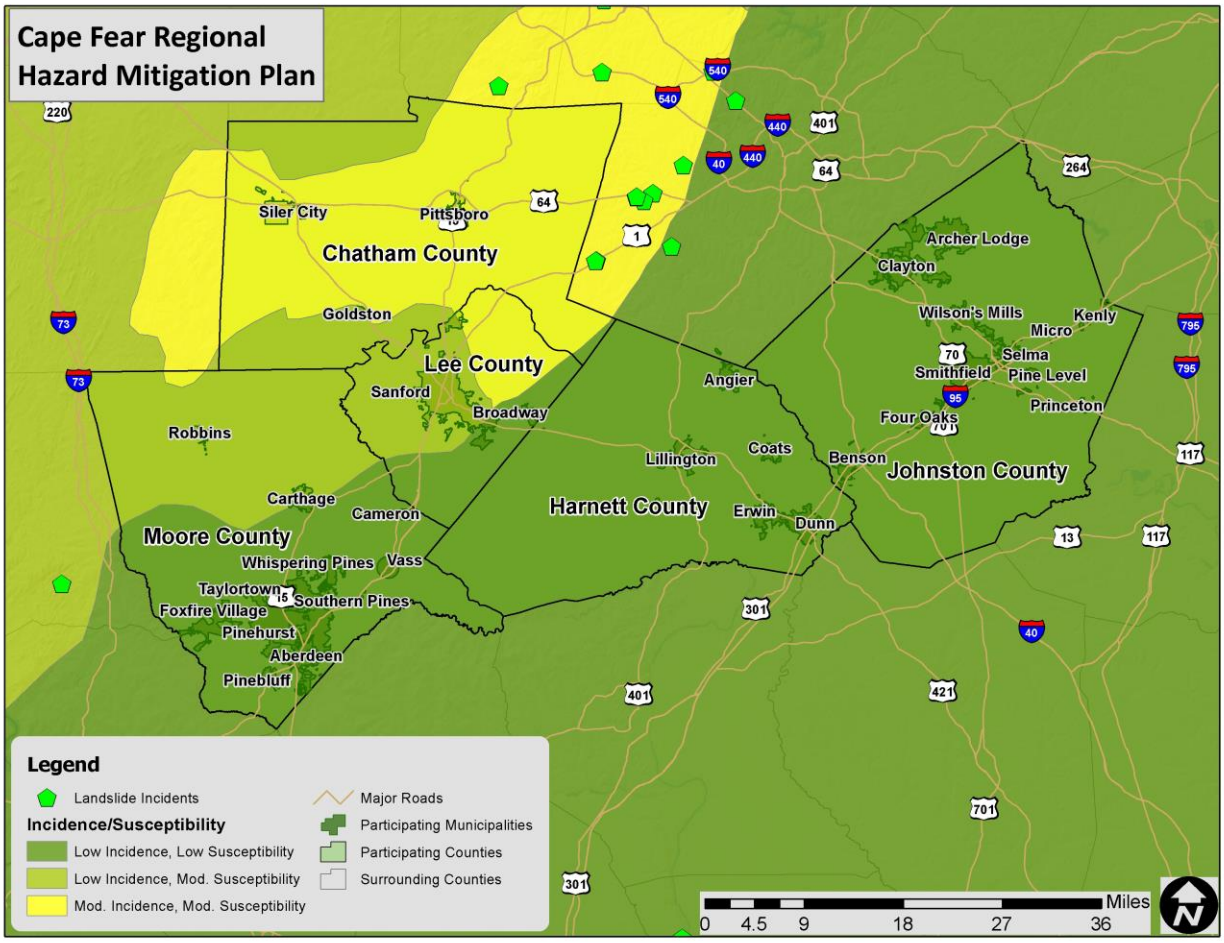


Source: United States Geological Survey

5.12.3 Historical Occurrences

Some areas of the Cape Fear Region planning area are susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the region, it should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The locations of landslide events that occurred nearby the region are presented in **Figure 5.13**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE 5.13: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN THE CAPE FEAR REGION



Source: North Carolina Geological Survey

5.12.4 Probability of Future Occurrences

Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent annual probability). However, local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in the Cape Fear Region have greater risk than others given factors such as steepness on slope and modification of slopes.

Hydrologic Hazards

5.13 DAM AND LEVEE FAILURE

5.13.1 Background

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation, and maintenance.

There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. If a levee breaks, scores of properties may become submerged in floodwaters and residents may become trapped by rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way.

5.13.2 Location and Spatial Extent

The North Carolina Division of Energy, Mineral, and Land Resources provides information on dams, including a hazard potential classification. There are three hazard classifications—high, intermediate, and low—that correspond to qualitative descriptions and quantitative guidelines. **Table 5.24** explains these classifications.

TABLE 5.24: NORTH CAROLINA 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
High	Loss of human life*	Probable loss of 1 or more human lives
	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

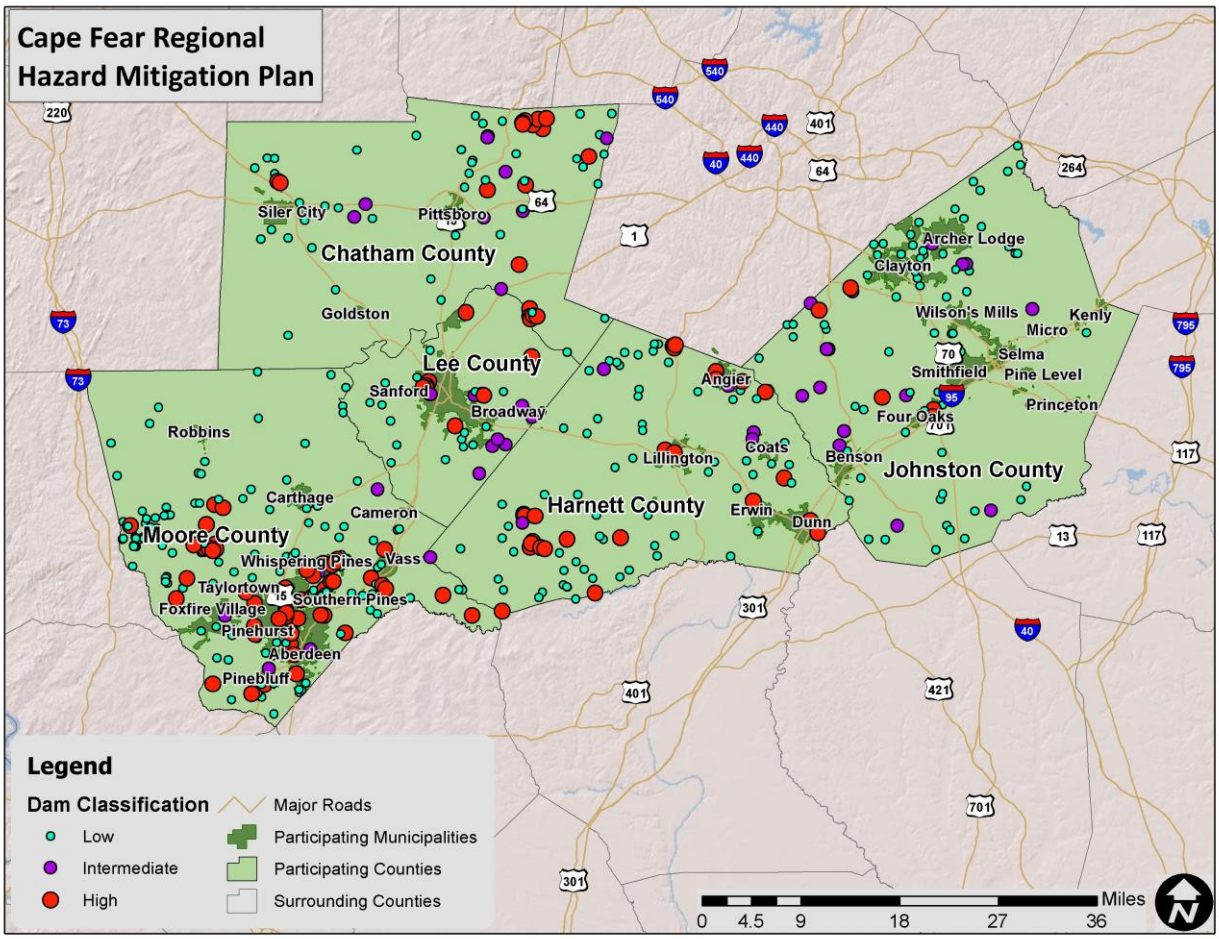
Source: North Carolina Division of Energy, Mineral, and Land Resources

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 499 dams in the Cape Fear Region.[21] **Figure 5.14** shows the dam location and the corresponding hazard ranking for each. Of these dams, 113 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.25** and more detailed information for each dam is listed in the jurisdiction-specific annexes.

TABLE 5.25: SUMMARY OF HIGH HAZARD DAM LOCATION

Location	Number High Hazard Dams
Chatham County	18
Harnett County	28
Johnston County	5
Lee County	9
Moore County	53
CAPE FEAR REGION TOTAL	**113**

FIGURE 5.14: CAPE FEAR REGION DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

[21] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

It should be noted that dam regulations for classifying dams was recently changed. As a result, generally more dams are classified as high hazard.

5.13.3 Historical Occurrences

There have been two dam breaches reported in the Cape Fear Region, both in Johnston County. Although no damage was reported with these events, several breach scenarios in the region could be catastrophic.

Additionally, according to the North Carolina State Hazard Mitigation Plan, there were 15 dam breaks reported across Eastern North Carolina following Hurricane Fran in 1996 and another 36 failures as a result of Hurricane Floyd in 1999. County-specific information is not available to determine if any of these breaks occurred in the Cape Fear Region.

The information below identifies additional historical information reported in the previous hazard mitigation plans.

Chatham County
No dam failures have been reported in Chatham County; however, failure of one or more of the high hazard dams due to high rain precipitation or other events could result in significant damage to downstream properties and the possible loss of human life.

Harnett County
No information on past dam failure events in the county was provided.

Johnston County
Two dam breaches were reported, one at Keen Lake Dam #1 and one at Austin Lake Dam. There is little information provided about these two events and no date of occurrence or damage associated with these dam failures is identified.

Lee County
No information on past dam failure events in the county was provided.

Moore County
No information on past dam failure events in the county was provided.

5.13.4 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. No further analysis will be completed in Section 6: *Vulnerability Assessment* as more sophisticated dam breach plans (typically completed by the U.S. Army Corp of Engineers) have been completed for dams of concern in the region.

5.14 EROSION

5.14.1 Background

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An area's potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

5.14.2 Location and Spatial Extent

Erosion in the Cape Fear Region is typically caused by flash flooding events. In contrast to coastal areas, where the soil is mainly composed of fine grained particles, Cape Fear soils have greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. However, erosion does occur in the Cape Fear Region, particularly along the banks of rivers and streams. Still, it is not an extreme threat to any of the participating counties and jurisdictions. No areas of concern were reported by the planning team.

5.14.3 Historical Occurrences

Several sources were vetted to identify areas of erosion in the Cape Fear Region. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. Little information could be found beyond the hazard mitigation plans.

Erosion was not addressed in the previous Moore County hazard mitigation plan. Erosion was recognized in the Chatham, Harnett, and Lee County plans, but there was no recorded history of significant erosion events and it was found to be hazard with a low potential impact.

5.14.4 Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for the Cape Fear Region, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent). However, given the lack of historical events, location, data, and threat to life or property, no further analysis will be done in Section 6: *Vulnerability Assessment*.

5.15 FLOOD

5.15.1 Background

Flooding is the most frequent and costly natural hazard in the United States and is a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave action, and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as a floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies, such as the 100-year flood, are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.15.2 Location and Spatial Extent

There are areas in the Cape Fear Region that are susceptible to flood events. Special flood hazard areas in the Cape Fear Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[22] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 3,070 square miles that make up the Cape Fear Region (including the area of Chatham County, Harnett County, Johnston County, Lee County, and Moore County), there are 330.7 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 21.4 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.26**.

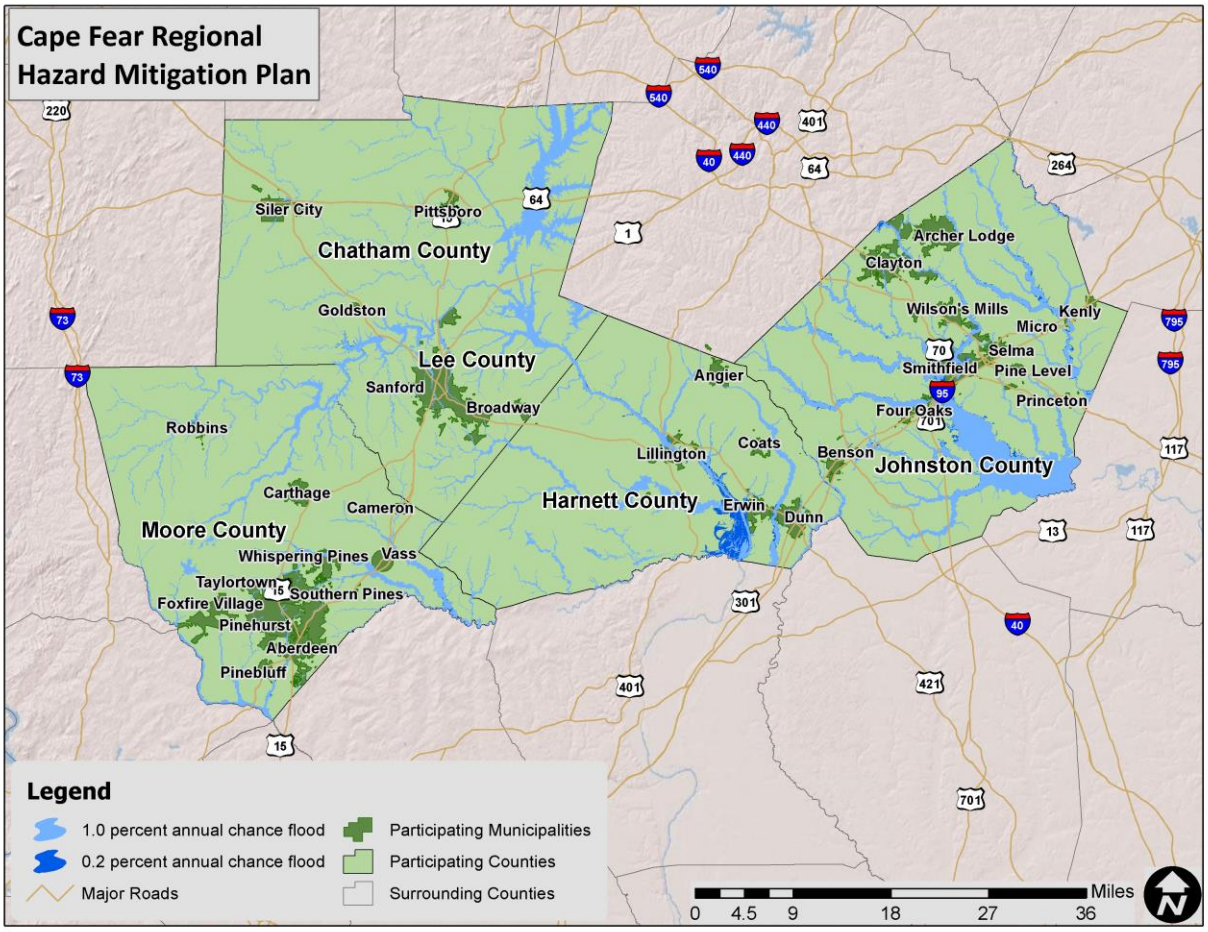
TABLE 5.26: SUMMARY OF FLOODPLAIN AREAS IN THE CAPE FEAR REGION

Location	100-year area (square miles)	500-year area (square miles)
Chatham County	73.1	0.4
Harnett County	52.9	11.8
Johnston County	126.0	7.8
Lee County	24.5	0.3
Moore County	54.2	1.1
CAPE FEAR REGION TOTAL	**330.7**	**21.4**

These flood zone values account for 11.5 percent of the total land area in the Cape Fear Region. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure 5.15** illustrates the location and extent of currently mapped special flood hazard areas for the Cape Fear Region based on best available FEMA DFIRM data.

[22] The county-level DFIRM data used for Harnett, Lee, and Moore Counties were updated in 2009, the Johnston County data was updated in 2010, and the Chatham County data was updated in 2011.

FIGURE 5.15: SPECIAL FLOOD HAZARD AREAS IN THE CAPE FEAR REGION



Source: Federal Emergency Management Agency

Additional, more detailed county-level and jurisdiction-level maps can be found in the annexes.

5.15.3 Historical Occurrences

Flooding was at least partially responsible for one disaster declaration in the Cape Fear Region in 2011.[23] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 121 events throughout the Cape Fear Region since 1993.[24] A summary of these events is presented in **Table 5.27**. These events accounted for almost $519,000 (2013 dollars) in property damage throughout the region as well as three fatalities and one injury.[25] Specific information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in the jurisdiction-specific annexes.

[23] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[24] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[25] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

TABLE 5.27: SUMMARY OF FLOOD OCCURRENCES IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**23**	**0/0**	**$9,040**
Goldston	1	0/0	$0
Pittsboro	3	0/0	$0
Siler City	3	0/0	$0
Unincorporated Area	16	0/0	$9,040
Harnett County	**15**	**0/0**	**$9,040**
Angier	0	0/0	$0
Coats	0	0/0	$0
Dunn	1	0/0	$0
Erwin	0	0/0	$0
Lillington	2	0/0	$0
Unincorporated Area	12	0/0	$9,040
Johnston County	**34**	**3/0**	**$45,869**
Archer Lodge	1	0/0	$0
Benson	2	0/0	$0
Clayton	5	0/0	$0
Four Oaks	0	0/0	$0
Kenly	0	0/0	$0
Micro	0	0/0	$0
Pine Level	0	0/0	$0
Princeton	1	0/0	$0
Selma	2	0/0	$0
Smithfield	5	0/0	$0
Wilson's Mills	1	0/0	$0
Unincorporated Area	17	3/0	$45,869
Lee County	**19**	**0/1**	**$0**
Broadway	0	0/0	$0
Sanford	7	0/0	$0
Unincorporated Area	12	0/1	$0
Moore County	**30**	**0/0**	**$454,835**
Aberdeen	1	0/0	$0
Cameron	1	0/0	$0
Carthage	3	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	1	0/0	$0
Pinehurst	0	0/0	$0
Robbins	4	0/0	$0
Southern Pines	2	0/0	$0
Taylortown	0	0/0	$0
Vass	1	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	17	0/0	$454,835
CAPE FEAR REGIONAL TOTAL	**121**	**3/1**	**$518,784**

Source: National Climatic Data Center

5.15.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been 121 flood losses reported in the Cape Fear Region through the National Flood Insurance Program (NFIP) since 1978, totaling almost $3.0 million in claims payments. A summary of these figures for each Cape Fear county is provided in **Table 5.28**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the Cape Fear Region were either uninsured, denied claims payment, or not reported.

TABLE 5.28: SUMMARY OF INSURED FLOOD LOSSES IN THE CAPE FEAR REGION

Location	Flood Losses	Claims Payments
Chatham County	**3**	**$135,191**
Goldston*	--	--
Pittsboro	0	$0
Siler City	3	$135,191
Unincorporated Area	0	$0
Harnett County	**14**	**$84,200**
Angier	0	$0
Coats*	--	--
Dunn	6	$41,512
Erwin	0	$0
Lillington	0	$0
Unincorporated Area	8	$42,688
Johnston County	**79**	**$2,278,297**
Archer Lodge	0	$0
Benson	0	$0
Clayton	2	$1,498
Four Oaks	0	$0
Kenly	0	$0
Micro*	--	--
Pine Level	0	$0
Princeton	0	$0
Selma	0	$0
Smithfield	48	$1,596,593
Wilson's Mills*	--	--
Unincorporated Area	29	$680,206
Lee County	**14**	**$171,753**
Broadway	0	$0
Sanford	7	$60,597
Unincorporated Area	7	$111,156
Moore County	**11**	**$309,964**
Aberdeen	0	$0
Cameron	0	$0
Carthage	0	$0
Foxfire Village	0	$0

Location	Flood Losses	Claims Payments
Pinebluff	0	$0
Pinehurst	4	$62,318
Robbins	0	$0
Southern Pines	0	$0
Taylortown	0	$0
Vass	0	$0
Whispering Pines	0	$0
Unincorporated Area	7	$247,646
CAPE FEAR REGION TOTAL	**121**	**$2,979,405**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency, National Flood Insurance Program

5.15.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

Currently (as of July 2013), there are 2 non-mitigated repetitive loss properties located in the Cape Fear Region, which accounted for 4 losses and more than $34,000 in claims payments under the NFIP. The average claim amount for these properties is $6,830. One property is a single family residential buildings and one property is a non-residential building. Without mitigation these properties will likely continue to experience flood loses. **Tables 5.29** presents a summary these figures for the Cape Fear Region. Detailed information on repetitive loss properties and NFIP claims and policies can be found in the jurisdiction-specific annexes.

TABLE 5.29: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE CAPE FEAR REGION

Location	Number of Properties	Number of Losses	Total Payments
Chatham County	**1**	**2**	**$128,419**
Goldston*	--	--	--
Pittsboro	0	0	$0
Siler City	1	2	$128,419
Unincorporated Area	0	0	$0
Harnett County	**1**	**2**	**$2,805**
Angier	0	0	$0
Coats*	--	--	--
Dunn	1	2	$2,805
Erwin	0	0	$0
Lillington	0	0	$0
Unincorporated Area	0	0	$0
Johnston County	**0**	**0**	**$0**
Archer Lodge	0	0	$0
Benson	0	0	$0

Location	Number of Properties	Number of Losses	Total Payments
Clayton	0	0	$0
Four Oaks	0	0	$0
Kenly	0	0	$0
Micro*	--	--	--
Pine Level	0	0	$0
Princeton	0	0	$0
Selma	0	0	$0
Smithfield	0	0	$0
Wilson's Mills*	--	--	--
Unincorporated Area	0	0	$0
Lee County	**0**	**0**	**$0**
Broadway	0	0	$0
Sanford	0	0	$0
Unincorporated Area	0	0	$0
Moore County	**0**	**0**	**$0**
Aberdeen	0	0	$0
Cameron	0	0	$0
Carthage	0	0	$0
Foxfire Village	0	0	$0
Pinebluff	0	0	$0
Pinehurst	0	0	$0
Robbins	0	0	$0
Southern Pines	0	0	$0
Taylortown	0	0	$0
Vass	0	0	$0
Whispering Pines	0	0	$0
Unincorporated Area	0	0	$0
CAPE FEAR REGIONAL TOTAL	**2**	**4**	**$131,224**

* These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

5.15.6 Probability of Future Occurrences

Flood events will remain a threat in the Cape Fear Region, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the Cape Fear Region. For example, Angier, Broadway, Carthage, Coats, Foxfire Village, Goldston, and Vass have less floodplain and thus a lower risk of flood than other municipalities. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

Other Hazards

5.16 HAZARDOUS MATERIALS INCIDENTS

5.16.1 Background

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes.[26] In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxological concern.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

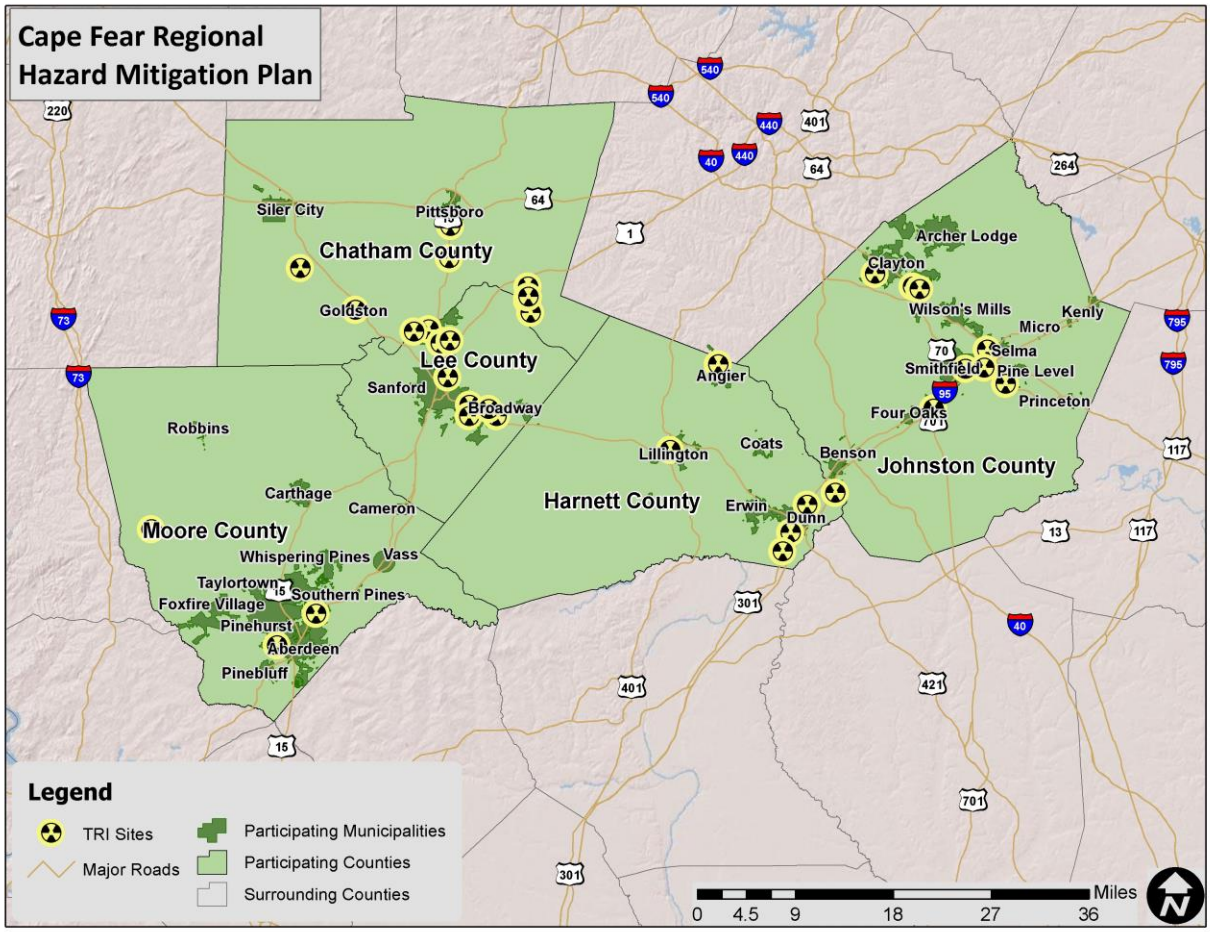
5.16.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic

[26] FEMA, 1997.

agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The Cape Fear Region has 36 TRI sites. These sites are shown in **Figure 5.16.**

FIGURE 5.16: TOXIC RELEASE INVENTORY (TRI) SITES IN THE CAPE FEAR REGION



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the region via roadways and rail. Many roads in the region are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

5.16.3 Historical Occurrences

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,
- the alteration of an aircraft flight plan or operation,

- the release of radioactive materials from Type B packaging,
- the release of over 11.9 galls or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

However, prior to 2002, a hazardous materials "serious incident" was defined as follows:

- a fatality or major injury due to a hazardous material,
- closure of a major transportation artery or facility or evacuation of six or more person due to the presence of hazardous material, or
- a vehicle accident or derailment resulting in the release of a hazardous material.

There have been a total of 159 recorded HAZMAT incidents in the Cape Fear Region since 1971. These events resulted in over $42,000 (2013 dollars) in property damages as well as three fatalities and eight injuries. **Table 5.30** summarizes the HAZMAT incidents reported in the Cape Fear Region. Detailed information on these events is presented in the jurisdiction-specific annexes.

TABLE 5.30: SUMMARY OF HAZMAT INCIDENTS IN THE CAPE FEAR REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	**16**	**0/4**	**$0**
Goldston	2	0/0	$0
Pittsboro	2	0/0	$0
Siler City	5	0/1	$0
Unincorporated Area	7	0/3	$0
Harnett County	**11**	**1/1**	**$16,607**
Angier	0	0/0	$0
Coats	1	0/0	$0
Dunn	4	1/1	$0
Erwin	1	0/0	$0
Lillington	5	0/0	$16,607
Unincorporated Area	0	0/0	$0
Johnston County	**76**	**2/2**	**$23,280**
Archer Lodge	0	0/0	$0
Benson	3	0/0	$2,144
Clayton	7	0/0	$0
Four Oaks	1	0/0	$0
Kenly	10	0/1	$5,597
Micro	0	0/0	$0
Pine Level	1	0/0	$0
Princeton	2	0/0	$2,356
Selma	36	2/1	$11,918
Smithfield	14	0/0	$0
Wilson's Mills	1	0/0	$0
Unincorporated Area	1	0/0	$1,266
Lee County	**32**	**0/1**	**$1,661**
Broadway	1	0/0	$0
Sanford	30	0/1	$1,661

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Unincorporated Area	1	0/0	$0
Moore County	**24**	**0/0**	**$596**
Aberdeen	14	0/0	$0
Cameron	0	0/0	$0
Carthage	2	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	1	0/0	$0
Robbins	3	0/0	$596
Southern Pines	4	0/0	$0
Taylortown	0	0/0	$0
Vass	0	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	0	0/0	$0
CAPE FEAR REGIONAL TOTAL	**159**	**3/8**	**$42,144**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

5.16.4 Probability of Future Occurrence

Given the location of 36 toxic release inventory sites in the Cape Fear Region and prior rail and roadway incidents it is likely that a hazardous material incident may occur in the region (between 10 and 100 percent annual probability). County and municipal officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

5.17 WILDFIRE

5.17.1 Background

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.[27] Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning. In North Carolina, a majority of fires are caused by debris burning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping

[27] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are located within high wildfire hazard areas. Furthermore, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends, and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

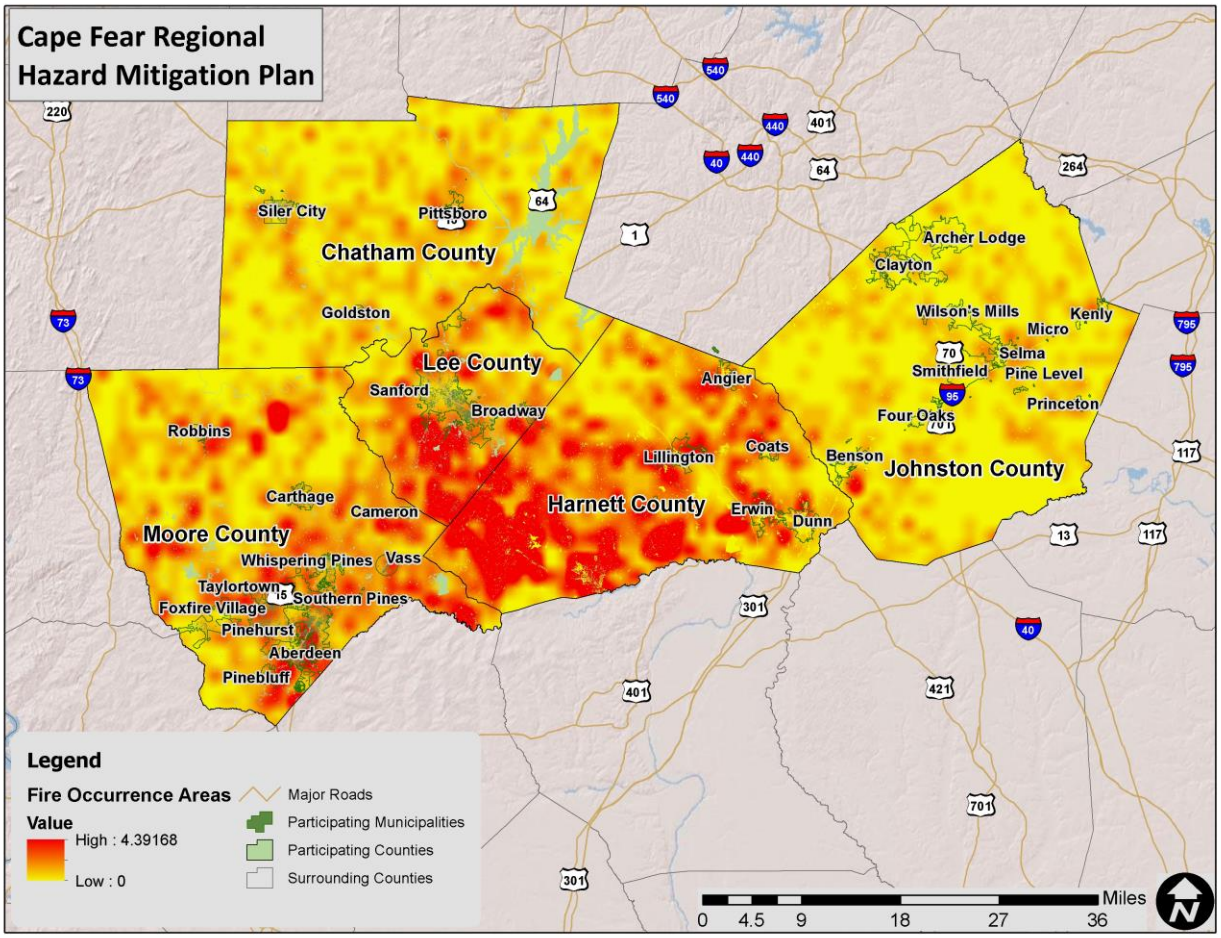
5.17.2 Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic locations impacted.

5.17.3 Historical Occurrences

Figure 5.17 shows the Fire Occurrence Areas (FOA) in the Cape Fear Region based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE 5.17: HISTORIC WILDFIRE EVENTS IN THE CAPE FEAR REGION



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, the Cape Fear Region experienced an average of 431 wildfires annually which burn a combined 1,216 acres, on average per year. The data indicates that most of these fires are small, averaging three acres per fire. **Table 5.31** provides a summary table for wildfire occurrences in the Cape Fear Region. The number of reported wildfire occurrences in the participating counties between the years 2003 and 2012 is listed in the jurisdiction-specific annexes.

TABLE 5.31: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2003-2012)*

	Chatham County	Harnett County	Johnston County	Lee County	Moore County	Cape Fear Region
Average Number of Fires per year	58	141	37	67	129	432
Average Number of Acres Burned per year	108	551	191	74	317	1,241
Average Number of Acres Burned per fire	2	4	5	1	2	3

Source: North Carolina Division of Forest Resources

5.17.4 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the Cape Fear Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the Cape Fear Region for future wildfire events is likely (10 to 100 percent annual probability).

5.18 NUCLEAR ACCIDENT

5.18.1 Background

A nuclear and radiation accident is defined by the International Atomic Energy Agency as "an event that has led to significant consequences to people, the environment or the facility. Often, this type of incident results from damage to the reactor core of a nuclear power plant which can release radioactivity into the environment. The degree of exposure from nuclear accidents has varied from serious to catastrophic.

By some estimates, over 50 percent of nuclear accidents that have ever occurred were in the United States.[28] However, it is also important to note that generally, nuclear accidents are a rare occurrence. Many incidents are extremely well known due to their large-scale impact and serious effects on people and the environment.

One of the most notorious accidents in the United States was the Three Mile Island accident which occurred in 1979 and released small amounts of radioactive gases and iodine into the environment. Although no deaths have been directly attributed to the accident, it invoked a strong public reaction and demonstrated the potential dangers associated with nuclear power generation.

Shearon Harris Nuclear Station, which is located in southwest Wake County, is a 2,948 megawatt power plant that began commercial operation in 1987. Its reactor is a pressurized water reactor and the plant operates with a very high level of security.

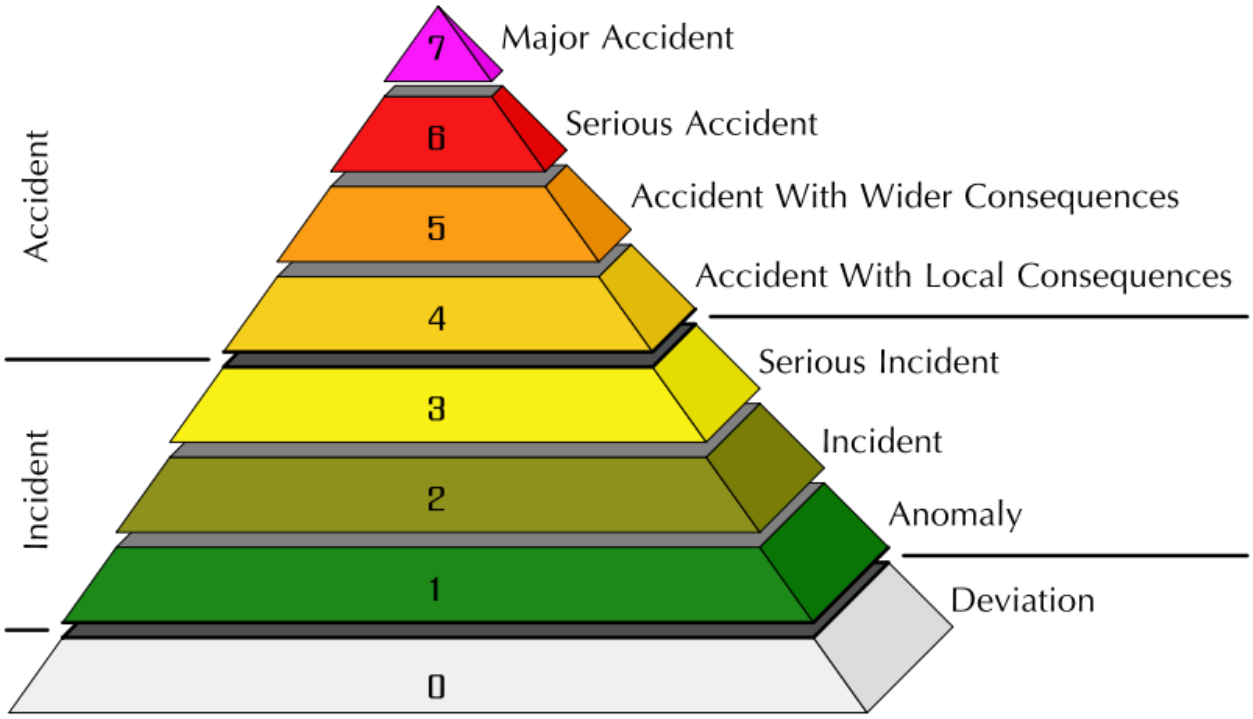
5.18.2 Location and Spatial Extent

Almost the entire region is at risk to a nuclear incident. However, areas in the northeastern part of the region are more susceptible due to their proximity to the Shearon Harris Nuclear Station. The International Atomic Energy Association has developed a scale called the International Nuclear and Radiological Event Scale (INES) which provides a quantitative means of assessing the extent of a nuclear

[28] Benjamin K. Sovacool. A Critical Evaluation of Nuclear Power and Renewable Electricity in Asia *Journal of Contemporary Asia*, Vol. 40, No. 3, August 2010, pp. 393–400.

event. This scale, like the MMI used for earthquakes, is logarithmic which means that each increasing level on the scale represents an event 10 times more severe than the previous level (**Figure 5.18**).

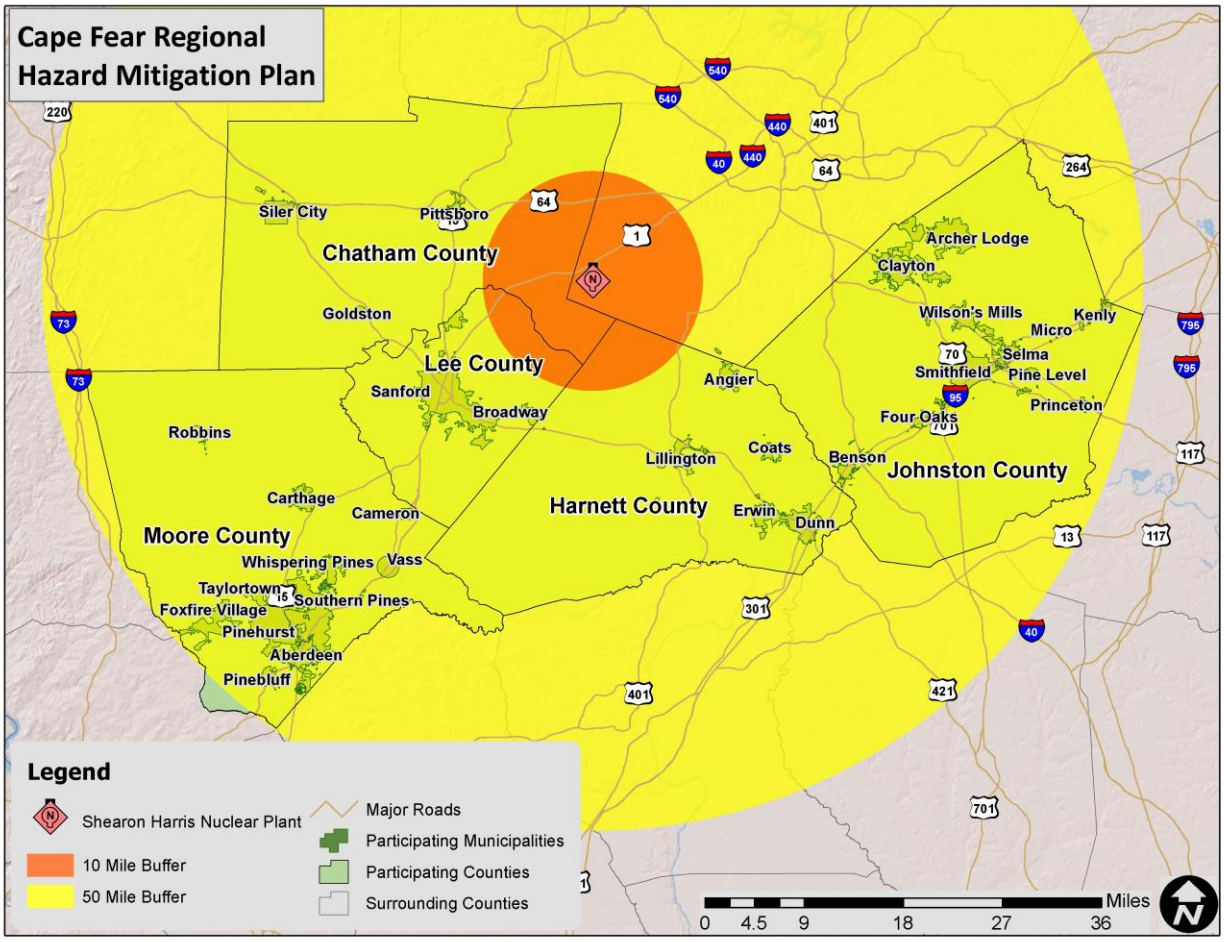
FIGURE 5.18: INTERNATIONAL NUCLEAR EVENT SCALE



Source: International Atomic Energy Agency

The Nuclear Regulatory Commission defines two emergency planning zones around nuclear plants. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and this radius is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure 5.19**). Within the 10 mile zone, the primary concern is exposure to and inhalation of radioactive contamination. The most concerning effects in the secondary 50 mile zone are related to ingestion of food and liquids that may have been contaminated. Nearly all areas of the region that are not located within the 10 mile radius are located within this 50 mile radius that is still considered to be at risk to some impacts from a nuclear incident.

FIGURE 5.19: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

5.18.3 Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986, which are shown in **Table 5.32.** There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.

Table 5.32: SHEARON HARRIS EMERGENCY DECLARATION HISTORY

Emergency Declaration	Date	Description
Alert	08/12/1988	Loss of greater than 50% of main control board (MCB) alarms due to electrical problems; normal power supply to annunciator panel failed and did not transfer to its backup inverter.

Emergency Declaration	Date	Description
Alert	10/09/1988	Fire on "B" Main Electrical Transformer; release of flammable gas in the Protected Area.
Unusual Event	11/28/1986	Loss of ERFIS computer system to display Safety Parameter Display System (SPDS) (55 lapsed minutes).
Unusual Event	11/29/1986	Loss of ERFIS computer system to display SPDS (58 lapsed minutes).
Unusual Event	11/30/1986	Loss of ERFIS computer system to display SPDS (48 lapsed minutes).
Unusual Event	12/03/1986	Loss of ERFIS computer system to display SPDS (27 lapsed minutes).
Unusual Event	12/11/1986	Safety Injection (an Emergency Core Cooling System) actuated while testing electronic circuitry.
Unusual Event	01/27/1987	Loss of ERFIS computer system to display SPDS (23 lapsed minutes).
Unusual Event	07/11/1987	Loss of ERFIS computer system to display SPDS (22 lapsed minutes).
Unusual Event	07/24/1987	Loss of ERFIS computer system to display SPDS (32 lapsed minutes).
Unusual Event	07/25/1987	Loss of ERFIS computer system to display SPDS (28 lapsed minute).
Unusual Event	02/04/1988	Fire within the Protected Area greater than 10 minutes; smoke observed coming from the motor for the reactor auxiliary building supply fan.
Unusual Event	10/06/1988	RCS leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	10/20/1988	RCS leakage in excess of Tech Specs; pressure operated relief valve opened and admitted RCS inventory to the pressurized relief tank (PRT).
Unusual Event	11/17/1988	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	12/01/1988	Reactor coolant system (RCS) leakage in excess of Tech Specs (unidentified leakage > 1.0 gpm).
Unusual Event	12/16/1988	High level alarm on radiological effluent release monitor the (Treated Laundry and Hot Shower high level alarm was set just above background).
Unusual Event	03/13/1989	Loss of ERFIS computer system to display SPDS for > 60 minutes.
Unusual Event	01/24/1991	Plant shutdown required by Technical Specifications. Excessive leakage of a containment penetration; leakage discovered during surveillance testing.
Unusual Event	02/15/1991	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	03/05/1991	Plant shutdown required by Technical Specifications (testing of "A" Reactor Coolant Pump (RCP) electrical protection function).
Unusual Event	04/14/1992	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/06/1993	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	02/17/1994	Loss of ERFIS computer system to display SPDS for > 4 hours.
Unusual Event	07/22/1994	Loss of both emergency diesel generators - "B" diesel generator was being worked on; in accordance with test procedures, "A" diesel generator is required to be tested within 24 hours following having redundant diesel out-of-service; did not pass test.
Unusual Event	11/05/1995	Unplanned emergency core cooling system (ECCS) discharge to the reactor vessel; reactor trip and safety injection (SI) occurred during the performance of testing.
Unusual Event	12/14/1995	Train derailment on site - while removing empty cask car from the Protected Area, the rail cars were moved onto the Engine Spur to allow passage of the CSX engine on adjacent Plant Spur; cask car shifted; 4 wheels of the car left the rails.
Unusual Event	01/22/1997	Security Event - while working Work Request and Authorization (WR&A), I&C Tech investigation found cut wire in a Turbine Building radiation monitor. Later determined to not be vandalism (i.e., not a security threat).
Unusual Event	04/02/2000	Loss of Emergency Response Facility Information System (ERFIS) computer system to display Safety Parameter Display System (SPDS) for more than 4 hours.
Unusual Event	08/23/2011	Seismic activity at the site due to a magnitude 5.8 earthquake near Mineral, VA.

Source: Nuclear Regulatory Commission

5.18.4 Probability of Future Occurrences

A major nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

5.19 TERROR THREAT

5.19.1 Background

Terrorism is defined in the United States by the Code of Federal Regulations as: "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."[29] Academic literature identifies some overarching political goals that terrorism seeks to achieve, including spreading anxiety and alarm among immediate victims, families, and the general public; eliminating opponents and destroying symbolic targets; and generating direct damage on society, such as affecting business confidence. In the following sections, some general background information about terrorism is presented prior to the county's hazard identification and risk assessment findings.

There are two general types of terrorist groups: network and hierarchical. The type of organization a group adopts largely depends on how long the group has existed. More recently developed groups tend to organize or adapt to the possibilities of the network model. Older, more established groups lean toward the hierarchical structure and are often more associated with violence of a political nature.[30] Terrorist acts can be committed by large, formally organized groups with terrorist cells in different parts of the world, or they can originate from smaller groups or individuals from a small city or domestic "homegrown" location. In the United States, terrorists that are "homegrown" do not belong to a defined group, may operate very effectively "under the radar," and may pose the biggest threat initially at the local level.[31]

5.19.2 Location and Spatial Extent

A terror threat could potentially occur at any location in the region. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table 5.33** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

[29] U.S. Code of Federal Regulations. 23 C.F.R. Section 0.85
[30] Terrorism Research. *Terrorist groups*. Retrieved December 27, 2011, from http://www.terrorism-research.com/groups/
[31] *Ibid*.

TABLE 5.33 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section 6: *Vulnerability Assessment*) are at a heightened level of risk in the Cape Fear Region, there are several that have been identified as the likely primary targets. These are listed in **Table 5.34**.

TABLE 5.34: CRITICAL FACILITIES AT ELEVATED RISK OF TERROR THREAT IN THE CAPE FEAR REGION

Critical Facility
Chatham County
Chatham County Emergency Operations Center
Chatham Hospital
Harnett County
Harnett County Emergency Operations Center
Central Harnett Hospital
Betsy Johnson Hospital
Johnston County
Johnston County Emergency Operations Center
Johnston Medical Center
Lee County
Lee County Emergency Operations Center
Central Carolina Hospital
Moore County
Rick Rhyne Public Safety: Moore County Emergency Operations Center
Moore Regional Hospital

Source: Local Governments

5.19.3 Historical Occurrences

Although there have been no major terror events in the Cape Fear Region, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

5.19.4 Probability of Future Occurrences

The Cape Fear Region has had no recorded terrorist events. Due to no recorded incidents against the region, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

5.20 CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

5.20.1 Hazard Extent

Table 5.35 describes the extent of each natural hazard identified for the Cape Fear Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.35: EXTENT OF CAPE FEAR REGION HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Each of the participating counties has received this ranking at least two times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in the Cape Fear Region is 108 degrees Fahrenheit (last reported on August 22, 1983). • Chatham County: 108°F • Harnett County: 108°F • Johnston County: 107°F • Lee County: 107°F • Moore County: 107°F
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Cape Fear Region was 2.75 inches (last reported April 24, 2009. It should be noted that future events may exceed this. • Chatham County: 1.75 inches • Harnett County: 2.75 inches • Johnston County: 2.75 inches • Lee County: 2.00 inches • Moore County: 2.75 inches

Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through the Cape Fear Region was an Unnamed Category 3 storm which reached a maximum wind speed of 70 knots in the region. The following lists the greatest extent of hurricane winds to pass through the area, though it should be noted that strongest storms could impact the region without a direct hit: • Chatham County: Unnamed 1896 Storm, Category 3 Hurricane (62 knots) • Harnett County: Unnamed 1893 Storm, Category 3 Hurricane (70 knots) • Johnston County: Unnamed 1893 Storm, Category 3 Hurricane (70 knots) • Lee County: Unnamed 1896 Storm, Category 3 Hurricane (62 knots) • Moore County: Unnamed 1896 Storm, Category 3 Hurricane (62 knots)
Lightning	According to the Vaisala flash density map (Figure 5.5), the majority of the Cape Fear Region is located in an area that experiences 3 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunderstorm events and wind speeds reported. According to a 56-year history from the National Climatic Data Center, the strongest recorded wind event in the Cape Fear Region was reported on July 9, 1976 at 87 knots (approximately 100 mph). It should be noted that future events may exceed these historical occurrences. • Chatham County: 65 knots • Harnett County: 87 knots • Johnston County: 75 knots • Lee County: 70 knots • Moore County: 70 knots
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F3 (last reported on April 16, 2011). It should be noted that an F5 tornado is possible. • Chatham County: F2 • Harnett County: F3 • Johnston County: F3 • Lee County: F3 • Moore County: F2
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region was 26 inches on March 2, 1927. Due to unpredictable variations in snowfall throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not abundantly available. • Chatham County: 15.0 inches • Harnett County: 7.2 inches • Johnston County: 18.0 inches • Lee County: 10.5 inches • Moore County: 26.0 inches

Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from the Cape Fear Region. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the region was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (reported on September 1, 1886). The epicenter of this earthquake was located 277.0 km away. • Chatham County: none reported • Harnett County: none reported • Johnston County: IV; 318.0 km to epicenter • Lee County: V; 295.0 km to epicenter • Moore County: V; 276.0 km to epicenter
Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is generally low throughout the region. However, there are some areas of moderate incidence and there is also moderate susceptibility in some areas of the region.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 499 dams in Cape Fear Region, 113 are classified as high-hazard. • Chatham County: 18 high hazard dams • Harnett County: 28 high hazard dams • Johnston County: 5 high hazard dams • Lee County: 9 high hazard dams • Moore County: 53 high hazard dams
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records available for the Cape Fear Region.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 11.5 percent of the total land area in the Cape Fear Region. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many jurisdictions. The greatest peak discharge recorded for the region was reported on September 19, 1945. Water reached a discharge of 150,000 cubic feet per second and the stream crest height was recorded at 33.19 feet. Additional peak discharge readings and crest heights are in the table below.

Location/Jurisdiction	Date	Peak Discharge (cfs)	Crest Height (ft)
Chatham County			

Goldston			
Bear Creek near Goldston	8/31/1952	7,400	30.60
Pittsboro			
Haw River near Pittsboro	8/1908	98,000	32.10
Siler City			
Rocky River at US 64 near Siler City	2/5/2010	4,650	15.20
Unincorporated Area			
Haw River near Bynum	9/6/1996	76,700	21.76
Harnett County			
Angier			
N/A	--	--	--
Coats			
N/A	--	--	--
Dunn			
N/A	--	--	--
Erwin			
N/A	--	--	--
Lillington			
Cape Fear River at Lillington	9/19/1945	150,000	33.19
Unincorporated Area			
Little River at Linden	9/18/1945	13,500	41.47
Johnston County			
Archer Lodge			
N/A	--	--	--
Benson			
Hannah Creek near Benson	10/5/1964	820	23.19
Clayton			
Neuse River near Clayton	9/19/1945	22,900	22.12
Four Oaks			
N/A	--	--	--
Kenly			
Little River near Kenly	10/6/1964	5,030	16.30
Micro			
N/A	--	--	--
Pine Level			
N/A	--	--	--
Princeton			
Little River near Princeton	9/17/1999	20,700	16.58
Selma			
Long Branch near Selma	10/24/1959	2,050	24.96
Smithfield			
Neuse River at Smithfield	1908	19,900	27.10
Wilson's Mills			
N/A	--	--	--
Unincorporated Area			
Stone Creek near Newton Grove	6/4/1962	3,110	24.58

Lee County			
Broadway			
N/A	--	--	--
Sanford			
N/A	--	--	--
Unincorporated Area			
Deep River at Moncure	9/18/1945	80,300	17.20
Moore County			
Aberdeen			
N/A	--	--	--
Cameron			
N/A	--	--	--
Carthage			
Dunhams Creek near Carthage	4/21/1959	410	24.52
Foxfire Village			
N/A	--	--	--
Pinebluff			
N/A	--	--	--
Pinehurst			
N/A	--	--	--
Robbins			
Bear Creek at Robbins	7/20/1956	43,600	34.57
Southern Pines			
N/A	--	--	--
Taylortown			
N/A	--	--	--
Vass			
Crane Creek near Vass	4/22/1959	2,650	25.95
Whispering Pines			
N/A	--	--	--
Unincorporated Area			
Deep River near Glendon	7/26/1993	877	4.11

Other Hazards

Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the region was 16,800 LGA released on the highway on March 31, 1977. It should be noted that larger events are possible. • Chatham County: 16,800 LGA • Harnett County: 8,800 LGA • Johnston County: 9,100 LGA • Lee County: 5,383 GCF • Moore County: 163 LGA

Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. Analyzing the data by county indicates the following wildfire hazard extent for each county. ***Chatham County*** • The greatest number of fires to occur in any year was 102 in 2005. • The greatest number of acres to burn in a single year occurred in 2009 when 343.6 acres were burned. ***Harnett County*** • The greatest number of fires to occur in any year was 266 in 2007. • The greatest number of acres to burn in a single year occurred in 2006 when 1,063.3 acres were burned. ***Johnston County*** • The greatest number of fires to occur in any year was 75 in 2007. • The greatest number of acres to burn in a single year occurred in 2007 when 384.2 acres were burned. ***Lee County*** • The greatest number of fires to occur in any year was 106 in 2011. • The greatest number of acres to burn in a single year occurred in 2005 when 130.1 acres were burned. ***Moore County*** • The greatest number of fires to occur in any year was 248 in 2007. • The greatest number of acres to burn in a single year occurred in 2006 when 912.7 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the region.
Nuclear Accident	Although there is no history of a major nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in the Cape Fear Region; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

5.20.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the Cape Fear Region, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for the Cape Fear Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard

classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for the jurisdictions in the Cape Fear Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Cape Fear Region is based principally on the PRI, a tool used to measure the degree of risk for identified hazards in a particular planning area. The PRI is used to assist the Cape Fear Regional Hazard Mitigation Planning Team in gaining consensus on the determination of those hazards that pose the most significant threat to the Cape Fear counties based on a variety of factors. The PRI is not scientifically based, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in the Cape Fear Region based on standardized criteria.

The application of the PRI results in numerical values that allow identified hazards to be ranked 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 has been assigned a value (1 to 4) and an agreed upon weighting factor[32], as summarized in **Table 5.36**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the Cape Fear Region, the highest PRI value is 3.3 (thunderstorm/high wind). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Hazard Mitigation Planning Team.

[32] The Regional Hazard Mitigation Planning Team, based upon any unique concerns or factors for the planning area, may adjust the PRI weighting scheme during future plan updates.

TABLE 5.36: PRIORITY RISK INDEX FOR THE CAPE FEAR REGION

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and 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 more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one 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 for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self explanatory	1	10%
	12 to 24 hours	Self explanatory	2	
	6 to 12 hours	Self explanatory	3	
	Less than 6 hours	Self explanatory	4	
Duration	Less than 6 hours	Self explanatory	1	10%
	Less than 24 hours	Self explanatory	2	
	Less than one week	Self explanatory	3	
	More than one week	Self explanatory	4	

5.20.3 Priority Risk Index Results

Table 5.37 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.37: SUMMARY OF PRI RESULTS FOR THE CAPE FEAR REGION

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm / High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Unlikely	Minor	Small	Less than 6 hours	Less than 6 hours	**1.5**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	**3.0**
Other Hazards						
Hazardous Materials Incident	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**
Nuclear Accident	Unlikely	Critical	Small	6 to 12 hours	Less than 1 week	**2.2**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

5.21 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Cape Fear Region, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.38**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the Cape Fear

Region. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment*. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE 5.38: CONCLUSIONS ON HAZARD RISK FOR THE CAPE FEAR REGION

HIGH RISK	Thunderstorm Wind / High Wind Flood Hurricane and Tropical Storm Tornado Hailstorm Drought Winter Storm and Freeze
MODERATE RISK	Hazardous Material Incident Extreme Heat Wildfire Lightning
LOW RISK	Nuclear Accident Terror Threat Dam and Levee Failure Erosion Earthquake Landslide

SECTION 6
VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the jurisdictions within the Cape Fear Region to the significant hazards identified in the previous sections (*Hazard Identification and Profiles*). It consists of the following subsections:

- 6.1 Overview
- 6.2 Methodology
- 6.3 Explanation of Data Sources
- 6.4 Asset Inventory
- 6.5 Vulnerability Assessment Results
- 6.6 Conclusions on Hazard Vulnerability

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44 CFR Requirement
44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

6.1 OVERVIEW

This section builds upon the information provided in Section 4: *Hazard Identification and* Section 5*: Hazard Profiles* by identifying and characterizing an inventory of assets in the Cape Fear Region. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the Cape Fear counties and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for jurisdictions in the Cape Fear Region. The remainder of this section focuses on the results of the assessment conducted.

6.2 METHODOLOGY

This vulnerability assessment was conducted using three distinct methodologies: (1) A stochastic risk assessment; (2) a geographic information system (GIS)-based analysis; and (3) a risk modeling software

analysis. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information provided in the *Hazard Identification* and *Hazard Profiles* sections. A brief description of the three different approaches is provided on the following pages.

6.2.1 Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of hazard risk models and the GIS-based risk assessment. This involves the consideration of annualized loss estimates and impacts of current and future buildings and populations. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). This methodology is applied primarily to hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- ❑ Dam Failure
- ❑ Drought
- ❑ Erosion
- ❑ Extreme Heat
- ❑ Hailstorm
- ❑ Lightning
- ❑ Terror Threat
- ❑ Thunderstorm Wind
- ❑ Tornado
- ❑ Winter Storm and Freeze

With the exception of Dam Failure, Erosion, and Terror Threat, the hazards listed above are considered atmospheric and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides information about all improved property in the Cape Fear Region that is vulnerable to these hazards. For all hazards annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Climatic Data Center records, Cape Fear county hazard mitigation plans, and local knowledge. Annualized loss estimates were generated by totaling the amount of property damage over the period of time for which records were available, and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For the dam failure[1], drought, erosion, extreme heat, and terror threat, no data with historical property damages was available. Therefore a detailed vulnerability assessment could not be completed for these hazards at this time.

The results for these hazards are found at the end of this section in **Table 6.16**.

[1] As noted in Section 5: *Hazard Profiles*, dam failure could be catastrophic to structures and populations in the inundation area. However, due to lack of data, no additional analysis was performed. Further, local USACE and NCDENR also complete separate dam failure plans to identify risk and response measures.

6.2.2 GIS-Based Analysis

Other hazards have specified geographic boundaries that permit additional analysis using Geographic Information Systems (GIS). These hazards include:

- Flood
- Hazardous Material Incident
- Landslide
- Wildfire
- Nuclear Accident

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the Cape Fear Region using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings. This included local tax assessor records for individual parcels and buildings and geo-referenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS™ 10.0 was used to assess hazard vulnerability utilizing digital hazard data, as well as local building data. Using these data layers, hazard vulnerability can be quantified by estimating the assessed building value for parcels and/or buildings determined to be located in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2010 data by census tract was obtained. This was intersected with hazard areas to determine exposed population counts. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the assessed value of parcels and improvements, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

6.2.3 Risk Modeling Software Analysis

A risk modeling software was used for the following hazards:

- Earthquake
- Hurricane and Tropical Storm

There are several models that exist to model hazards. Hazus-MH was used in this vulnerability assessment to address the aforementioned hazards.

Hazus-MH

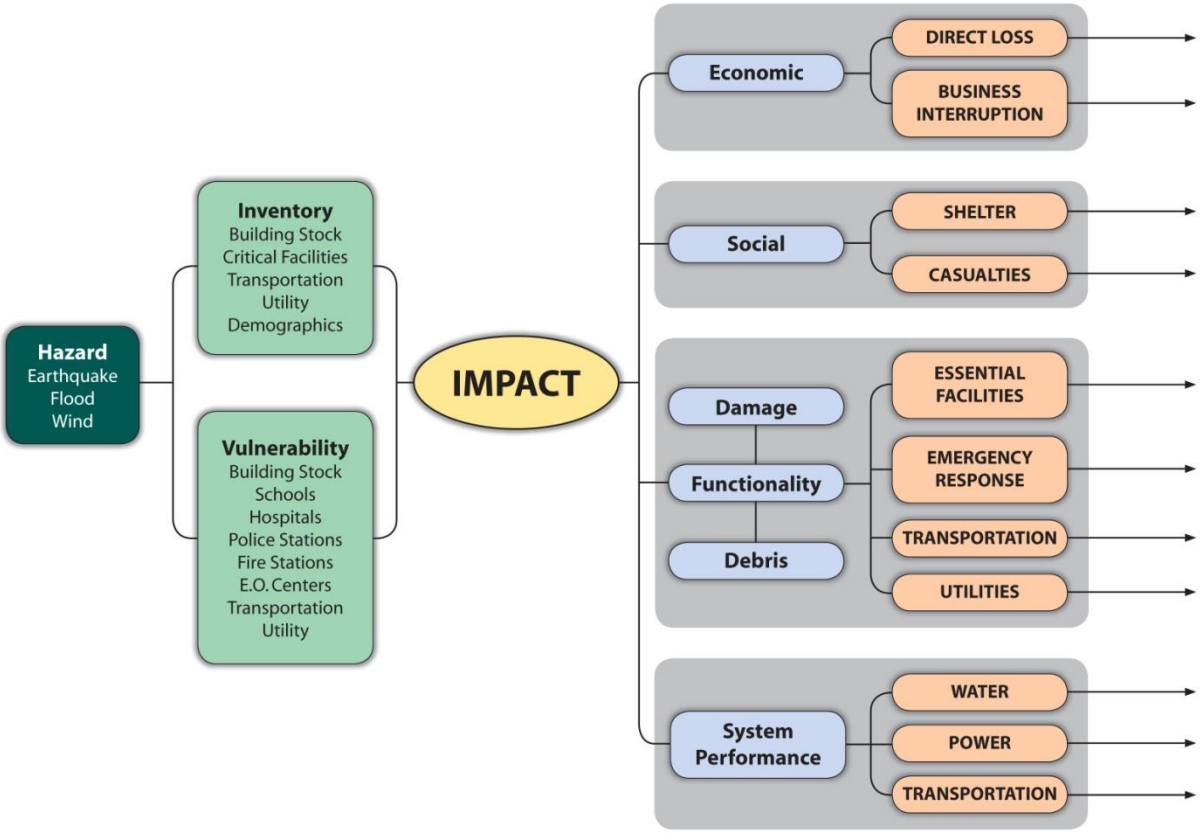
Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.



The Cape Fear Regional Risk Assessment utilized Hazus-MH to produce hazard damage loss estimations for hazards for the planning area. At the time this analysis was completed, Hazus-MH 2.1 was used to estimate potential damages from hurricane winds earthquake hazards using Hazus-MH methodology. Although the program can also model losses for flood and storm surge, it was not used in this Risk Assessment.

Figure 6.1 illustrates the conceptual model of the Hazus-MH methodology.

Figure 6.1: CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY



Hazus-MH is capable of providing a variety of loss estimation results. In order to be consistent with other hazard assessments, annualized losses are presented when possible. Some additional results based on location-specific scenarios may also be presented to provide a complete picture of hazard vulnerability.

Loss estimates provided in this vulnerability assessment are based on best available data and methodologies. The results are an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, non-specific locations, demographics, or economic parameters).

All conclusions are presented in "Conclusions on Hazard Vulnerability" at the end of this section.

6.3 EXPLANATION OF DATA SOURCES

Earthquake

Hazus-MH 2.1 (as described above) was used to assess earthquake vulnerability. A level 1, probabilistic scenario to estimate annualized loss was utilized. In this scenario, several return periods (events of varying intensities) are run to determine annualized loss. Default Hazus earthquake damage functions and methodology were used to determine the probability of damage for 100-, 250- 500-, 750-, 1,000-, 1,500-, and 2,500-year frequency events (also known as a return period). Results are calculated at the 2000 U.S. Census tract level in Hazus and presented at the county level.

Flood

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and, they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. It should be noted that such an analysis does not account for building elevation.

Hurricane and Tropical Storm Wind

Hazus-MH 2.1 (as described above) was used to assess wind vulnerability. For the hurricane wind analysis, a probabilistic scenario was created to estimate the annualized loss damage and probable peak wind speeds in the Cape Fear Region. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 50-, 100-, 500-, and 1,000-year frequency events (also known as return periods) in the scenario. Results are calculated in Hazus at the 2000 U.S. Census tract level and presented at the county level.

Hazardous Materials Incident

For the fixed hazardous materials incident analysis, Toxic Release Inventory (TRI) data was used. The Toxics Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
- Has 10 or more full-time employee equivalents; and
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative, and toxic

(PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

For the mobile hazardous materials incident analysis, transportation data including major highways and railroads were obtained from the North Carolina Department of Transportation. This data is ArcGIS compatible, lending itself to buffer analysis to determine risk.

Landslide

The USGS Landslide Susceptibility Index was used to determine vulnerability to landslides. The risk levels of low, moderate, and high correspond to the Landslide Susceptibility Index where "Low" indicates a zone of Low Incident/High Susceptibility, "Mod" indicates a zone of Moderate Incident/High Susceptibility, and "High" indicates a zone of High Landslide Susceptibility. For the vulnerability assessment, local parcel data and critical facilities were overlaid on the moderate and high incidence areas.

Wildfire

The data used to determine vulnerability to wildfire in the Cape Fear Region is based on GIS data called the Southern Wildfire Risk Assessment (SWRA). It was provided for use in this plan by the North Carolina Division of Forest Resources. A specific layer, known as "Level of Concern" (LOC) was used to determine vulnerability of people and property. The LOC is presented on a scale of 1 to 100. It combines a Wildfire Susceptibility Index (WFSI) with a Fire Effects Index (FEI). The primary purpose of the LOC data is to highlight areas of concern that may be conducive to mitigation actions. Due to the assumptions made, it is not a true probability. However, it does provide a comparison of risk throughout the region.

Nuclear Accident

The data used to determine vulnerability to a nuclear accident in the Cape Fear Region is based on the location of the Shearon Harris Nuclear Power Station and buffer radii recommended by the Nuclear Regulatory Commission for emergency management planning in the event of a nuclear accident.

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within the Cape Fear counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[2]. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. Additionally, social assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.2.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

[2] While potentially not all-inclusive for the jurisdictions in the Cape Fear region, "georeferenced" assets include those assets for which specific location data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis.

1. Improved Property: Includes all improved properties in the Cape Fear Region according to local parcel and building footprint data provided by counties. The information has been expressed in terms of the number of parcels and total assessed value of improvements (buildings) that may be exposed to the identified hazards.

2. Critical Facilities: Critical facilities vary by jurisdiction. When provided, the critical facilities provided by the jurisdiction are used in this section. If no critical facilities were identified, facilities were used from Hazus-MH which includes fire stations, police station, medical care facilities, schools, and emergency operation centers. It should be noted that this listing is not all-inclusive for assets located in the region, but it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

The following tables provide a detailed listing of the geo-referenced assets that have been identified for inclusion in the vulnerability assessment for the Cape Fear Region.

Table 6.1 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the Cape Fear Region (study area of vulnerability assessment).[3]

TABLE 6.1: IMPROVED PROPERTY IN THE CAPE FEAR REGION

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[4]
Chatham County	**42,136**	**$9,679,182,721**	**39,487**	**$5,417,460,799**
Goldston	208	$18,917,702	245	$14,109,087
Pittsboro	1,923	$399,912,184	1,591	$283,695,816
Siler City	2,808	$341,987,155	2,889	$254,476,937
Unincorporated Area	37,197	$8,918,365,680	34,762	$4,865,178,959
Harnett County	**64,570**	**$6,716,003,387**	**57,035**	**$4,566,025,607**
Angier	1,862	$204,154,164	1,722	$152,433,474
Coats	1,002	$83,433,680	992	$61,881,400
Dunn	4,829	$608,930,378	4,114	$451,638,268
Erwin	2,470	$220,463,380	2,160	$159,419,650
Lillington	1,639	$244,373,348	1,055	$145,446,258
Unincorporated Area	52,768	$5,354,648,437	46,992	$3,595,206,557
Johnston County	**91,719**	**$13,568,650,678**	**80,508**	**$8,608,016,248**
Archer Lodge	1,750	$247,693,690	1,595	$170,585,060
Benson	1,712	$257,648,473	1,458	$178,956,673
Clayton	7,504	$1,494,324,813	4,762	$1,031,714,203
Four Oaks	1,131	$129,732,334	915	$92,646,954
Kenly	741	$68,712,041	750	$48,529,791
Micro	244	$15,870,507	256	$11,897,567
Pine Level	795	$98,304,350	820	$70,814,330

[3] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.
[4] Building value for each county is based on the number of parcels with an improved building value greater than zero.

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[4]
Princeton	707	$104,664,930	628	$83,358,730
Selma	2,311	$308,607,010	2,506	$205,382,510
Smithfield	5,236	$1,182,116,491	4,798	$815,559,431
Wilson's Mills	1,093	$124,486,200	895	$82,053,740
Unincorporated Area	68,495	$9,536,489,839	61,125	$5,816,517,259
Lee County	**31,547**	**$4,470,799,360**	**43,630**	**$3,117,299,580**
Broadway	700	$82,776,760	844	$68,903,880
Sanford	11,665	$1,904,810,000	13,980	$1,439,592,100
Unincorporated Area	19,182	$2,483,212,600	28,806	$1,608,803,600
Moore County	**69,582**	**$13,184,827,276**	**74,517**	**$8,177,661,828**
Aberdeen	3,268	$506,861,340	3,339	$362,337,820
Cameron	222	$16,494,610	362	$12,184,480
Carthage	1,220	$171,090,030	1,428	$134,851,010
Foxfire Village	887	$123,111,560	472	$90,386,300
Pinebluff	862	$81,763,510	975	$62,333,510
Pinehurst	9,496	$2,931,076,680	7,111	$2,164,614,510
Robbins	631	$47,844,530	809	$36,792,390
Southern Pines	7,735	$1,962,592,842	6,285	$1,253,968,868
Taylortown	644	$70,729,730	575	$51,615,140
Vass	662	$63,353,460	770	$45,738,310
Whispering Pines	1,788	$356,890,320	1,378	$274,595,350
Unincorporated Area	42,167	$6,853,018,664	51,013	$3,688,244,140
CAPE FEAR REGION TOTAL	**299,554**	**$47,619,463,422**	**295,177**	**$29,886,464,062**

Table 6.2 lists the fire stations, police stations, EMS/rescue stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in the Cape Fear Region. Local governments at the county level provided a majority of the data for this analysis; however, gaps in the data were filled using Hazus 2.1 to obtain the location of some critical facilities for which spatial data was not available. In addition, **Figure 6.2** shows the locations of essential facilities in the Cape Fear Region. **Table 6.17**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the counties and Hazus 2.1.

TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE CAPE FEAR REGION

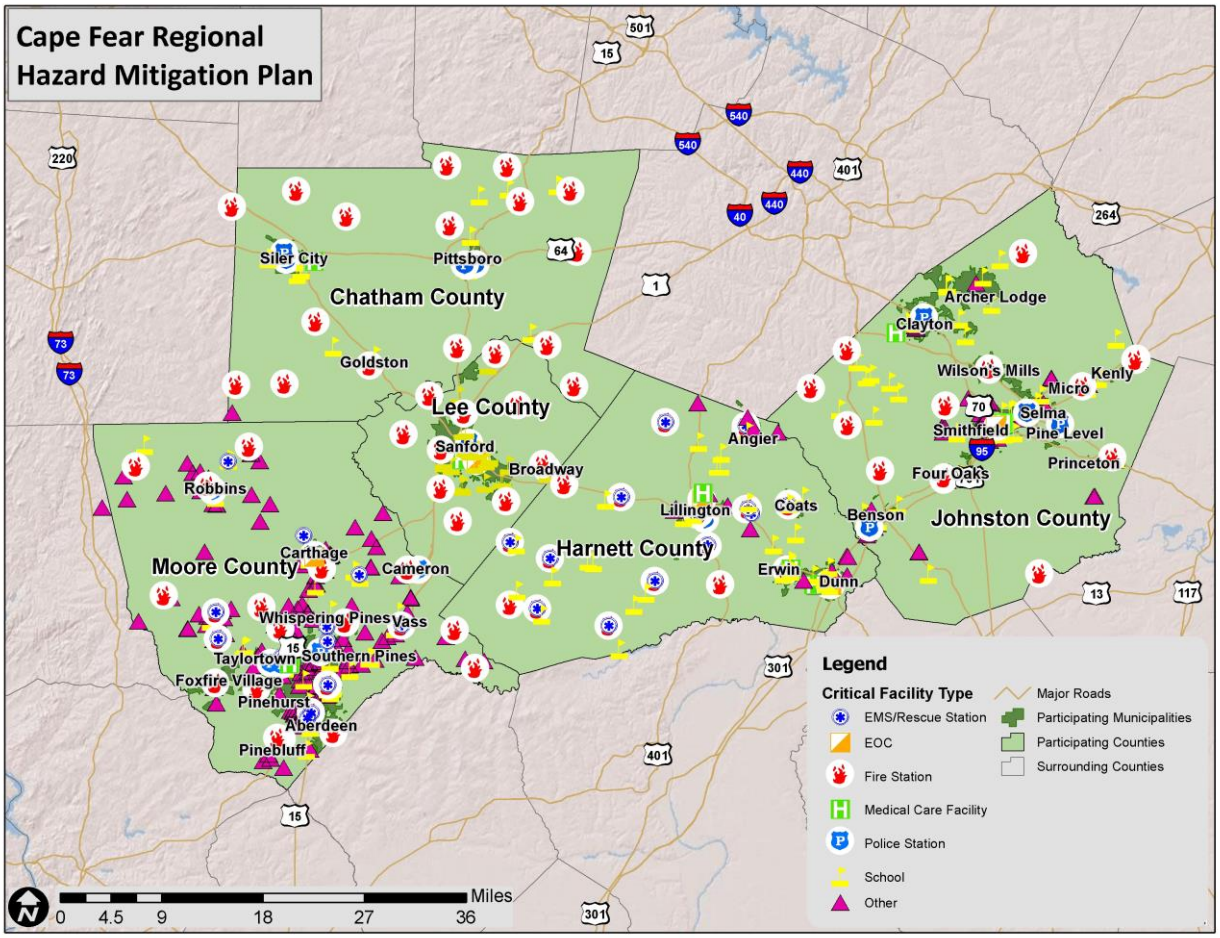
Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Chatham County	**19**	**4**	**0**	**1**	**1**	**18**	**0**
Goldston	1	0	0	0	0	0	0
Pittsboro	1	2	0	0	1	3	0
Siler City	1	2	0	1	0	2	0
Unincorporated Area	16	0	0	0	0	13	0
Harnett County	**19**	**9**	**15**	**3**	**2**	**33**	**16**
Angier	1	1	1	0	0	1	2

Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Coats	1	1	1	0	0	1	0
Dunn	2	1	1	1	1	6	3
Erwin	1	1	1	1	0	4	1
Lillington	2	4	1	0	1	2	2
Unincorporated Area	12	1	10	1	0	19	8
Johnston County	**12**	**8**	**0**	**2**	**1**	**46**	**105**
Archer Lodge	0	0	0	0	0	1	1
Benson	0	1	0	0	0	2	8
Clayton	0	1	0	1	0	7	7
Four Oaks	1	1	0	0	0	2	4
Kenly	1	1	0	0	0	0	6
Micro	1	0	0	0	0	1	5
Pine Level	0	1	0	0	0	1	3
Princeton	1	0	0	0	0	2	6
Selma	0	1	0	0	0	2	12
Smithfield	0	1	0	1	1	9	37
Wilson's Mills	1	1	0	0	0	1	2
Unincorporated Area	7	0	0	0	0	18	14
Lee County	**10**	**3**	**0**	**1**	**1**	**25**	**0**
Broadway	1	1	0	0	0	1	0
Sanford	1	2	0	1	1	17	0
Unincorporated Area	8	0	0	0	0	7	0
Moore County	**21**	**16**	**13**	**1**	**1**	**38**	**187**
Aberdeen	1	1	2	0	0	4	16
Cameron	1	1	0	0	0	1	1
Carthage	0	3	0	0	1	2	24
Foxfire Village	1	1	0	0	0	0	2
Pinebluff	1	1	0	0	0	0	3
Pinehurst	0	1	2	1	0	1	4
Robbins	2	1	0	0	0	1	3
Southern Pines	1	3	1	0	0	11	13
Taylortown	0	1	0	0	0	1	3
Vass	1	1	1	0	0	1	3
Whispering Pines	1	0	1	0	0	0	3
Unincorporated Area	12	2	6	0	0	16	112
CAPE FEAR REGION TOTAL	**91**	**44**	**28**	**9**	**7**	**194**	**387**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.

Source: Local Governments; Hazus-MH

FIGURE 6.2: CRITICAL FACILITY LOCATIONS IN THE CAPE FEAR REGION



Source: Local Governments

6.4.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in the Cape Fear Region that are potentially at risk to these hazards.

Table 6.3 lists the population by county according to U.S. Census 2010 population estimates. The total population in the Cape Fear Region according to Census data is 493,174 persons. Additional population estimates are presented in Section 3: *Community Profile*.

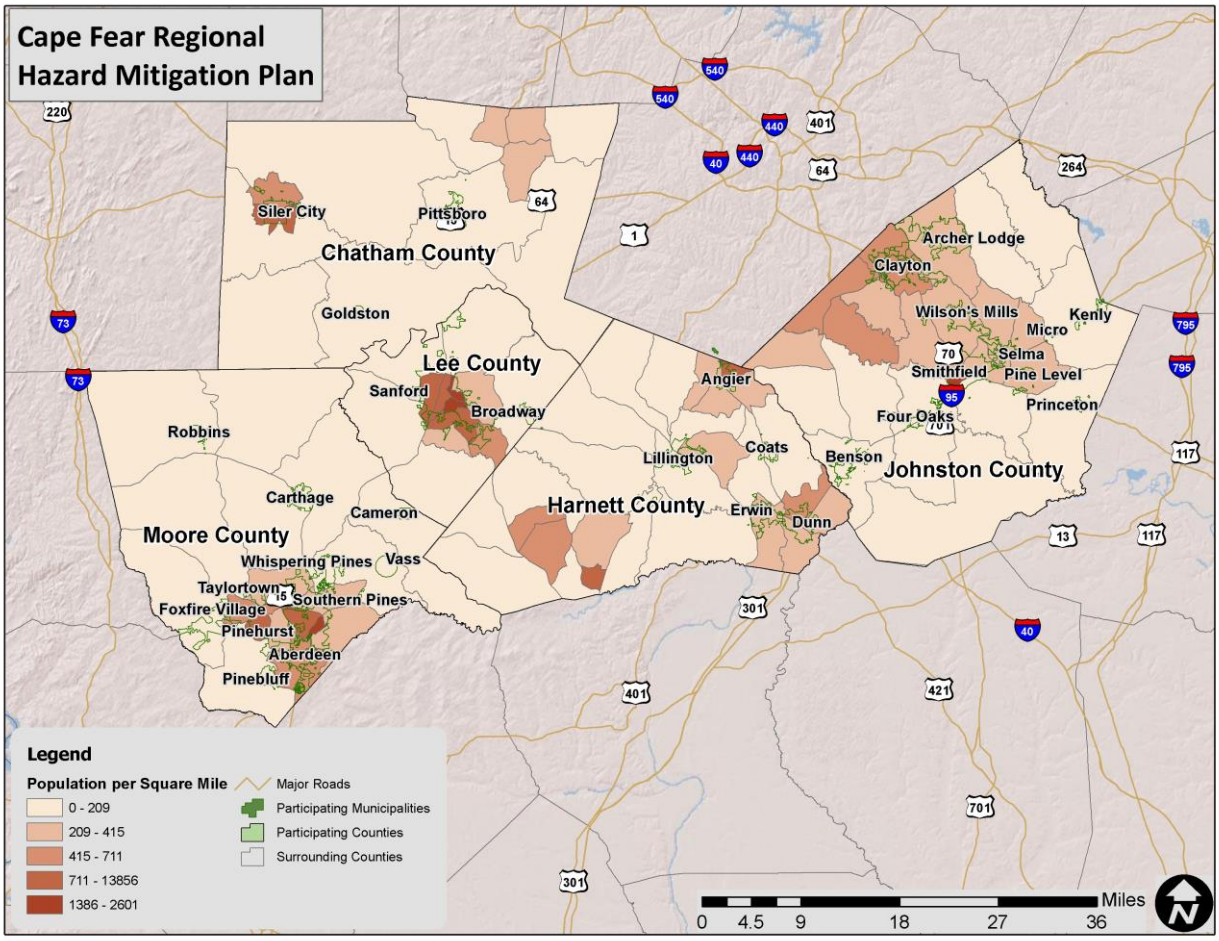
TABLE 6.3: TOTAL POPULATION IN THE CAPE FEAR REGION

Location	Total 2010 Population
Chatham County	63,505
Harnett County	114,678
Johnston County	168,878
Lee County	57,866
Moore County	88,247
CAPE FEAR REGION TOTAL	**493,174**

Source: United States Census 2010

In addition, **Figure 6.3** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE 6.3: POPULATION DENSITY IN THE CAPE FEAR REGION



Source: United States Census Bureau, 2010

6.4.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans were approved (in 2010, 2011, and 2012), the Cape Fear Region has experienced some growth and development. **Table 6.4** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE 6.4: BUILDING COUNTS FOR THE CAPE FEAR REGION

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Chatham County	**28,681**	**199**	**0.7%**
Goldston	160	0	0.0%
Pittsboro	1,511	0	0.0%
Siler City	2,973	54	1.8%
Unincorporated Area	24,037	145	0.6%
Harnett County	**49,926**	**518**	**1.0%**
Angier	2,146	16	0.7%
Coats	1,088	0	0.0%
Dunn	4,457	0	0.0%
Erwin	2,039	0	0.0%
Lillington	986	0	0.0%
Unincorporated Area	39,210	502	1.3%
Johnston County	**67,535**	**353**	**0.5%**
Archer Lodge	1,540	0	0.0%
Benson	1,599	0	0.0%
Clayton	6,657	0	0.0%
Four Oaks	907	0	0.0%
Kenly	736	0	0.0%
Micro	222	5	2.3%
Pine Level	793	0	0.0%
Princeton	572	0	0.0%
Selma	2,719	0	0.0%
Smithfield	4,970	0	0.0%
Wilson's Mills	873	0	0.0%
Unincorporated Area	45,947	348	0.8%
Lee County	**24,070**	**51**	**0.2%**
Broadway	542	0	0.0%
Sanford	11,398	34	0.3%
Unincorporated Area	12,130	17	0.1%
Moore County	**43,890**	**162**	**0.4%**
Aberdeen	3,401	54	1.6%
Cameron	154	0	0.0%
Carthage	833	5	0.6%
Foxfire Village	594	0	0.0%
Pinebluff	591	4	0.7%
Pinehurst	8,078	10	0.1%
Robbins	550	2	0.4%

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Southern Pines	6,443	0	0.0%
Taylortown	495	0	0.0%
Vass	318	0	0.0%
Whispering Pines	1,356	14	1.0%
Unincorporated Area	21,077	73	0.3%
CAPE FEAR REGION TOTAL	**214,102**	**1,283**	**0.6%**

Source: United States Census Bureau

Table 6.5 shows population growth estimates for the region from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE 6.5: POPULATION GROWTH FOR THE CAPE FEAR REGION

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Chatham County	**63,764**	**65,257**	**65,899**	**66,817**	**4.8%**
Goldston	268	276	279	282	5.2%
Pittsboro	3,780	3,873	3,906	3,962	4.8%
Siler City	7,903	8,039	8,149	8,169	3.4%
Unincorporated Area	51,813	53,069	53,565	54,404	5.0%
Harnett County	**115,726**	**119,253**	**122,132**	**124,987**	**8.0%**
Angier	4,382	4,498	4,592	4,718	7.7%
Coats	2,134	2,209	2,276	2,340	9.7%
Dunn	9,330	9,497	9,633	9,758	4.6%
Erwin	4,436	4,527	4,591	4,637	4.5%
Lillington	3,209	3,285	3,345	3,408	6.2%
Unincorporated Area	92,235	95,237	97,695	100,126	8.6%
Johnston County	**169,613**	**172,747**	**174,801**	**177,967**	**4.9%**
Archer Lodge	4,290	4,378	4,435	4,516	5.3%
Benson	3,322	3,381	3,422	3,484	4.9%
Clayton	16,206	16,642	17,058	17,694	9.2%
Four Oaks	1,929	1,959	1,969	2,005	3.9%
Kenly	1,345	1,366	1,381	1,400	4.1%
Micro	442	451	457	464	5.0%
Pine Level	1,708	1,739	1,758	1,787	4.6%
Princeton	1,198	1,222	1,236	1,252	4.5%
Selma	6,089	6,152	6,189	6,237	2.4%
Smithfield	11,011	11,220	11,356	11,560	5.0%
Wilson's Mills	2,287	2,326	2,348	2,386	4.3%
Unincorporated Area	119,786	121,911	123,192	125,182	4.5%
Lee County	**57,904**	**58,568**	**59,579**	**60,266**	**4.1%**
Broadway	1,230	1,244	1,266	1,279	4.0%
Sanford	28,170	28,570	29,084	29,470	4.6%
Unincorporated Area	28,504	28,754	29,229	29,517	3.6%

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Moore County	**88,562**	**89,344**	**90,387**	**91,587**	**3.4%**
Aberdeen	6,382	6,478	6,682	6,906	8.2%
Cameron	290	291	294	296	2.1%
Carthage	2,282	2,297	2,319	2,341	2.6%
Foxfire Village	914	924	936	949	3.8%
Pinebluff	1,309	1,341	1,364	1,397	6.7%
Pinehurst	14,725	14,866	15,041	15,255	3.6%
Robbins	1,128	1,136	1,147	1,158	2.7%
Southern Pines	12,401	12,563	12,764	13,005	4.9%
Taylortown	774	780	788	797	3.0%
Vass	713	719	726	734	2.9%
Whispering Pines	2,962	2,994	3,031	3,071	3.7%
Unincorporated Area	44,682	44,955	45,295	45,678	2.2%
CAPE FEAR REGION TOTAL	**495,569**	**505,169**	**512,798**	**521,624**	**5.3%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the region since 2010. However, Siler City, unincorporated Harnett County, Micro, Aberdeen, and Whispering Pines have experienced slightly higher rates of development compared to the rest of the region, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. Additionally, there have been slightly higher rates of population growth in the following municipalities: Angier, Coats, Lillington, Clayton, Aberdeen, and Pinebluff. Since the population has increased in these municipalities, there are now greater numbers of people exposed to the identified hazards. Therefore, development and population growth have impacted the region's vulnerability since the previous local hazard mitigation plans were approved and there has been a slight increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, primary and secondary TRI site buffers, or Shearon Harris Nuclear Station's 10-mile buffer.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total region exposure, and thus risk, was presented in **Table 6.1**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table 6.16.**

The hazards presented in this subsection include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

6.5.1 Hurricane and Tropical Storm

Historical evidence indicates that the Cape Fear Region has a significant risk to the hurricane and tropical storm hazard. There have been three disaster declarations due to hurricanes (Hurricane Fran, Hurricane Floyd, and Hurricane Isabel) in the region. Several tracks have come near or traversed through the Cape Fear Region, as shown and discussed in Section 5: *Hazard Profiles*.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the region as shown below in **Table 6.6.** Only losses to buildings, contents, and inventory are reported, in order to better match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE 6.6: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Chatham County	$511,000
Harnett County	$1,669,000
Johnston County	$2,339,000
Lee County	$674,000
Moore County	$1,262,000
CAPE FEAR REGION TOTAL	**$6,455,000**

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table 6.7.**

TABLE 6.7: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Chatham County	**72.2**	**81.4**	**100.0**	**107.7**
Goldston	71.6	81.4	98.8	107.7
Pittsboro	70.9	80.7	98.4	106.5
Siler City	69.4	78.9	97.0	105.1
Unincorporated Area	72.2	81.4	100.0	107.7
Harnett County	**81.3**	**90.5**	**109.9**	**116.9**
Angier	77.0	86.3	105.7	111.9
Coats	78.9	88.3	107.6	114.2
Dunn	81.3	90.5	109.9	116.9
Erwin	81.3	90.5	109.9	116.9
Lillington	78.0	88.0	106.5	113.5

Location	50-year event	100-year event	500-year event	1,000-year event
Unincorporated Area	81.3	90.5	109.9	116.9
Johnston County	**83.2**	**92.4**	**110.8**	**117.4**
Archer Lodge	77.7	87.1	104.4	111.0
Benson	80.8	90.1	109.2	116.0
Clayton	79.0	88.3	106.1	113.2
Four Oaks	80.8	90.3	108.8	115.5
Kenly	80.7	89.8	107.5	113.6
Micro	81.2	90.5	108.1	114.9
Pine Level	81.7	91.0	109.4	115.7
Princeton	83.2	92.4	110.2	116.2
Selma	81.2	90.5	108.1	114.9
Smithfield	81.7	91.0	109.4	115.7
Wilson's Mills	79.0	88.3	106.1	113.2
Unincorporated Area	77.7	87.1	110.8	117.4
Lee County	**76.1**	**85.8**	**104.1**	**110.7**
Broadway	76.1	85.8	104.1	110.7
Sanford	74.6	84.4	102.9	110.5
Unincorporated Area	76.1	85.8	104.1	110.7
Moore County	**75.4**	**85.4**	**104.6**	**111.4**
Aberdeen	75.4	85.4	104.6	111.4
Cameron	75.3	85.2	103.8	111.4
Carthage	72.4	82.4	100.7	108.4
Foxfire Village	74.4	84.3	103.9	110.4
Pinebluff	75.1	84.9	104.1	111.4
Pinehurst	75.1	84.9	104.1	111.4
Robbins	71.7	81.2	101.3	108.4
Southern Pines	75.4	85.4	104.6	111.4
Taylortown	73.6	83.3	103.0	109.3
Vass	75.4	85.4	104.6	111.2
Whispering Pines	74.7	84.6	102.8	110.5
Unincorporated Area	75.4	85.4	104.6	111.4
MAXIMUM WIND SPEED REPORTED	**83.2**	**92.4**	**110.8**	**117.4**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the entire Cape Fear Region, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across the Cape Fear Region, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in the Cape Fear Region. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

6.5.2 Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for the region. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table 6.8** summarizes the findings.

TABLE 6.8: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Chatham County	$12,000
Harnett County	$21,000
Johnston County	$20,000
Lee County	$15,000
Moore County	$35,000
CAPE FEAR REGION TOTAL	**$104,000**

Source: Hazus-MH 2.1

Social Vulnerability

It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table 6.17**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in the Cape Fear Region. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

6.5.3 Landslide

In order to complete the vulnerability assessment for landslides in the Cape Fear Region, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax parcel and building footprint data, and GIS analysis. **Table 6.9** presents the potential at-risk property where

available. Some areas of the Cape Fear Region are identified as moderate incidence areas by the USGS landslide data, but there are no areas of high incidence. Therefore, the moderate incidence level was used to identify different areas of concern for the analysis below.

TABLE 6.9: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Buildings At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Chatham County	**36,701**	**32,737**	**$5,082,594,475**
Goldston	23	28	$1,777,877
Pittsboro	1,923	1,591	$283,695,816
Siler City	2,808	2,889	$254,476,937
Unincorporated Area	31,947	28,229	$4,542,643,845
Harnett County	**0**	**0**	**$0**
Angier	0	0	$0
Coats	0	0	$0
Dunn	0	0	$0
Erwin	0	0	$0
Lillington	0	0	$0
Unincorporated Area	0	0	$0
Johnston County	**0**	**0**	**$0**
Archer Lodge	0	0	$0
Benson	0	0	$0
Clayton	0	0	$0
Four Oaks	0	0	$0
Kenly	0	0	$0
Micro	0	0	$0
Pine Level	0	0	$0
Princeton	0	0	$0
Selma	0	0	$0
Smithfield	0	0	$0
Wilson's Mills	0	0	$0
Unincorporated Area	0	0	$0
Lee County	**2,767**	**4,816**	**$177,921,000**
Broadway	1	0	$0
Sanford	0	0	$0
Unincorporated Area	2,766	4,816	$177,921,000
Moore County	**266**	**543**	**$12,243,960**
Aberdeen	0	0	$0
Cameron	0	0	$0
Carthage	0	0	$0
Foxfire Village	0	0	$0
Pinebluff	0	0	$0
Pinehurst	0	0	$0
Robbins	0	0	$0
Southern Pines	0	0	$0
Taylortown	0	0	$0

Location	Number of Parcels At Risk	Number of Buildings At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Vass	0	0	$0
Whispering Pines	0	0	$0
Unincorporated Area	266	543	$12,243,960
CAPE FEAR REGION TOTAL	**39,734**	**38,096**	**5,272,759,435**

Source: United States Geological Survey

Social Vulnerability

Given moderate susceptibility in some areas of the Cape Fear Region, it is assumed that the populations in Chatham County are at slightly higher risk than other areas. However, all areas are at some risk.

Critical Facilities

One hundred and thirty-four critical facilities in the region are located in a moderate susceptibility area, though the majority (326) are located in an area of low susceptibility. Chatham County has 37 critical facilities located within a moderate incidence area (moderate susceptibility), including 1 EOC, 14 fire stations, 1 medical care facility, 4 police stations, and 17 schools. Lee County only has 3 critical facilities located in a moderate incidence area (moderate susceptibility), including 2 fire stations and 1 school. Moore, Harnett, and Johnston Counties have no critical facilities in a moderate incidence area. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a landslide has the potential to impact some existing and future buildings, facilities, and populations in the Cape Fear Region, and some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for Cape Fear assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

6.5.4 Flood

Historical evidence indicates that the Cape Fear Region is susceptible to flood events. A total of 87 flood events have been reported by the National Climatic Data Center resulting in nearly $473,000 dollars in damages and one injury. On an annualized level, these damages amount to almost $24,000 for the Cape Fear Region.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the Cape Fear counties. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table 6.10** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE 6.10: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Chatham County	**3,310**	**237**	**$305,691,442**	**26**	**19**	**$7,032,547**
Goldston	0	0	$0	0	0	$0
Pittsboro	82	17	$25,250,289	3	1	$235,864
Siler City	210	77	$19,683,496	9	12	$5,483,543
Unincorporated Area	3,018	143	$260,757,657	14	6	$1,313,140
Harnett County	**3,691**	**450**	**$212,393,380**	**762**	**507**	**$40,329,040**
Angier	13	1	$438,820	2	1	$754,550
Coats	0	0	$0	0	0	$0
Dunn	218	99	$22,443,480	31	19	$1,792,580
Erwin	58	15	$12,418,680	64	55	$3,430,800
Lillington	20	7	$709,240	25	20	$8,325,230
Unincorporated Area	3,382	328	$176,383,160	640	412	$26,025,880
Johnston County	**7,386**	**920**	**$620,984,390**	**785**	**453**	**$88,424,540**
Archer Lodge	42	2	$3,039,260	0	0	$0
Benson	4	1	$51,270	0	0	$0
Clayton	213	20	$58,841,010	68	34	$10,496,010
Four Oaks	29	3	$1,501,390	23	4	$2,645,850
Kenly	0	0	$0	0	0	$0
Micro	1	0	$0	0	0	$0
Pine Level	1	0	$31,870	0	0	$0
Princeton	1	0	$120,110	0	0	$0
Selma	23	2	$1,070,130	0	0	$0
Smithfield	609	287	$105,484,330	272	178	$34,648,500
Wilson's Mills	14	1	$536,410	0	0	$0
Unincorporated Area	6,449	604	$450,308,610	422	237	$40,634,180
Lee County	**2,819**	**532**	**$435,806,000**	**82**	**80**	**$13,160,900**
Broadway	0	0	$0	0	0	$0
Sanford	627	197	$137,463,600	67	59	$9,426,300
Unincorporated Area	2,192	335	$298,342,400	15	21	$3,734,600
Moore County	**5,949**	**838**	**$973,218,800**	**148**	**172**	**$12,359,110**
Aberdeen	92	68	$8,716,810	43	25	$3,941,560
Cameron	20	1	$145,810	0	0	$0
Carthage	0	0	$0	0	0	$0
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	21	0	$981,520	8	7	$67,720
Pinehurst	651	154	$372,422,300	7	5	$1,186,550
Robbins	12	4	$500,040	2	6	$2,234,830
Southern Pines	142	9	$41,464,100	4	3	$536,800
Taylortown	11	1	$107,130	0	0	$0
Vass	4	0	$0	0	0	$0
Whispering Pines	179	35	$24,426,800	15	41	$1,527,290

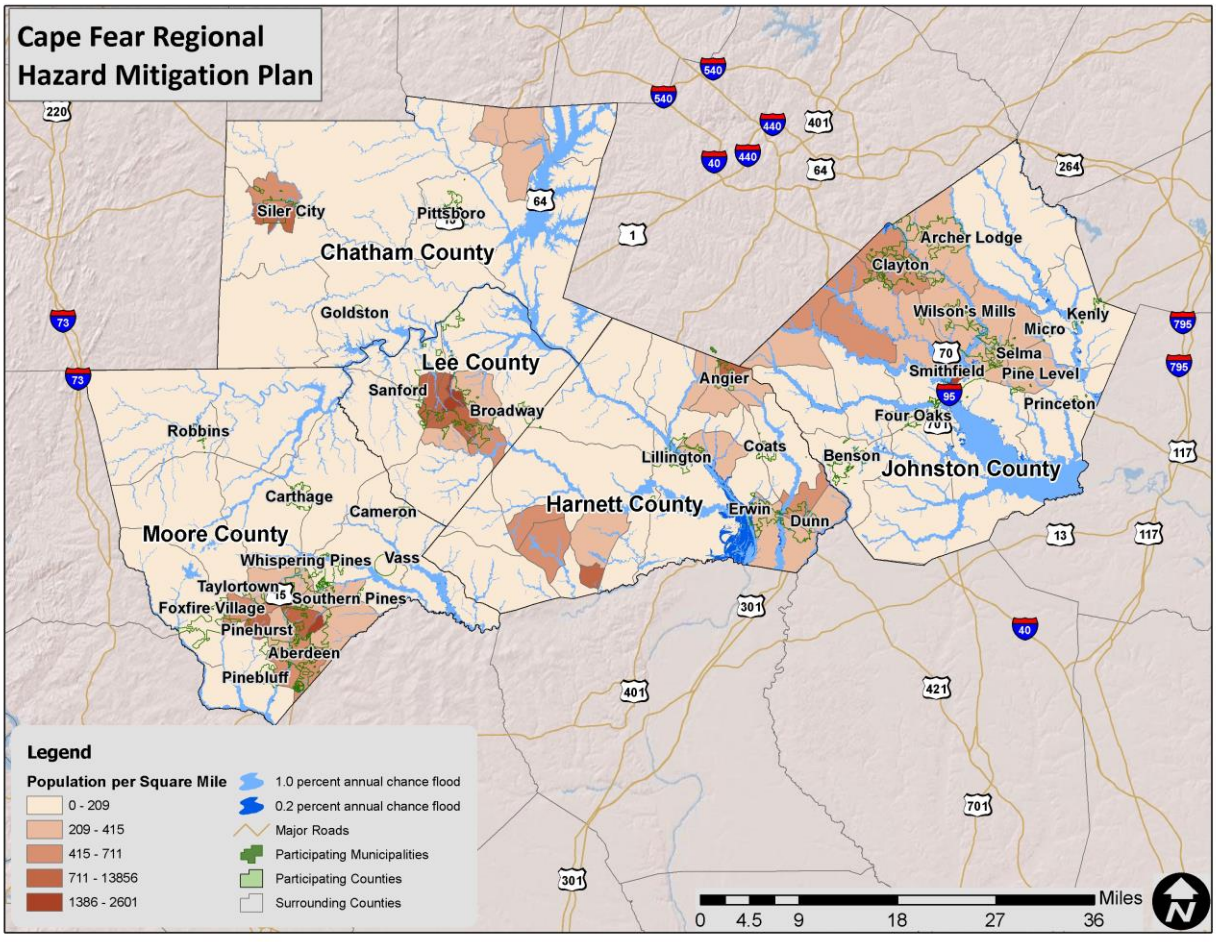
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Unincorporated Area	4,817	566	$524,454,290	69	85	$2,864,360
CAPE FEAR REGION TOTAL	**23,155**	**2,977**	**$2,548,094,012**	**1,803**	**1,231**	**$161,306,137**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure 6.4** is presented to gain a better understanding of at risk population.

FIGURE 6.4: POPULATION DENSITY NEAR FLOODPLAINS IN THE CAPE FEAR REGION



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no critical facilities in Chatham, Harnett, or Lee Counties located in the Cape Fear 1.0-percent annual chance floodplain and 0.2-percent annual chance

floodplain based on FEMA DFIRM boundaries and GIS analysis (as previously noted, this analysis does not consider building elevation, which may negate risk). In Moore County there are 7 critical facilities located in the 1.0 percent annual chance floodplain, including 1 EMS/rescue station, a town hall, and several communications towers/units. There is 1 additional Moore County critical facility, a wastewater treatment plant, located in the 0.2 percent annual chance floodplain. In Johnston County there are five facilities located in the 1.0 percent annual chance floodplain including two adult care facilities, two town-owned buildings, and a school. There are also two facilities located in the 0.2 percent annual chance floodplain: Smithfield Operation Center and Meadowview Assisted Living Center. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the Cape Fear Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

6.5.5 Hazardous Materials Incident

Historical evidence indicates that the Cape Fear Region is susceptible to hazardous materials events. A total of 83 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration resulting in almost $19,000 dollars in damages, 1 fatality, and 6 injures. On an annualized level, these damages amount to $610 for the Cape Fear Region.

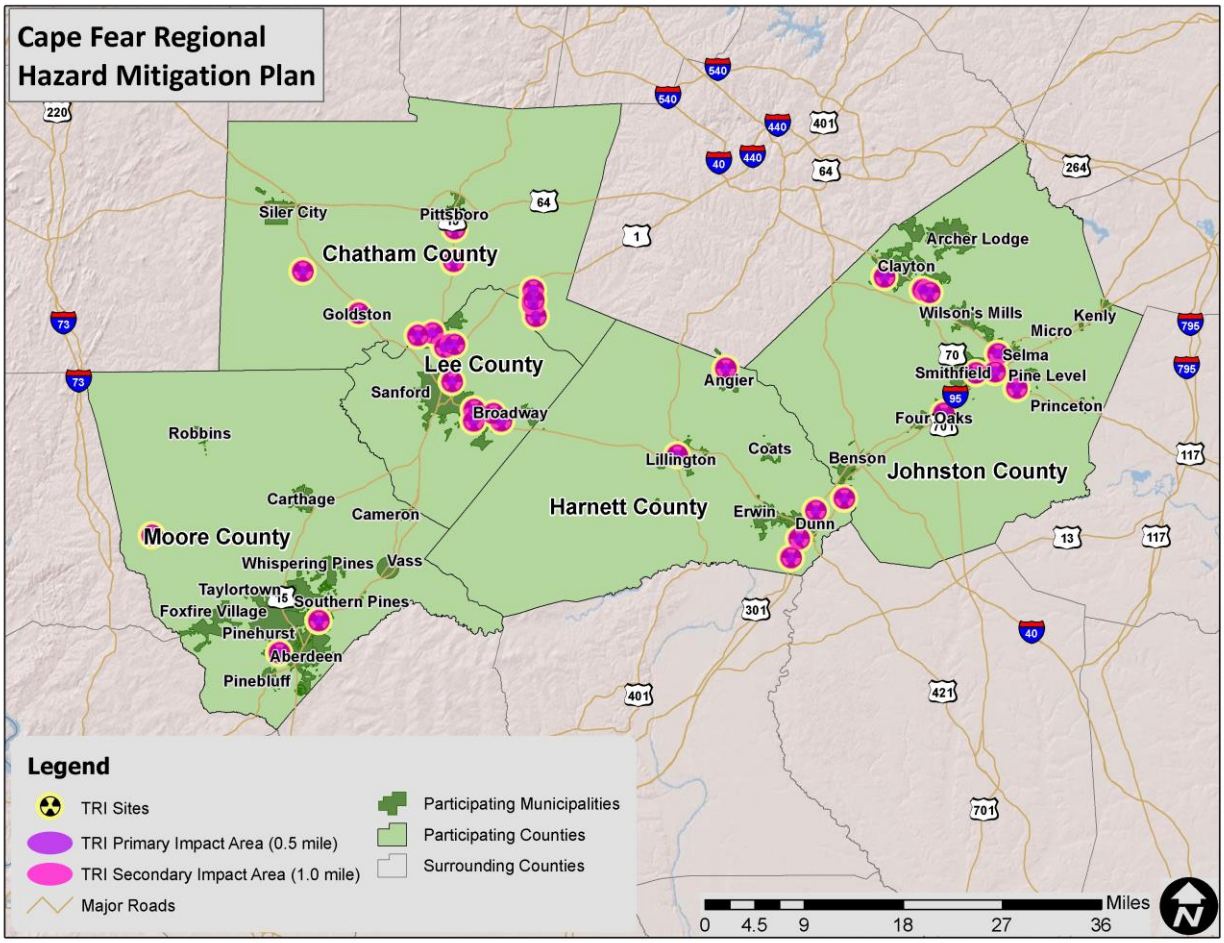
Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[5] In both scenarios, two sizes of buffers—0.5 mile and 1.0 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in the Cape Fear Region, along with buffers, were used for analysis as shown in **Figure 6.5.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer

[5] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an actual event).

analysis. **Figure 6.6** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.11** (fixed sites), **Table 6.12** (mobile road sites) and **Table 6.13** (mobile railroad sites).[6]

FIGURE 6.5: TRI SITES WITH BUFFERS IN THE CAPE FEAR REGION



Source: Environmental Protection Agency

[6] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

TABLE 6.11: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Chatham County	**829**	**802**	**$108,827,637**	**1,881**	**1,715**	**$202,857,142**
Goldston	191	207	$12,798,039	208	245	$14,109,087
Pittsboro	267	224	$40,835,250	543	429	$86,176,897
Siler City	0	0	$0	0	0	$0
Unincorporated Area	371	371	$55,194,348	1,130	1,041	$102,571,158
Harnett County	**1,222**	**964**	**$149,230,780**	**5,110**	**4,272**	**$451,854,131**
Angier	475	439	$49,692,030	1,283	1,180	$102,306,420
Coats	0	0	$0	0	0	$0
Dunn	118	97	$13,287,460	1,572	1,355	$131,464,850
Erwin	0	0	$0	0	0	$0
Lillington	310	204	$23,614,090	1,020	755	$86,084,870
Unincorporated Area	319	224	$62,637,200	1,235	982	$131,997,991
Johnston County	**2,179**	**1,823**	**$466,467,500**	**7,921**	**6,553**	**$1,239,691,111**
Archer Lodge	0	0	$0	0	0	$0
Benson	0	0	$0	0	0	$0
Clayton	676	455	$89,812,190	2165	1492	$252,085,700
Four Oaks	47	47	$6,134,280	107	89	$13,623,180
Kenly	0	0	$0	0	0	$0
Micro	0	0	$0	0	0	$0
Pine Level	1	0	$0	33	82	$2,901,220
Princeton	0	0	$0	0	0	$0
Selma	223	205	$23,799,580	1,476	1,361	$138,515,920
Smithfield	738	642	$155,396,310	2,284	1,881	$471,013,961
Wilson's Mills	0	0	$0	0	0	$0
Unincorporated Area	494	474	$191,325,140	1,856	1,648	$361,551,130
Lee County	**1,490**	**2,092**	**$435,620,000**	**4,220**	**5,925**	**$713,980,600**
Broadway	0	0	$0	0	0	$0
Sanford	1,169	1,586	$241,133,700	2,972	4,079	$455,745,500
Unincorporated Area	321	506	$194,486,300	1,248	1,846	$258,235,100
Moore County	**835**	**684**	**$59,959,540**	**3,418**	**2,911**	**$354,457,430**
Aberdeen	50	69	$5,678,000	272	239	$37,631,880
Cameron	0	0	$0	0	0	$0
Carthage	0	0	$0	0	0	$0
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	0	0	$0	0	0	$0
Pinehurst	0	0	$0	17	19	$7,611,530
Robbins	0	0	$0	0	0	$0
Southern Pines	618	458	$43,565,000	2,547	2,080	$269,029,140
Taylortown	0	0	$0	0	0	$0
Vass	0	0	$0	0	0	$0
Whispering Pines	0	0	$0	0	0	$0

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Unincorporated Area	167	157	$10,716,540	582	573	$40,184,880
CAPE FEAR REGION TOTAL	**8,011**	**7,686**	**$1,590,626,487**	**28,199**	**26,348**	**$3,936,822,645**

FIGURE 6.6: MOBILE HAZMAT BUFFERS IN THE CAPE FEAR REGION

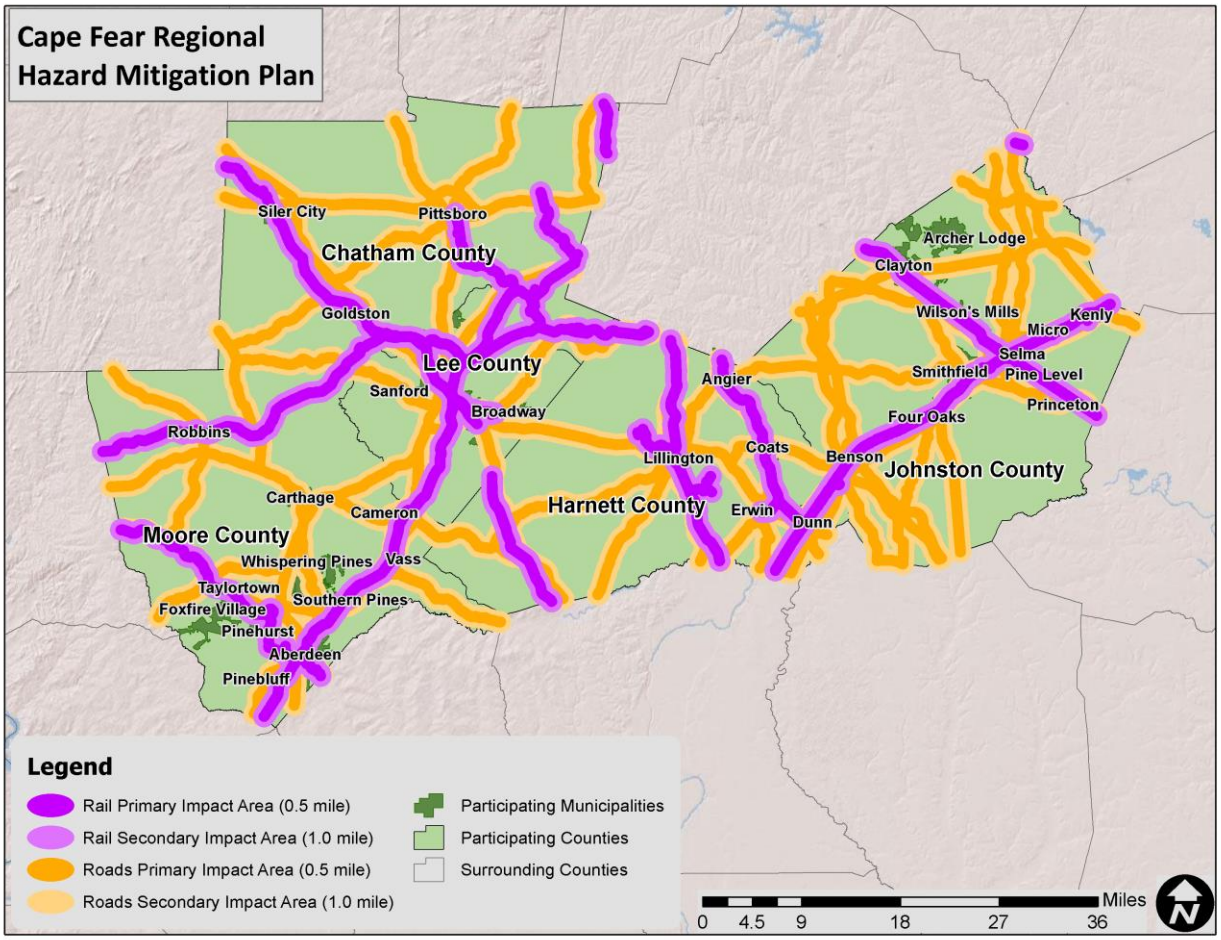


TABLE 6.12: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS – ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Chatham County	**13,913**	**13,539**	**$1,550,493,395**	**21,342**	**20,293**	**$2,310,617,755**
Goldston	61	69	$5,226,391	208	239	$14,109,087
Pittsboro	1,899	1,577	$278,581,181	1,923	1,591	$283,695,816

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Siler City	1,555	1,525	$140,202,599	2,404	2,463	$215,052,134
Unincorporated Area	10,398	10,368	$1,126,483,224	16,807	16,000	$1,797,760,718
Harnett County	**29,870**	**25,890**	**$2,064,280,457**	**42,468**	**37,104**	**$2,974,403,705**
Angier	1,744	1,614	$144,327,984	1,862	1,722	$152,433,474
Coats	900	846	$53,792,220	997	974	$61,414,920
Dunn	4,075	3,395	$372,827,698	4,829	4,113	$451,638,268
Erwin	2,173	1,902	$136,380,170	2,470	2,160	$159,419,650
Lillington	1,584	970	$141,390,598	1,632	1,049	$144,987,408
Unincorporated Area	19,394	17,163	$1,215,561,787	30,678	27,086	$2,004,509,985
Johnston County	**42,360**	**37,441**	**$4,389,025,032**	**61,201**	**54,421**	**$6,004,405,922**
Archer Lodge	0	0	$0	20	13	$1,164,490
Benson	1,712	1458	$178,956,673	1,712	1,458	$178,956,673
Clayton	3,534	2,712	$505,484,383	6,044	4,213	$817,554,253
Four Oaks	977	832	$85,536,644	1,131	915	$92,646,954
Kenly	741	742	$48,529,791	741	750	$48,529,791
Micro	244	254	$11,897,567	244	256	$11,897,567
Pine Level	754	808	$68,553,540	795	820	$70,814,330
Princeton	436	394	$67,521,100	707	628	$83,358,730
Selma	2,006	2,099	$186,057,540	2,311	2,506	$205,382,510
Smithfield	4,568	4,125	$704,429,091	5,208	4,763	$814,517,971
Wilson's Mills	434	377	$44,864,030	890	792	$70,463,670
Unincorporated Area	26,954	23,640	$2,487,194,673	41,398	37,307	$3,609,118,983
Lee County	**14,287**	**17,892**	**$1,749,760,180**	**21,922**	**27,836**	**$2,463,436,380**
Broadway	31	32	$1,391,180	223	269	$30,926,980
Sanford	8,139	9,662	$1,079,629,200	10,852	12,937	$1,353,784,100
Unincorporated Area	6,117	8,198	$668,739,800	10,847	14,630	$1,078,725,300
Moore County	**32,116**	**31,947**	**$4,122,295,218**	**47,638**	**47,271**	**$6,021,311,378**
Aberdeen	2,727	2,954	$302,590,390	3,261	3,328	$361,460,040
Cameron	222	362	$12,184,480	222	362	$12,184,480
Carthage	1,036	1,267	$127,870,220	1,216	1,424	$134,751,010
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	605	688	$43,943,660	856	971	$62,333,510
Pinehurst	5,519	3,866	$1,387,032,900	8,116	5,929	$1,892,762,910
Robbins	549	666	$32,953,060	631	809	$36,792,390
Southern Pines	4,218	3,461	$679,321,908	6,631	5,223	$1,027,620,558
Taylortown	356	265	$41,625,120	644	571	$51,615,140
Vass	643	725	$45,044,780	662	770	$45,738,310
Whispering Pines	0	0	$0	219	148	$34,101,010
Unincorporated Area	16,241	17,693	$1,449,728,700	25,180	27,736	$2,361,952,020
CAPE FEAR REGION TOTAL	**132,546**	**126,709**	**$13,875,854,282**	**194,571**	**186,925**	**$19,774,175,140**

TABLE 6.13: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS – RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Chatham County	**6,823**	**6,052**	**$777,646,801**	**11,699**	**10,350**	**$1,352,950,392**
Goldston	208	245	$14,109,087	208	245	$14,109,087
Pittsboro	980	773	$152,957,766	1,628	1,414	$237,350,609
Siler City	1,790	1,558	$152,421,343	2,613	2,371	$220,529,904
Unincorporated Area	3,845	3,476	$458,158,605	7,250	6,320	$880,960,792
Harnett County	**15,466**	**13,140**	**$1,114,687,502**	**24,820**	**21,470**	**$1,838,940,605**
Angier	1,600	1,414	$131,870,374	1,787	1,625	$146,193,924
Coats	878	771	$52,624,330	962	912	$58,097,190
Dunn	3,350	2,661	$295,703,910	4,744	4,011	$444,654,578
Erwin	1,379	1,260	$86,821,570	2,211	1,937	$139,041,490
Lillington	930	723	$84,644,550	1,242	919	$119,800,278
Unincorporated Area	7,329	6,311	$463,022,768	13,874	12,066	$931,153,145
Johnston County	**16,633**	**14,898**	**$1,950,368,209**	**24,037**	**21,041**	**$2,704,451,349**
Archer Lodge	0	0	$0	0	0	$0
Benson	1,223	1,117	$123,465,933	1,628	1,382	$169,048,163
Clayton	2,353	1,840	$289,210,633	3,851	2,462	$492,544,973
Four Oaks	1,014	854	$88,689,664	1,131	915	$92,646,954
Kenly	711	692	$46,486,171	741	750	$48,529,791
Micro	239	242	$11,694,027	244	256	$11,897,567
Pine Level	618	644	$56,764,240	756	737	$67,194,450
Princeton	696	618	$80,436,730	707	626	$83,358,730
Selma	2,087	2,163	$178,150,020	2,311	2,506	$205,382,510
Smithfield	3,092	2,734	$528,934,641	4,055	3,631	$683,811,301
Wilson's Mills	792	689	$58,194,890	997	836	$73,824,230
Unincorporated Area	3,808	3,305	$488,341,260	7,616	6,940	$776,212,680
Lee County	**8,928**	**11,489**	**$1,185,815,400**	**14,019**	**18,750**	**$1,640,390,600**
Broadway	0	0	$0	0	0	$0
Sanford	2,827	7,288	$756,695,900	8,791	10,557	$1,057,791,600
Unincorporated Area	6,101	4,201	$429,119,500	5,228	8,193	$582,599,000
Moore County	**16,039**	**15,691**	**$2,181,317,488**	**27,037**	**26,124**	**$3,876,597,248**
Aberdeen	2,275	2,592	$267,715,730	3,010	3,306	$346,408,630
Cameron	187	240	$9,970,980	216	344	$11,812,920
Carthage	0	0	$0	0	0	$0
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	86	65	$5,347,930	329	321	$21,176,000
Pinehurst	2,721	2,052	$699,164,590	5,510	4,189	$1,483,220,110
Robbins	615	767	$35,900,470	629	800	$36,607,070
Southern Pines	2,157	2,051	$296,184,208	3,753	3,472	$453,906,838
Taylortown	0	0	$0	173	135	$37,626,040
Vass	577	612	$41,234,140	662	770	$45,738,310

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Buildings	Approx. Improved Value of Buildings
Whispering Pines	0	0	$0	0	0	$0
Unincorporated Area	7,421	7,312	$825,799,440	12,755	12,787	$1,440,101,330
CAPE FEAR REGION TOTAL	**63,889**	**61,270**	**$7,209,835,400**	**101,612**	**97,735**	**$11,413,330,194**

Social Vulnerability

Given high susceptibility across the entire Cape Fear Region, it is assumed that the total population is at risk to hazardous materials incidents. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 120 facilities located in a HAZMAT risk zone. The primary impact zone includes 19 facilities: 3 fire stations and 1 school in Chatham County; 2 fire stations, 1 EMS/rescue station, 1 police station, and 1 other facility in Harnett County; 5 schools in Lee County; 1 medical care facility, 1 school, and 9 others in Johnston County; and 5 other facilities in Moore County. The remaining 90 at-risk critical facilities are located in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in the Cape Fear Region revealed that there are 546 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 223 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes 22 critical facilities in Chatham County, 81 critical facilities in Harnett County, 26 critical facilities in Lee County, 136 critical facilities in Johnston County, and 203 critical facilities in Moore County. The remaining 80 at-risk critical facilities are in the secondary road buffer area. The primary railroad buffer area includes the following critical facilities: 15 in Chatham County, 51 in Harnett County, 16 in Lee County, 95 in Johnston County, and 83 in Moore County. The remaining 80 at-risk critical facilities are in the secondary railroad buffer area. Although this is a worst case scenario model, it indicates that many of the critical facilities in the Cape Fear Region are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in the Cape Fear Region. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the region.

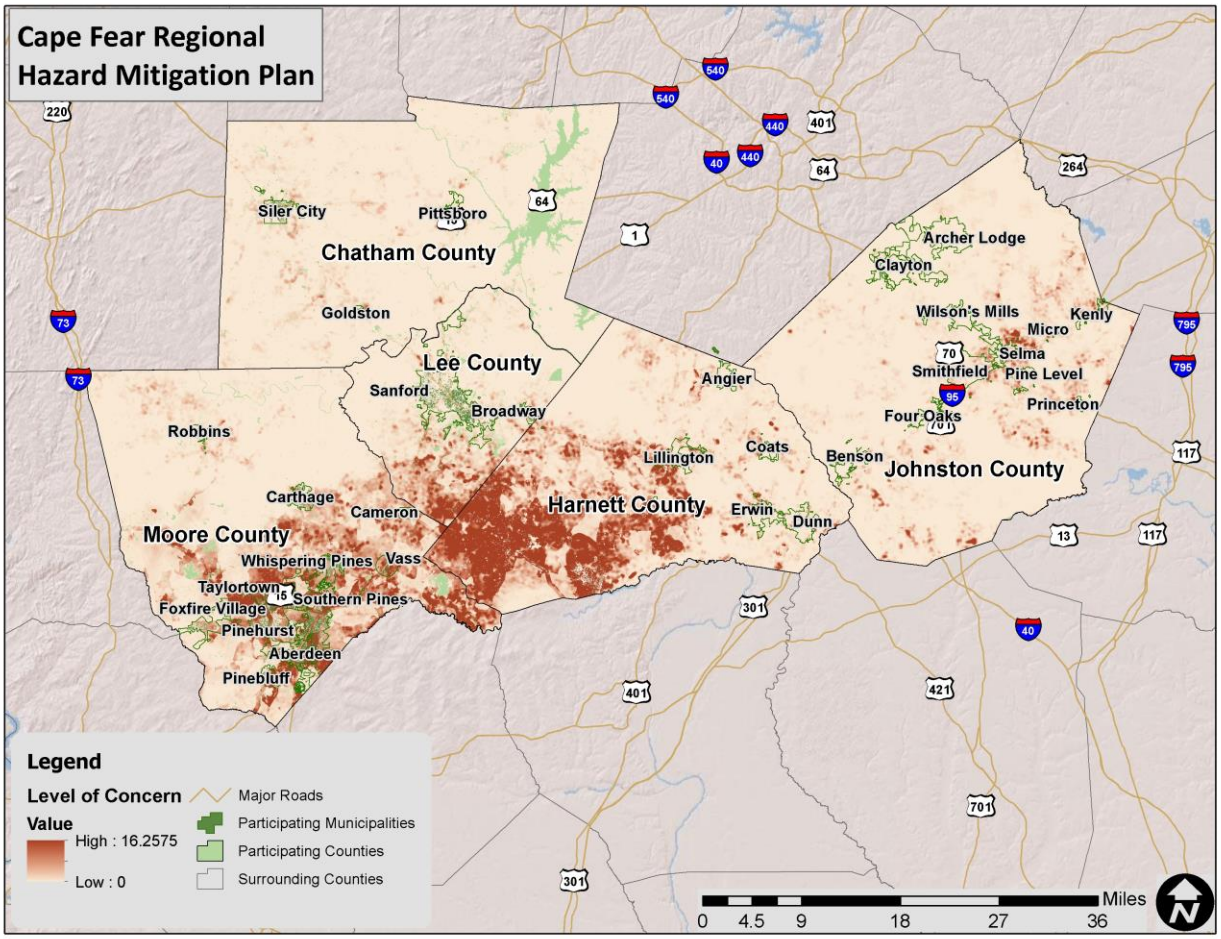
6.5.6 Wildfire

Although historical evidence indicates that the Cape Fear Region is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the region.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure 6.7** shows the Level of Concern data and **Figure 6.8** shows the areas of analysis where any grid cell is greater than or equal to 1.0. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above or equal to 1 were chosen to be displayed as areas of risk. The region contains some lands where the value falls into the at-risk category, and though it has somewhat less land labeled as at-risk compared to other regions of North Carolina, the level of concern in those areas that are considered at-risk is somewhat higher than other areas of the state. Since all of this land area is on the lower fifth of the overall LOC scale, there is likely considerably less risk in the region than in other areas of the country.

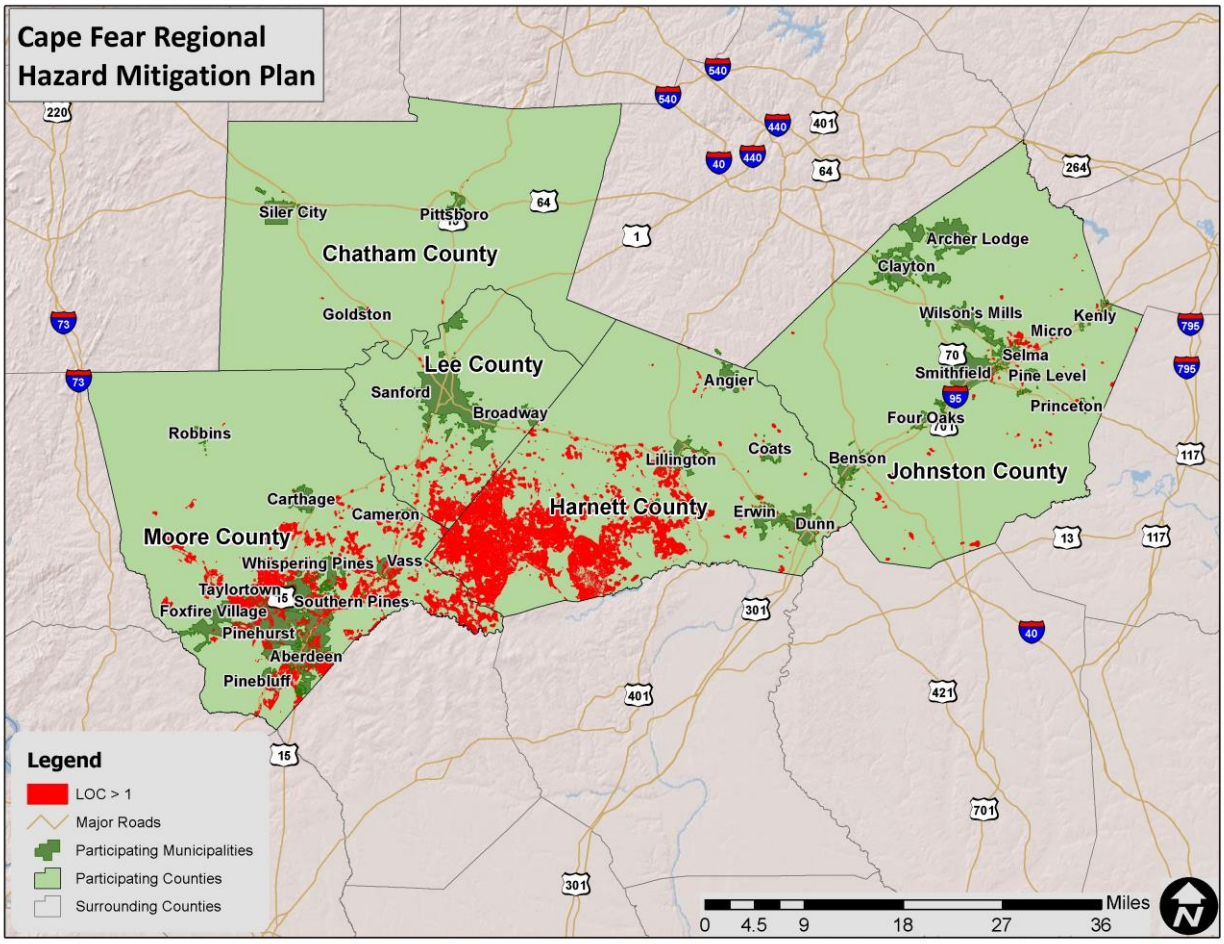
Table 6.14 shows the results of the analysis.

FIGURE 6.7: WILDFIRE RISK AREAS IN THE CAPE FEAR REGION



Source: Southern Wildfire Risk Assessment Data

FIGURE 6.8: WILDFIRE RISK AREAS IN THE CAPE FEAR REGION



Source: Southern Wildfire Risk Assessment Data

TABLE 6.14: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Chatham County	**51**	**30**	**$8,020,564**
Goldston	1	0	$23,683
Pittsboro	4	3	$565,768
Siler City	0	0	$0
Unincorporated Area	46	27	$7,431,113
Harnett County	**21,745**	**13,578**	**$1,629,662,809**
Angier	0	0	$0
Coats	31	17	$4,560,240
Dunn	491	264	$56,593,760
Erwin	115	43	$8,519,980
Lillington	127	15	$9,641,298
Unincorporated Area	20,981	13,239	$1,550,347,531

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Johnston County	**1,277**	**570**	**$138,681,250**
Archer Lodge	0	0	$0
Benson	0	0	$0
Clayton	0	0	$0
Four Oaks	1	0	$0
Kenly	264	142	$14,562,830
Micro	6	0	$7,600
Pine Level	13	13	$1,340,190
Princeton	15	5	$471,680
Selma	146	73	$48,572,760
Smithfield	70	36	$42,369,820
Wilson's Mills	0	0	$0
Unincorporated Area	762	301	$31,356,370
Lee County	**2,086**	**2,679**	**$145,912,750**
Broadway	1	13	$102,350
Sanford	13	12	$7,770,000
Unincorporated Area	2,072	2,654	$138,040,400
Moore County	**22,757**	**16,570**	**$3,685,311,100**
Aberdeen	1,233	1,091	$157,030,050
Cameron	7	10	$250,430
Carthage	278	198	$59,544,610
Foxfire Village	50	14	$4,716,320
Pinebluff	315	233	$24,031,590
Pinehurst	5,841	3,829	$1,434,214,860
Robbins	0	0	$0
Southern Pines	2,549	1,652	$446,086,160
Taylortown	500	307	$31,726,180
Vass	414	345	$35,304,090
Whispering Pines	242	91	$29,045,670
Unincorporated Area	11,328	8,800	$1,463,361,140
CAPE FEAR REGION TOTAL	**47,916**	**33,427**	**$5,607,588,473**

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire Cape Fear Region. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in wildfire areas of concern in Chatham County or Johnston County. However, there are 10 in Harnett County, 4 in Lee County, and 44 in Moore County. This reflects the elevated risk in these three counties for critical facilities to wildfire. It should be noted, however, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in the Cape Fear Region.

6.5.7 Nuclear Accident

The location of Shearon Harris Nuclear Station north of the Cape Fear Region demonstrates that the region is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. Nearly all areas of the Cape Fear Region are located within one of the risk zones. **Table 6.15** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[7]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[8]
Chatham County	**3,122**	**3,156**	**$340,412,640**	**42,136**	**39,487**	**$5,417,460,799**
Goldston	0	0	$0	208	245	$14,109,087
Pittsboro	0	0	$0	1,923	1,591	$283,695,816
Siler City	0	0	$0	2,808	2,889	$254,476,937
Unincorporated Area	3,122	3,156	$340,412,640	37,197	34,762	$4,865,178,959
Harnett County	**2,835**	**3,420**	**$168,946,050**	**64,570**	**57,035**	**$4,566,025,607**
Angier	0	0	$0	1,862	1,722	$152,433,474
Coats	0	0	$0	1,002	992	$61,881,400
Dunn	0	0	$0	4,829	4,114	$451,638,268
Erwin	0	0	$0	2,470	2,160	$159,419,650
Lillington	0	0	$0	1,639	1,055	$145,446,258
Unincorporated Area	2,835	3,420	$168,946,050	52,768	46,992	$3,595,206,557
Johnston County	**0**	**0**	**$0**	**91,719**	**80,508**	**$8,608,016,248**
Archer Lodge	0	0	$0	1,750	1,595	$170,585,060
Benson	0	0	$0	1,712	1,458	$178,956,673
Clayton	0	0	$0	7,504	4,762	$1,031,714,203
Four Oaks	0	0	$0	1,131	915	$92,646,954
Kenly	0	0	$0	741	750	$48,529,791

[7] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[8] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[7]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[8]
Micro	0	0	$0	244	256	$11,897,567
Pine Level	0	0	$0	795	820	$70,814,330
Princeton	0	0	$0	707	628	$83,358,730
Selma	0	0	$0	2,311	2,506	$205,382,510
Smithfield	0	0	$0	5,236	4,798	$815,559,431
Wilson's Mills	0	0	$0	1,093	895	$82,053,740
Unincorporated Area	0	0	$0	68,495	61,125	$5,816,517,259
Lee County	**1,215**	**1,973**	**$66,555,100**	**31,547**	**43,630**	**$3,117,299,580**
Broadway	0	0	$0	700	844	$68,903,880
Sanford	0	0	$0	11,665	13,980	$1,439,592,100
Unincorporated Area	1,215	1,973	$66,555,100	19,182	28,806	$1,608,803,600
Moore County	**0**	**0**	**$0**	**69,536**	**74,453**	**$8,176,825,678**
Aberdeen	0	0	$0	3,268	3339	$362,337,820
Cameron	0	0	$0	222	362	$12,184,480
Carthage	0	0	$0	1,220	1428	$134,851,010
Foxfire Village	0	0	$0	887	472	$90,386,300
Pinebluff	0	0	$0	862	975	$62,333,510
Pinehurst	0	0	$0	9,496	7111	$2,164,614,510
Robbins	0	0	$0	631	809	$36,792,390
Southern Pines	0	0	$0	7,735	6285	$1,253,968,868
Taylortown	0	0	$0	644	575	$51,615,140
Vass	0	0	$0	662	770	$45,738,310
Whispering Pines	0	0	$0	1,788	1378	$274,595,350
Unincorporated Area	0	0	$0	42121	50949	$3,687,407,990
CAPE FEAR REGION TOTAL	**7,172**	**8,549**	**$575,913,790**	**299,508**	**295,113**	**$29,885,627,912**

Source: International Atomic Energy Agency

Social Vulnerability

Since nearly all areas of the region are within at least the 50-mile buffer area, the total population is considered to be at risk to a nuclear accident. However, populations in the northeast part of the region are considered to be at an elevated risk.

Critical Facilities

The critical facility analysis revealed that there are a total of seven critical facilities located in the 10-mile nuclear buffer area. This includes the following: 3 fire stations and 1 school in Chatham County and 1 EMS/rescue station, 1 fire station, and 1 other facility in Harnett County. All critical facilities in all counties are located within the 50-mile nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table 6.17** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in the Cape Fear Region, though areas in the northeast of the region are at a

higher risk than others. All structures in the county are at some risk given that they are nearly all located within the 50-mile buffer area.

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the natural hazards in the Cape Fear through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.
- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in the Cape Fear Region. Updating this risk "snapshot" with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.
- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in the Cape Fear Region. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the Cape Fear counties.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through locally assessed values for improvements (buildings), and social exposure can be identified by estimating the population exposed to each hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example all building types are considered at risk to the winter storm hazard and commercial, residential, and government owned facilities are at risk to repetitive flooding, etc).

Table 6.16 presents a summary of annualized loss for each hazard in the Cape Fear Region. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE 6.16: ANNUALIZED LOSS FOR THE CAPE FEAR REGION

Event	Chatham County	Harnett County	Johnston County	Lee County	Moore County	Region Total
Atmospheric Hazards						
Drought	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Event	Chatham County	Harnett County	Johnston County	Lee County	Moore County	Region Total
Extreme Heat	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Hailstorm	Negligible	$5,393	$70,609	Negligible	Negligible	$76,002
Hurricane & Tropical Storm	$511,000	$1,669,000	$2,339,000	$674,000	$1,262,000	$6,445,000
Lightning	$50,750	$13,998	$40,508	$22,027	$168,152	$295,435
Severe Thunderstorm / High Wind	$25,249	$29,061	$26,524	$18,425	$61,319	$160,578
Tornado	$18,229	$411,492	$4,492,630	$1,040,079	$224,085	$6,186,516
Winter Storm & Freeze	$40,343	$40,624	$40,624	$40,343	$40,343	$202,279
Geologic Hazards						
Earthquake	$12,000	$21,000	$20,000	$15,000	$35,000	$104,000
Landslide	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Hydrologic Hazards						
Dam Failure	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Erosion	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Flood	$452	$452	$2,293	Negligible	$22,742	$25,939
Other Hazards						
HAZMAT Incident	Negligible	$554	$858	$40	$16	$1,468
Wildfire	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Nuclear Accident	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Terror Threat	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.17** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE 6.17: AT-RISK CRITICAL FACILITIES

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
CHATHAM COUNTY																							
BENNETT VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
BONLEE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X			X	X			X	X			X
BENNETT VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
SILK HOPE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X													X
SILK HOPE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X													X
STALEY VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X						X		X			X
MONCURE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X		X	X
NORTHVIEW VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X						X		X	X	X			X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X				X	X
MONCURE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X			X	X			X	X		X	X
PITTSBORO SUBSTATION 2	Fire Station	X	X	X	X	X	X	X	X	X		X											X
PITTSBORO SUBSTATION 3	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
Bennett School	School	X	X	X	X	X	X	X	X	X		X					X	X					X
Siler City Elementary	School	X	X	X	X	X	X	X	X	X		X					X	X					X
J. S. Waters	School	X	X	X	X	X	X	X	X	X		X				X	X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Chatham Central H.S.	School	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
Bonlee School	School	X	X	X	X	X	X	X	X	X		X			X	X			X	X			X
Chatham Middle School	School	X	X	X	X	X	X	X	X	X		X							X	X			X
Silk Hope School	School	X	X	X	X	X	X	X	X	X													X
Moncure School	School	X	X	X	X	X	X	X	X	X		X					X	X	X	X		X	X
North Chatham School	School	X	X	X	X	X	X	X	X	X		X											X
Perry Harrison	School	X	X	X	X	X	X	X	X	X		X											X
Northwood H.S.	School	X	X	X	X	X	X	X	X	X		X					X	X					X
Virginia Cross School	School	X	X	X	X	X	X	X	X	X		X						X		X			X
Margaret Pollard Middle School	School	X	X	X	X	X	X	X	X	X		X											X
GOLDSTON VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X					X	X			X	X			X
CHATHAM COUNTY EMERGENCY OPERATIONS	EOC	X	X	X	X	X	X	X	X	X		X					X	X		X			X
PITTSBORO VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
PITTSBORO POLICE	Police Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
CHATHAM SHERIFF	Police Station	X	X	X	X	X	X	X	X	X		X					X	X		X			X
Horton Middle School	School	X	X	X	X	X	X	X	X	X		X				X	X	X	X	X			X
Pittsboro Elementary	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
School Administration	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
SILER CITY FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X						X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
CHATHAM HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X		X					X	X					X
SILER CITY POLICE	Police Station	X	X	X	X	X	X	X	X	X		X						X	X	X			X
HIGHWAY PATROL	Police Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
SAGE Academy	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
Jordan Matthews H.S.	School	X	X	X	X	X	X	X	X	X		X						X		X			X
HARNETT COUNTY																							
BENHAVEN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X
HARNETT EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
BENHAVEN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
SPOUT SPRINGS EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
BOONE TRAIL EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
BUIES CREEK EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
FLAT BRANCH EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
FLATWOODS EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COUNTY EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X												X	X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
ANDERSON CREEK EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
BUIES CREEK FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FLATWOODS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
FLAT BRANCH FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
BOONE TRAIL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
BENHAVEN FIRE	Fire Station	X	X	X	X	X	X	X	X	X								X					X
BENHAVEN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
SPOUT SPRINGS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
SPOUT SPRINGS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
BUNNLEVEL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
BOONE TRAIL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
NORTHWEST HARNETT FIRE	Fire Station	X	X	X	X	X	X	X	X	X												X	X
ANDERSON CREEK FIRE	Fire Station	X	X	X	X	X	X	X	X	X													X
CENTRAL HARNETT HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
CENTRAL HARNETT HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
Harnett County Airpo	Other	X	X	X	X	X	X	X	X	X								X					X
JOHNSON BETTER CARE FACILITY	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
STAGE COACH MANOR	Other	X	X	X	X	X	X	X	X	X								X					X
PINECREST GARDENS OF LILLINGTON	Other	X	X	X	X	X	X	X	X	X							X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
KNOLLWOOD GARDENS OF LILLINGTON	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CORE FAMILY CARE INC	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
UNPRECEDENTED CARE	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SENTERS REST HOME	Other	X	X	X	X	X	X	X	X	X							X	X	X	X		X	X
CAMPBELL UNIVERSITY WELCOME CTR	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Benhaven Elem	School	X	X	X	X	X	X	X	X	X								X		X	X		X
West Harnett High	School	X	X	X	X	X	X	X	X	X							X	X					X
West Harnett Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
Highland Elem	School	X	X	X	X	X	X	X	X	X													X
Johnsonville Elem	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Cameron Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cape Fear Christian	School	X	X	X	X	X	X	X	X	X							X	X					X
Coats Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Coats-Erwin Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Buies Creek Elem	School	X	X	X	X	X	X	X	X	X								X					X
Harnett Central Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
Harnett Central High	School	X	X	X	X	X	X	X	X	X								X					X
North Harnett Primary	School	X	X	X	X	X	X	X	X	X							X	X					X
Lafayette Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Boone Tral Elem	School	X	X	X	X	X	X	X	X	X								X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER									
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Anderson Creek Primary	School	X	X	X	X	X	X	X	X	X							X	X					X
South Harnett Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Overhills Middle	School	X	X	X	X	X	X	X	X	X							X	X			X		X
Overhills High	School	X	X	X	X	X	X	X	X	X							X	X			X		X
ANGIER BLACK RIVER EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
ANGIER & BLACK RIVER FIRE	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
PRIMROSE VILLA INC- (II, III, & IV)	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
OAK HILL LIVING CENTER	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
ANGIER POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Angier Elem	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
COATS GROVE EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COATS GROVE FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COATS POLICE DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Coats Christian	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CITY OF DUNN – PD	EOC	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
BETSY JOHNSON HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X								X					X
BETSY JOHNSON HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X								X					X
DUNN REHABILITATION & NURSING CENTER	Other	X	X	X	X	X	X	X	X	X						X		X		X			X
SENIOR CITIZENS VILLAGE/MOORE HEALTH CAR	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
MAGNOLIA LIVING CENTER LLC	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Excel Christian	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Faith Education	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Gospel Tabernacle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Dunn Middle	School	X	X	X	X	X	X	X	X	X						X		X		X			X
Harnett Primary	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Wayne Ave Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
ERWIN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
ERWIN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
GOOD HOPE BEHAVORIAL HEALTH SERVICES	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X	X	X			X
GOOD HOPE BEHAVORIAL HEALTH SERVICES	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X	X	X			X
BRITTHAVEN OF HARNETT	Other	X	X	X	X	X	X	X	X	X								X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
ERWIN POLICE DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Malthouse Appleworks School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Erwin Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Gentry Elem	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Triton High	School	X	X	X	X	X	X	X	X	X							X	X		X			X
LILLINGTON FIRST RESPONDER	EMS/Rescue Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
CENTRAL DISPATCH- SHERIFF DEPT	EOC	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
LILLINGTON FIRE	Fire Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SUMMERVILLE FIRE	Fire Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
BROOKFIELD RETIREMENT CENTER	Other	X	X	X	X	X	X	X	X	X							X	X					X
HARNETT MANOR	Other	X	X	X	X	X	X	X	X	X							X	X					X
LILLINGTON POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
NC STATE HIGHWAY PATROL	Police Station	X	X	X	X	X	X	X	X	X								X	X	X			X
SHERIFF DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
HARNETT COUNTY DETENTION CENTER	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Star Academy	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Lillington-Shawtown Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
JOHNSTON COUNTY																							

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		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Bentonville Fire Department	Fire Station	X	X	X	X	X	X	X	X	X													X
Cleveland Fire Department Inc	Fire Station	X	X	X	X	X	X	X	X	X								X					X
Elevation Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
50-210 Community Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
50-210 Community Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X													X
Wilson Mills Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X													X
Corinth-Holder Vol Fire Dept	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Autumn Care #1	Other	X	X	X	X	X	X	X	X	X								X					X
Autumn Wind Rest Home & Retirem	Other	X	X	X	X	X	X	X	X	X							X	X					X
Mclamb's Rest Home #1	Other	X	X	X	X	X	X	X	X	X							X	X					X
Oasis Of Four Oaks Rest Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Progressive Care	Other	X	X	X	X	X	X	X	X	X													X
Hester's Family Care	Other	X	X	X	X	X	X	X	X	X													X
Autumn Care #2	Other	X	X	X	X	X	X	X	X	X								X					X
Autumn Care #3	Other	X	X	X	X	X	X	X	X	X								X					X
Mclamb's Rest Home #2	Other	X	X	X	X	X	X	X	X	X							X	X					X
Landfill	Other	X	X	X	X	X	X	X	X	X							X	X					X
Johnston County Airport Authority	Other	X	X	X	X	X	X	X	X	X								X					X
Johnston County Livestock Arena	Other	X	X	X	X	X	X	X	X	X							X	X					X
Johnston County Garage	Other	X	X	X	X	X	X	X	X	X								X					X
Johnston County Landfill	Other	X	X	X	X	X	X	X	X	X								X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
North Johnston High	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Meadow Elementary	School	X	X	X	X	X	X	X	X	X							X	X					X
Glendale-Kenly Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
South Johnston High	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Mcgee's Crossroads Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
East Clayton Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Cleveland Elementary	School	X	X	X	X	X	X	X	X	X													X
Cleveland Middle	School	X	X	X	X	X	X	X	X	X													X
Corinth-Holders School	School	X	X	X	X	X	X	X	X	X							X	X					X
Polenta Elementary	School	X	X	X	X	X	X	X	X	X													X
Mcgees Crossroads Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
River Dell Elem	School	X	X	X	X	X	X	X	X	X								X					X
West Johnston High	School	X	X	X	X	X	X	X	X	X								X					X
West Smithfield Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Dixon Road Elem	School	X	X	X	X	X	X	X	X	X								X					X
West View Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Corinth Holders High	School	X	X	X	X	X	X	X	X	X													X
Cleveland High	School	X	X	X	X	X	X	X	X	X													X
Archer Lodge Town Hall	Other	X	X	X	X	X	X	X	X	X													X
Archer Lodge Middle	School	X	X	X	X	X	X	X	X	X													X
Oasis Of Benson Rest Home(1 - 6	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Liberty Commons	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Mary Duncan Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Benson Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Elementary	School	X	X	X	X	X	X	X	X	X							X	X					X
Benson Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Johnston Health Clayton	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X					X
Brian Center	Other	X	X	X	X	X	X	X	X	X						X	X	X					X
Front Street Family Care	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Diversicare AL Of Clayton	Other	X	X	X	X	X	X	X	X	X						X	X	X					X
Hocutt-Ellington Memorial Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Operations Center	Other	X	X	X	X	X	X	X	X	X					X	X	X	X					X
Town Of Clayton Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton High	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
West Clayton Elem	School	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Cooper Elementary	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Riverwood Elementary	School	X	X	X	X	X	X	X	X	X													X
Riverwood Middle	School	X	X	X	X	X	X	X	X	X													X
Clayton Middle	School	X	X	X	X	X	X	X	X	X					X	X	X	X					X
Powhatan Elem	School	X	X	X	X	X	X	X	X	X													X
Four Oaks Rescue Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Johnston County Group Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Jame Bryan Creech Public Library	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Smithfield Post Office 2	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Four Oaks Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Four Oaks Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Four Oaks Elementary	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Four Oaks Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Volunteer Fire Depart	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Village Association	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
College Court Apartments	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Maintenance/Storage Facility	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

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		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Town Of Kenly Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Volunteer Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Hilmont Village	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Public Works Department	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Town Dump	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
North Johnston Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Public Works	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Pine Level Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro-Pine Level Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Volunteer Fire	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Senior Center	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Princeton Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Maintenance Building	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Princeton Parking Garage	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

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Princeton Ms_Hs	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Elem	School	X	X	X	X	X	X	X	X	X								X		X			X
Selma Public Library	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Selma Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Public Works	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Town Of Selma Police	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Middle School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Selma Elementary	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
County Of Johnston Police	Eoc	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston Medical Center	Medical Care Facility	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Diversicare AL Of Smithfield Wes	Other	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Classic Care #101	Other	X	X	X	X	X	X	X	X	X							X	X					X
Britthaven	Other	X	X	X	X	X	X	X	X	X								X					X
Smithfield Manor Inc.	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Council On Aging	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Meadowview Assisted Living Cente	Other	X	X	X	X	X	X	X	X	X				X			X	X					X
Carolina House Of Smithfield	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Pine Knoll Manor #2	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pine Knoll Manor #1	Other	X	X	X	X	X	X	X	X	X							X	X					X
Greenwood Group Home	Other	X	X	X	X	X	X	X	X	X			X				X	X					X
Laurel Woods Group Home	Other	X	X	X	X	X	X	X	X	X								X					X
Rha Group Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Public Library Of Johnston County And Smithfield	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
The Heritage Center	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Smithfield Post Office	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

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		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Town Hall	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Johnston County Court House	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Happ	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Human Resources	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Maintenance	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Land Use Center	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Johnston County Agricultural Building	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Johnston County Division Of Social Services	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Johnston County Health Center	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Town Of Smithfield Maintenance	Other	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X
Johnston County Animal Shelter	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Smithfield Operation Center	Other	X	X	X	X	X	X	X	X	X				X		X	X	X		X			X
Johnston Memorial Hospital	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Smithfield Parks & Rec	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Town Of Smithfield Police	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Smithfield-Selma High	School	X	X	X	X	X	X	X	X	X								X		X			X
Smithfield Middle	School	X	X	X	X	X	X	X	X	X													X
South Campus Cmty	School	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X
South Smithfield Elem	School	X	X	X	X	X	X	X	X	X							X	X		X			X

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Neuse Charter School	School	X	X	X	X	X	X	X	X	X								X		X			X
Board Of Education	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Operations	School	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Jo Co Middle College High	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Jo Co Early Academy	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Wilson Mills Fire Department	Fire Station	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilsons Mill Post Office	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilson's Mills Town Hall	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Town Of Wilson's Mills Police	Police Station	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilson's Mills Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
LEE COUNTY																							
FD VFD FIRE DEPT POCKET	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD VFD FIRE LEMON SPRINGS VOL	Fire Station	X	X	X	X	X	X	X	X	X									X	X	X		X
FD DEPT TRAMWAY	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD DEPT CAROLINA TRACE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD VFD DEEP RIVER	Fire Station	X	X	X	X	X	X	X	X	X		X											X
FD NORTHVIEW VFD STA # 6	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
FD VFD FIRE WEST SANFORD VFD	Fire Station	X	X	X	X	X	X	X	X	X						X		X	X	X			X
FD VFD DEEP RIVER FIRE SUBSTATION	Fire Station	X	X	X	X	X	X	X	X	X		X								X			X
SCH GRACE CHAPEL SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X			X		X

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SCH GREENWOOD ELEMENTERY	School	X	X	X	X	X	X	X	X	X									X	X	X		X
SCH BETHEL BIBLE COLLEGE	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH TRAMWAY ELEM	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH CENT CAR COMM COLL MAINT BUILD	School	X	X	X	X	X	X	X	X	X						X		X		X			X
SCH J GLENN EDWARDS ELEM	School	X	X	X	X	X	X	X	X	X						X				X			X
SCH DEEP RIVER ELEM	School	X	X	X	X	X	X	X	X	X		X											X
FD CAPE FEAR VOL	Fire Station	X	X	X	X	X	X	X	X	X													X
BU BROADWAY POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X													X
SCH BROADWAY ELEMENTARY	School	X	X	X	X	X	X	X	X	X								X					X
BU EMERGENCY MANAGEMENT	EOC	X	X	X	X	X	X	X	X	X							X	X	X	X			X
FD CITY STA #3	Fire Station	X	X	X	X	X	X	X	X	X								X					X
BU CENTRAL CAROLINA HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
BU SANFORD MUNICIPAL CENTER	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
BU LEE COUNTY SHERIFFS OFFICE	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH WEST LEE MIDDLE	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH CENTRAL CAROLINA COMM COLLEGE	School	X	X	X	X	X	X	X	X	X					X	X		X		X			X
SCH LEE SENIOR HIGH	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH LEE CO BUS GARAGE	School	X	X	X	X	X	X	X	X	X							X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
SCH JONESBORO ELEM	School	X	X	X	X	X	X	X	X	X							X	X		X			X
SCH EAST LEE MIDDLE	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH BRAGG ST	School	X	X	X	X	X	X	X	X	X								X		X			X
SCH MONTESSORI	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH FLOYD L KNIGHT	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH OLD MCIVER	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH LEE CHRISTIAN SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH J R INGRAM ELEM	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH MONTESSORI	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH BENJAMIN T BULLOCK ELEM	School	X	X	X	X	X	X	X	X	X					X	X	X	X		X			X
SCH TRACY HOOVER MONTESSORI	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
SCH SOUTHERN LEE HIGH SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH SAN LEE MIDDLE SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
MOORE COUNTY																							
Moore County Medic 1	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
Moore County Medic 2	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
Moore County Medic 3	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Moore County Medic 5	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Rescue 30	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Seven Lakes Rescue 69	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X		X			X
High Falls Station 12	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Westmoore Station 14	Fire Station	X	X	X	X	X	X	X	X	X													X
Cypress Point Station Station 3 (Woodlake)	Fire Station	X	X	X	X	X	X	X	X	X											X		X
Crains Creek Station 23	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Station 31	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Eastwood Station 52	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
West End 60/61	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Eagle Springs Station 62	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Seven Lakes Station 63	Fire Station	X	X	X	X	X	X	X	X	X								X		X			X
Crestline Station 72	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Pinehurst Station 91	Fire Station	X	X	X	X	X	X	X	X	X													X
Pinehurst Station 92	Fire Station	X	X	X	X	X	X	X	X	X													X
Samarkand Youth Development Center	Other	X	X	X	X	X	X	X	X	X													X
Beacon Ridge Golf and Country Club	Other	X	X	X	X	X	X	X	X	X													X
Hyland Hills Resort	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Legacy Golf Links	Other	X	X	X	X	X	X	X	X	X							X	X					X
Little River Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Midland Country Club	Other	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Pinebluff Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pine Needles Golf Club	Other	X	X	X	X	X	X	X	X	X								X					X
Pinewild Country Club	Other	X	X	X	X	X	X	X	X	X								X	X	X	X		X
The Pit Golf Links	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Riverside Country Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Seven Lakes Country Club	Other	X	X	X	X	X	X	X	X	X													X
Talamore	Other	X	X	X	X	X	X	X	X	X								X					X
Woodlake Country Club	Other	X	X	X	X	X	X	X	X	X			X					X					X
Water Treatment Facilities	Other	X	X	X	X	X	X	X	X	X							X	X					X
Main Office-Moore County Public Utilitie	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Southern Pines	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage	Other	X	X	X	X	X	X	X	X	X													X
Moore County Airport	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Progress Energy	Other	X	X	X	X	X	X	X	X	X													X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X
REMC Station	Other	X	X	X	X	X	X	X	X	X										X			X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
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REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X
REMC Breaker Station	Other	X	X	X	X	X	X	X	X	X										X			X
CEMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
CEMC Substation	Other	X	X	X	X	X	X	X	X	X													X
CEMC	Other	X	X	X	X	X	X	X	X	X							X	X					X
Communications Center	Other	X	X	X	X	X	X	X	X	X													X
Carthage Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Cranes Creek Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Seven Lakes Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Westmoore Tower	Other	X	X	X	X	X	X	X	X	X													X
Alltel, Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X								X	X	X	X		X
Alltel, Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Alltel Substation	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Alltel, Bellsouth, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Bellsouth, Sprint Cell Tower	Other	X	X	X	X	X	X	X	X	X			X				X	X					X

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Bellsouth, SunCom, Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Bellsouth, Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Bellsouth, Alltel, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Cingular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cingular Wireless Tower	Other	X	X	X	X	X	X	X	X	X													X
Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X													X
Nextel, Sprint PCS, Bellsouth Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Cingular Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint PCS, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X		X
SunCom, Bellsouth Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X								X		X	X		X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Verizon Comm. Site	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
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Central Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Century Link	Other	X	X	X	X	X	X	X	X	X													X
Embarq Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
Embarq Telephone Pedestal	Other	X	X	X	X	X	X	X	X	X							X	X					X
Embarq Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Sprint Pedestal	Other	X	X	X	X	X	X	X	X	X													X
Sprint Distribution	Other	X	X	X	X	X	X	X	X	X									X	X			X
Sprint Switch Box	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint Switch Box	Other	X	X	X	X	X	X	X	X	X													X
Sprint Phone Box	Other	X	X	X	X	X	X	X	X	X													X
Sprint 1001 #2	Other	X	X	X	X	X	X	X	X	X			X				X	X					X
Sprint Centel	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint/Embarq Pedestal	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Telephone Utility	Other	X	X	X	X	X	X	X	X	X													X
Telephone Pad	Other	X	X	X	X	X	X	X	X	X													X
United Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Coastal Agrobusiness	Other	X	X	X	X	X	X	X	X	X							X	X					X
Southern States Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sandhills Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Dixie Denning Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Airport Fuel Tanks	Other	X	X	X	X	X	X	X	X	X							X	X			X		X

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Woodlake Maintenance Shop	Other	X	X	X	X	X	X	X	X	X											X		X
RBI Retail Golf Balls	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Little River Golf	Other	X	X	X	X	X	X	X	X	X							X	X					X
Kens Body Works	Other	X	X	X	X	X	X	X	X	X								X					X
High Falls Oil	Other	X	X	X	X	X	X	X	X	X							X	X					X
Greens Fuel	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Eastwood Fire Department	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Deep River Mills	Other	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Wastewater Treatment Plant	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Hussey Oil	Other	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Spies Rd. Booster Station	Other	X	X	X	X	X	X	X	X	X										X			X
Van DerVeers LP - Robbins	Other	X	X	X	X	X	X	X	X	X							X	X					X
McNeil Oil Company	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Synergy LP	Other	X	X	X	X	X	X	X	X	X							X	X					X
Coopers LP	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Seven Lakes South Maintenance	Other	X	X	X	X	X	X	X	X	X													X
Moore County Senior Enrichment Center	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Animal Control	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Works	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Water Pollution	Other	X	X	X	X	X	X	X	X	X									X	X			X

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Vass Waste Water Treatment Plant	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Carthage Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X					X
Whispering Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X													X
Carthage Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Southern Middle School	School	X	X	X	X	X	X	X	X	X							X	X					X
West End Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
West Pine Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
West Pine Middle School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Union Pines High School	School	X	X	X	X	X	X	X	X	X													X
North Moore High School	School	X	X	X	X	X	X	X	X	X													X
Sandhills Farmlife Elementary School	School	X	X	X	X	X	X	X	X	X													X
Crain's Creek Middle School	School	X	X	X	X	X	X	X	X	X								X		X			X
New Century Middle School	School	X	X	X	X	X	X	X	X	X								X					X
Moore County Schools Admin Building	School	X	X	X	X	X	X	X	X	X							X	X					X
Highfalls Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Westmoore Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Elementary School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Stars Charter School	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Longleaf Academy	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X

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		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Highland Christian Academy	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Moore County Medic 6	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Rescue 40	EMS/Rescue Station	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X
Aberdeen Station 41	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CP & L Transmission	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
CP& L	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Transformer Station	Other	X	X	X	X	X	X	X	X	X						X		X		X	X		X
Alltel	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Sprint PCS, Aberdeen Water Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Sprint Equipment Box	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Telephone Drop	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X
Gulistan Carpet	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
WC Richards	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Ferrell Gas - Vann Pl	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Ferrell Gas - NC 5	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Cardinal Chemical	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Town Hall	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Aberdeen Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Primary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Academy of Moore County	School	X	X	X	X	X	X	X	X	X							X	X					X
Soild Rock Christian School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cypress Point Station 2 (Cameron)	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Cameron Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cameron Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cameron Elementary School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Rick Rhyne-Public Safety Moore Cnty EOC	EOC	X	X	X	X	X	X	X	X	X							X	X					X
Jail	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint, SunCom Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Agribusiness - Southern States	Other	X	X	X	X	X	X	X	X	X							X	X					X
Van DerVeers LP - Carthage	Other	X	X	X	X	X	X	X	X	X													X
Energy United	Other	X	X	X	X	X	X	X	X	X							X	X					X
Ferrell Gas	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Oil Company	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Jail	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Library	Other	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Moore County Historic Courthouse	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Board of Elections	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Child Support	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Register of Deeds	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Courthouse	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Social Services	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Health Department	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Information Technology	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Planning & Zoning	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Safety	Other	X	X	X	X	X	X	X	X	X							X	X					X
NC Cooperative Extension Service / Soil	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Day Reporting Center / Yout	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Environmental Health	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Financial Services	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County GIS / Transportation / Vete	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Safety	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Rick Rhyne-Moore County Sheriffs Office	Police Station	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Moore County Sheriff's Office	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Pinckney Academy Alternative School	School	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
West End/Foxfire Substation	Fire Station	X	X	X	X	X	X	X	X	X													X
Foxfire Country Club	Other	X	X	X	X	X	X	X	X	X													X
Foxfire Village	Other	X	X	X	X	X	X	X	X	X													X
Foxfire Police Department	Police Station	X	X	X	X	X	X	X	X	X													X
Pinebluff Station 71	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Pinebluff Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pinebluff Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Pinebluff Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X		X			X
Moore County Medic 4	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Pinehurst Rescue 90	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Moore Regional Hospital	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Country Club of North Carolina	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Mid Pines Inn and Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pinehurst Resort and Country Club	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Pinehurst Village Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Station 11	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Rescue 10	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Water Treatment Plant	Other	X	X	X	X	X	X	X	X	X				X			X	X	X	X			X
Robbins Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Elise Middle School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Moore County Medic 7	EMS/Rescue Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Southern Pines 81	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
The Carolina	Other	X	X	X	X	X	X	X	X	X								X					X
The Club at Longleaf	Other	X	X	X	X	X	X	X	X	X							X	X					X
Forest Creek Golf Club	Other	X	X	X	X	X	X	X	X	X								X					X
Knollwood Fairways	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Mid South	Other	X	X	X	X	X	X	X	X	X							X	X					X
National Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Elks Lodge	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Southern Pines Tower	Other	X	X	X	X	X	X	X	X	X								X		X			X
Bellsouth, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Century Link	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Dixie Pipeline	Other	X	X	X	X	X	X	X	X	X							X	X					X
Southern Pines Town Hall	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Southern Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Police Department	Police Station	X	X	X	X	X	X	X	X	X								X					X
Southern Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Community College	School	X	X	X	X	X	X	X	X	X							X	X					X
Southern Pines Elementary School	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Southern Pines Primary School	School	X	X	X	X	X	X	X	X	X						X		X					X
Pinecrest High School	School	X	X	X	X	X	X	X	X	X							X	X					X
Sandhills Community College	School	X	X	X	X	X	X	X	X	X							X	X					X
The O'Neal School	School	X	X	X	X	X	X	X	X	X							X	X					X
Episcol Day School	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Calvary Christian School	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Classical Christian School	School	X	X	X	X	X	X	X	X	X							X	X					X
Pope John Paul II Catholic School	School	X	X	X	X	X	X	X	X	X						X		X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Sandhills Childrens Center	School	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Sprint Equipment Box	Other	X	X	X	X	X	X	X	X	X								X			X		X
Taylortown Village Hall	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Taylortown Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X		X			X
Academy Heights Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Medic 8	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Cypress Point Station 1 (Vass)	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sandhills Pool and Spa	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Vass Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Vass Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Vass-Lakeview Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Whispering Pines Rescue 50	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X
Whispering Pines Station 51	Fire Station	X	X	X	X	X	X	X	X	X													X
Country Club of Whispering Pines	Other	X	X	X	X	X	X	X	X	X													X
Whispering Woods	Other	X	X	X	X	X	X	X	X	X													X
Whispering Pines Village Hall	Other	X	X	X	X	X	X	X	X	X													X

SECTION 7
CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the communities in the Cape Fear Region to implement hazard mitigation activities. It consists of the following four subsections:

- 7.1 What is a Capability Assessment?
- 7.2 Conducting the Capability Assessment
- 7.3 Capability Assessment Findings
- 7.4 Conclusions on Local Capability

7.1 WHAT IS A CAPABILITY ASSESSMENT?

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[1]. As in any planning process, it is important to try to establish which goals, objectives, and/or 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, or 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. A 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 Cape Fear Region serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the region to pursue under this Plan, but it also ensures that those goals and objectives are realistically achievable under given local conditions.

[1] While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the Cape Fear counties, a detailed Capability Assessment Survey was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The survey questionnaire compiled 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 communities' fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision making process, was also evaluated with respect to hazard mitigation.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs, and resources that are in place or under development in addition to their overall effect on hazard loss reduction. However, the survey instrument can also serve to identify gaps, weaknesses, or conflicts that counties and local jurisdictions can recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information collected in 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.[2] According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation.

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. The results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the jurisdictions in the Cape Fear Region to implement hazard mitigation activities. All information is based upon the review of existing hazard mitigation plans and local government websites through the Capability Assessment Survey and input provided by local government officials during meetings of the Cape Fear Regional Hazard Mitigation Planning Team.

7.3.1 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; 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

[2] The scoring methodology used to quantify and rank the region's capability can be found in Appendix B.

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 and programs that are in place or under development for the jurisdictions in the Cape Fear Region along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the jurisdictions in the Cape Fear 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	CHATHAM COUNTY	Goldston	Pittsboro	Siler City	HARNETT COUNTY	Angier	Coats	Dunn	Erwin	Lillington	JOHNSTON COUNTY	Archer Lodge	Benson	Clayton	Four Oaks	Kenly	Micro	Pine Level	Princeton	Selma	Smithfield	Wilson's Mills	LEE COUNTY	Broadway	Sanford	MOORE COUNTY	Aberdeen	Cameron	Carthage	Foxfire Village	Pinebluff	Pinehurst	Robbins	Southern Pines	Taylortown	Vass	Whispering Pines
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	*	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Management Plan																																					
Open Space Management Plan (Parks & Rec/Greenway Plan)	✓		✓		✓	✓	✓	✓	✓	✓	✓	*	✓	✓	*	*	*	*	*	*	*	*	✓		✓		✓					✓		✓			✓
Stormwater Management Plan/Ordinance	✓		✓	✓	✓	✓					✓			✓			✓		*		✓	✓				✓	✓					✓		✓			✓
Natural Resource Protection Plan	✓																																				
Flood Response Plan																																					
Emergency Operations Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Continuity of Operations Plan	✓				✓						✓												✓			✓											
Evacuation Plan																																					
Disaster Recovery Plan																										*											
Capital Improvements Plan	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					✓	✓	✓	✓		✓	✓	✓			✓		✓					✓
Economic Development Plan	✓	✓	✓	✓	✓						*		✓	✓							✓		✓	✓	✓	✓											
Historic Preservation Plan																																					

Planning / Regulatory Tool	CHATHAM COUNTY	Goldston	Pittsboro	Siler City	HARNETT COUNTY	Angier	Coats	Dunn	Erwin	Lillington	JOHNSTON COUNTY	Archer Lodge	Benson	Clayton	Four Oaks	Kenly	Micro	Pine Level	Princeton	Selma	Smithfield	Wilson's Mills	LEE COUNTY	Broadway	Sanford	MOORE COUNTY	Aberdeen	Cameron	Carthage	Foxfire Village	Pinebluff	Pinehurst	Robbins	Southern Pines	Taylortown	Vass	Whispering Pines
Flood Damage Prevention Ordinance	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Subdivision Ordinance	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unified Development Ordinance			*	✓	✓	✓							✓	✓						✓	✓		✓	✓	✓	✓	✓				✓		✓				✓
Post-Disaster Redevelopment																																					
Building Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fire Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
National Flood Insurance Program (NFIP)	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NFIP Community Rating System																																					

A more detailed discussion on the region's planning and regulatory capability follows.

7.3.2 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. The three other phases include preparedness, response, and recovery. In reality, each phase is interconnected with hazard mitigation, as **Figure 7.1** suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as the elevation of flood prone structures or the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards due to its location, design, or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and certainly during the long-term recovery and redevelopment process following a hazard event.

FIGURE 7.1: 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 a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the Cape Fear Region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and 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.

- Each of the four counties participating in this multi-jurisdictional plan has previously adopted a hazard mitigation plan. Each participating municipality was included in their respective county's plan except the Town of Archer Lodge, which was not incorporated until November 2009.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. 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.

- None of the counties or municipalities participating in this multi-jurisdictional plan have adopted a disaster recovery plan; however, Moore County is currently in the process of developing one. The other jurisdictions should consider developing a plan to guide the recovery and reconstruction process following a disaster.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Chatham County, Harnett County, Johnston County, Lee County, and Moore County each maintain emergency operations plans through their respective Emergency Management Departments. These plans have been formally adopted by each of the municipalities located within their respective counties.

- The Village of Pinehurst also maintains a village emergency operations plan that is updated annually.

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.

- Chatham County, Harnett County, Johnston County, Lee County, and Moore County each have continuity of operations plans in place. However, none of the municipalities participating in this multi-jurisdictional plan have developed a continuity of operations plan.

7.3.3 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 are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the Cape Fear Region.

Comprehensive Land Use Plan: A comprehensive land use 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.

- Chatham County and the Town of Cary have adopted a joint land use plan which covers the area located east of Jordan Lake in Chatham County. The county has also adopted a countywide land conservation and development plan which was signed by the governing boards of Goldston, Pittsboro, and Siler City. Pittsboro and Siler City have also adopted municipal-level land use plans.
- Harnett County has adopted a comprehensive land use plan. Each of the participating municipalities in the county has also adopted a land use or comprehensive plan except the Town of Coats.
- Johnston County has adopted a comprehensive plan. Each of the participating municipalities has also adopted a land use or comprehensive plan except the Towns of Archer Lodge, Four Oaks, and Micro, and the Town of Archer Lodge is currently in the process of developing a comprehensive land use plan.
- Lee County and the City of Sanford have both adopted the Sanford-Lee County 2020 Land Use Plan.
- Moore County has also adopted a land use plan. Each of the municipalities in the county has adopted a land use or comprehensive plan as well.

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.

- ❑ Chatham County, Pittsboro, and Siler City have capital improvement plans in place.
- ❑ Harnett County and all of its municipalities have capital improvement plans in place.
- ❑ Johnston County maintains a tax-supported capital improvement plan. The Towns of Benson, Clayton, Four Oaks, Selma, Smithfield, and Wilson's Mills also have capital improvement plans in place.
- ❑ Lee County and the City of Sanford both have five-year capital improvement plans.
- ❑ Moore County, Aberdeen, Foxfire Village, Pinehurst, and Whispering Pines also have capital improvement plans.

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.

- ❑ None of the counties or municipalities participating in this multi-jurisdictional plan have a historic preservation plan.

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.

- ❑ All of the counties and municipalities participating in this plan have adopted zoning ordinances, except the Town of Goldston. The following jurisdictions include zoning regulations as part of their local unified development ordinance: Siler City, Harnett County, Angier, Benson, Clayton, Selma, Smithfield, Lee County, Broadway, Sanford, Moore County, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines. The remaining municipalities (excluding Goldston) and counties have adopted stand-alone zoning ordinances.

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 of the counties and municipalities participating in this plan, have adopted subdivision regulations, except the Town of Goldston and the Town of Kenly. Again, the following jurisdictions include subdivision regulations are part of their local unified development ordinance: Siler City, Harnett County, Angier, Benson, Clayton, Selma, Smithfield, Lee County, Broadway, Sanford, Moore County, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines.

The other municipalities and counties with subdivision regulations have adopted stand-alone ordinances.

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.

- North Carolina has a state compulsory building code, which applies throughout the state; however, jurisdictions may adopt codes if approved as providing adequate minimum standards. All of the participating counties and municipalities have adopted a building code.
- Chatham County Inspections is responsible for building code enforcement within the county, Pittsboro, and Goldston. Siler City administers it own building code enforcement.
- Harnett County Inspections provides building code inspections and enforcement to the county and all municipalities within the county, with the exception of Dunn, which enforces the building code within its jurisdiction.
- Johnston County Building Inspections provides building code enforcement to the unincorporated county as well as the following municipalities: Archer Lodge, Kenly, Micro, Pine Level, Smithfield, and Wilson's Mills. The remaining municipalities administer their own building code enforcement.
- Sanford/Lee County Inspections Services provides building code inspection services for Sanford, Broadway, and Lee County.
- Moore County Inspections provides building inspection services to the county and all municipalities except Aberdeen, Pinehurst, Southern Pines, and Pinebluff, which administer their own building code enforcement.

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).[3] 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 concept 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 the 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.

[3] Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, 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 *National Flood Insurance Program* (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 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 will be protected from damage by a 100-year flood event and that new development in the floodplain will 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 7.2 provides NFIP policy and claim information for each participating jurisdiction in the Cape Fear Region.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
CHATHAM COUNTY†	03/04/97	01/02/08	119	$35,230,600	0	$0
Goldston*	--	--	--	--	--	--
Pittsboro	02/02/07	01/02/08	19	$3,978,300	0	$0
Siler City	07/02/87	01/02/08	18	$2,456,700	3	$135,191
HARNETT COUNTY†	04/16/90	07/17/07	300	$70,957,100	8	$42,688
Angier	02/03/00	07/17/07	11	$3,303,000	0	$0
Coats*	--	--	--	--	--	--
Dunn	09/04/86	07/17/07	53	$9,639,100	6	$41,512
Erwin#	02/28/97	07/17/07	13	$3,077,600	0	$0
Lillington	09/04/86	07/17/07	2	$700,000	0	$0
JOHNSTON COUNTY†	09/30/83	07/07/14	249	$52,636,900	29	$680,206

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Archer Lodge	05/06/14	12/02/05	0	$0	0	$0
Benson	09/13/00	01/05/07	5	$1,480,000	0	$0
Clayton	04/01/82	01/05/07	42	$12,495,900	2	$1,498
Four Oaks	09/24/02	01/05/07	3	$674,200	0	$0
Kenly	04/12/01	01/05/07	3	$840,000	0	$0
Micro*	--	--	--	--	--	--
Pine Level	06/22/05	01/05/07	5	$1,400,000	0	$0
Princeton	02/14/97	01/05/07	2	$252,000	0	$0
Selma	10/20/00	01/05/07	6	$1,470,000	0	$0
Smithfield	04/01/82	01/05/07	104	$19,672,500	48	$1,596,593
Wilson's Mills*	--	--	--	--	--	--
LEE COUNTY†	09/06/89	02/02/07	62	$16,522,600	7	$111,156
Broadway	03/13/09	(NSFHA)	1	$350,000	0	$0
Sanford	09/06/89	02/02/07	51	$11,480,400	7	$60,597
MOORE COUNTY†	12/15/89	01/02/08	311	$70,069,900	7	$247,646
Aberdeen	05/15/86	01/02/08	37	$8,058,400	0	$0
Cameron	05/21/09	01/02/08	1	$28,000	0	$0
Carthage	05/06/10	01/02/08	0	$0	0	$0
Foxfire Village	02/14/97	01/02/08	1	$350,000	0	$0
Pinebluff	07/17/86	01/02/08	1	$329,400	0	$0
Pinehurst	03/25/91	01/02/08	105	$28,138,000	4	$62,318
Robbins	07/03/86	01/02/08	0	$0	0	$0
Southern Pines	03/04/88	01/02/08	68	$16,455,500	0	$0
Taylortown	10/17/07	01/02/08	0	$0	0	$0
Vass	05/22/09	01/02/08	1	$350,000	0	$0

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Whispering Pines	12/15/89	01/02/08	39	$9,140,700	0	$0

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
#Probation effective April 28, 2006
(NSFHA) – No Special Flood Hazard Area – All Zone C
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Community Rating System: An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP by adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class rating. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3**. As class rating improves (the lower the number the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

CRS Class	Premium Reduction
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: *FEMA*

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. Changes were made with the intent to make the CRS more user-friendly and make extensive technical assistance available for communities who request it.

- ❑ None of the jurisdictions currently participates in the CRS. Participation in the CRS program should be considered as a mitigation action by the counties and municipalities. The program would be most beneficial to the Moore County, Harnett County, Johnston County, Chatham County, the Village of Pinehurst, and the Town of Smithfield, which have 311, 300, 249, 119, 105, and 104 NFIP policies, respectively.

Flood Damage Prevention Ordinance: A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and municipalities participating in this hazard mitigation plan, with the exception of Goldston, Coats, Micro, and Wilson's Mills, also participate in the NFIP and they all have adopted flood damage prevention regulations. Although Micro and Wilson's Mills do not currently participate in the NFIP, they have both adopted flood damage prevention ordinances.

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.

- None of the counties or municipalities participating in this multi-jurisdictional plan have adopted floodplain management plans.

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.

- Chatham County has adopted a comprehensive parks and recreation master plan which has also been adopted by the Town of Pittsboro.
- Harnett County has adopted a comprehensive recreation and parks systemwide master plan that includes all of its municipalities. The City of Dunn and the Town of Lillington have also adopted municipal-level parks and recreation plans.
- Johnston County is currently developing a county-wide parks and recreation master plan. The Towns of Benson and Clayton already have municipal parks and recreation plans in place. Johnston County, Clayton, and Smithfield have also developed a master plan for the county's portion of the Mountains-to-Sea Trail.
- Lee County has a parks and recreation master plan which was also adopted by the City of Sanford.
- Moore County does not have an open space management plan in place; however, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines have all adopted parks, recreation, greenway, and/or open space plans.

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.

- Although none of the participating counties or municipalities have stormwater management plans in place, the following jurisdictions have adopted stormwater management regulations through various local ordinances: Chatham County, Pittsboro, Siler City, Harnett County, Angier, Johnston County, Clayton, Micro, Smithfield, Wilson's Mills, Moore County, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines.

- ❑ The Town of Princeton has a study in progress that will lead to the development of a stormwater management plan.

7.3.5 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 Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 7.4 provides a summary of the capability assessment results for the Cape Fear 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 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	CHATHAM COUNTY	Goldston	Pittsboro	Siler City	HARNETT COUNTY	Angier	Coats	Dunn	Erwin	Lillington	JOHNSTON COUNTY	Archer Lodge	Benson	Clayton	Four Oaks	Kenly	Micro	Pine Level	Princeton	Selma	Smithfield	Wilson's Mills	LEE COUNTY	Broadway	Sanford	MOORE COUNTY	Aberdeen	Cameron	Carthage	Foxfire Village	Pinebluff	Pinehurst	Robbins	Southern Pines	Taylortown	Vass	Whispering Pines
Planners with knowledge of land development / 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	✓	✓	✓	✓	✓	✓		✓		✓	✓												✓	✓	✓	✓	✓				✓		✓				✓
Emergency Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Manager	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Land Surveyors																																					
Scientists familiar with the hazards of the community	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Staff / Personnel Resource	CHATHAM COUNTY	Goldston	Pittsboro	Siler City	HARNETT COUNTY	Angier	Coats	Dunn	Erwin	Lillington	JOHNSTON COUNTY	Archer Lodge	Benson	Clayton	Four Oaks	Kenly	Micro	Pine Level	Princeton	Selma	Smithfield	Wilson's Mills	LEE COUNTY	Broadway	Sanford	MOORE COUNTY	Aberdeen	Cameron	Carthage	Foxfire Village	Pinebluff	Pinehurst	Robbins	Southern Pines	Taylortown	Vass	Whispering Pines
Staff with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Personnel skilled in GIS and/or Hazus	✓			✓	✓						✓			✓							✓		✓		✓	✓								✓			
Resource development staff or grant writers	✓				✓																															

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

7.3.6 Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. 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 homes, which can require a substantial commitment from local, state, and federal funding sources.

The Capability Assessment Survey was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the Cape Fear 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) according to the previous county hazard mitigation plans.

TABLE 7.5: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	CHATHAM COUNTY	Goldston	Pittsboro	Siler City	HARNETT COUNTY	Angier	Coats	Dunn	Erwin	Lillington	JOHNSTON COUNTY	Archer Lodge	Benson	Clayton	Four Oaks	Kenly	Micro	Pine Level	Princeton	Selma	Smithfield	Wilson's Mills	LEE COUNTY	Broadway	Sanford	MOORE COUNTY	Aberdeen	Cameron	Carthage	Foxfire Village	Pinebluff	Pinehurst	Robbins	Southern Pines	Taylortown	Vass	Whispering Pines
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Purpose Taxes (or taxing districts)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gas / Electric Utility Fees																																					
Water / Sewer Fees																																					
Stormwater Utility Fees																																					
Development Impact Fees																																					
General Obligation, Revenue, and/or Special Tax Bonds																																					
Partnering Arrangements or Intergovernmental Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.7 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 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 Capability Assessment Survey was used to capture information on political capability of the cape Fear Region. Previous county-level hazard mitigation plans were reviewed for 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 (i.e., building codes, floodplain management, etc.).

- ❑ The previous county hazard mitigation plans identified existing ordinances that address natural hazards or are related to hazard mitigation such as emergency management, flood damage prevention, stormwater control, sedimentation and erosion control, watershed protection, zoning, and subdivision.

- Chatham County has experienced the devastating effects of natural hazards (i.e., recent hurricanes and ice storms). The citizens, property owners, business owners, and elected officials of the county are committed to implementing a hazard mitigation plan in order to reduce community vulnerability. The Chatham County Board of Commissioners, the professional staff, and the citizens of the county are continually striving to make Chatham County a safer community in which to live, work, and play. The county recognizes that implementation of a hazard mitigation plan is an essential component in helping to achieve these goals.
- Harnett County is working to establish hazard mitigation in its day-to-day operations. In taking this step, the county will have to de-politicize many of the issues surrounding mitigation efforts. Public education and awareness campaigns about the economic efficiency and social utility of mitigative measures can help foster its general acceptance by citizens and politicians in the long run. Close governmental coordination is needed for the prevention of damage and recovery from natural disasters. This refers to coordination and cooperation between agencies in a local government, between local governments within a county, and between local, state, and federal governments. This provides Harnett County, Angier, Coats, Dunn, Erwin, and Lillington with the political capability to carry out this plan and its hazard mitigation goals and objectives.
- The general populace and governing officials in Johnston County are open to mitigation efforts. Following the devastation that Hurricanes Fran and Floyd inflicted on Johnston County, and following several severe ice events in the last few years, the citizens and leaders of Johnston County are aware of the widespread damage that can be done by a natural event. Analyzing how mitigation can be inserted into everyday decision making as a routine course may help to depoliticize the issue. Public education and awareness campaigns about the economic efficiency and social utility of mitigation measures can help foster its general acceptance by citizens, and, in turn, by politicians.
- Lee County is currently a participant in the NFIP and has adopted the required flood damage prevention ordinance. Additionally, the Unified Development Ordinance includes sedimentation and erosion control and watershed protection standards. This demonstrates to some extent both favorable political support and willingness to adopt hazard mitigation efforts in an active manner.
- The following principles of political acceptability are applicable for Moore County and all of its incorporated municipalities: independent of existing regulations that directly address hazard mitigation (e.g., floodplain management ordinance), hazard mitigation is not a goal that should be addressed independent of other goals and objectives of the local government, due to limited government resources. Hazard mitigation should be considered and incorporated into policies, procedures, and programs which affect land use and development, such as siting of roadways, siting and building of public facilities, zoning and subdivision ordinances, and extension of infrastructure necessary for growth. Local revenues are insufficient to support hazard mitigation projects for mitigation of existing hazards at the local level; however, Federal and state grant funds should be pursued when available. One of the local government's primary roles in implementing hazard mitigation is educating the public about the risks of natural hazards and how to reduce these risks and/or the costs of these risks.

7.4 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 Capability Assessment Survey. This

methodology, further described in Appendix B, attempts to assess the overall level of capability of the Cape Fear Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varies among the participating jurisdictions. For planning and regulatory capability, the majority of the jurisdictions are in the moderate to high range. There is also variation in the administrative and technical capability among the jurisdictions with larger jurisdictions generally having greater staff and technical resources. Most of jurisdictions are in the moderate range for fiscal capability.

Table 7.6 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for all jurisdictions is 30.5, which falls into the moderate capability ranking.

TABLE 7.6: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CHATHAM COUNTY	46	High
Goldston	16	Limited
Pittsboro	35	Moderate
Siler City	36	Moderate
HARNETT COUNTY	45	High
Angier	36	Moderate
Coats	17	Limited
Dunn	33	Moderate
Erwin	29	Moderate
Lillington	32	Moderate
JOHNSTON COUNTY	43	High
Archer Lodge	21	Moderate
Benson	33	Moderate
Clayton	36	Moderate
Four Oaks	25	Moderate
Kenly	24	Moderate
Micro	16	Limited

Jurisdiction	Overall Capability Score	Overall Capability Rating
Pine Level	24	Moderate
Princeton	25	Moderate
Selma	30	Moderate
Smithfield	34	Moderate
Wilson's Mills	28	Moderate
LEE COUNTY	42	High
Broadway	25	Moderate
Sanford	35	Moderate
MOORE COUNTY	43	High
Aberdeen	36	Moderate
Cameron	25	Moderate
Carthage	25	Moderate
Foxfire Village	25	Moderate
Pinebluff	26	Moderate
Pinehurst	37	Moderate
Robbins	25	Moderate
Southern Pines	36	Moderate
Taylortown	25	Moderate
Vass	25	Moderate
Whispering Pines	35	Moderate

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 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

7.4.1 Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy

The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the CFRHMPT considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8
MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the Cape Fear Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Cape Fear Regional Hazard Mitigation Planning Team and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

- 8.1 Introduction
- 8.2 Mitigation Goals
- 8.3 Identification and Analysis of Mitigation Techniques
- 8.4 Selection of Mitigation Techniques for the Cape Fear Region
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the Cape Fear Region communities with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic, and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high risk hazards, but also to help the region achieve compatible economic, environmental, and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional,* each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance) and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue

to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the Cape Fear Region (provided separately in Section 9: *Mitigation Action Plan*). Each county and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflects the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for Chatham, Lee, Harnett, Johnston, and Moore Counties and their municipal jurisdictions to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Regional Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the Cape Fear Region, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community.

8.1.1 Mitigation Action Prioritization

In the previous versions of the participating jurisdictions' hazard mitigation plans, not all actions were prioritized. In addition, there needed to be consistency among the counties and jurisdiction regarding how they prioritized their actions. Therefore, for the 2014 Cape Fear Regional plan, the Regional Hazard Mitigation Planning Team members were tasked with establishing a priority, implementation status, and completion timeline for each action at the second Regional Hazard Mitigation Planning Team meeting (April 17, 2014). Prioritization of the proposed mitigation actions was based on the following six factors:

- ❑ Effect on overall risk to life and property
- ❑ Ease of implementation
- ❑ Political and community support
- ❑ A general economic cost/benefit review[1]
- ❑ Funding availability
- ❑ Continued compliance with the NFIP

[1] Only a general economic cost/benefit review was considered by the Regional Hazard Mitigation Planning Committee through the process of selecting and prioritizing mitigation actions. Mitigation actions with "high" priority were determined to be the most cost effective and most compatible with the participating jurisdictions' unique needs. Actions with a "moderate" priority were determined to be cost-effective and compatible with jurisdictional needs, but may be more challenging to complete administratively or fiscally than "high" priority actions. Actions with a "low" priority were determined to be important community needs, but the community likely identified several potential challenges in terms of implementation (e.g. lack of funding, technical obstacles). A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

The point of contact for each county helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above.

Using these criteria, actions were classified as high, moderate, or low priority by the participating jurisdiction officials.

8.2 MITIGATION GOALS

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

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, Chatham, Lee, Harnett, Johnston, and Moore Counties and the participating municipalities have developed six goal statements for local hazard mitigation planning in the region. In developing these goals, the previous five county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the five existing plans that were combined to form this regional plan. Many of the goals were similar and regional goals were formulated based on commonalities found between the goals in each plan. These proposed regional goals and their corresponding goals or objectives from the previous plans are presented in **Table 8.1**.

The proposed regional goals were presented, reviewed, voted on, and accepted by the Hazard Mitigation Planning Team at their second meeting. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The Cape Fear Regional Mitigation Goals are presented in **Table 8.2**. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: PROPOSED MITIGATION GOALS

	Proposed Goal	Former Plan Reference				
		Chatham County	Harnett County	Johnston County	Lee County	Moore County
Goal #1	Increase **public awareness** of hazards and encourage collective and individual responsibility for mitigating hazard risks.	Goal 1	Goal 4	Goal 3	Goal 1	Goal 5
Goal #2	Strive to **reduce loss of life, personal injury, and property damage** from natural hazards.		Goal 1	Goal 1		Goal 1
Goal #3	Strive to maintain **existing structures and infrastructure** in such a manner that they will be as resilient as possible from natural hazards.		Goal 3	Goal 7		

	Proposed Goal	Former Plan Reference				
		Chatham County	Harnett County	Johnston County	Lee County	Moore County
Goal #4	Protect the most **vulnerable populations, buildings, and critical facilities** through the implementation of cost-effective and technically feasible mitigation actions.	Goal 4				
Goal #5	Manage **future development** to minimize vulnerability of public and private property to natural hazards.		Goal 2			Goal 2
Goal #6	Protect and preserve the **natural resources and environmentally sensitive areas** within the region.		Goal 6	Goal 2		Goal 6

TABLE 8.2: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement

44 CFR Part 201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Mitigation Strategy for the Cape Fear Region, a wide range of activities were considered in order to help achieve the established mitigation goals, in addition to addressing any specific hazard concerns. These activities were discussed during the Cape Fear Regional Hazard Mitigation Planning Team meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Team can be classified under one of the following six broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- ❑ Planning and zoning
- ❑ Building codes
- ❑ Open space preservation
- ❑ Floodplain regulations
- ❑ Stormwater management regulations
- ❑ Drainage system maintenance
- ❑ Capital improvements programming
- ❑ Riverine / fault zone setbacks

8.3.2 Property Protection

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- ❑ Acquisition
- ❑ Relocation
- ❑ Building elevation
- ❑ Critical facilities protection
- ❑ Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- ❑ Safe rooms, shutters, shatter-resistant glass
- ❑ Insurance

8.3.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- ❑ Floodplain protection
- ❑ Watershed management
- ❑ Riparian buffers
- ❑ Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)

- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

8.3.4 Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

8.3.5 Emergency Services

Although not typically considered a "mitigation" technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

8.3.6 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs

- Hazard expositions

8.4 SELECTION OF MITIGATION TECHNIQUES FOR THE CAPE FEAR REGION

In order to determine the most appropriate mitigation techniques for the communities in the Cape Fear Region, the Regional Hazard Mitigation Planning Team members thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous county plans were evaluated to determine their 2014 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in Section 9: *Mitigation Action Plan* include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2014 planning process.

SECTION 9
MITIGATION ACTION PLAN

This section includes the listing of the mitigation actions proposed by the participating jurisdictions in the Cape Fear Region. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

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44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy* and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the Cape Fear Region. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed, relative priority, and estimated cost. Other information provided in the MAP includes potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the Cape Fear Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of "high," "moderate," or "low" as described below and in Section 8 (page 8.2).

The Mitigation Action Plan is organized by mitigation strategy category (Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, or Public Education and Awareness). The following are the key elements described in the Mitigation Action Plan:

- Hazard(s) Addressed—Hazard which the action addresses.
- Relative Priority—High, moderate, or low priority as assigned by the jurisdiction.
- Lead Agency/Department—Department responsible for undertaking the action.
- Potential Funding Sources—Local, State, or Federal sources of funds are noted here, where applicable.

- Implementation Schedule—Date by which the action the action should be completed. More information is provided when possible.
- Implementation Status (2014)—Indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here.

9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in 37 individual MAPs on the following pages. **Table 9.1** shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

TABLE 9.1: INDIVIDUAL MAP LOCATIONS

Location	Page	Number of Mitigation Actions
Chatham County	**9:4**	**13**
Goldston	9:10	13
Pittsboro	9:16	13
Siler City	9:22	13
Harnett County	**9:29**	**7**
Angier	9:32	7
Coats	9:35	12
Dunn	9:39	11
Erwin	9:42	12
Lillington	9:44	6
Johnston County	**9:47**	**12**
Archer Lodge	9:51	4
Benson	9:52	13
Clayton	9:55	11
Four Oaks	9:57	11
Kenly	9:59	18
Micro	9:63	10
Pine Level	9:65	8
Princeton	9:67	11
Selma	9:69	21
Smithfield	9:72	7
Wilson's Mills	9:74	18
Lee County	**9:77**	**14**
Broadway	9:82	14
Sanford	9:87	14
Moore County	**9:92**	**45**
Aberdeen	9:113	57
Cameron	9:135	44
Carthage	9:156	44
Foxfire Village	9:177	44
Pinebluff	9:198	44

Location	Page	Number of Mitigation Actions
Pinehurst	9:219	45
Robbins	9:242	44
Southern Pines	9:263	45
Taylortown	9:284	44
Vass	9:305	44
Whispering Pines	9:326	44

Chatham County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2019	Funding for a land use plan update was eliminated in 2010. Staff has discussed options for updating the land use plan with the Planning Board and Board of Commissioners in 2014. In 2012, The Board of Commissioners adopted a joint land use plan with the Town of Cary for an area in the northeastern portion of the county. The plan includes a section with approaches for mitigating adverse water quality impacts to Jordan Lake in Section 5.3. Further, the plan includes a discussion about notification requirements for controlled burn areas for property owners near Jordan Lake in Section 6.4.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works	Local	2018	Stormwater Ordinance adopted in November 2008 and amended in 2012. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works	Local	2018	Updated riparian buffer requirements adopted in 2008 and revised in 2012. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning	Local	2015, Annual Update	Educational materials are provided to the public as they are made available to the county. The county will continue to re-evaluate public education materials and update them on an annual basis as necessary.
PEA-2	Develop an Environmental Health program that will, in part, address environmental concerns that might develop from a natural disaster.	Flood	High	Chatham County Environmental Health, Chatham County Public Works	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Goldston Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2019	Funding for a land use plan update was eliminated in 2010. Staff has discussed options for updating the land use plan with the Planning Board and Board of Commissioners in 2014. In 2012, The Board of Commissioners adopted a joint land use plan with the Town of Cary for an area in the northeastern portion of the county. The plan includes a section with approaches for mitigating adverse water quality impacts to Jordan Lake in Section 5.3. Further, the plan includes a discussion about notification requirements for controlled burn areas for property owners near Jordan Lake in Section 6.4.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections, Town of Goldston Administration	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections, Town of Goldston Administration	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Town of Goldston Administration	Local	2018	Stormwater Ordinance adopted in November 2008 and amended in 2012. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Town of Goldston Administration	Local	2018	Updated riparian buffer requirements adopted in 2008 and revised in 2012. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, Town of Goldston Administration	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2015, Annual Updates	Educational materials are provided to the public as they are made available to the county. The county will continue to evaluate public education materials and update them as necessary on an annual basis.
PEA-2	Develop an Environmental Health program that will, in part, address environmental concerns that might develop from a natural disaster.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Town of Goldston Administration	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Pittsboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2019	Land Use Plan Adopted October 22, 2012. This plan will be re-evaluated and updated on a regular basis so this action will remain in the plan.
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections, Town of Pittsboro Engineering	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections, Town of Pittsboro Engineering	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Town of Pittsboro Public Works	Local	2019	Adopted Stormwater Ordinance November 12, 2013. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Town of Pittsboro Planning	Local	2019	Adopted Riparian Buffer Ordinance February 14, 2011. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2015, Annual Update	Educational materials are provided to the public as they are made available to the county. The county will continue to re-evaluate public education materials and update them on an annual basis as necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	The Chatham County Environmental Health has received training on erosion and sedimentation methods. This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Resources within the department and filled the position with a professional engineer that is also a certified flood manager (CFM). On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Town of Pittsboro Public Works and Administration	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Siler City Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Siler City	Local	2019	The Town was planning on updating the Land Development Plan starting in FY 14/15 with the assistance of the NC Department of Commerce Division of Community Assistance. However, that has been put on hold due to budget cuts in the Division of Community Assistance. No alternative has been determined at this time.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Siler City	Local	2015, After Disaster Events	Building inspectors are trained to perform inspections of flood damaged structures and will perform those duties as needed. All building inspections should be the same as Chatham County. Town staff would perform the functions instead of county personnel. In the past the Town has conducted the audits for County EOC and passed that information along to EOC. We also can do after hours inspections to accommodate citizens. The only thing we know that is different is that the county waived inspection fees during a windstorm event. We would have to have approval from the Town Board of Commissioners to waive Town fees. Our Town Code also has a section that states damage beyond 50% valuation eliminates the option of repairing the structure if it located in the flood area.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Siler City	Local	2015, After Disaster Events	The Town Manager coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Siler City Public Works	Local	2018	The Town amended storm water ordinance in 2009 to comply with State law. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Siler City Public Works	Local	2018	The Town amended watershed protection and stream buffer requirements in 2003. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Siler City Planning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contacts with floodplain management staff. This list will continue to be updated annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Siler City Fire	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, , Siler City Fire	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Siler City Fire	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, , Siler City Fire	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Siler City Fire	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Siler City Planning	Local	2015, Annual Updates	Educational materials are provided to the public as they are made available to the county. The county will continue to evaluate public education materials and update them as necessary on an annual basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	The Chatham County Environmental Health has received training on erosion and sedimentation methods. This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Resources within the department and filled the position with a professional engineer that is also a certified flood manager (CFM). On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Siler City Public Works	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Siler City	Local	2006-2007	Completed.
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Siler City	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Siler City	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Siler City	Local	2008	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Revise and update the regulator floodplain maps.	Flood	High	Siler City	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Siler City	Local	2008	Completed.

Harnett County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	The County will make it policy that any property owner wanting to build in a floodplain, must wait for 48 hours until a complete review of the elevation certificate can be made, to determine that the FEMA form is filled out correctly and the information is accurate.	Flood	High	Harnett County Planning Department	Local	2015, Annual Review and Update	This is currently a part of our standard operating procedure when it comes to permitting in the floodplain. We will continue to adhere to this policy.
P-2	The County will start a GIS project that will create a data layer of all known properties that are located within the floodplain to be used for future development planning purposes.	Flood	High	Harnett County GIS, Planning Department	Local, State	2015, Updated with new data	The County has mapped these properties in accordance with the latest FEMA studies, and the layers are continuously updated as we receive new data.
P-3	The County will further extend its Conservation zoning overlay district to protect more riparian zones of intermittent blue-line streams.	Flood	High	Harnett County Planning Department	Local	December 2017	The county has been working on extending the conservation overlay district, but there were more affected blue line streams than anticipated, so there is still work that needs to be done.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Distribute information to citizens in the Inspections department on how to retrofit homes to help prevent wind and flood damage during natural hazards.	Flood, High Wind, Hurricane, Thunderstorm, Tornado	Moderate	Harnett County Planning Department	FEMA, NCEM	2015, Updated with new data	The Planning Department crafted a brochure on this subject matter. Citizens are informed of best management practices in the field of construction to properly plan for, and prevent damage to structures. Severe weather advisories are sent out by emergency personnel on a consistent basis, and are perpetually updated.
PP-2	Continue to apply for pre- & post-disaster grants to buyout or elevate flood prone properties within Country Walk subdivision.	Flood	High	Planning department, Community Development, Building Inspections	Local/State/ Federal	2015, Annually	The county has implemented buyout/elevation projects in the past and will continue to do so as opportunities exist for these projects through mitigation funding.
PP-3	The County will partner with a local sand mining facility to retrofit a pit into a future reservoir	Flood	Moderate	Harnett County Planning Department	None; unless BRAC Regional Task Force acquires other funding	2020	The county has looked into carrying out this project but it is still a work in progress so it will remain in the plan.
Natural Resource Protection							
NRP-1	Explore requiring all new major subdivisions to set aside land for open space and restrict any building in environmentally sensitive areas.	Flood	High	Harnett County Planning Department	None	2015, Implemented with new development	The Harnett County UDO has outlined this objective as the "Compatibility Concept Model" and solicits offerings of open space for greater density within a given development.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	The County will conduct a training exercise each year to ensure that County emergency resource distribution operations, such as response time, communication, and coordination with DOT, are adequate for natural hazard events.	All	High	Harnett County Emergency Management	Local	2015, Annually	The County in conjunction with other local entities performs at least 3 exercises a year. These training sessions consist of a wide range of scenarios and settings.
Public Education and Awareness							
PEA-1	The County will hold an Emergency Management open house on October 1st each year to inform the public and County employees about all natural hazards and their corresponding mitigation techniques.	All	Moderate	Emergency Management Director	Local, State, sell advertisements for public information handed out at meetings	2015, Annually	Emergency Management plans this year to start conducting an annual "Open House" where they educate both the public and other staff members. These sessions are to take place in October which coincides with hurricane season.
PEA-2	The County will provide a GIS training tool that will be aimed at educating surveyors and builders about responsible growth in regard to hazard mitigation.	All	High	Harnett County GIS, Planning Department	Local, State	June 2015	We are currently working interdepartmentally to devise a strategy, and tool that will be easy to access and operate by the general public.

Town of Angier Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Create and define suitable areas for growth by updating existing land use plan or creation of a new land use plan.	All	Moderate	Zoning/Planning Administrator, Town Administrator	Local	2019	The town has updated its existing land use plan to identify areas suitable for growth. However, further updates of the land use plan will be required, so this action will remain in the plan.
P-2	Create a yearly checklist that will help monitor and protect infrastructure and existing structures.	All	High	Public Works Director, Building Inspector	Local, State	2015, Annual review and update	The town has developed a checklist that will help it to monitor its infrastructure and existing structures. This list will require annual review and update.
P-3	The Town will involve county officials with future growth plans and patterns, and hold community-visioning meetings to educate the public and developers about future growth and hazard mitigation planning.	All	Moderate	Town Administrator, Planning Director, Town/County Boards	Local	2015, Annual meetings	The town has involved county officials in future growth plans and has held meetings with the community to discuss growth and hazard mitigation topics. In the future, the town will continue to keep these stakeholders involved in planning for growth in a way that will reduce risk.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create new ordinances and/or strengthen existing ordinances to protect and preserve environmentally sensitive areas and open space.	Flood	High	Town Administrator, Planning/Zoning Administrator, Town/County Boards	Local	2018	Ordinances have been developed in a way that attempts to minimize degradation to environmentally sensitive areas and to preserve open space. Nevertheless, there are still revisions that could be made to the town's ordinances that would further reduce risk and the tow n will look into making those changes going forward.
Structural Projects							
SP-1	Try to set aside monies for long range Capital Improvement Projects that would help protect public health and safety.	All	Moderate	Town/County Manager, Planning Director, Finance Director	Local	2019	In the past, the town has set aside funding for Capital Improvements that would protect public health and safety, but there are so many projects that need to be completed that this action will remain in the plan to demonstrate the need for additional funding of projects in the future.
Emergency Services							
ES-1	Pursue state and Federal grants that would help improve emergency services along with mitigation planning.	All	Moderate	Town/County Manager, Planning Director, Finance Director	Local	2018	The town has pursued state and federal grants in the past and has had some moderate success in getting funding for projects. However, the town would like to continue to pursue funding for mitigation related projects to build on past projects.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Make a list available for distribution at the Inspections Department of contractors and consultants knowledgeable or experienced in retrofitting techniques and construction.	All	Moderate	Chief Building Inspector, Harnett County Planning and Inspections Department	Local, Possible Grant	2015, Annual review and update	The town has developed a list of contractors that are knowledgeable in the area of retrofitting homes and other structures. This list is available at the Inspections Department but needs to be reviewed and updated annually.

Town of Coats Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	The Town will initiate a policy to identify and remove potentially dangerous trees and vegetation along public roadways.	Thunderstorm, High Wind, Hurricane, Winter Storm	High	Town of Coats Board of Commissioners	Local	Completed	The town has initiated a program to remove dangerous trees and vegetation along public roadways and will continue to implement this program going forward. This action will be removed as a capability at the next update.
P-2	The Town will conduct quarterly inspections of all storm sewers and open ditches in order to evaluate their readiness and to make corrections as needed. The Town will review and update its Storm Water Readiness Plan.	Flood	High	Town of Coats Public Works Department	Local	2015, Quarterly	The town has regularly conducted inspections of all storm sewers and ditches in order to ensure they are in suitable condition for managing stormwater. The town will update its Stormwater Readiness Plan in the future and perform quarterly inspections of its infrastructure system.
P-3	Ensure that all redevelopment and growth is sustainable to natural hazards through the development of new Zoning and Subdivision regulations.	All	High	Town of Coats Planning Board and Board of Commissioners	Local	2015, Annual review and update	The town has developed new zoning and subdivision regulations, but these regulations need to be reviewed and updated annually so that the town can improve the way it redevelops and grows in terms of mitigating hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	The Town will become a member of the National Flood Insurance Program.	Flood	High	Town of Coats Board of Commissioners	Local	Completed	The town is currently a member of the NFIP. This action will be removed from the next update as a capability.
P-5	The Town will develop a checklist to be used for an annual inspection of all Public Buildings to ensure they remain as structurally secure to hazard events as possible.	All	High	Coats Public Works Department, Town Manager, Town Board	Local	January 2015, Annual review	The town has developed a checklist to ensure all public buildings and structures are in the best condition possible to resist hazard events. In the future, the town will continue to improve its inspections process for public buildings and identify projects that could be implemented to further reduce risk.
P-6	The Town will utilize information obtained from the county GIS floodplain project to prevent redevelopment in flood prone areas and to help identify any currently developed areas that may be at risk.	Flood	Moderate	Town Manager, Town Planning Board, Town Board	Local	2015, Annually review growth areas	The town has utilized its GIS database to help prevent development in known hazard areas such as the floodplain. The town will continue to regulate development in the floodplain in a way that will reduce risk.
P-7	The Town will include in its new Zoning Ordinance an Open Space District Classification that will effectively set aside any environmentally sensitive areas and restrict any development therein.	Flood		Town Manager, Town Planning Board	Local	2017	The town has included the Open Space District classification in its zoning ordinance, but the town will need to identify and protect additional areas by designating them as that classification in order to further reduce risk.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	The Town will update its Land Use Plan with special emphasis being given to any environmentally sensitive or flood-prone areas.	Flood		Town Manager, Town Planning Board	Local	2015, Annual review and update	The town has updated its Land Use Plan in the past and this has led to the identification of flood prone and environmentally sensitive areas. However, the town will also work to identify additional flood prone areas in the future by reviewing the LUP on an annual basis.
Structural Projects							
SP-1	The Town will target infrastructure needs during the development of the annual Town budget.	All	High	Coats Public Works Department, Town Manager, Town Board	Local	January 2015, Annual review and update	In the past, the town has looked at long term infrastructure needs when developing the town budget. Many of these projects have overlapped with mitigation. On an annual basis going forward, the town will evaluate additional infrastructure projects that can help reduce risk and protect citizens.
Emergency Services							
ES-1	The Town will update and revise its Emergency Services and Disaster Response Readiness Plan.	All	High	Town of Coats Public Works Department, Coats Police Department, Town Manager, Town Board	Local	2015, Major reviews semi-annually	The town has kept up a consistent review and update process for its Emergency and Disaster Readiness Plan. However, in order to maintain its plan and ensure it is maximizing its risk-reducing capabilities, the town will update this plan at least twice per year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	The Town will educate and solicit public input concerning hazard mitigation strategies and policies through semiannual Town Meetings.	All	Moderate	Board of Commissioners & Planning Board, Harnett County EMC	Local	2015, Annual update on strategies	Semi-annual town meetings have been held each year since the last update of this plan. The town has pushed out strategies for mitigation during these meetings and sought input from residents. As such, the town will continue to hold these meetings at least twice per year to review strategies and update citizens on the latest techniques for mitigation.
PEA-2	The Town will develop an informational flier to be distributed each year that will provide our citizenry with the information and suggestions useful during natural disasters.	All	Moderate	Coats Public Works Department, Town Manager, Town Board	Local	2016	The town has developed an informational flyer and it has been distributed to citizens. This flyer will need to be updated and sent out again on at least an annual basis. The town will work on updating this with the latest information on pertaining to homeowner mitigation.

City of Dunn Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Create policy to annually trim trees and cut down dead trees under the city's supervision prior to April 15th.	Thunderstorm, High Wind, Hurricane, Winter Storm	Moderate	Public Works Department, City Council & Planning Board	Local	2015, Annually	A policy has been adopted to trim trees and cut down dead trees. This is done every year, at least twice a year. The city will continue to implement this action going forward.
P-2	Create and modify existing policies to prevent building in areas prone to flooding and/or wind damage.	Flood, Thunderstorm, High Wind, Hurricane, Tornado	Moderate	Planning Department, City Council & Planning Board	Local, State	2019, pending funding	The city has some policies in place to prevent building in flood/wind prone areas, but needs to do a study of its stormwater system and lacks the funding to do so.
P-3	Create a policy to require private property owners to remove storm debris (trees, limbs, etc.) within 45 days to prevent potential fire hazards to existing structures.	Wildfire	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2019	Deferred, this policy does not exist, but we will begin to work on creating this policy.
P-4	Create policy to inspect public buildings on annual basis for areas that need repair to keep the buildings as structurally sound as possible.	All	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2015, Annually	Completed. Building inspectors do this at least once a year. The building inspections department will continue to inspect public buildings to ensure they are structurally sound.
P-5	Create a policy to prevent redevelopment in areas that are especially prone to flooding and wind damage, especially repetitive loss structures in the City.	Flood, High Wind, Hurricane, Thunderstorm, Tornado	Moderate	Inspections & Planning Department, Planning Board, City Council, Public Works	Local, State	2019	Deferred. Although this policy does not exist currently and is not necessarily anticipated to be implemented in the immediate term, it may be revisited in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Create a stormwater management ordinance and provide the inspectors and/or code enforcement officers with the authority to complete inspections of businesses that could cause potential harm to the environment in the case of a natural hazard occurrence.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	2018	Deferred. This ordinance is not in place, but is still a priority for the City and we will work on this. Funds needed to hire the appropriate firm/engineer to draft the ordinance.
P-7	Ensure proper stormwater best management practices are implemented for repetitive loss property, and for area in its vicinity if development occurs	Flood	Moderate	City Council,, Planning Department, Public Works Department	Local funding; Grants that may become available either annually or after a declared event	2015, Annually	Best Management Practices are in place for stormwater in the vicinity of the repetitive loss property, but the area will need to continue to be monitored and evaluated.
Property Protection							
PP-1	Seek funding to retrofit or acquire repetitive loss property.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2018	Deferred. No funding has been available to retrofit or acquire the property. Funding needed.
Natural Resource Protection							
NRP-1	Create a policy to establish vegetative buffers on all properties bordering drainage canals, creeks, streams, etc. to prevent water contamination.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	Completed	Completed. We have a landscape ordinance that requires buffers. This action will be removed as a capability during the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
NRP-2	Create policy to require quarterly checks on these buffers to ensure that they are free of debris and are being maintained properly.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	2015	The city currently does not have a policy to check on the buffers, but this needs to be done.
Public Education and Awareness							
PEA-1	Create a brochure to increase public awareness of the benefits of being more conscientious of mitigation activities that minimize loss of property/property damage.	All	Moderate	Administration, City Council	Local, Grant Money	2016	Deferred. No brochure has been created but this is still a priority of the City.

Town of Erwin Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Encourage activities that will make structures less susceptible to damage during natural hazard events through improving the Erwin code of ordinances and creation of a storm-water management plan.	All	Moderate	Town of Erwin Planning Department and Planning Board	Local, Grant	2016	The town has developed a stormwater management plan that it updates regularly and the Town Engineer is working on 2 area drainage projects.
P-2	Meet quarterly with other local governments to discuss new ideas that will help Erwin provide safe and responsible growth patterns for the future.	All	Moderate	Erwin Planning Department	Local	2015	Done on an as-needed basis, but staff will work to re-establish communication on a regular basis.
P-3	Encourage growth only in areas suitable for development and preserve open space in environmentally sensitive areas through enforcement of a Comprehensive Land Use Plan.	Flood	Moderate	Town of Erwin Planning Board	Local	2019	The Land Use Plan was updated and adopted in 2014. The town will continue to review and update the plan going forward so this action will remain in the plan.
P-4	Collect data on repetitive stormwater incidents to create GIS layer for the town.	Flood, Hurricane, Thunderstorm	Moderate	Planning and Zoning	Local Budget	2015	New action
P-5	Continue being a member of the National Flood Insurance Program. Review all zoning permit applications to ensure compliance with the Town's Flood Damage Prevention Ordinance.	Flood	High	Planning and Zoning; Town Engineer	Local Budget	2014	New action. The Town updated its Flood Damage Prevention Ordinance in 2014 and, before the end of 2014, will have completed abatement projects to have its probationary status lifted.
Structural Projects							
SP-1	Implement East Erwin Drainage Project with design and permitting in FY2014.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2014 (for permitting)	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Implement South 13th Street Drainage Project, proposed for completion in FY2016.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2016	New action
SP-3	As part of stormwater management plan, conduct regular schedule of ditch maintenance.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2015, Annual Evaluation	New action
Emergency Services							
ES-1	Renew and update disaster response/readiness plan.	All	Moderate	Erwin Board of Commissioners, Fire & Emergency Services Director	Local	2015, Annual review and update	In conjunction with Harnett County, the town updates its response/readiness plan on an annual basis and will continue to review and update annually.
Public Education and Awareness							
PEA-1	Improve education and outreach to the community regarding flood hazards and flood mitigation through dissemination of mitigation pamphlets in the Town Hall.	Flood	High	Chief Building Inspector	Local	6 months following adoption of the plan	Have printed new FEMA brochures & handouts for citizen availability. The town will continue to evaluate and update education materials on an annual basis.
PEA-2	Maintain a system for identifying Town's special needs citizens.	All	Moderate	Police Department	Local	2019	New action
PEA-3	Provide education materials on preparedness/mitigation measures on www.erwin-nc.org to include ReadyNC.org and www.dhs.gov/ready.	All	Moderate	Planning and Zoning	Local Budget	2014	New action

Town of Lillington Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	To include in our rewrite of our Zoning Ordinance and Subdivision Ordinance sound planning practices that allow only responsible growth in floodplain areas. Note: All new buildings are inspected by Harnett County. The Town will coordinate with the County to make sure that all applicable building codes are followed with regard to hurricane or high wind standards.	Flood, Hurricane, High Wind	High	Town Board of Commissioners, Town Manager	Local	2015	The town has worked to develop ordinances that include standards for responsible growth in hazard areas. These standards are in place, but will need to be reviewed and updated in order to improve the allowable growth in high hazard areas further.
P-2	The Town will aim to have floodplain data and other useful tools available online to aid with responsible growth.	Flood	High	Town Manager	Local	2015, Annual update	The town has developed a number of tools that have been displayed online and which can help citizens better understand responsible growth strategies. These tools and information will need to be updated on an annual basis.
Natural Resource Protection							
NRP-1	Rewrite Zoning Ordinance to protect natural areas along the Cape Fear River and to determine the correct riparian buffer to preserve open space and limit development.	Flood	High	Town Manager	Local	Completed	The Zoning Ordinance has been re-written to protect natural areas along the Cape Fear River and to preserve open space and limit development. This ordinance is in place so this action is complete and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Retrofit all Town owned buildings to safeguard against natural disasters and distribute information to the community on how to retrofit privately owned structures.	All	Low	Town Manger and Director of Public Works	Local	2015	The town has retrofitted many public buildings, but it will need to continue to work to meet the goal of retrofitting all buildings, especially as new techniques are developed to make structures more resilient. The town will additionally work to improve its outreach to homeowners to help them better understand the benefits of retrofitting and the best strategies for doing so.
Emergency Services							
ES-1	To protect life and property through continuing efforts to improve emergency response and preparation.	All	Moderate	Town Manager, Local Fire Chiefs	Local	2015, Annual review	The town is fully committed to emergency response and preparation activities and has been well prepared for major events in the past. In the future, the town will continue to put a strong emphasis on these activities and ensure it is ready for the next disaster event.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Send out newsletter to inform the community of disasters and mitigation. For example, information may concern when hurricane season begins and ends and may ask citizens to inspect their property for possible hurricane/high wind susceptibility.	All	Moderate	Town Manager	Local	2015, Annually	The town sends out an annual newsletter to let property owners know when hurricane season has begun and ends. The town also puts out a lot of information on the strategies property owners can take to protect their property from natural disasters. This information will need to be reviewed at least any

Johnston County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Johnston County will apply to reduce their NFIP-CRS (Community Rating System) score.	Flood, Hurricane, Thunderstorm	Moderate	Emergency Services Coordinator, Environmental Protection Administrator	In house staff	2019	Although the county has not reduced its CRS score in the past 5 years, it will continue to work to develop a floodplain management program that will earn points through the CRS program.
P-2	Conduct a county dam safety inventory. People downstream of hazardous dams would be notified. Owners would be notified of ways to reduce the risk of their dams.	Dam Failure	Low	Public Utilities Director	In house staff	Deleted	This action was deleted because there is not sufficient staff time or resources to complete the action.
P-3	Develop a Johnston County Burning Ordinance	Wildfire	Low	Fire Marshal	In house staff	Deleted	This action was deleted because there is not sufficient staff time or resources to complete the action.
Property Protection							
PP-1	Relocation of 4 server boxes located in the basement of the Johnston County courthouse and/or increase from one to multiple servers at the Johnston County Health Department to increase redundancy.	Flood, Hurricane, Thunderstorm	High	Technology Services Director	Grants, General Fund budget	2018	The county has not completely mitigated the redundancy issues with its server boxes even though some steps have been taken to reduce the risk. Therefore, the county will continue to work to increase redundancy in its server systems.
PP-2	Replace generator at Pine Level wastewater pump station.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	July 2015	The generator a Pine Level wastewater pump station has not been replaced, but this is still a priority and the county will work to replace it in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Complete rehabilitation work on three gravity sewer outfalls to reduce system infiltration.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	Deleted	Delete, same as SP-2
Structural Projects							
SP-1	Improve County water system to provide hydrant coverage to 85 percent of County Fire Districts.	Fire	High	Emergency Services Director	In house staff	2019	The county has made some improvements to the water system, but 85 percent coverage has not been achieved so this action will continue to be pursued going forward.
SP-2	Complete rehabilitation work on three gravity sewer outfalls to reduce system infiltration.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	December 2015	Rehabilitation work on the gravity sewer outfalls has begun but it is not complete. The county intends to continue to work to reduce infiltration and will aim to have the project done by late 2015.
SP-3	Replace bridge No. 40 located on US 70 Business (Market St.) over Neuse River.	Flood	High	Emergency Services Director	In house staff	Completed	DOT has completed work on this project as a new bridge was constructed and opened on April 24, 2013
Emergency Services							
ES-1	The Johnston County Continuity of Operations Plan (COOP) will be upgraded.	All	Moderate	Emergency Services Director	NCEM grant	2015	The county upgraded the COOP in 2012, but another upgrade is required and the budget for FY15 includes funds for COOP update.
ES-2	Provide auxiliary heating and cooling capability and generator connections to shelter sites at North Johnston Middle School, West Johnston High School, and First Baptist Church Smithfield.	All	Moderate	Emergency Services Director, Johnston County School System	Public/private partnership, industry donations, lease units, assistance groups (i.e. Red Cross)	2018	These shelter sites do not have generator capability so this will need to be addressed in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish a site for supporting an NCOEMS Medical Support Shelter. (CapRac).	All	High	Emergency Services Department	In house staff	2016	A site for supporting an NCOEMS Medical Support Shelter has not been established, so this will need to be established going forward.
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The county will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-2	Update and maintain educational information and links on County website for the public to access in order to stay informed.	All	Low	Emergency Services Department	In house staff	2015, Annual review and update	The county website includes information on hazards and mitigation for the public. The website will need to be reviewed and updated to include the most recent data on hazards.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The county will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
Previously Completed Mitigation Actions							
	Johnston County adopted Sedimentation and Erosion Control Ordinance.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	Grants, General Fund budget	Completed 2013	
	Establish a system and plan for identifying and sheltering special needs populations within Johnston County.	All	High	Emergency Services Department	In house staff	Completed 2013	

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Develop a system and plan for points of distribution throughout Johnston County for the dissemination of essential commodities to citizens during a disaster.	All	High	Emergency Services Department	In house staff	Complete 2012	

Town of Archer Lodge Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Work with county to improve water system to provide hydrant coverage to 85 percent of County Fire Districts.	Fire	High	Emergency Services Director	In house staff	2019	New action
Emergency Services							
ES-1	Work with Johnston County to upgrade Continuity of Operations Plan (COOP).	All	Moderate	Emergency Services Director	NCEM grant	2015	New action
Public Education and Awareness							
PEA-1	Update and maintain educational information and links on County website for the public to access in order to stay informed on natural hazard risk and mitigation techniques.	All	Low	Town Administration	In house staff	2015, Annual review and update	New action
PEA-2	Make available to public any brochures/materials that may be available from the county, state, or federal level that outline homeowner mitigation techniques.	All	Low	Town Administration	In house staff	2016	New action

Town of Benson Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Propose a stormwater drainage study.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Planning, Public Works	Local, Federal/State Grants	Completed	Drainage study was proposed in July 2011, so this action is complete. See PP-1 for continuation.
P-2	Maintain list of residents with special needs.	All	High	Administration	Local	2015, Annual review and update	The town has developed a preliminary list of residents with special needs, but this list will need to be updated and reviewed each year.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Electric Department, Public Works Department	Local	2015, Annually	Tree trimming is carried out at least annually and will need to continue to be taken care of each year. Rights of way for sewer and water are maintained as well.
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	A list of contractors has been developed to help in case of an emergency, but this list will need to be updated annually.
Property Protection							
PP-1	Conduct smoke testing and camera system of existing sewer lines.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
PP-2	Conduct a comprehensive drainage study.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
PP-3	Replace three existing pump stations.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-4	On pump stations, raise all controls above Base Flood Elevation. Lift Station needs to be 2ft higher.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
Structural Projects							
SP-1	Continue upgrades of sanitary sewer system.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Wastewater Treatment, Public Works	Operating Budget, Federal/State Grants	2019	Some upgrades to the sanitary sewer system have been implemented, but overall the system requires more work so this action will remain in the plan.
Emergency Services							
ES-1	Enter into agreement with Johnston County to use current county notification system.	All	Low	Administration	Local	Completed	The town has entered into an agreement with Johnston County to use the county notification system. This action will be removed as a capability during the next update.
Public Education and Awareness							
PEA-1	Maintain and update the Town of Benson website.	All	Low	Administration	Local	2015, Annual review and update	The town website includes information on hazards and mitigation for the public. The website will need to be reviewed and updated to include the most recent data on hazards.
PEA-2	Educate public of potential natural disasters.	All	High	Administration	Local	2015, Annual review and update	The town works to educate the public on natural disasters in a number of ways, both through electronic and paper media. The town will continue to do this going forward and will be working to update its materials.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-3	Information regarding fire prevention and safe burning practices will be distributed to the public.	Wildfire	Moderate	Fire Department	Local	2015, Annual review and update	The town has informed the public of fire prevention techniques and safe burning practices and will continue to develop and distribute fire prevention information to the public, both through electronic and paper media.

Town of Clayton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Town of Clayton public power tree trimming program.	Thunderstorm, Lightning, Severe Winter Storm, Hurricane, Tornado	High	Electric System Director	Town electric fund	2015, Annually – July through September	In process and scheduled for completion in September 2014, after which the town will continue to implement on an annual basis.
P-2	Develop a Johnston County burning ordinance.	Wildfire	Low	Fire Marshall, Zoning Enforcement	In house staff	Deleted	Deleted, this action was deemed not applicable to the Town of Clayton.
P-3	Conduct a community risk assessment.	Hazardous Materials	Moderate	Fire Department	Local	2015, Annually	New action
P-4	Develop comprehensive plan.	All	High	Planning Department	Town Budget	August 2015	New action
Property Protection							
PP-1	Auxiliary power for Town of Clayton sewer lift stations.	All	High	Public Works Director	Town water/sewer fund budget	July 2016	Purchased two additional back up pumps to supplement 3 existing generators (5 total). All new facilities require back-up equipment.
PP-2	Town of Clayton public power electric system upgrade and relocation of overhead power lines. Convert 1\0 ACSR conductor to 477 AL conductor.	All	High	Electric System Director	Town electric fund	June 2015	Initial upgrade complete. Additional conversion of 1/0 ACSR conductor will take place by 2015.
PP-3	Add North Side Substation.	All	High	Electric Department	Town electric fund/bond money	2018	New action
Emergency Services							
ES-1	The Johnston County Continuity of Operations Plan (COOP) will be upgraded.	All	Moderate	Emergency Services Director	NCEM grant	2015	The county upgraded the COOP, but another upgrade is required and the budget for FY15 includes funds for COOP update.
ES-2	Conduct Annual EOC training.	All	Low	Fire Department	Town Budget	2015, Annually	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Develop Firewise Community Program.	Wildfire	Moderate	Fire Department	NC Forestry Service/ USFA	2015	New action
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.

Town of Four Oaks Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Develop a stormwater ordinance for the Town of Four Oaks.	Flood, Hurricane, Thunderstorm	High	Town Engineer, Zoning Administrator	In house staff, contracted town engineer	Completed	The town has developed a stormwater ordinance that is in place. This action will be removed as a capability at the next update.
P-2	Develop a burning ordinance for the Town of Four Oaks.	Wildfire	Low	Zoning Administrator, Fire Chief	In house staff	Completed	The town has developed a burning ordinance that is in place. This action will be removed as a capability at the next update.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Public Works/ Duke Energy	Local	2015, Annually	New action
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	New action
P-5	Digitize copies of town ordinances, polices, and procedures.	All	High	Administration and Town Council	Local, Grants	December 2015	New action
Property Protection							
PP-1	Town of Four Oaks public power electric system upgrade and relocation of overhead power lines.	All	High	Public Works	Federal or state grant	December 2018	New action
PP-2	Assess sewer lines due to infiltration issues. Need to address five to six manholes per year.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action
PP-3	Clean street grates before heavy rains and in large drain tiles to accommodate water.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action
PP-4	Install drainage pipe to relieve storm runoff and clean culvert areas.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Maintain a system for identifying special needs citizens in the town.	All	High	Police Department, Administration	Local	June 2015	New action
Public Education and Awareness							
PEA-1	Maintain town's website to include links to ReadyNC.org and FEMA-www.DHS.gov/ready.	All	Moderate	Administration	Local	June 2015	New action

Town of Kenly Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Digitize copies of town ordinances, polices, and procedures.	All	High	Town Manager	Grants	Completed June 2014	The town has digitized copies of all town ordinances, policies, and procedures. Town ordinances are now online and available for public access.
P-2	Develop a Town of Kenly burning ordinance.	Wildfire	Low	Town Manager, Fire Chief	Town Staff	Deleted	The town has elected not to institute a burning ordinance.
P-3	Develop ordinance to penalize intentional or malicious damage to canal and drainage system.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, Town Council	Town Manager, Town Council	January 2016	The town is working to develop an ordinance to penalize intentional damage to the canal and drainage system and will aim to have it in place by 2016.
P-4	Clean out and improve drainage pipe located on CSX Railroad right-of-way.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, CSX Officials	CSX Transportation	January 2016	The town is working with the railroad to clean out and improve the drainage pie that is located in the railroad right of way.
P-5	Remove beaver dam and trap beavers on east side of town to improve drainage and prevent flooding of low lying areas and streets.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	Local Budget, Grants	January 2016	The town is has been working to develop a system to reduce beaver dams and trap beavers so that it will not experience drainage problems. This project is still a work in progress.
P-6	Conduct study of drainage system to look for ways to improve drainage in southwest part of Town.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, Engineering Firm	Local Budget	December 2014	Project in work. Engineering firm currently conducting the study of the system in this area.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Conduct smoke test and sewer system audit to study excess water that flows into sewer pipes from groundwater and storm water infiltration and inflow.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	Grants	January 2016	The town conducts smoke and sewer system tests/audits to study the excess water that flows into the sewer system through I&I. More evaluation is necessary and continual monitoring will be needed.
P-8	Create a process and infrastructure to backup documents and records on town computers.	All	High	Town Manager Town Staff	Local Budget	December 2015	The town is working to develop a process for backing up all documents and records on the town's computer system.
Property Protection							
PP-1	Provide for a secondary means of power at sewer lift stations without this capability.	Flood, Hurricane, Thunderstorm	Moderate	Town Manager, Town Council	Grants	January 2016	All lift stations have been retrofitted for a secondary power source except this station on Bay Valley Road. The upgrades to the other stations were completed in September 2014.
Structural Projects							
SP-1	Provide a secondary means to connect the Town of Kenly water system to the Princeton-Kenly Water District.	Drought	High	Town Manager, Johnston County Director of Public Utilities	Grants	Completed	**Completed approximately 5 years ago. The Town of Kenly also has connected to the Wilson County water system at the intersection of NC Highway 581 and Saint Mary's Church Road to provide another emergency connection.**

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Improve drainage ditches and canal system in Town and other areas located in the ETJ.	Flood, Hurricane, Thunderstorm, Tornado	High	Town of Kenly, Johnston County, Wilson County	Grants	January 2020	The town has worked to improve its drainage ditches and canals in areas outside the city limits, but additional work needs to be carried out to ensure water flows out properly and doesn't cause flooding.
SP-3	Water/Sewer Main Project – Upgrade and loop water mains to improve water for domestic consumption and fire protection, upgrade sewer lines to prevent infiltration of storm water into sewer system.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	CDBG Grant	Complete May 2015	**Project in work.** This project is currently underway and funded through a Community Development Block Grant
SP-4	Install water main valves to grid town system in a manner to eliminate the disruption of water to the entire town during failures in the system.	Drought, Fire, Extreme Heat	High	Town Manager	Local Budget	December 2014	Project is currently underway and scheduled for completion by December 2014.
Emergency Services							
ES-1	Develop a Continuity of Operations Plan (COOP) for the Town of Kenly.	All	High	Town Council, Town Government	Grants	Complete 2020	The town has not developed a Continuity of Operations plan, but it coordinates with Johnston County and is working to develop its own COOP.
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Analyst, Emergency Services Department	Local Budget	2015, Annually	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Conduct a dam/hog lagoon safety inventory. People downstream of hazardous dams/hog lagoons would be notified. Owners would be notified of ways to reduce the risk of their dams/lagoons.	Dam Failure	Low	Public Utilities Director for Johnston County	Local Budget	2015, Annually	The town will notify citizens that are downstream of dams and hog lagoons that there are potential safety issues and will ensure that this notification takes place each year at least.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Johnston County Planning and Inspections	Local Budget	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-4	Provide education materials on preparedness/mitigation measures and display at the Town Hall, Town Library, and Town Website.	All	Moderate	Town Staff	Local Budget	December 2015	The town will develop and provide education materials on mitigation to citizens at both public locations and via the town's website.

Town of Micro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt the NFIP.	Flood, Hurricane, Thunderstorm	High	Town Board	Local budget	Completed	The town is a participating member of the NFIP. This action will be removed as a capability at the next update.
P-2	Improve drainage in Micro.	Flood, Hurricane, Thunderstorm	High	Town Board	Local budget, grants	2019	The town is working to improve drainage throughout the town in many ways, but there are still several projects that need to be completed to improve drainage further.
P-3	Develop a Johnston County burning ordinance.	Wildfire	Low	Fire Marshall, Zoning Enforcement	In house staff	Completed	The county has developed a burning ordinance that is in place. This action will be removed as a capability at the next update.
P-4	Create a process and infrastructure to backup documents, forms, and utility records on town computers.	All	High	Town Staff	Local Budget	December 2015	New action
Property Protection							
PP-1	Provide for a secondary means of power for wells and sewer lift stations through the installation of appropriate electrical connections and purchase of 40 KW generator.	All	High	Town Board	Grants	January 2016	New action
Structural Projects							
SP-1	Upsize culvert located on CSX Railroad right-of-way to handle storm water drainage from the new North Johnston Middle School.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Board, CSX Railroad	CSX Railroad	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Provide a means to connect the Town of Micro water distribution system to the Johnston County water system on US Highway 301 near North Johnston High School.	Drought, Wildfire, Extreme Heat	High	Town Board, Johnston County	Grants	January 2020	New action
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual update and review	The town currently has an up to date repetitive loss list and it will annually work to update that list and attempt to encourage property owners to take action to mitigate.
PEA-2	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-3	Provide education materials on preparedness/mitigation measures and display at the Town Hall, and Town Website.	All	Moderate	Town Staff	Local Budget	December 2015	New action

Town of Pine Level Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt a flood ordinance that is more restrictive on construction within a 100 year flood zone.	Flood, Hurricane, Thunderstorm	High	Zoning Administrator, Board of Commissioners	In house staff	Completed	The town has adopted an ordinance that is more restrictive on construction within the 100 year flood zone. This action will be removed from the next update as a capability.
P-2	Incorporate inspection and management of hazardous trees into the Town's systematic inspection process of public facilities and utilities.	All	High	Zoning Administrator	Town	2015, Annual review and update	The town has incorporated the evaluation of hazardous trees into its inspection process, but this process will need to be reviewed and updated annually so this action will remain in the plan.
Property Protection							
PP-1	Develop a systematic inspection process of the Town's public facilities and utilities to prevent or minimize potential damage.	All	High	Director of Public Works	Town	2015, Annual review and update	The town has developed a systematic inspection process for its public utilities, but this process will need to be carried out, reviewed, and updated on at least an annual basis, so it will remain in the plan.
PP-2	Improve drainage in Southern part of town based on a Comprehensive drainage study performed in 2011.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2020	New action
Structural Projects							
SP-1	Upgrade lift station located on the East Side due to its location being in a low point in the flood plain.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Public Works	Federal/State Grants	December 2020	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Increase public awareness of risk and mitigation measures available through a series of informative news articles.	All	Low	Zoning Administrator, Town Clerk	Town	2015, Annually	In the past, the town has developed and published articles on risks and mitigation for its citizens, but the town is planning to continue this process by developing these articles at least annually.
PEA-2	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.

Town of Princeton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Maintain Moccasin Creek and right away from erosion.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Public Works	Operating Budget	2019	New action
P-2	Maintain right of way for water and sewer lines.	Hurricane, Tornado, Thunderstorm, Winter Storm and Freze	High	Public Works	Operating Budget	2015, Annual review	New action
P-3	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annual review and update	New action
P-4	Maintain town ordinances, policies, and procedures for the Town of Princeton on their website.	All	High	Administration	In house staff, grants	June 2015	New action
Property Protection							
PP-1	Conduct annual smoke testing of existing sewer lines. 10% of lines to be tested annually.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State grants	December 2018	New action
Structural Projects							
SP-1	Upgrade existing manual bar screen with an automatic bar screen at Wastewater Treatment Facility.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Federal/State grants	December 2018	New action
SP-2	Upgrade grit removal system at Wastewater Treatment Plan.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/State grants	December 2018	New action
Emergency Services							
ES-1	Maintain a system at Town Hall for identifying towns' special needs citizens within the Princeton area.	All	High	Police Department, Administration	Local	June 2015	New action
ES-2	Install stationary 75kw generator for Town Hall.	All	High	Public Works	Federal/State grants	June 2016	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-2	Educate public on potential natural disasters by maintaining town's website to include links to ReadyNC.org and FEMA – www.dhs.gov/ready.	All	Moderate	Town Administration	Operating Budget	June 2015	New action
Previously Completed Mitigation Actions							
	Install auxiliary power generators at all sewage lift stations.	All	High	Water and Sewer Commission, Mayor	Grants, local funds		Completed. June, 2006.

Town of Selma Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Update Town Development Code with latest hazard mitigation measures; revise floodplain and stormwater regulations.	All	High	Planning and Inspections	Local	2019	The town development code was previously updated with the latest hazard mitigation measures, as were floodplain and stormwater regulations. However, these will need to be updated again in the next several years.
P-2	Incorporate latest NC Building Code regulations.	All	Moderate	Planning and Inspections, Administration	Local	Completed	The latest NC Building Code has been incorporated into town regulations. This action will be removed from the next update as a capability.
P-3	Provide Cloud access for government software and date.	All	High	Administration	Local	2019	New action
P-4	Develop a fuel back up plan.	All	High	Public works, Fire	Local	2019	New action
P-5	Maintain a list of contractors to assist in town emergency recovery.	All	High	Public Works	Local	2019	New action
P-6	Improve Storm water drainage.	All	High	Public Works	Local	2019	New action
P-7	Complete storm water GIS mapping project.	All	High	Public Works	Local	2019	New action
P-8	Complete sewer inspection to eliminate INI.	Flooding	High	Public Works	Local	2019	New action
Property Protection							
PP-1	Install emergency power back up to all critical facilities.	All	High	Administration	Local	2019	New action
Natural Resource Protection							
NRP-1	Install emergency power back up to critical wells and lift stations.	All	High	Administration	Local	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Incorporate an EOC into the Town Hall.	Natural disaster	Moderate	Administration	Local	2019	New action
SP-2	Improve drainage ditches and canal system in areas outside of the incorporated area.	Flooding	High	Public works	Local	2019	New action
Emergency Services							
ES-1	Increase the Town's emergency service measures that would minimize the impact of a natural hazard event on people and property immediately prior to, during, or in response to a natural hazard event.	All	High	Fire, Police	Local	Deleted	Deleted, this action was further specified and divided into multiple actions ES-2 through ES-7
ES-2	Increase staff of the Fire Department to meet NFPA 1710.	All	High	Fire	Local	2019	New action
ES-3	Develop the Fire Department Training room into an EOC by adding data, and phone lines.	Natural Disaster	Moderate	Fire, Police	Local	2019	New action
ES-4	Develop a list of special needs citizens in need of assistance during a disaster.	All	High	Fire, Police	Local	2019	New action
ES-5	Develop and exercise the towns emergency plan annually with all departments.	All	High	Fire	Local	2019	New action
ES-6	Develop a shelter plan for the Town.	All	High	Fire, Police	Local	2019	New action
ES-7	Purchase a mobile Command Center.	All	Moderate	Police	Local	2019	New action
Public Education and Awareness							
PEA-1	Advertise and promote the availability of flood insurance to town residents and property owners by including such information in the Town's water billing at least once a year.	Flood	Moderate	Planning and Inspections, Administration	Local	2015, Annually	The town works to advertise the availability of flood insurance at least annually via water bills. The town will continue to advertise and encourage homeowners to purchase flood insurance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Collect education materials on preparedness/mitigation measures and display at both the Town Hall and Town Library.	All	Moderate	Planning and Inspections, Administration	Local	2015, Annually	The town has developed a number of materials to display at the Town Hall and in the Town Library. However, this material will need to be reviewed and updated as it may be out of date.

Town of Smithfield Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Complete storm water GIS mapping project, with elevations showing where deficiencies exist in the storm water system.	Flood, Hurricane, Thunderstorm	High	Director of Public Works	General fund budget	June 2016	This project is still around75 percent complete. Scheduled for completion by FY 2015 due to budget cuts.
P-2	Johnston County will apply to reduce their NFIP-CRS (Community Rating System) score.	Flood, Hurricane, Thunderstorm	Moderate	Emergency Services Coordinator, Environmental Protection Administrator	In house staff	Deleted	Deleted, this is a Johnston County action
Property Protection							
PP-1	Install generators to at least two, possibly three, critical sewer lift stations within the Town of Smithfield.	All	High	Director of Public Works	Annual budget (appropriations from utility fund)	2019	This project is a work in progress as the town is still trying to install generators to support critical sewer lift stations.
Structural Projects							
SP-1	Complete the Spring Branch Wetlands Restoration Project in order to improve the quality of stormwater runoff before it enters the Neuse River.	Flood, Hurricane, Thunderstorm	Moderate	Public Works Director	Local Funding, Grants	2019	This project is complete, but the town is still working to improve the quality of stormwater runoff before it enters the Neuse River.
SP-2	Eliminate Lift Station #3 and convert to a gravity sewer line.	Flood, Hurricane, Thunderstorm	High	Public Works Director	Local Funding, Utility Fund Budget	July, 2016	The town has been working on the conversion to a gravity sewer line. This is scheduled for completion in current budget year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-2	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-3	Update and maintain educational information and links on County website for the public to access in order to stay informed on natural hazard risk and mitigation techniques.	All	Low	Town Administration	In house staff	2015, Annual review and update	New Action
Previously Completed Mitigation Actions							
	The development of a Continuity of Operations Plan (COOP) for the Town of Smithfield.	All	High	Emergency Services Director, Town Manager	Grant		Completed. In spring 2006 and updates ongoing. An NCEM grant was secured for $26,000.
	Adopt a new flood ordinance that is more restrictive on construction within a 100-year flood zone.	Flood, Hurricane, Thunderstorm	High	Director of Public Works, Director of Planning and Zoning	FEMA, in house staff		Completed. December of 2008. The IEMC retreat is paid for by FEMA. In-house staff will do all of the work done on the flood ordinances.
	Rehabilitate and protect Sewer Lift Station #2 raising all controls above Base Flood Elevation. Eliminate Lift Station #3 and convert to a gravity sewer line.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	Loans, grants, utility fund budget		Completed. December 2005.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Complete the Spring Branch Wetlands Restoration Project in order to improve the quality of stormwater runoff before it enters the Neuse River.	Flood, Hurricane, Thunderstorm	Moderate	Public Works Director	Clean Water Management Trust Fund Grant, local funding		Completed. June 30, 2007.

Town of Wilson's Mills Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt NFIP.	Flood, Hurricane, Thunderstorm	High	Town staff	Local budget	2016	The town has not adopted the NFIP and will work to do this going forward.
P-2	Improve drainage in Wilson's Mills.	Flood, Hurricane, Thunderstorm	Moderate	Town staff	Grants, local budget	2019	Although some steps have been taken to improve drainage in the town, there are still some outstanding projects so this action will remain in the plan.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Public Works/ Duke Energy	Local	2015, Annually	New action
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	New action
P-5	Digitize copies of town ordinances, polices, and procedures.	All	High	Administration and Town Council	Local, Grants	December 2015	New action
Property Protection							
PP-1	Work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County & Town limits in particular. The goal of this effort will be to provide the pertinent agencies with better information regarding river water levels.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2019	New action
PP-2	Subsequent to the establishment of additional stream gauges as noted above, establish a working group including all individuals charged with floodplain and dam management within the County.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Install generators to sewer pumps if possible.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	2019	New action
Natural Resource Protection							
NRP-1	When appropriate, continue accepting dedication of open space within all new major subdivisions, especially when environmentally sensitive areas are present.	Flood, Hurricane, Thunderstorm, Tornado	High	Planning	Local	2019	New action
NRP-2	Continue ensuring that new developments have adequate hydrants per the Town development ordinances.	Flood, Hurricane, Tornado, Thunderstorm	High	Planning	Local	2019	New action
Emergency Services							
ES-1	Maintain a system for identifying special needs citizens in the town.	All	High	Police Department, Administration	Local	June 2015	New action
ES-2	Establishment of additional Community Emergency Response Teams (CERT). This effort will so address the ongoing training and support of the eleven teams currently operating within the County.	All	Moderate	Administration/ Police	Local	2016	New action
ES-3	Utilize the Town's Blackboard Connect system to notify Town residents and business owners regarding natural and man-made hazard events. Town residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Administration	Local	2015	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-2	Maintain town's website to include links to ReadyNC.org and FEMA – www. dhs.gov/ready.	All	Moderate	Administration	In house	June 2015	New action
PEA-3	Conduct research activities aimed at educating business owners about how to address the issue of continuity of operations in the face of natural and man-made disasters, since following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	Moderate	Planning	Local	2015, After disaster events	New action
PEA-4	Advertise and promote the availability of flood insurance to town residents and property owners by including such information on the Town website as well as through a Blackboard Connect message.	Flood, Hurricane, Thunderstorm	Moderate	Planning	Local	2015, Annual review and update	New action
PEA-5	Information regarding fire prevention and safe burning practices will be available the Town Hall & published on the town website.	Wildfire	Moderate	Administration/ Planning	Local	2015, Annual review and update	New action

Lee County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the county is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the county will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	All Hazards	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.
Property Protection							
PP-1	Work to improve individual homes and businesses in terms of their resistance to wind event.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2019	Public education efforts have been undertaken to try to encourage property owners to improve the resistance of structures to wind, however, more outreach is still necessary to try to improve other existing buildings that have not implemented stronger wind protection measures.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county board has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	All Hazards	High	Emergency Management	Local	Completed, Annual Review and Update	The county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies in the county. This action is complete and will be removed from the next update as a capability.
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

Town of Broadway Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the town is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the town will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Work to improve individual homes and businesses in terms of their resistance to wind event.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2019	Public education efforts have been undertaken to try to encourage property owners to improve the resistance of structures to wind, however, more outreach is still necessary to try to improve other existing buildings that have not implemented stronger wind protection measures.
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed, Annual Review and Update	In conjunction with the towns, the county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies throughout the county. This action is complete and will be removed from the next update as a capability.
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

City of Sanford Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the town is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the town will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.
Property Protection							
PP-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed, Annual Review and Update	In conjunction with the towns, the county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies throughout the county. This action is complete and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

Moore County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	Deleted	Although the County's 2013 Land Use Plan Update has some policies that support this action item, the county determined that this action was not feasible to implement so it was deleted.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	The county has made some strides through the Land Use Plan and will work with local land preservation programs to try to focus on areas that are vulnerable to natural hazards.
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage “hot spots” within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Aberdeen Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
P-17	Implement at least one of the three stormwater BMP's identified through the Town's existing comprehensive stormwater mapping project.	Flood	High	Town Planning Director	Local	2019	The town has worked to implement BMPs in its stormwater mapping project, but integrating additional BMPs will further improve the program, so this action will be continued into the next plan.
P-18	Promote floodplain mapping of the Ray's Mill Pond (Pee Dee Lake) and Creek system).	Flood	High	Town Planning Director	Local	2018	Floodplain mapping of the pond and creek needs to be carried out. This will be taken on in the coming years.
P-19	Incorporate dam maintenance into the CIP. This task should be coordinated with County efforts.	Dam/Levee Failure	High	Town Planning Director	Local	2018	Dam maintenance has not been incorporated into the CIP process, but the town will work do so going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-20	Revise Land Development Plan goals, objectives, and policies to address natural resource protection, hazard mitigation, and rail corridor protection.	All	High	Town Planning Director	Local	2019	Goals, objectives, and policies in the Land Development Plan have been revised to incorporate aspects of hazard mitigation and natural resource protection, but additional revisions would be useful to further improve the plan.
P-21	Continue to show improvement and maintain ISO audit ratings of building inspections and the fire department at the highest levels possible with available funding.	All	High	Town Planning Director	Local	2018	The building inspections and fire department have maintained high levels, but additional improvements may be implemented.
P-22	Promote use of freeboard for construction of projects adjacent to floodplain boundaries.	Flood	High	Town Planning Director	Local	2019	The town has promoted the use of freeboard in construction projects adjacent to floodplain boundaries, but this will require a proactive effort going forward.
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
PP-2	Seek funding to relocate the repetitively flooded Rescue building located downstream of the Aberdeen Lake Dam.	Flood	High	Town Planning Director	Local, Grants	2018	Funding to relocate the Rescue building has not been acquired, so this project will need to be pursued.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Identify any sewer manholes within floodprone areas that require flood proofing.	Flood	Moderate	Town Planning Director	Local	2016	The town has begun to build a list of floodprone sewer manholes, but needs to build on this list.
PP-4	Investigate the feasibility and cost of floodproofing manholes within floodprone areas.	Flood	Moderate	Town Planning Director	Local	2018	Once floodprone sewer manholes have been identified, the town will need to assess cost and feasibility of floodproofing.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.
NRP-2	Add ½ mile of greenway trail to serve as a buffer to Aberdeen Lake Park.	Flood	Moderate	Town Planning Director	Local	2016	The town is working to complete a project on adding a greenway trail buffer to Aberdeen Lake Park.
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

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ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

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ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

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ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

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ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

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ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
ES-15	Incorporate the Emergency Evacuation Limits of intermediate to high hazard dams onto maps in use in Town hall, Police, and Fire Departments. Notify all potentially affected property owners.	Dam/Levee Failure	Moderate	Town Planning Director	Local	2017	The town has worked on developing these maps and will need to take action to notify affected property owners of their risk.
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-11	Ensure adequate notification of parties potentially affected by revisions to floodplain boundaries as a result of NCDOT road improvement projects.	Flood	Moderate	Town Planning Director	Local	2019	The town has notified parties affected by revisions to floodplain boundaries and will work to continue to reach out to property owners as additional revisions are made in the future
PEA-12	Provide in-house training for Public Works administrators to ensure compliance of public infrastructure installation with the FDPO.	Flood	Low	Town Planning Director	Local	2016	The town has trained Public Works administrators on ensuring infrastructure is in compliance with FDPO. The town will continue to ensure adequate enforcement and planning in this respect going forward.
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Cameron Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Carthage Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Foxfire Village Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Pinebluff Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Village of Pinehurst Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.
	Designing a public awareness brochure.						Completed. Hard copy public awareness information is available at Village Hall; however, the web is currently utilized as the predominant means of communication. The Village is very proactive about providing comprehensive and current information relating to protection from natural and man-made hazards on their website.
	Updating the Village Pinehurst website.						Completed/Ongoing. This effort has been completed, and the website is updated on a regular basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Providing information on natural disasters in the Village's quarterly newsletter.						Completed/Ongoing. The Village produces this newsletter approximately one every three months. The newsletter contains seasonal information relating to protection from both natural and man-made hazards on an as needed/seasonal basis.
	Update Emergency Operations Plan.						Completed. The Village updates it Emergency Operations Plan on an annual basis to ensure that all procedures and processes are current and appropriate.
	Continue to update/amend the Pinehurst Development Ordinance.						Completed. A complete overhaul of the Pinehurst Development Ordinance was completed. The Village does, as a practice, update all development regulations on an as-needed basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Develop and implement a Stormwater Master Plan.						Completed/Ongoing. The Village has completed the development and implementation of their stormwater master plan. The Village maintains a listing of stormwater improvements that need to be completed, and completes 4 to 6 projects on an annual basis. The Village maintains a very effective stormwater management program, and will continue to do so through this update. The Village has also initiated a program to purchase lots in drainage ways to preclude development in floodprone areas and preserve greenspace.

Town of Robbins Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

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ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Southern Pines Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Taylortown Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Vass Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Village of Whispering Pines Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

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P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

SECTION 10
PLAN MAINTENANCE

This section discusses how the Cape Fear Region Mitigation Strategy and Mitigation Action Plan will be implemented and how the Regional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following four subsections:

- 10.1 Monitoring and Evaluating the Previous Plan
- 10.2 Implementation and Integration
- 10.3 Monitoring, Evaluation, and Enhancement
- 10.4 Continued Public Involvement

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44 CFR Requirement
44 CFR Part201.6(c)(4)(i): The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle. ***44 CFR Part 201.6(c)(4)(ii):*** The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

10.1 MONITORING AND EVALUATING THE PREVIOUS PLAN

Since the previous five plans were adopted (Chatham County in 2010; Harnett, Johnston, and Moore Counties in 2011; and Lee County in 2012), each county has worked to ensure that mitigation was integrated into local activities and that the mitigation plan was appropriately implemented. Each of the counties outlined a process in their previous county-level mitigation plans for monitoring and evaluating the plan throughout the interim period between plan updates.

Each county was ultimately successful in implementing the monitoring and evaluation processes that were outlined in previous plans as all five counties held annual meetings to discuss the mitigation plan and the priorities that were outlined in it. Each county's specific process is outlined below with an explanation of how the monitoring and evaluating process was carried out as well as any changes that were identified by the county or its jurisdictions that would be useful to implement during the next update.

Chatham County

The Chatham County Hazard Mitigation Plan (2010) included an annual review process and progress report on the plan. This review process was carried out by the County Planner and Emergency Operations Director every year since the previous plan was approved. During this annual review process, the Planner and Emergency Operations Director developed a progress report on the plan and

presented it to the Hazard Mitigation Team for review. The plan was also open to comments from the general public during this timeframe.

Moreover, the County Manager and County Board of Commissioners each received an annual presentation on the implementation status of the plan which included a review of mitigation actions in the plan and progress that had been made towards completing those actions.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual reviews and the Hazard Mitigation Team generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Harnett County

The Harnett County Hazard Mitigation Plan (2011) included an annual evaluation and update process. This process was the responsibility of the Harnett County Planning and Emergency Management Departments along with members of the Harnett County Hazard Mitigation Committee. Since the plan was approved, the Hazard Mitigation Committee met annually to develop a report on the status of the plan and make any necessary updates to the plan. The Committee also assessed the mitigation goals and objectives in reference to the changing needs of the community and its vulnerabilities as well as evaluated the plan's effectiveness in terms of reduction of risks and efficient implementation of mitigation strategies according to county goals and objectives on an annual basis.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual evaluations and the Hazard Mitigation Committee generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Johnston County

The Johnston County Hazard Mitigation Plan (2011) included an annual evaluation process to determine if the mitigation actions are on schedule and whether the goals of the plan are still relevant. This annual evaluation process was carried out by the Johnston County Emergency Services Department and each participating jurisdiction's designated Executive Officer every year since the previous plan was approved.

During the month of September every year since the plan was approved, each jurisdiction's Executive Officer was responsible for obtaining reports for each party responsible for the mitigation actions to determine if the mitigation action is on schedule. This was done through phone calls or email queries directed toward the responsible individual/department. The Executive Officer was also responsible for reviewing the risk assessment portion of the plan to determine if any information needs to be updated or modified. Following these tasks, the Executive Officer wrote a narrative on the progress which was sent to the Emergency Services Department. If any changes were noted, the Department of Emergency Services will keep the narratives for incorporation into future plan updates.

As necessary and appropriate, each October following the plan's approval, all Executive Officers convened for a meeting that was organized and preside over by the County Emergency Services Department. A report from each Executive Officer on the status of his or her jurisdiction was presented to the group at this time. The group also discussed whether the goals of the mitigation plan were still relevant as well as any other issues that required attention.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual evaluations and the Executive Officers generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Lee County
The Lee County Hazard Mitigation Plan (2012) included an annual plan evaluation process that was primarily conducted by the Sanford/Lee County Community Development Department. Every year since the plan was approved, the Community Development department asked each of the municipalities to submit a progress report so that the county could ensure that implementation of the actions was taking place at a desirable pace.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these yearly meetings and the update team generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Moore County
The Moore County Hazard Mitigation Plan (2011) included an annual evaluation and update process. In order to track progress and updated the mitigation strategies identified in the plan, the county revisited the plan on a quarterly basis. The County Emergency Services Director was responsible for initiating this review and consulted with the Mitigation Advisory Committee. Monitoring and updating took place through a formal review by the Mitigation Advisory Committee twice annually since the plan was approved. Changes were made to accommodate for projects that failed or were no longer considered feasible. Priorities that were identified as potential mitigation strategies were also reviewed at this time to determine feasibility of future implementation.

The plan was updated by written changes and submissions as the Mitigation Advisory Committee deemed appropriate and necessary and as approved by the Moore County Board of Commissioners. In keeping with the process that adopted the plan, a public involvement process to receive public comment on the plan maintenance and updating was held once annually.

Although there were some minor revisions made to the plan during interim update period, there were few major revisions identified during these annual evaluations and the Mitigation Advisory Committee generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

10.2 IMPLEMENTATION AND INTEGRATION

Each agency, department, or other partner participating under the Cape Fear Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific “lead” agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being

implemented in a timely fashion. The counties in the Cape Fear Region 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.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant city and county government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes, or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of the Cape Fear Regional Hazard Mitigation Planning Committee (CFRHMPC) will remain charged with ensuring that the goals and mitigation actions of new and updated local planning documents for their agencies or departments are consistent, or do not conflict with, the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in the Cape Fear Region.

Since the previous five plans were adopted (in 2010, 2011, and 2012), each county and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances;
- Integrating the mitigation plan into reviews and updates of County emergency operations plans;
- Integrating the mitigation plan into review and updates of building codes; and
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Committee, individual county meetings, and the annual 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 Regional Hazard Mitigation Plan is deemed by the Cape Fear Regional Hazard Mitigation Planning Committee to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.3 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Regional Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

When determined necessary, the Cape Fear Regional Hazard Mitigation Planning Committee shall meet in March of every year to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the Regional Hazard Mitigation Planning

Committee shall be documented in the form of a report that can be shared with interested City, Town, and County Council members. The Regional Hazard Mitigation Planning Committee will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within the Cape Fear Region. The Moore County Emergency Management Coordinator will be responsible for reconvening the Regional Hazard Mitigation Planning Committee for these reviews.

Five Year Plan Review

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Planning Committee every five years to determine whether there have been any significant changes in the Cape Fear Region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides Cape Fear county officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. The Moore County Emergency Management Coordinator will be responsible for reconvening the Regional Hazard Mitigation Planning Committee and conducting the five-year review.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Cape Fear Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCDEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Because the plan update process can take several months to complete, and because Federal funding may be needed to update the plan, it is recommended that the five-year review process begin at the beginning of the third year after the plan was last approved. This will allow the participants in the Cape Fear Regional Hazard Mitigation Plan to organize in order to seek Federal funding if necessary and complete required plan update documentation before the plan expires at the end of the fifth year.

Disaster Declaration

Following a disaster declaration, the Cape Fear Regional Hazard Mitigation 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 Moore County Emergency Management Coordinator to reconvene the Regional Hazard Mitigation Planning Committee and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

The results of the five-year review will be summarized by the Regional Hazard Mitigation Planning Committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, representatives from the Cape Fear counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to the North Carolina Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the Regional Hazard Mitigation Planning Committee for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the Regional Hazard Mitigation Planning Committee:

- ❑ There are errors, inaccuracies, or omissions made in the identification of issues or needs in the Plan.
- ❑ New issues or needs have been identified which are not adequately addressed in the Plan.
- ❑ There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the Regional Hazard Mitigation Planning Committee, and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the Regional Hazard Mitigation Planning Committee (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- ❑ Adopt the proposed amendments as presented;
- ❑ Adopt the proposed amendments with modifications;

- Refer the amendments request back to the Regional Hazard Mitigation Planning Committee for further revision; or
- Defer the amendment request back to the Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings.

10.4 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement
44 CFR Part 201.6(c)(4)(iii): The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation, and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the Regional Hazard Mitigation Planning Committee in local newspapers, public bulletin boards and/or County office buildings;
- Designating willing and voluntary citizens and private sector representatives as official members of the Regional Hazard Mitigation Planning Committee;
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place;
- Utilizing the websites of participating jurisdictions to advertise any maintenance and/or periodic review activities taking place; and
- Keeping copies of the Plan in public libraries.

Annex A
Chatham County

This annex includes jurisdiction-specific information for Chatham County and its participating municipalities. It consists of the following five subsections:

- A.1 Chatham County Community Profile
- A.2 Chatham County Risk Assessment
- A.3 Chatham County Vulnerability Assessment
- A.4 Chatham County Capability Assessment
- A.5 Chatham County Mitigation Strategy

A.1 CHATHAM COUNTY COMMUNITY PROFILE

A.1.1 Geography and the Environment

Chatham County is located at the geographic center of North Carolina just west of Raleigh, the state's capital. It comprises three municipalities, the Town of Goldston, Town of Pittsboro, and Town of Siler City, as well as many small communities. (A small portion of the Town of Cary is also located in Chatham County, but Cary is not a participating jurisdiction in this plan.) An orientation map is provided as **Figure A.1**.

The prevailing landscape of Chatham County consists of gently rolling hills with a general drop in elevation from northwest to southeast across the county. Jordan Lake, a major recreational lake and water reservoir, as well as several important rivers, including the Rocky River, Haw River, and Deep River, are the major water bodies in the county. The total area of the county is 710 square miles, 28 square miles of which is water area.

From December to February, the average high temperature is in the lower 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter. Snow and sleet is usually light and occurs on average once or twice per year.

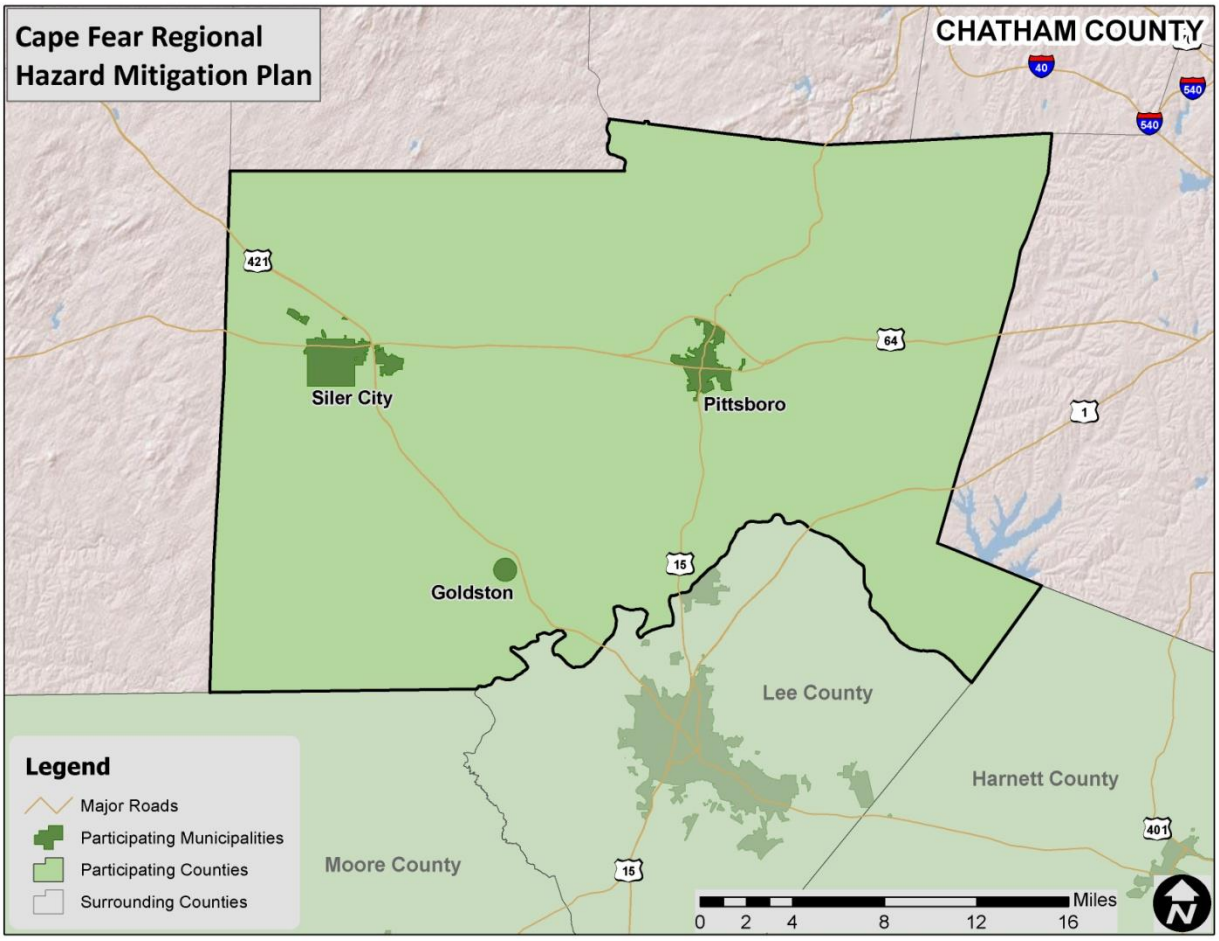
During the spring months, the days are warm and the nights are cool. Average high temperatures increase from the lower 60s in March to the upper 70s in May. There is a similar increase in average low temperatures, which start in the upper 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring.

The summer is characterized by warm temperatures and rather high humidity. Average high temperatures range from the mid to upper 80s and low temperatures average in the mid to upper 60s. Summer precipitation is normally the greatest, but also the most variable, and thunderstorms are common events.

Autumn is typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the lower 80s in September and fall

to the low to mid 60s by November. Average lows also drop significantly from the high 50s to high 30s from September to November. Autumn is the driest season.

FIGURE A.1: CHATHAM COUNTY ORIENTATION MAP



A.1.2 Population and Demographics

According to the 2010 Census, Chatham County has a population of 63,505 people. The county has seen almost 29 percent growth between 2000 and 2010, and the average population density is 93 people per square mile. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for the county and participating municipalities are presented in **Table A.1**.

TABLE A.1: POPULATION COUNTS FOR CHATHAM COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Chatham County	**38,759**	**49,329**	**63,505**	**28.7%**
Town of Goldston	299	319	268	-16.0%
Town of Pittsboro	1,436	2,226	3,743	68.1%
Town of Siler City	4,808	6,966	7,887	13.2%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Chatham County is 43.6 years. The racial characteristics of the county and participating municipalities are presented in **Table A.2**. Whites make up the majority of the population in the county, accounting for around 76 percent of the population.

TABLE A.2: DEMOGRAPHICS OF CHATHAM COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Chatham County	**76.0%**	**13.2%**	**0.5%**	**1.1%**	**0.0%**	**7.3%**	**1.9%**	**13.0%**
Town of Goldston	91.4%	5.6%	0.0%	0.4%	0.0%	0.4%	2.2%	3.4%
Town of Pittsboro	72.2%	19.5%	0.3%	1.8%	0.0%	3.7%	2.4%	8.9%
Town of Siler City	44.0%	19.1%	1.7%	0.4%	0.2%	31.1%	3.4%	49.8%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

A.1.3 Housing

According to the 2010 U.S. Census, there are 21,358 housing units in Chatham County, the majority of which are single family homes or mobile homes. Housing information for the county and towns is presented in **Table A.3**. As shown in the table, the county and towns all have a very low percentage of seasonal units.

TABLE A.3: HOUSING CHARACTERISTICS OF CHATHAM COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Chatham County	**21,358**	**28,753**	**1.1%**	**$193,900**
Town of Goldston	142	144	0.7%	$106,300
Town of Pittsboro	939	1,606	0.7%	$206,900
Town of Siler City	2,526	2,890	0.4%	$90,600

Source: United States Census Bureau

A.1.4 Infrastructure

Transportation

There are several major highways that cross Chatham County. US Route 64 is the major east-west thoroughfare which connects Chatham County to Wake County and the Triangle. US-1 also links the southeastern corner of Chatham County to Wake County. US-15 is the major north-south thoroughfare which again connects Chatham County to the Triangle, passes through Pittsboro, and continues on into neighboring Lee County. US-421 is another important highway which crosses Chatham County linking it to the Triad as well as Lee County. There is also a designated scenic byway in Chatham County, Devil's Stompin' Ground Road, which extends from the Chatham County Courthouse in Pittsboro through the farmlands and forests of the lower Piedmont into Moore County.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to Chatham County. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 30 miles from Pittsboro. An additional relief airport, Raleigh Exec, is also located nearby just outside of Sanford and provides additional capacity to the RDU airport. An additional general aviation airport servicing the county is the Siler City Municipal Airport.

Utilities

Electrical power in Chatham County is provided by one public utility and two electricity cooperatives. Duke Energy Progress serves major portions of the county while Central Electric Membership Corporation serves a wide area of rural customers in southern and western parts of the county and Randolph Electric Membership Corporation services rural areas in the northwest and southwest corners of the county.

Water and sewer service in county is provided by the Towns of Pittsboro and Siler City (within their respective jurisdictions) as well as by Chatham County System, which has waterlines in various parts of the county but limited wastewater in the Bynum area only. Additionally, the Goldson-Gulf Sanitary District provides water only in the Goldston and Gulf areas. Therefore, some parts of the county require the use of wells and septic systems.

Community Facilities

There are a number of buildings and community facilities located throughout Chatham County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 19 fire stations, 4 police stations, and 18 public schools located within the county.

There is one medical care facility located in Chatham County. This facility, Chatham Hospital, is a 25-bed critical access hospital located in Siler City.

In addition to Jordan Lake Recreation Area and White Pines Nature Preserve, the county contains numerous local parks and recreation areas. These facilities offer recreational opportunities to area residents and many visitors each year.

A.1.5 Land Use

Chatham County is experiencing growth and development due to its proximity to the major metropolitan areas in the Triangle and Triad. There are several incorporated municipalities located throughout the county which make up most of the county's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with some agricultural and recreational uses in the more rural areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

A.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Chatham County had an average annual employment of 31,537 workers and an average unemployment rate of 7.3 percent (compared to 8.0 percent for the state). In 2012, the Health Care and Social Assistance industry employed 17.4 percent of the county's workforce followed by Manufacturing (16.0%); Retail Trade (11.9%); and Education Services (11.3%). The American Community Survey (ACS) found the average annual median household income in Chatham County was $57,793 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

A.2 CHATHAM COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Chatham County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

A.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, Chatham County has had drought occurrences in each of the last fourteen years (2000-2013). **Table A.4** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE A.4: HISTORICAL DROUGHT OCCURRENCES IN CHATHAM COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Chatham County
2000	MODERATE
2001	EXTREME
2002	EXCEPTIONAL
2003	ABNORMAL
2004	ABNORMAL
2005	SEVERE
2006	SEVERE
2007	EXCEPTIONAL
2008	EXCEPTIONAL
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE

Source: North Carolina Drought Monitor

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Chatham County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

A.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Chatham County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Chatham County. One event was reported:

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1894. The recorded maximum for Chatham County can be found below in **Table A.5**.

TABLE A.5: HIGHEST RECORDED TEMPERATURE IN CHATHAM COUNTY

Location	Date	Temperature (F)
Moncure 3 SE	7/27/1940	108
CHATHAM COUNTY MAXIMUM	--	**108**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the county. The most centralized location is Siler City. **Table A.6** shows the average maximum temperatures from 1971 to 2000 at the Siler City 2 N observation station which can be used as a general comparison for the county.

TABLE A.6: AVERAGE MAXIMUM TEMPERATURE IN SILER CITY 2 N, CHATHAM COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	49.2	53.6	62.0	71.0	77.8	84.7	88.5	86.8	81.2	71.4	62.2	52.7

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Chatham County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county.

A.2.3 Hailstorm

Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Chatham County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

Historical Occurrences

According to the National Climatic Data Center, 66 recorded hailstorm events have affected Chatham County since 1975.[1] **Table A.7** is a summary of the hail events in Chatham County. **Table A.8** provides detailed information about each event that occurred in the county. In all, hail occurrences did not result in any recorded monetary property damages. Hail ranged in diameter from 0.75 inches to 1.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE A.7: SUMMARY OF HAIL OCCURRENCES IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	8	0/0	$0
Pittsboro	15	0/0	$0

[1] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected Chatham County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Siler City	5	0/0	$0
Unincorporated Area	38	0/0	$0
CHATHAM COUNTY TOTAL	**66**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE A.8: HISTORICAL HAIL OCCURRENCES IN CHATHAM COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Goldston				
Goldston	5/19/1993	1.75 in.	0/0	$0
GOLDSTON	6/3/1998	0.75 in.	0/0	$0
GOLDSTON	7/16/2000	1.00 in.	0/0	$0
GOLDSTON	6/1/2001	1.00 in.	0/0	$0
GOLDSTON	8/27/2001	0.75 in.	0/0	$0
GOLDSTON	5/14/2006	0.75 in.	0/0	$0
GOLDSTON	6/5/2006	0.75 in.	0/0	$0
GOLDSTON	5/22/2012	1.00 in.	0/0	$0
Pittsboro				
PITTSBORO	4/21/1997	1.00 in.	0/0	$0
PITTSBORO	3/20/1998	0.75 in.	0/0	$0
PITTSBORO	5/7/1998	0.75 in.	0/0	$0
PITTSBORO	5/7/1998	1.75 in.	0/0	$0
PITTSBORO	6/2/1998	1.75 in.	0/0	$0
PITTSBORO	4/1/2001	0.75 in.	0/0	$0
PITTSBORO	4/1/2001	0.75 in.	0/0	$0
PITTSBORO	5/23/2004	1.00 in.	0/0	$0
PITTSBORO	7/28/2005	1.75 in.	0/0	$0
PITTSBORO	4/3/2006	0.75 in.	0/0	$0
PITTSBORO	5/18/2006	0.75 in.	0/0	$0
PITTSBORO	6/6/2006	0.75 in.	0/0	$0
PITTSBORO	7/27/2007	0.88 in.	0/0	$0
PITTSBORO	4/20/2008	1.00 in.	0/0	$0
PITTSBORO	5/20/2008	1.00 in.	0/0	$0
Siler City				
SILER CITY	6/2/1998	1.00 in.	0/0	$0
SILER CITY	5/21/2000	1.00 in.	0/0	$0
SILER CITY	4/1/2001	0.75 in.	0/0	$0
SILER CITY	6/23/2006	0.75 in.	0/0	$0
SILER CITY	6/23/2006	0.88 in.	0/0	$0
Unincorporated Area				
Chatham County	5/22/1975	1.00 in.	0/0	$0
Chatham County	7/8/1975	0.75 in.	0/0	$0
Chatham County	7/8/1975	1.50 in.	0/0	$0
Chatham County	4/30/1981	1.75 in.	0/0	$0
Chatham County	3/24/1985	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
Chatham County	4/26/1986	1.50 in.	0/0	$0
Chatham County	4/26/1986	0.75 in.	0/0	$0
Chatham County	6/24/1986	0.75 in.	0/0	$0
Chatham County	8/27/1986	1.50 in.	0/0	$0
Chatham County	8/29/1987	0.88 in.	0/0	$0
Chatham County	3/26/1988	1.50 in.	0/0	$0
Chatham County	6/2/1988	1.75 in.	0/0	$0
Chatham County	6/2/1988	1.00 in.	0/0	$0
Chatham County	9/24/1988	1.75 in.	0/0	$0
Chatham County	7/1/1990	1.75 in.	0/0	$0
Chatham County	8/16/1990	0.75 in.	0/0	$0
Chatham County	3/19/1992	0.88 in.	0/0	$0
Chatham County	8/12/1992	0.75 in.	0/0	$0
Chatham County	11/22/1992	0.75 in.	0/0	$0
SE Portion	3/27/1993	1.75 in.	0/0	$0
Chatham County	6/8/1995	1.00 in.	0/0	$0
Jordan Lake	6/10/1995	0.75 in.	0/0	$0
JORDON LAKE	7/2/1996	1.75 in.	0/0	$0
BENNETT	7/28/1996	1.00 in.	0/0	$0
BENNETT	3/20/1998	1.00 in.	0/0	$0
SILK HOPE	3/20/1998	0.75 in.	0/0	$0
SILK HOPE	6/15/1998	0.75 in.	0/0	$0
BEAR CREEK	5/10/2000	0.75 in.	0/0	$0
CARBONTON	8/13/2000	0.75 in.	0/0	$0
MONCURE	5/12/2001	0.75 in.	0/0	$0
FARRINGTON	6/13/2007	0.75 in.	0/0	$0
HARPERS XRDS	7/17/2007	0.75 in.	0/0	$0
BONLEE	5/9/2008	1.00 in.	0/0	$0
BYNUM	5/9/2008	1.75 in.	0/0	$0
CRUTCHFIELD XRDS	5/20/2008	1.00 in.	0/0	$0
CRUTCHFIELD XRDS	5/20/2008	1.75 in.	0/0	$0
BELLS	6/29/2008	0.75 in.	0/0	$0
CORINTH	8/5/2009	1.00 in.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Chatham County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

A.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Chatham County. The entire county is equally susceptible to hurricane and tropical storms.

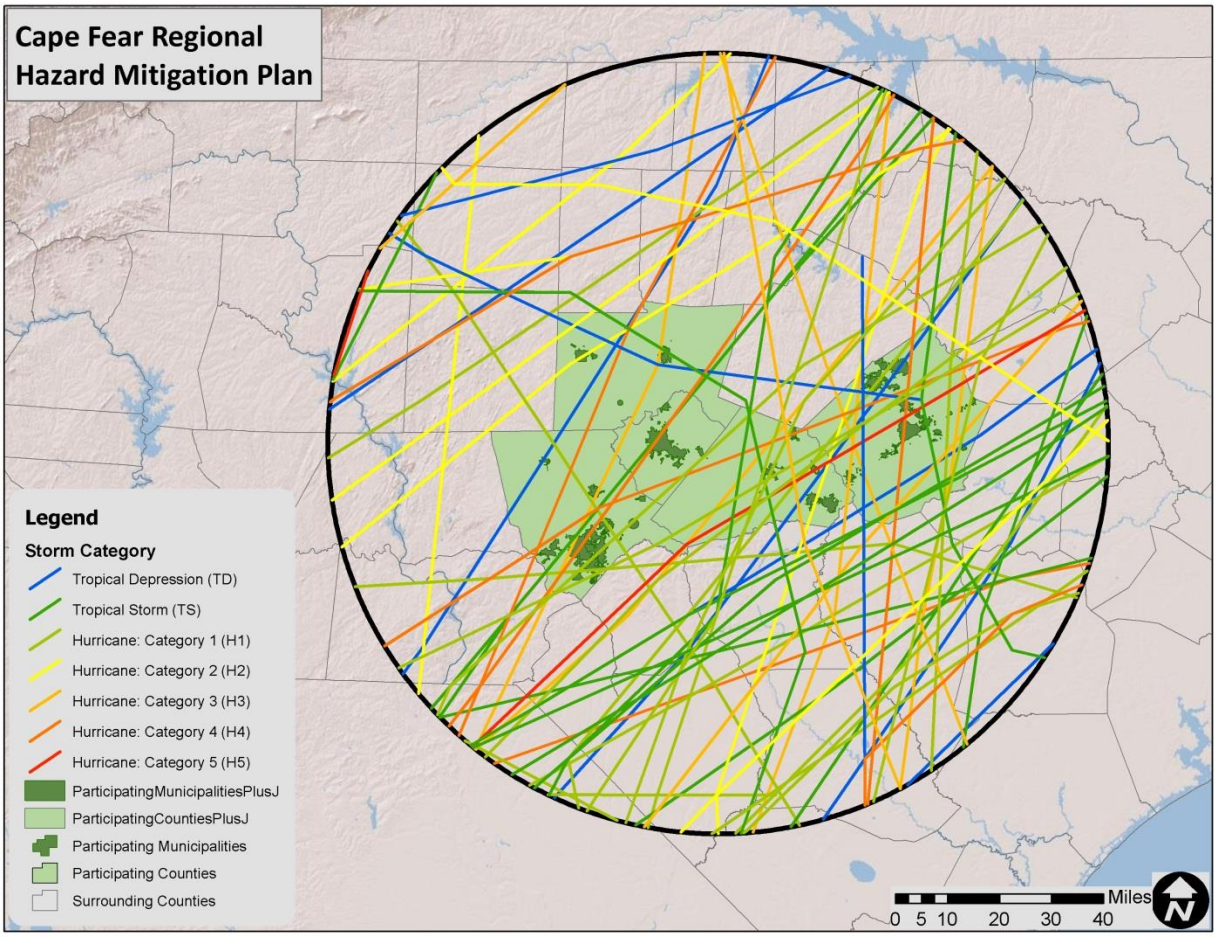
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[2] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

Of the recorded storm events, 10 have traversed directly through Chatham County as shown in **Figure A.2**. **Table A.9** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cape Fear Region) and Maximum Category of the storm based on the Saffir-Simpson Scale for each event.

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE A.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE A.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center has reported five events associated with a hurricane or tropical storm in Chatham County since 1996. These storms are listed in **Table A.10** and are generally representative of storms with the greatest impact on the county over that time period.

TABLE A.10: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN CHATHAM COUNTY

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$645,322,144
8/30/2004	Tropical Depression Gaston	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that two disaster declarations were made in 1996 (Hurricane Fran) and 1999 (Hurricane Floyd) for the county.[3]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in Chatham County as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Tropical Storm Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over

[3] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

Probability of Future Occurrences
Given the inland location of the county, Chatham County is less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the county's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historic evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. When the county is impacted, the damage could be significant, threatening lives and property throughout the planning area.

A.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Chatham County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there has been one recorded lightning event in Chatham County since 2012, as listed in summary **Table A.11**.[4] This event resulted in almost $51,000 (2013 dollars) in damages. A complete listing of events can be found in **Table A.12**. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE A.11: SUMMARY OF LIGHTNING OCCURRENCES IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	0	0/0	$0
Pittsboro	0	0/0	$0
Siler City	0	0/0	$0
Unincorporated Area	1	0/0	$50,750
CHATHAM COUNTY TOTAL	**1**	**0/0**	**$50,750**

Source: National Climatic Data Center

[4] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in Chatham County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

TABLE A.12: HISTORIC LIGHTNING OCCURRENCES IN CHATHAM COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Goldston				
None Reported	--	--	--	--
Pittsboro				
None Reported	--	--	--	--
Siler City				
None Reported	--	--	--	--
Unincorporated Area				
Bynum	7/21/12	0/0	$50,750	Lightning struck a home on Jamestown Road in Pittsboro causing a fire. The fire was contained to the attic. The home suffered fire damage in the attic and roof and some water damage was sustained to other parts of the house. Damage was estimated.

*Property Damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Chatham County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Chatham County is located in an area of the country that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

A.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Chatham County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Chatham County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms have not resulted in any disaster declarations in Chatham County.[5] According to NCDC, there have been 142 reported thunderstorm wind and high wind events since 1957 in Chatham County.[6]

[5]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

These events caused over $527,000 (2013 dollars) in damages. There were also reports of three injuries. **Table A.13** summarizes this information. **Table A.14** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event. [7]

TABLE A.13: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	8	0/0	$761
Pittsboro	19	0/0	$171,445
Siler City	24	0/0	$232,982
Unincorporated Area	91	0/3	$121,861
CHATHAM COUNTY TOTAL	**142**	**0/3**	**$527,049**

Source: National Climatic Data Center

TABLE A.14: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN CHATHAM COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Goldston					
GOLDSTON	7/25/1996	TSTM WIND	0 kts.	0/0	$0
GOLDSTON	6/3/2000	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	6/22/2001	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	6/6/2002	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	7/22/2002	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	5/14/2006	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	7/27/2006	TSTM WIND	50 kts.	0/0	$0
GOLDSTON	9/8/2012	THUNDERSTORM WIND	50 kts.	0/0	$761
Pittsboro					
PITTSBORO	5/11/1996	TSTM WIND	0 kts.	0/0	$0
PITTSBORO	5/24/1996	TSTM WIND	0 kts.	0/0	$0
PITTSBORO	9/10/1997	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	8/18/2000	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	6/10/2004	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	7/28/2005	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	9/20/2005	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	1/13/2006	TSTM WIND	60 kts.	0/0	$0
PITTSBORO	4/25/2006	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	6/11/2006	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	7/19/2006	TSTM WIND	50 kts.	0/0	$0
PITTSBORO	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
PITTSBORO	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
PITTSBORO	5/20/2008	THUNDERSTORM WIND	60 kts.	0/0	$135,280
PITTSBORO	6/11/2011	THUNDERSTORM WIND	50 kts.	0/0	$0

[6] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional thunderstorm events have occurred in Chatham County. As additional local data becomes available, this hazard profile will be amended.

[7] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
PITTSBORO	8/21/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
PITTSBORO	8/29/2011	THUNDERSTORM WIND	50 kts.	0/0	$31,089
PITTSBORO	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
PITTSBORO	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
Siler City					
Siler City	11/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$76,449
SILER CITY	3/20/1998	TSTM WIND	50 kts.	0/0	$21,436
SILER CITY	6/30/1998	TSTM WIND	50 kts.	0/0	$0
SILER CITY	9/29/1999	TSTM WIND	50 kts.	0/0	$0
SILER CITY	4/17/2000	TSTM WIND	50 kts.	0/0	$0
SILER CITY	8/10/2000	TSTM WIND	50 kts.	0/0	$0
SILER CITY	5/13/2002	TSTM WIND	50 kts.	0/0	$0
SILER CITY	6/2/2002	TSTM WIND	50 kts.	0/0	$0
SILER CITY	2/22/2003	TSTM WIND	60 kts.	0/0	$0
SILER CITY	7/7/2005	TSTM WIND	50 kts.	0/0	$0
SILER CITY	1/13/2006	TSTM WIND	60 kts.	0/0	$0
SILER CITY	8/3/2006	TSTM WIND	50 kts.	0/0	$0
SILER CITY	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	5/9/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	7/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	8/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	9/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	6/15/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$51,816
SILER CITY	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$51,816
SILER CITY	8/14/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY	7/6/2012	THUNDERSTORM WIND	50 kts.	0/0	$30,450
SILER CITY	7/27/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
Unincorporated Area					
Chatham County	6/28/1957	TSTM WIND	57 kts.	0/0	$0
Chatham County	3/24/1975	TSTM WIND	0 kts.	0/0	$0
Chatham County	3/24/1975	TSTM WIND	0 kts.	0/0	$0
Chatham County	7/8/1975	TSTM WIND	0 kts.	0/0	$0
Chatham County	7/8/1975	TSTM WIND	0 kts.	0/0	$0
Chatham County	2/23/1980	TSTM WIND	0 kts.	0/0	$0
Chatham County	3/20/1984	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/8/1984	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/15/1985	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/15/1985	TSTM WIND	0 kts.	0/0	$0
Chatham County	4/26/1986	TSTM WIND	0 kts.	0/0	$0
Chatham County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Chatham County	6/30/1986	TSTM WIND	0 kts.	0/0	$0
Chatham County	7/12/1986	TSTM WIND	0 kts.	0/0	$0
Chatham County	6/23/1987	TSTM WIND	0 kts.	0/0	$0
Chatham County	8/4/1987	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Chatham County	3/26/1988	TSTM WIND	0 kts.	0/0	$0
Chatham County	2/21/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	4/27/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/5/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/5/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/6/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/6/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	6/16/1989	TSTM WIND	0 kts.	0/1	$0
Chatham County	7/12/1989	TSTM WIND	0 kts.	0/0	$0
Chatham County	5/1/1990	TSTM WIND	0 kts.	0/0	$0
Chatham County	4/24/1992	TSTM WIND	0 kts.	0/0	$0
Gulf	4/26/1993	THUNDERSTORM WINDS	0 kts.	0/0	$0
Chatham County	5/19/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Chatham County	6/8/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
COUNTYWIDE	1/19/1996	TSTM WIND	0 kts.	0/0	$0
JORDAN LAKE	5/6/1996	TSTM WIND	0 kts.	0/0	$59,386
Chatham County	2/3/1998	HIGH WIND	35 kts.	0/0	$0
Chatham County	2/16/1998	HIGH WIND	52 kts.	0/0	$0
COUNTYWIDE	6/3/1998	TSTM WIND	50 kts.	0/0	$0
MONCURE	7/20/1998	TSTM WIND	50 kts.	0/0	$28,582
MONCURE	6/14/2000	TSTM WIND	50 kts.	0/0	$0
COUNTYWIDE	8/18/2000	TSTM WIND	50 kts.	0/0	$0
COUNTYWIDE	12/17/2000	TSTM WIND	50 kts.	0/0	$0
CARBONTON	6/1/2001	TSTM WIND	60 kts.	0/0	$0
SILK HOPE	8/11/2001	TSTM WIND	60 kts.	0/0	$0
BONLEE	7/9/2003	TSTM WIND	50 kts.	0/0	$0
Chatham County	3/7/2004	HIGH WIND	65 kts.	0/0	$6,446
COUNTYWIDE	1/14/2005	TSTM WIND	50 kts.	0/0	$0
HARPERS XRDS	3/8/2005	TSTM WIND	60 kts.	0/2	$0
MONCURE	6/7/2005	TSTM WIND	50 kts.	0/0	$0
WILSONVILLE	6/7/2005	TSTM WIND	50 kts.	0/0	$0
FARRINGTON	7/7/2005	TSTM WIND	50 kts.	0/0	$0
FARRINGTON	7/7/2005	TSTM WIND	50 kts.	0/0	$0
MONCURE	4/25/2006	TSTM WIND	50 kts.	0/0	$0
BENNETT	5/14/2006	TSTM WIND	50 kts.	0/0	$0
CORINTH	6/11/2006	TSTM WIND	50 kts.	0/0	$0
MONCURE	6/11/2006	TSTM WIND	50 kts.	0/0	$0
MONCURE	6/23/2006	TSTM WIND	50 kts.	0/0	$0
FARRINGTON	7/19/2006	TSTM WIND	50 kts.	0/0	$0
FARRINGTON	7/27/2006	TSTM WIND	50 kts.	0/0	$0
FARRINGTON	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CORINTH	6/29/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SILK HOPE	7/10/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
MERRY OAKS	7/11/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY ARPT	8/30/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
BONLEE	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
BEAR CREEK	5/11/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
CRUTCHFIELD XRDS	5/11/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BRICKHAVEN	7/22/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
WILSONVILLE	8/15/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
Chatham County	9/6/2008	HIGH WIND	50 kts.	0/0	$13,528
SILK HOPE	5/9/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SILK HOPE	9/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
CRUTCHFIELD XRDS	6/15/2010	THUNDERSTORM WIND	50 kts.	0/0	$2,139
BEAR CREEK	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SILK HOPE	11/16/2010	THUNDERSTORM WIND	50 kts.	0/0	$2,139
CRUTCHFIELD XRDS	12/1/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
CORINTH	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
FARRINGTON	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
FARRINGTON	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
BONLEE	7/24/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
BEAR CREEK	8/14/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
FARRINGTON	8/14/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
HAYWOOD	8/29/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
MERRY OAKS	8/29/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
BENNETT	3/3/2012	THUNDERSTORM WIND	56 kts.	0/0	$0
HAYWOOD	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
MERRY OAKS	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$2,030
WILSONVILLE	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$6,090
BYNUM	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$508
CRUTCHFIELD XRDS	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
FARRINGTON	7/24/2012	THUNDERSTORM WIND	56 kts.	0/0	$0
SILK HOPE	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
SILER CITY ARPT	7/27/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
FARRINGTON	7/28/2012	THUNDERSTORM WIND	50 kts.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

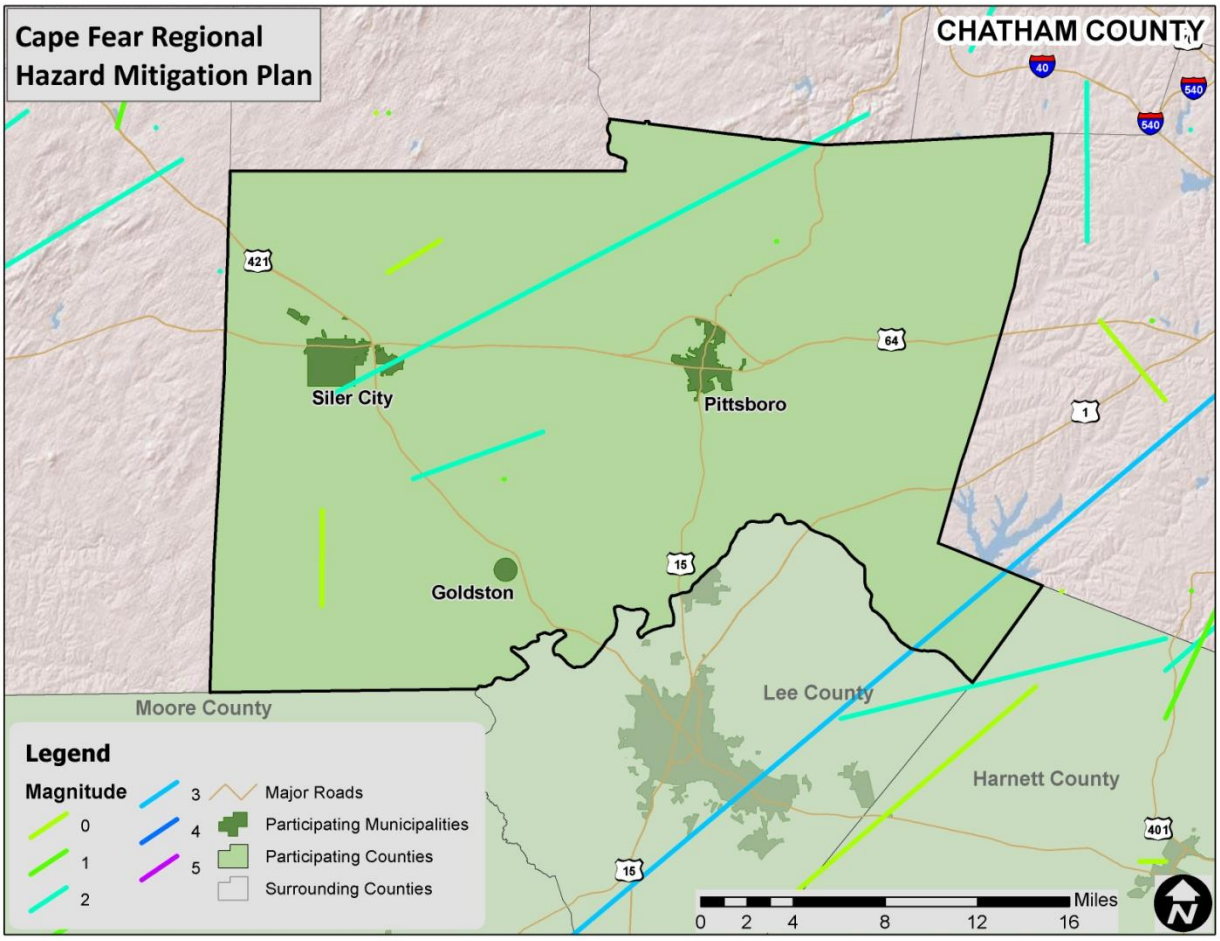
A.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Chatham County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Chatham County is uniformly exposed to this hazard. With that in mind, Figure **A.3** shows tornado track data for many of the major tornado events that have impacted the

county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE A.3: HISTORICAL TORNADO TRACKS IN CHATHAM COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes have not resulted in any disaster declarations in Chatham County.[8] According to the National Climatic Data Center, there have been a total of 10 recorded tornado events in Chatham County since 1965 (**Table A.15**), resulting in nearly $875,000 (2013 dollars) in property damages.[9] No fatalities or injuries were reported (**Table A.16**). The magnitude of these tornadoes ranges from F0 to F2 in intensity, although an F3 through F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 48 years.

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[9] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in Chatham County. As additional local data becomes available, this hazard profile will be amended.

TABLE A.15: SUMMARY OF TORNADO OCCURRENCES IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	0	0/0	$0
Pittsboro	1	0/0	$0
Siler City	0	0/0	$0
Unincorporated Area	9	0/0	$874,984
CHATHAM COUNTY TOTAL	**10**	**0/0**	**$874,984**

Source: National Climatic Data Center

TABLE A.16: HISTORICAL TORNADO IMPACTS IN CHATHAM COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Goldston					
None Reported	--	--	--	--	--
Pittsboro					
PITTSBORO	9/17/2004	F0	0/0	$0	A tornado touched down briefly on the west side of Pittsboro, blowing down several trees, which in turn knocked down several power lines.
Siler City					
None Reported	--	--	--	--	--
Unincorporated Area					
Chatham County	10/7/1965	F2	0/0	$184,657	
Chatham County	5/15/1975	F1	0/0	$108,210	
Chatham County	7/27/1977	F1	0/0	$962	
Chatham County	8/17/1985	F0	0/0	$54,184	
Chatham County	6/28/1989	F1	0/0	$0	
Chatham County	3/29/1991	F2	0/0	$427,603	
SILK HOPE	5/31/2003	F0	0/0	$0	A brief tornado touchdown twisted and blew down large trees.
CRUTCHFIELD XRDS	8/27/2008	F0	0/0	$21,645	A weak tornado initially touched down along Jesse Bridges Road between Smith Hudson Road and Rufus Brewer Road. Most of the damage occurred along Jesse Bridges Road with very large trees blown down in different directions. There was considerable damage to an outbuilding and in one case a window screen was torn from a porch and placed on a weathervane on the roof of a home. Some homes had experienced peeled aluminum siding. Several downed trees were noted near the intersection of Rufus Brewer and Silk Hope Liberty Roads and on Will Brown Road.
BRICKHAVEN	4/16/2011	F0	0/0	$77,724	The tornado exited Lee County and moved into extreme southeastern

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					Chatham County, just south and east of Harris Lake. Only 2 homes sustained damage, with moderate to major roof damage to one of the homes, when a tree crashed through it.
Chatham County	10/7/1965	F2	0/0	$184,657	

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Chatham County experience a direct tornado strike. The probability of future tornado occurrences affecting Chatham County is likely (10 to 100 percent annual probability).

A.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States 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. Chatham County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in three disaster declarations in Chatham County. This includes the Blizzard of 1996, a severe winter storm in 2000, and a severe ice storm in 2002.[10] According to the National Climatic Data Center, there have been a total of 29 recorded winter storm events in Chatham County since 1993 (**Table A.17**).[11] These events resulted in almost $807,000 (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table A.18**.

TABLE A.17: SUMMARY OF WINTER STORM EVENTS IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Chatham County	29	0/0	$806,869

Source: National Climatic Data Center

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[11] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional winter storm conditions have affected Chatham County.
[12] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

TABLE A.18: HISTORICAL WINTER STORM IMPACTS IN CHATHAM COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Goldston				
None Reported	--	--	--	--
Pittsboro				
None Reported	--	--	--	--
Siler City				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	3/12/1993	WINTER STORM	2/10†	$806,869
Northern and Central	1/3/1994	HEAVY SNOW	0/0	$0
Northern Interior and	2/10/1994	ICE STORM	0/0	$0
CHATHAM COUNTY	1/6/1996	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/11/1996	ICE STORM	0/0	$0
CHATHAM COUNTY	2/2/1996	ICE STORM	0/0	$0
CHATHAM COUNTY	2/16/1996	HEAVY SNOW	0/0	$0
CHATHAM COUNTY	12/23/1998	ICE STORM	0/0	$0
CHATHAM COUNTY	1/18/2000	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/20/00	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/22/00	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/242000	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/28/2000	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/19/2000	HEAVY SNOW	0/0	$0
CHATHAM COUNTY	1/3/2002	WINTER STORM	0/0	$0
CHATHAM COUNTY	12/4/2002	WINTER STORM	0/0	$0
CHATHAM COUNTY	2/16/2003	WINTER STORM	0/0	$0
CHATHAM COUNTY	2/27/2003	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/26/2004	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/29/2005	WINTER STORM	0/0	$0
CHATHAM COUNTY	1/18/2007	WINTER WEATHER	0/0	$0
CHATHAM COUNTY	1/17/2008	WINTER WEATHER	0/0	$0
CHATHAM COUNTY	1/19/2008	WINTER WEATHER	0/0	$0
CHATHAM COUNTY	1/19/2008	WINTER STORM	0/0	$0
CHATHAM COUNTY	3/1/2009	WINTER STORM	0/0	$0
CHATHAM COUNTY	12/18/2009	WINTER WEATHER	0/0	$0
CHATHAM COUNTY	1/29/2010	WINTER STORM	0/0	$0
CHATHAM COUNTY	12/16/2010	WINTER WEATHER	0/0	$0
CHATHAM COUNTY	1/10/2011	WINTER STORM	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
†Deaths/injuries were not reported at the county level; potentially outside of the county.
Source: National Climatic Data Center

There have been several severe winter weather events in Chatham County. The text below describes two of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

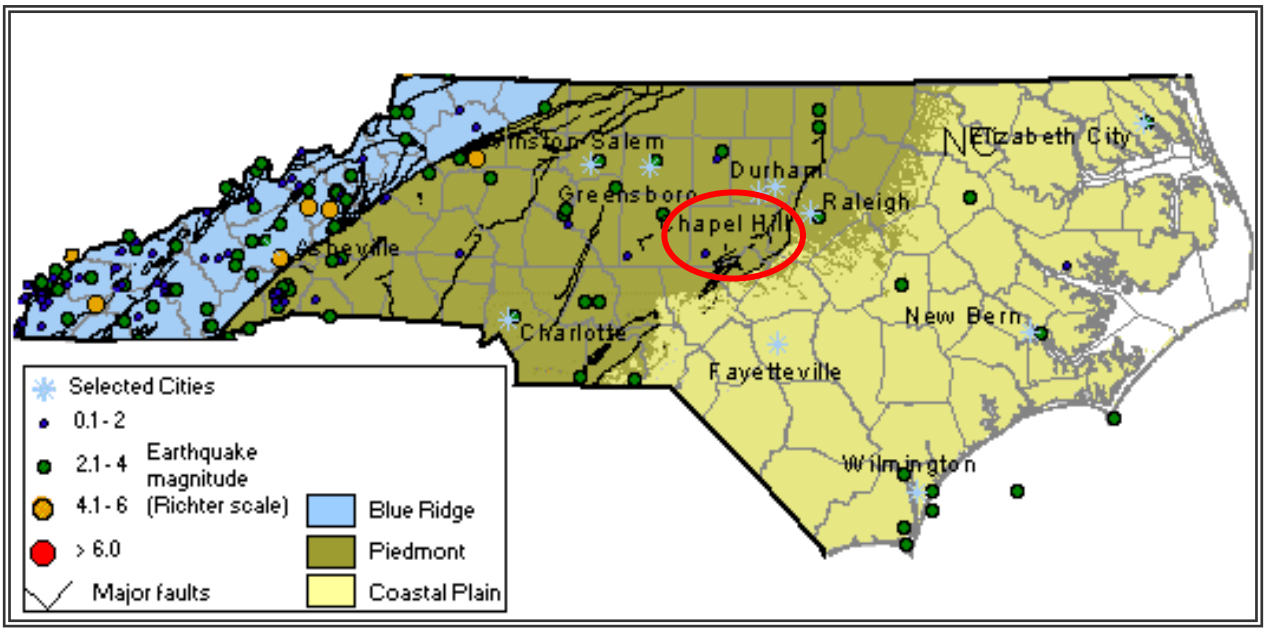
2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

Probability of Future Occurrences
Winter storm events will remain a regular occurrence in Chatham County. According to historical information, Chatham County generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

A.2.9 Earthquake

Location and Spatial Extent
Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure A.4** is a map showing geological and seismic information for North Carolina.

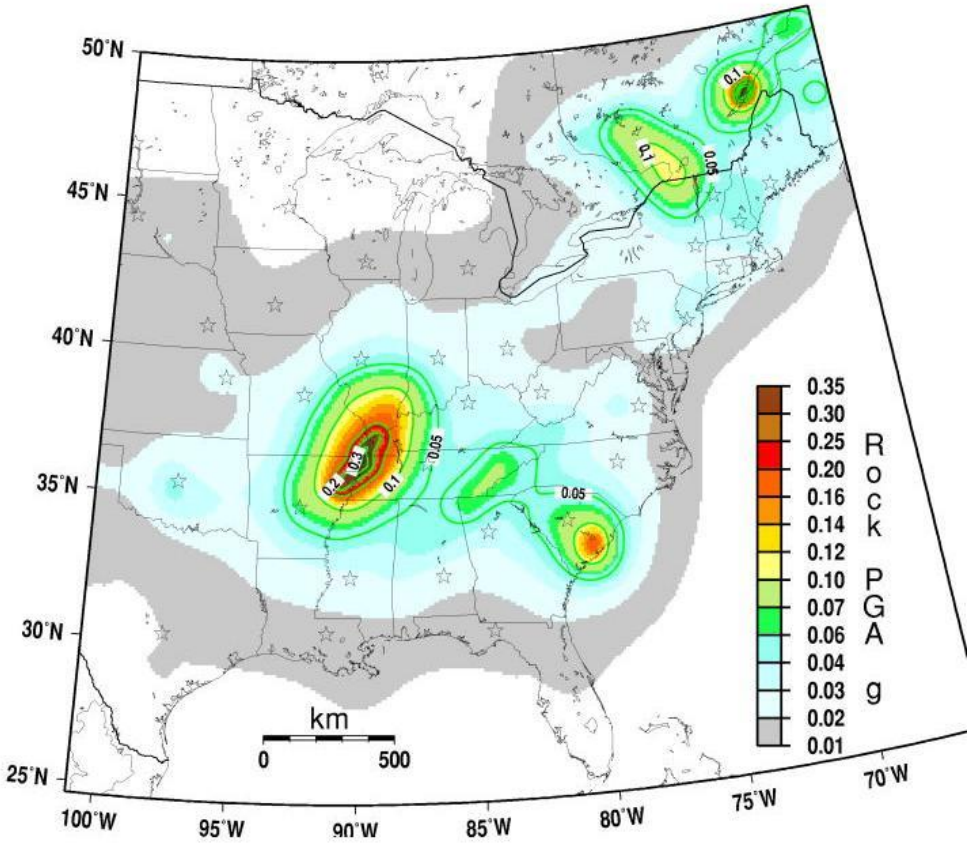
FIGURE A.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure A.5 shows the intensity level associated with Chatham County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Chatham County lies within an approximate zone of level "2" to "4" ground acceleration. This indicates that the county exists within an area of low to moderate seismic risk.

FIGURE A.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

No earthquakes are known to have affected Chatham County since 1638. **Table A.19** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table A.20** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE A.19: SUMMARY OF SEISMIC ACTIVITY IN CHATHAM COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Goldston	0	--	--
Pittsboro	0	--	--
Siler City	0	--	--
Unincorporated Area	0	--	--
CHATHAM COUNTY TOTAL	**0**	**--**	**--**

Source: National Geophysical Data Center

[13] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

TABLE A.20: SIGNIFICANT SEISMIC EVENTS IN CHATHAM COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Goldston				
None Reported	--	--	--	--
Pittsboro				
None Reported	--	--	--	--
Siler City				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Chatham County is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 percent (unlikely).

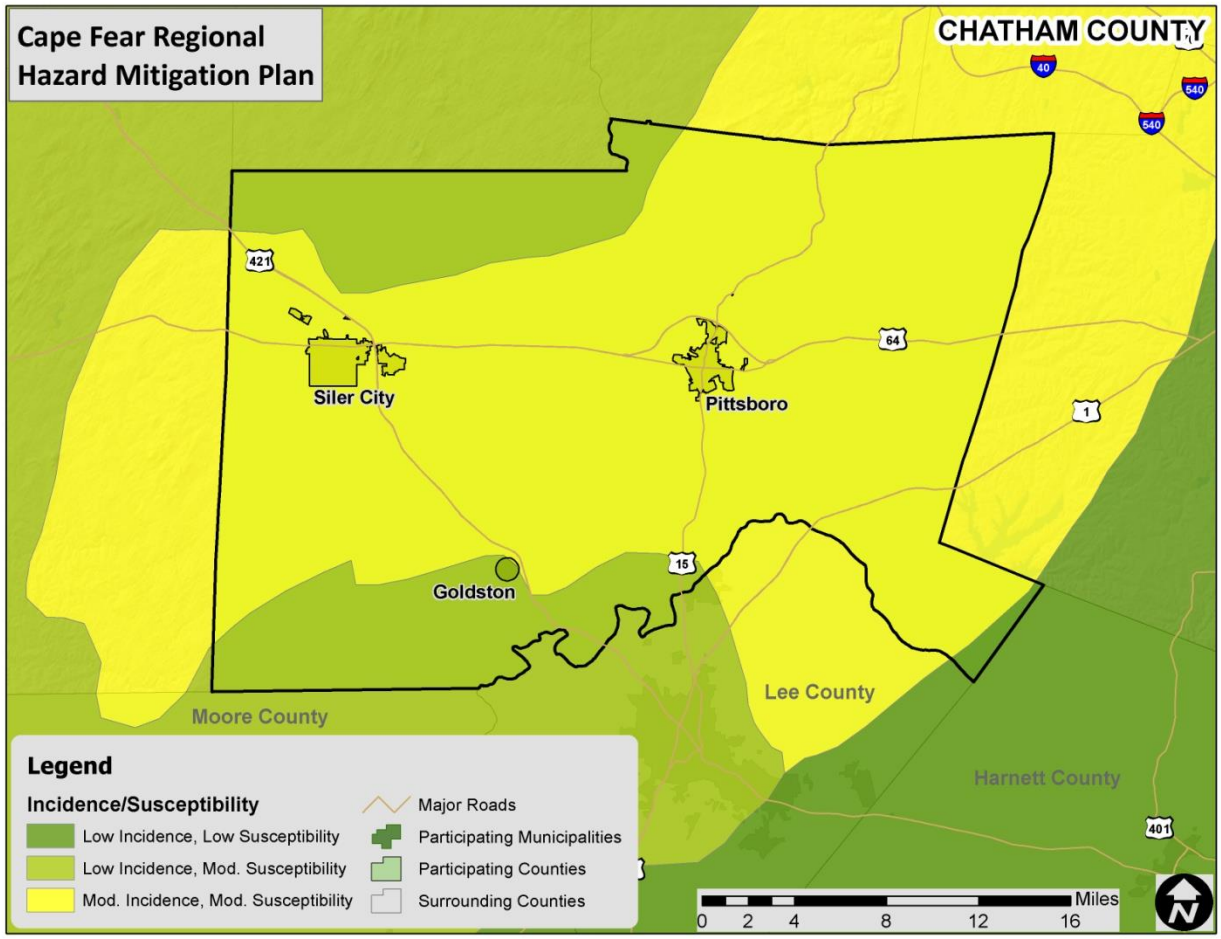
A.2.10 Landslide

Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout Chatham County.

According to **Figure A.6** below, the majority of the county has moderate landslide activity. The remaining portion of the county, along the northeast and southeast county boundaries, has a low incidence occurrence rate. There is moderate susceptibility throughout the county.

FIGURE A.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF CHATHAM COUNTY

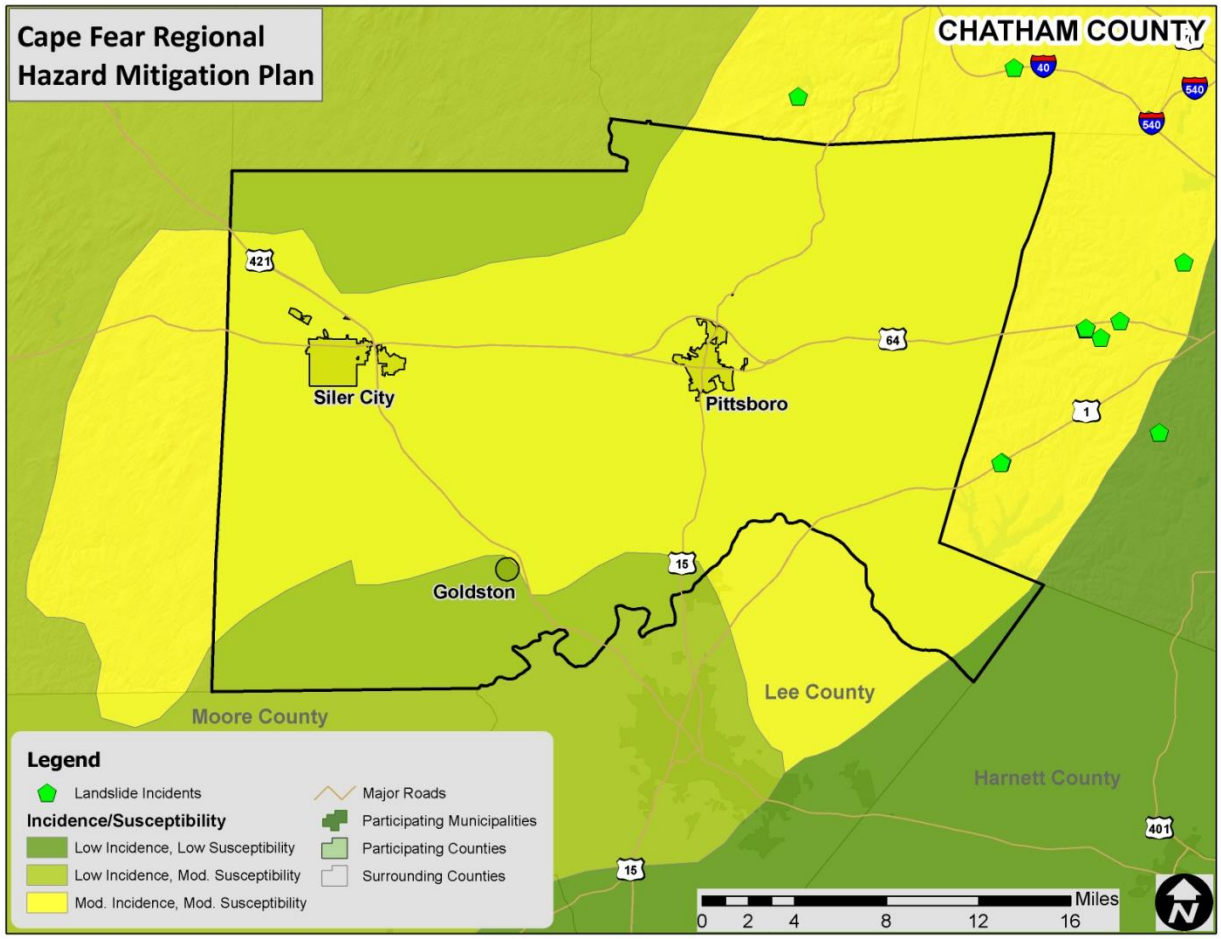


Source: United States Geological Survey

Historical Occurrences

Chatham County is moderately susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the county, it should be noted that the North Carolina Geological Survey emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The locations of landslide events that occurred nearby the county are presented in **Figure A.7**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE A.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN CHATHAM COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

Based on historical information and the USGS susceptibility index, the probability of future landslide events is possible (between 1 and 10 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Chatham County have greater risk than others given factors such as steepness on slope and modification of slopes.

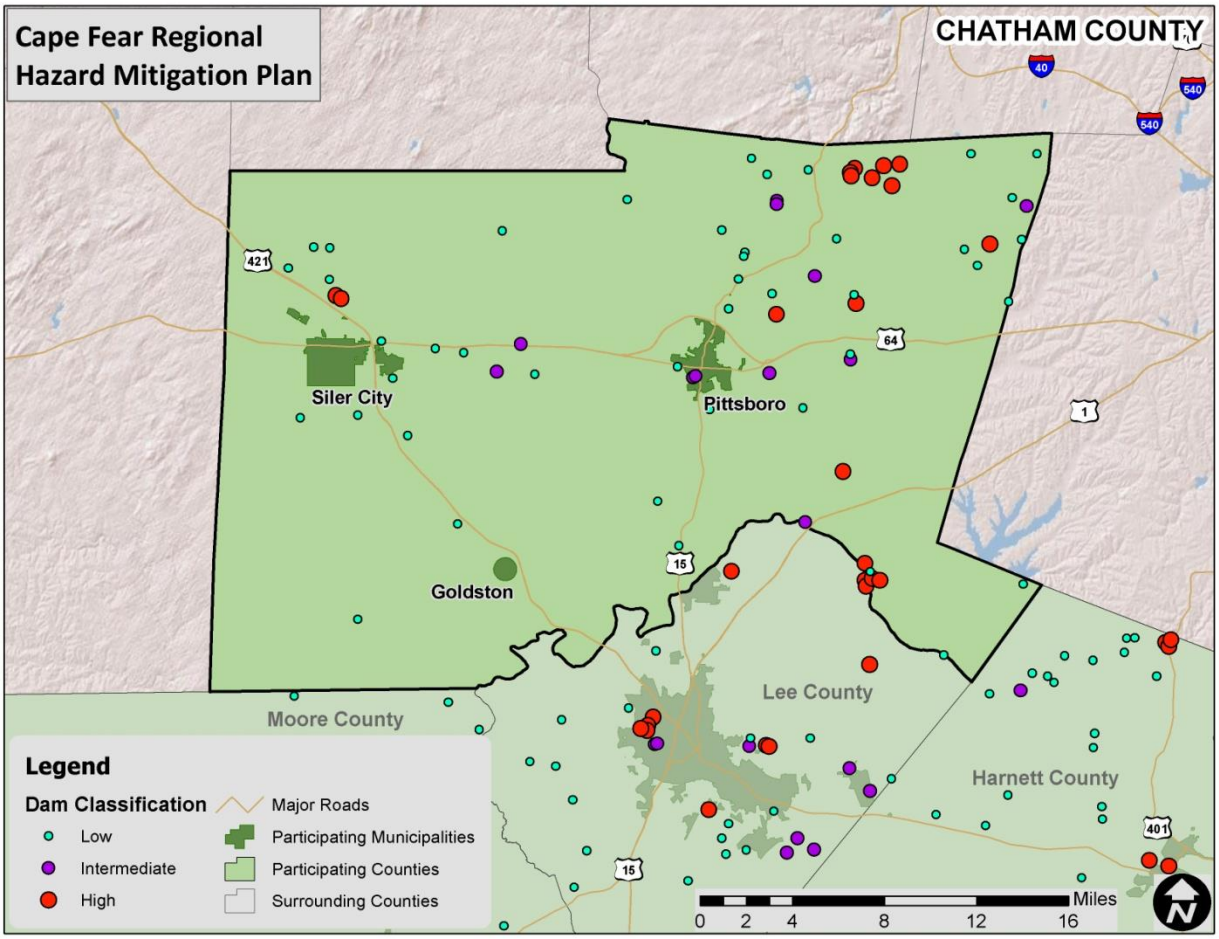
A.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division Energy, Mineral, and Land Resources, there are 74 dams in Chatham County.[14] **Figure A.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, 18 are classified as high hazard potential. These high hazard dams are listed in **Table A.21**.

[14] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE A.8: CHATHAM COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

TABLE A.21: CHATHAM COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Chatham County				
B. Everett Jordan Lake Dam	High		1,646,000	Federal
Siler City Water Supply Dam	High	12.0	70	Local Gov
Charles L. Turner Reservoir Dam	High		150	Local Gov
Red Bud Dam	High	6.4	92	Private
Wendy Hill Dam	High	13.1	163	Private
Governors Club Dam 3	High	17.0	204	Private
Governors Club Dam #4	High		72	Private
Governors Club Dam #1	High	5.9	1,512	Private
Governors Club Dam #5	High		15	Private
Governors Club Dam #6	High		13	Private
Governors Club Dam #7	High		16	Private
Legacy Pond #2	High	2.8	26	

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Cape Fear 1956 Ash Pond Dam (Inactive)	High			
Cape Fear 1963 Ash Pond Dam (Inactive)	High			
Cape Fear 1970 Ash Pond Dam (Inactive)	High			
Cape Fear 1978 Ash Pond Dam	High			Utility
Cape Fear 1985 Ash Pond Dam	High			Utility
Governors Village Dam #8	High			

Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been no dam breaches reported in Chatham County. However, several breach scenarios in the county could be catastrophic.

The information below identifies additional historical information reported in the previous county hazard mitigation plan.

Chatham County

No dam failures have been reported in Chatham County; however, failure of one or more of the high hazard dams due to high rain precipitation or other events could result in significant damage to downstream properties and the possible loss of human life.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

A.2.12 Erosion

Location and Spatial Extent

Erosion in Chatham County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Chatham County soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the county, particularly along the banks of rivers and streams, but it is not an extreme threat. No areas of concern were reported by the planning team.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Chatham County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Little information could be found beyond the hazard mitigation plan; however, there was no recorded history of significant erosion events and it was found to be a hazard with a low potential impact.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Chatham County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent).

A.2.13 Flood

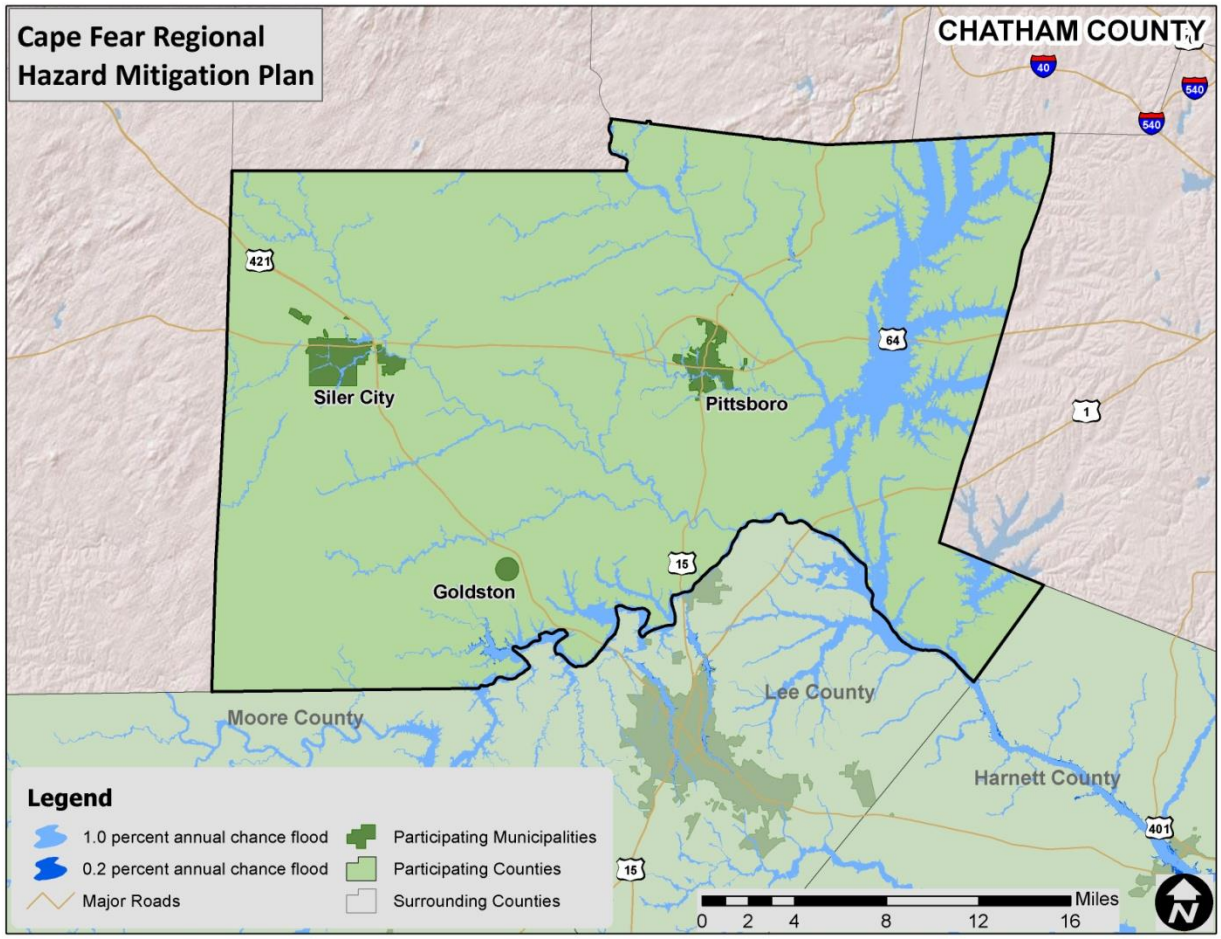
Location and Spatial Extent

There are areas in Chatham County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[15] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 709 square miles that make up Chatham County, there are 73.1 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.4 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 10.4 percent of the total land area in Chatham County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure A.9**, **Figure A.10**, **Figure A.11**, and **Figure A.12** illustrate the location and extent of currently mapped special flood hazard areas for Chatham County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

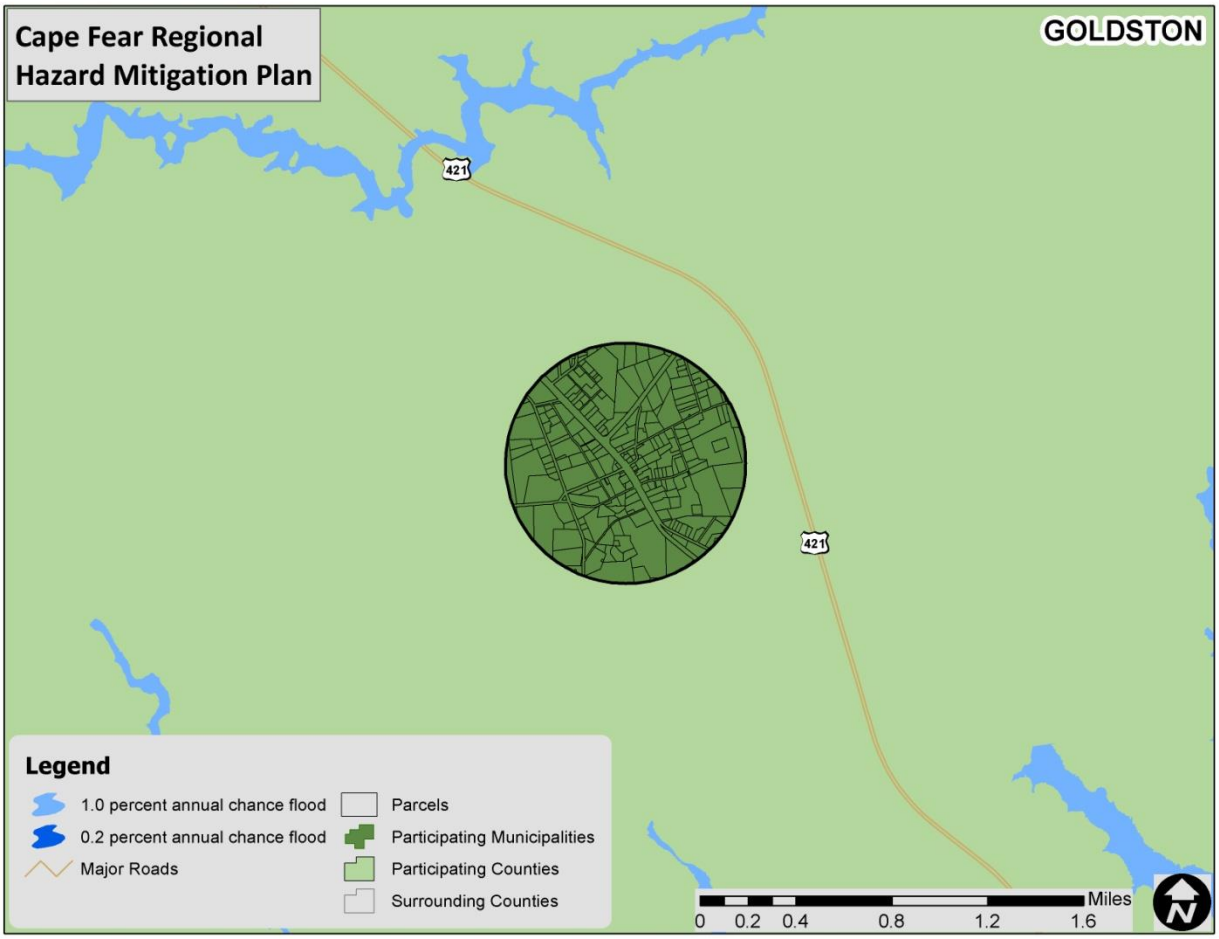
[15] The county-level DFIRM data used for Chatham County were updated in 2011.

FIGURE A.9: SPECIAL FLOOD HAZARD AREAS IN CHATHAM COUNTY



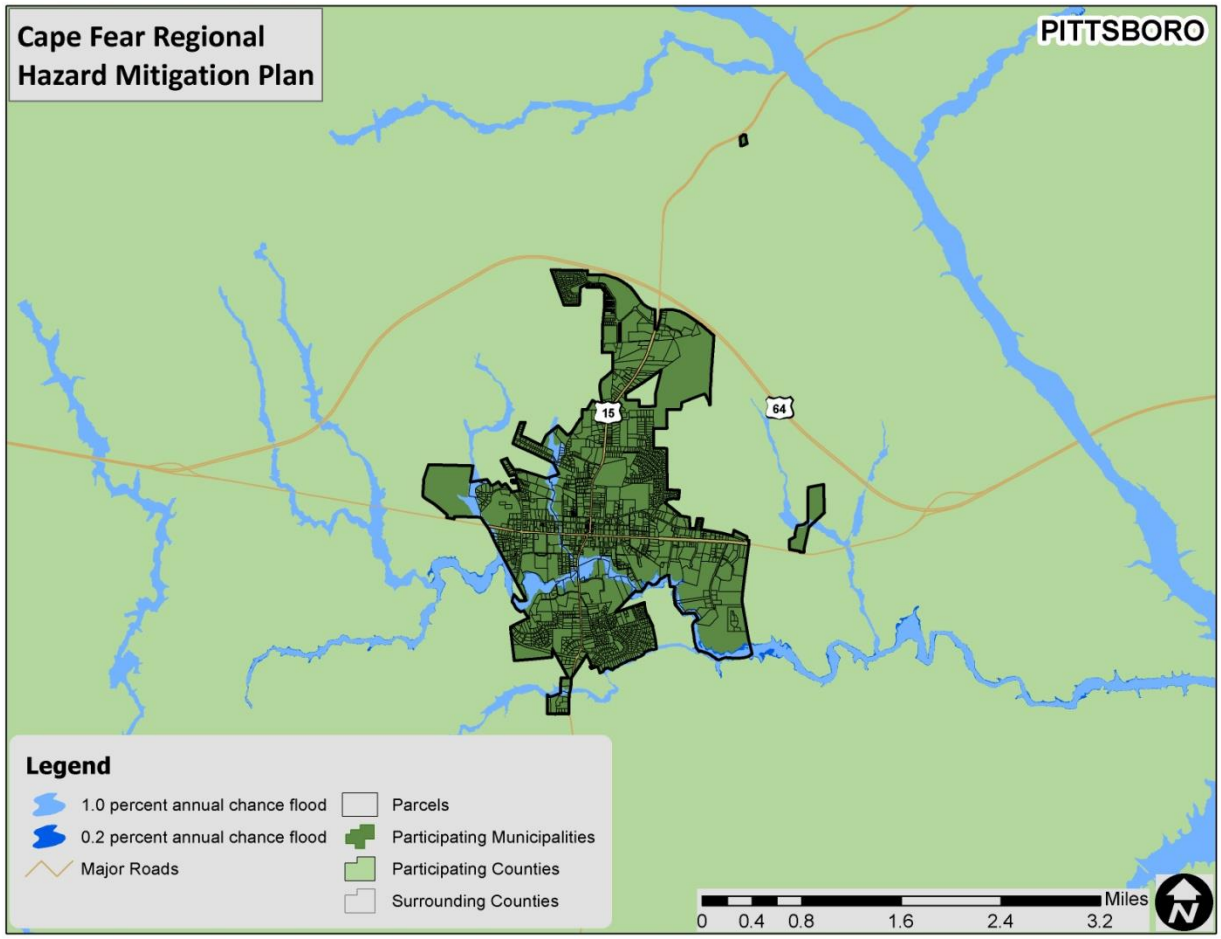
Source: Federal Emergency Management Agency

FIGURE A.10: SPECIAL FLOOD HAZARD AREAS IN GOLDSTON



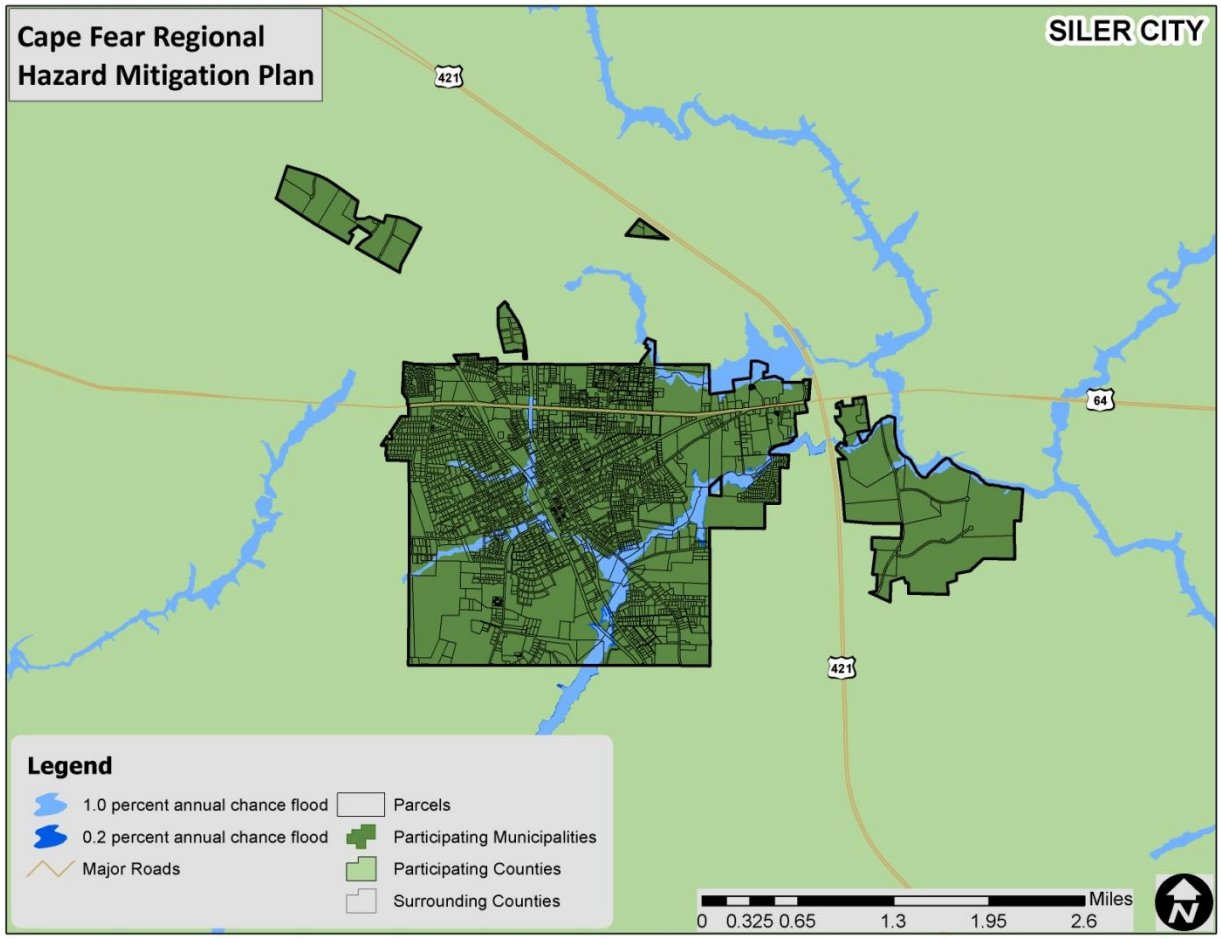
Source: Federal Emergency Management Agency

FIGURE A.11: SPECIAL FLOOD HAZARD AREAS IN PITTSBORO



Source: Federal Emergency Management Agency

FIGURE A.12: SPECIAL FLOOD HAZARD AREAS IN SILER CITY



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding has not resulted in any disaster declarations in Chatham County.[16] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 23 events in Chatham County since 1993.[17] A summary of these events is presented in **Table A.22**. These events accounted for over $9,000 (2013 dollars) in property damage in the county.[18] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table A.23**.

TABLE A.22: SUMMARY OF FLOOD OCCURRENCES IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	1	0/0	$0

[16] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[17] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[18] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Pittsboro	3	0/0	$0
Siler City	3	0/0	$0
Unincorporated Area	16	0/0	$9,040
CHATHAM COUNTY TOTAL	**23**	**0/0**	**$9,040**

Source: National Climatic Data Center

TABLE A.23: HISTORICAL FLOOD EVENTS IN CHATHAM COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Goldston				
GOLDSTON	9/10/1996	FLASH FLOOD	0/0	$0
Pittsboro				
Pittsboro	6/22/1995	FLASH FLOOD	0/0	$0
PITTSBORO	7/4/2001	FLASH FLOOD	0/0	$0
PITTSBORO	8/30/2004	FLASH FLOOD	0/0	$0
Siler City				
SILER CITY	8/4/2003	FLASH FLOOD	0/0	$0
SILER CITY	8/15/2006	FLASH FLOOD	0/0	$0
SILER CITY	8/27/2008	FLASH FLOOD	0/0	$0
Unincorporated Area				
Chatham County	3/23/1993	FLASH FLOODS	0/0	$0
COUNTYWIDE	9/6/1996	FLASH FLOOD	0/0	$0
Chatham County	1/28/1998	FLOOD	0/0	$0
Chatham County	2/4/1998	FLOOD	0/0	$0
Chatham County	2/18/1998	FLOOD	0/0	$0
MONCURE	3/19/1998	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/5/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/16/1999	FLASH FLOOD	0/0	$0
GULF	6/1/2001	FLASH FLOOD	0/0	$0
CENTRAL PORTION	8/30/2001	FLASH FLOOD	0/0	$0
Chatham County	3/20/2003	FLOOD	0/0	$9,040
Chatham County	4/10/2003	FLOOD	0/0	$0
EAST PORTION	6/14/2006	FLASH FLOOD	0/0	$0
SILK HOPE	1/25/2010	FLASH FLOOD	0/0	$0
FARRINGTON	7/28/2012	FLASH FLOOD	0/0	$0
SILK HOPE	9/18/2012	FLASH FLOOD	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been three flood losses reported in Chatham County through the National Flood Insurance Program (NFIP) since 1978, totaling over $135,000 in claims payments. A summary of these figures for the county is provided in **Table A.24**. It should be emphasized that these numbers include only those losses to structures that were insured

through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Chatham County were either uninsured, denied claims payment, or not reported.

TABLE A.24: SUMMARY OF INSURED FLOOD LOSSES IN CHATHAM COUNTY

Location	Flood Losses	Claims Payments
Goldston*	--	--
Pittsboro	0	$0
Siler City	3	$135,191
Unincorporated Area	0	$0
CHATHAM COUNTY TOTAL	**3**	**$135,191**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency, National Flood Insurance Program

Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

As of July 2013, there is one non-mitigated repetitive loss property located in Chatham County, which accounted for two losses and more than $128,000 in claims payments under the NFIP. The average claim amount for this property is $64,209. The property is non-residential. Without mitigation this property will likely continue to experience flood losses. **Table A.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Chatham County.

TABLE A.25: REPETITIVE LOSS PROPERTIES IN CHATHAM COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Goldston*	--	--	--	--	--	--	--
Pittsboro	0	--	0	$0	$0	$0	$0
Siler City	1	Non-residential	2	$128,419	$0	$128,419	$64,209
Unincorporated Area	0	--	0	$0	$0	$0	$0
CHATHAM COUNTY TOTAL	**1**		**2**	**$128,419**	**$0**	**$128,419**	**$64,209**

* These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Chatham County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

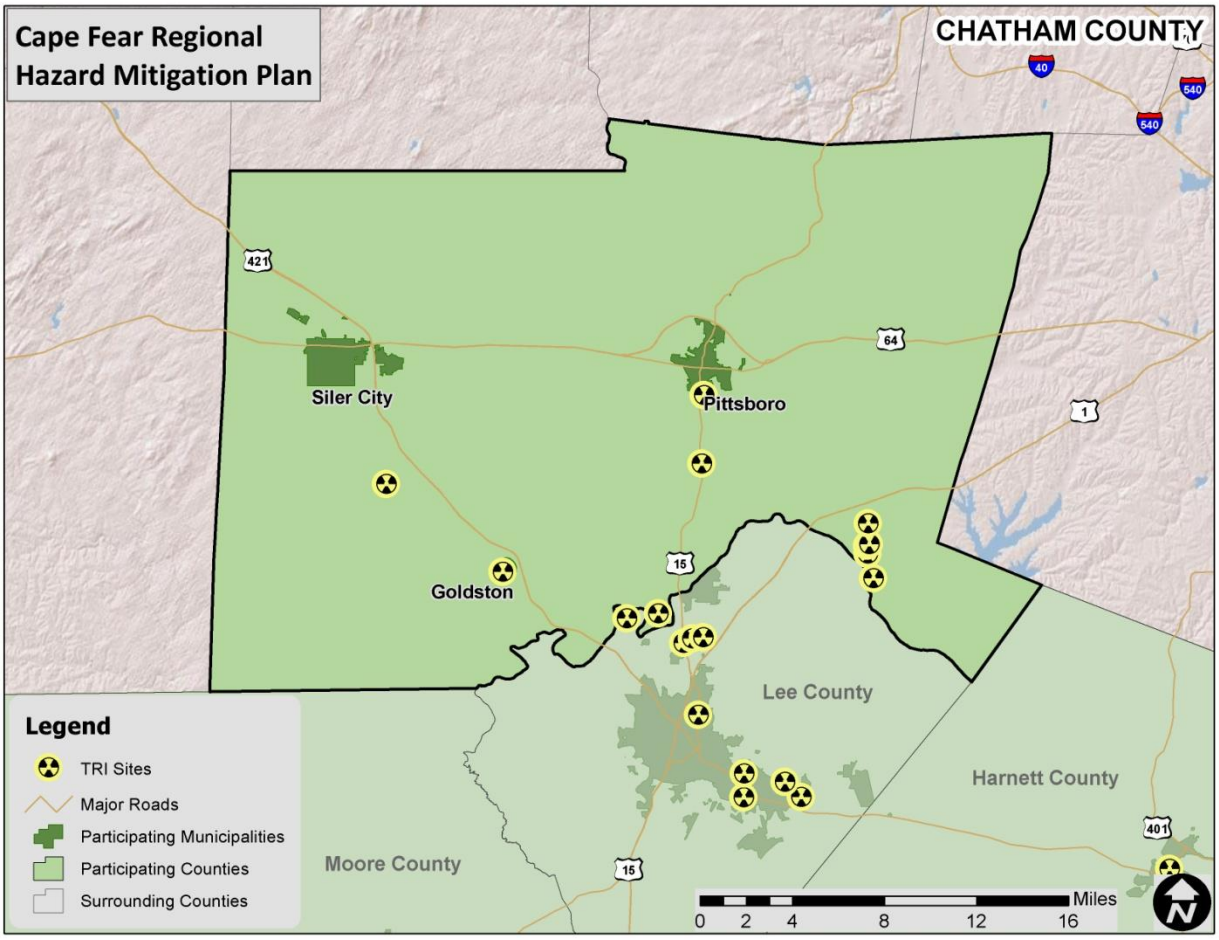
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Pittsboro and Siler City have more floodplain and thus a higher risk of flood than Goldston. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

A.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Chatham County has 10 TRI sites. These sites are shown in **Figure A.13.**

FIGURE A.13: TOXIC RELEASE INVENTORY (TRI) SITES IN CHATHAM COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 16 recorded HAZMAT incidents in Chatham County since 1977 (**Table A.26**). These events did not result in any recorded monetary property damages in the county; however, there

were four injuries reported. **Table A.27** presents detailed information on historic HAZMAT incidents in Chatham County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE A.26: SUMMARY OF HAZMAT INCIDENTS IN CHATHAM COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Goldston	2	0/0	$0
Pittsboro	2	0/0	$0
Siler City	5	0/1	$0
Unincorporated Area	7	0/3	$0
CHATHAM COUNTY TOTAL	**16**	**0/4**	**$0**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE A.27: HAZMAT INCIDENTS IN CHATHAM COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Goldston							
I-2002050900	4/29/2002	GOLDSTON	Highway	No	0/0	$0	50 LGA
E-2013030049	2/13/2013	GOLDSTON	Highway	No	0/0	$0	30 LGA
Pittsboro							
I-1982060033	5/25/1982	PITTSBORO	Highway	No	0/0	$0	20 LGA
I-1998040915	3/17/1998	PITTSBORO	Highway	No	0/0	$0	1 LGA
Siler City							
I-1981100703	10/21/1981	SILER CITY	Highway	Yes	0/0	$0	4,875 LGA
I-1985080365	7/25/1985	SILER CITY	Highway	Yes	0/0	$0	1,200 LGA
I-1999050745	4/28/1999	SILER CITY	Highway	No	0/0	$0	25 LGA
I-2001041144	3/29/2001	SILER CITY	Highway	No	0/0	$0	20 LGA
I-2007120477	11/1/2007	SILER CITY	Highway	Yes	0/1	$0	34.5897 GCF
Unincorporated Area							
I-1977071157	3/31/1977	BRICK HAVEN	Rail	Yes	0/0	$0	16,800 LGA
I-1977120135	11/25/1977	MONCURE	Highway	No	0/0	$0	50 LGA
I-1988110134	10/16/1988	HAYWOOD	Rail	Yes	0/1	$0	50 LGA
I-1988110134	10/16/1988	HAYWOOD	Rail	Yes	0/1	$0	10,000 LGA
I-1988110134	10/16/1988	HAYWOOD	Rail	Yes	0/1	$0	12,000 LGA
I-2000020250	12/17/1999	MATTHEWS	Highway	No	0/0	$0	10 LGA
I-2003011154	12/22/2002	MERRY OAKS	Rail	No	0/0	$0	2 LGA

*Property damage is reported in 2013 dollars.

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of 10 toxic release inventory sites in Chatham County and prior roadway and rail incidents, it is possible that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to

respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

A.2.15 Wildfire

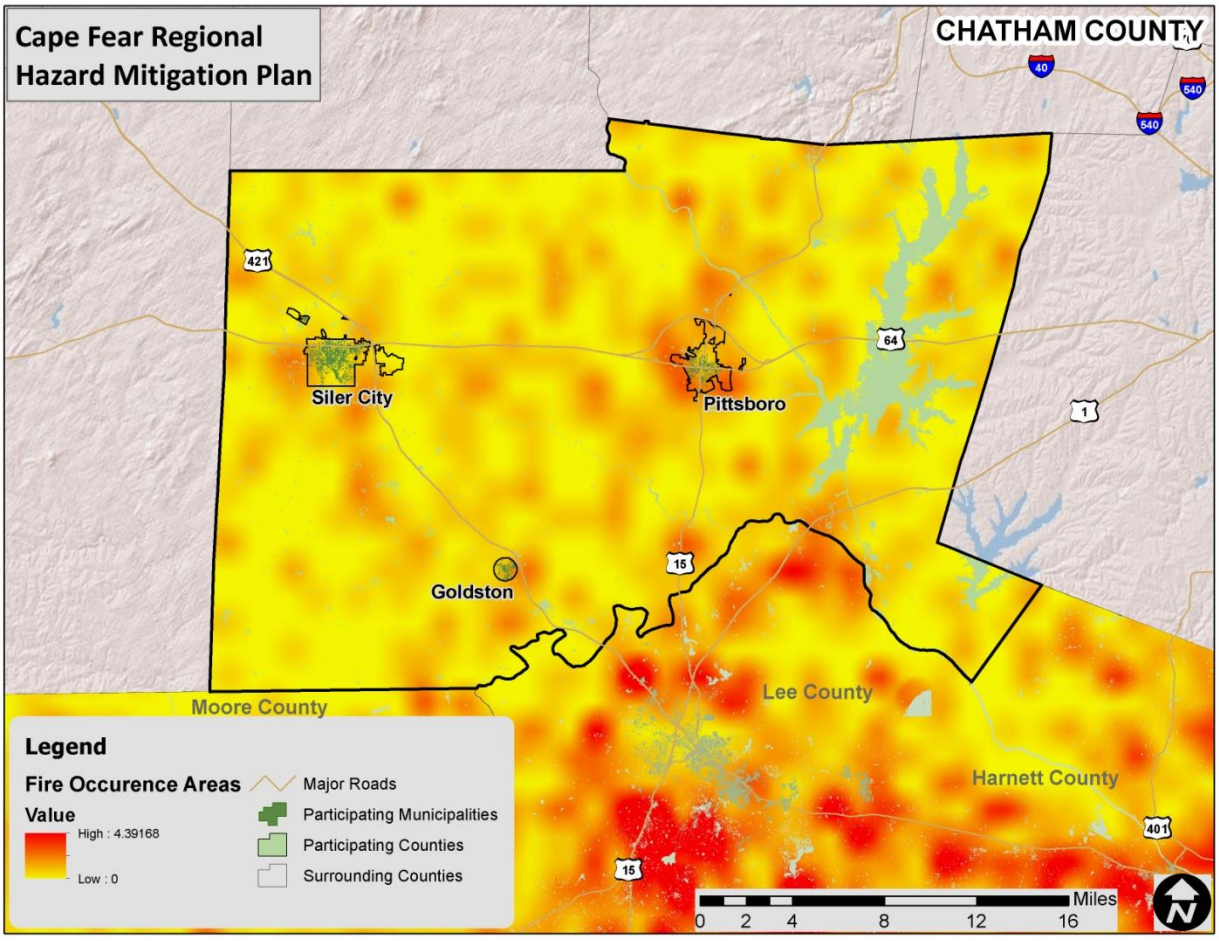
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic location.

Historical Occurrences

Figure A.14 shows the Fire Occurrence Areas (FOA) in Chatham County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE A.14: HISTORIC WILDFIRE EVENTS IN CHATHAM COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Chatham County experienced an average of 58 wildfires annually which burn an average of 108 acres per year. The data

indicates that most of these fires are small, averaging two acres per fire. **Table A.28** lists the number of reported wildfire occurrences in the county between the years 2003 and 2012.

TABLE A.28: HISTORICAL WILDFIRE OCCURRENCES IN CHATHAM COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Chatham County										
Number of Fires	20	50	102	65	87	64	41	57	55	35
Number of Acres	33.3	54.4	57.7	58.8	161.5	80.6	343.6	65.0	136.1	91.1

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

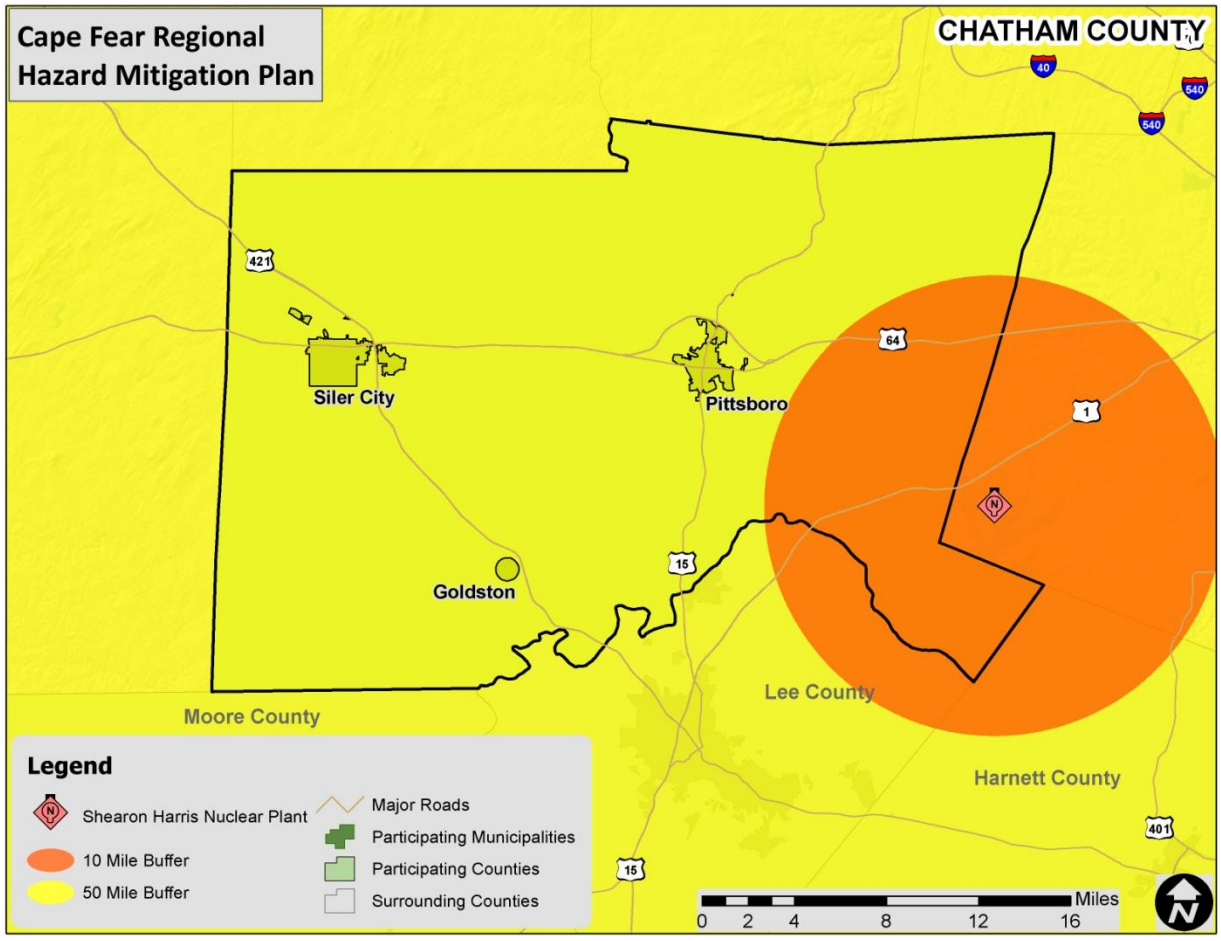
Wildfire events will be an ongoing occurrence in Chatham County. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Chatham County for future wildfire events is likely (10 to 100 percent annual probability).

A.2.16 Nuclear Accident

Location and Spatial Extent

The entire county is at risk to a nuclear incident. However, areas in the southeastern corner of the county are more susceptible due to their proximity to the Shearon Harris Nuclear Station. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure A.15**). All areas of the county that are not located within the 10 mile radius are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

FIGURE A.15: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES IN CHATHAM COUNTY



Source: International Atomic Energy Agency

Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986. There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.[19]

Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

[19] More information on Shearon Harris Emergency Declaration events can be found in Section 5: *Hazard Profiles*.

A.2.17 Terror Threat

Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table A.29** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE A.29 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section A.3.3) are at a heightened level of risk in Chatham County, there are several that have been identified as the likely primary targets. These critical facilities include the Chatham County Emergency Operations Center and Chatham Hospital.

Historical Occurrences

Although there have been no major terror events in Chatham County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

Probability of Future Occurrences

Chatham County has no recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

A.2.18 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table A.30 describes the extent of each natural hazard identified for Chatham County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE A.30: EXTENT OF CHATHAM COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Chatham County has received this ranking three times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Chatham County is 108 degrees Fahrenheit (reported on July 27, 1940).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Chatham County was 1.75 inches (last reported on May 20, 2008). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Chatham County was an Unnamed 1896 Storm which reached a maximum wind speed of 62 knots in the county.
Lightning	According to the Vaisala flash density map (Figure 5.5), Chatham County is located in an area that experiences 3 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 56-year history from the National Climatic Data Center, the strongest recorded wind event in Chatham County was reported on March 7, 2004 at 65 knots (approximately 75 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F2 (last reported on March 29, 1991).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Chatham County was 15 inches on February 13, 1899. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from Chatham County. According to data provided by the National Geophysical Data Center, no earthquakes have impacted the county.

Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is moderate across the majority of Chatham County. There is also moderate susceptibility throughout the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 74 dams in Chatham County, 18 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Chatham County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 10.4 percent of the total land area in Chatham County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at the Haw River near Pittsboro in 1908. Water reached a discharge of 98,000 cubic feet per second and the stream gage height was recorded at 32.10 feet. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 16,800 LGA released on the railway on March 31, 1977. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. The greatest number of fires to occur in Chatham County in any year was 102 in 2005. The greatest number of acres to burn in the county in a single year occurred in 2009 when 353.6 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Nuclear Accident	Although there is no history of a nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in Chatham County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Chatham County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.20.2.

Table A.31 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE A.31: SUMMARY OF PRI RESULTS FOR CHATHAM COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm/High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	**1.8**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	**3.0**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Negligible	Less than 6 hours	Less than 1 week	**2.1**
Nuclear Accident	Unlikely	Critical	Small	6 to 12 hours	Less than 1 week	**2.2**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

A.2.19 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Chatham County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table A.32**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Chatham County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section A.3. It should be noted that

although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE A.32: CONCLUSIONS ON HAZARD RISK FOR CHATHAM COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Flood Hurricane and Tropical Storm Tornado Hailstorm
MODERATE RISK	Drought Winter Storm and Freeze Extreme Heat Lightning
LOW RISK	Hazardous Material Incident Terror Threat Nuclear Accident Dam and Levee Failure Wildfire Landslide Erosion Earthquake

A.3 CHATHAM COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Chatham County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

A.3.1 Asset Inventory

Table A.33 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Chatham County and its participating jurisdictions (study area of vulnerability assessment).[20]

[20] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE A.33: IMPROVED PROPERTY IN CHATHAM COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[21]
Goldston	208	$18,917,702	245	$14,109,087
Pittsboro	1,923	$399,912,184	1,591	$283,695,816
Siler City	2,808	$341,987,155	2,889	$254,476,937
Unincorporated Area	37,197	$8,918,365,680	34,762	$4,865,178,959
CHATHAM COUNTY TOTAL	**42,136**	**$9,679,182,721**	**39,487**	**$5,417,460,799**

Table A.34 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in Chatham County. Local governments at the county level provided a majority of the data for this analysis; however, gaps in the data were filled using Hazus 2.1 to obtain the location of some critical facilities for which spatial data was not available. In addition, **Figure A.16** shows the locations of essential facilities in Chatham County. **Table A.49**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county and Hazus 2.1.

TABLE A.34: CRITICAL FACILITY INVENTORY IN CHATHAM COUNTY

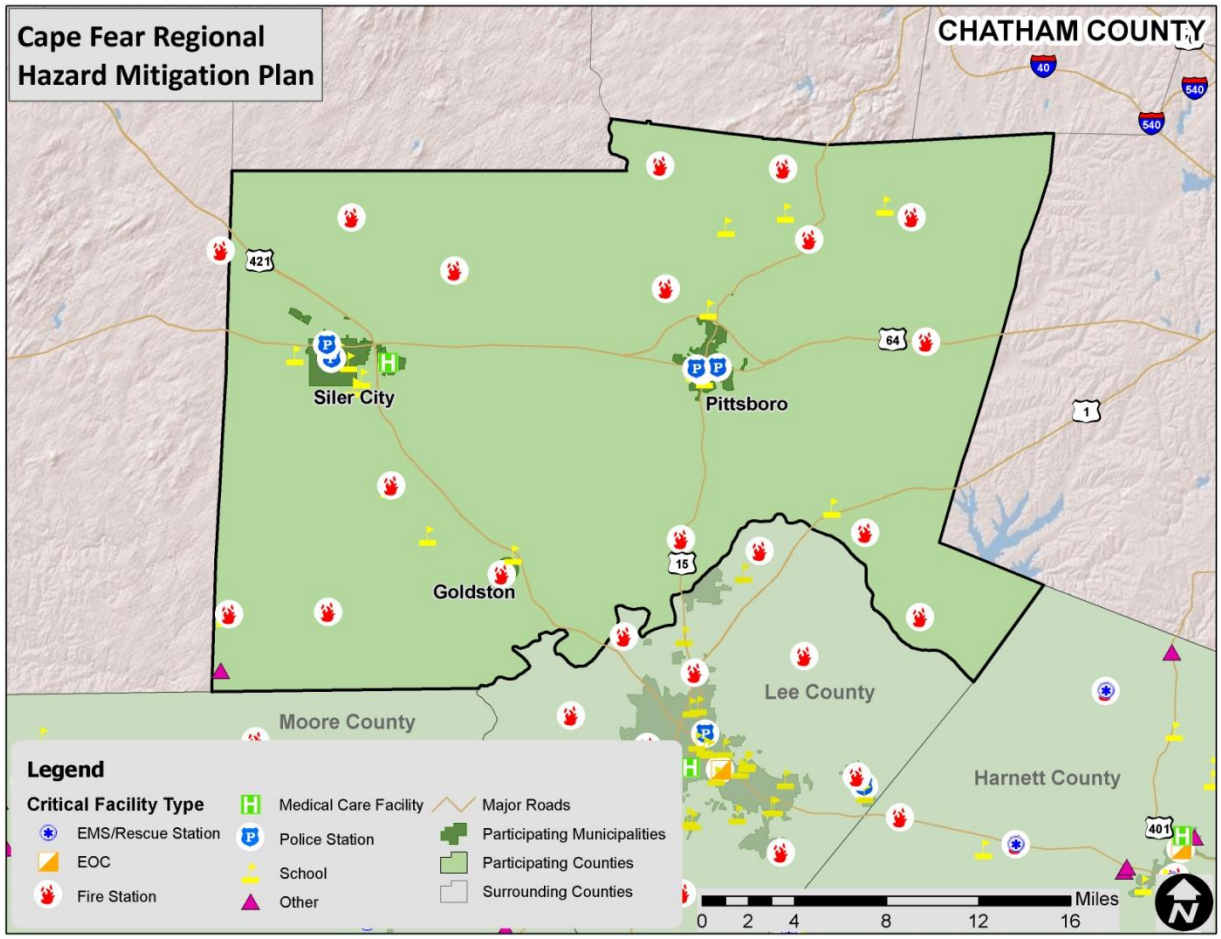
Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Goldston	1	0	0	0	0	0	0
Pittsboro	1	2	0	0	1	3	0
Siler City	1	2	0	1	0	2	0
Unincorporated Area	16	0	0	0	0	13	0
CHATHAM COUNTY TOTAL	**19**	**4**	**0**	**1**	**1**	**18**	**0**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.

Source: Local Governments; Hazus-MH

[21] Building value for each county is based on the number of parcels with an improved building value greater than zero.

FIGURE A.16: CRITICAL FACILITY LOCATIONS IN CHATHAM COUNTY



Source: Local Governments; Hazus-MH 2.1

A.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Chatham County that are potentially at risk to these hazards.

Table A.35 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Chatham County according to Census data is 63,505 persons. Additional population estimates are presented above in Section A.1.

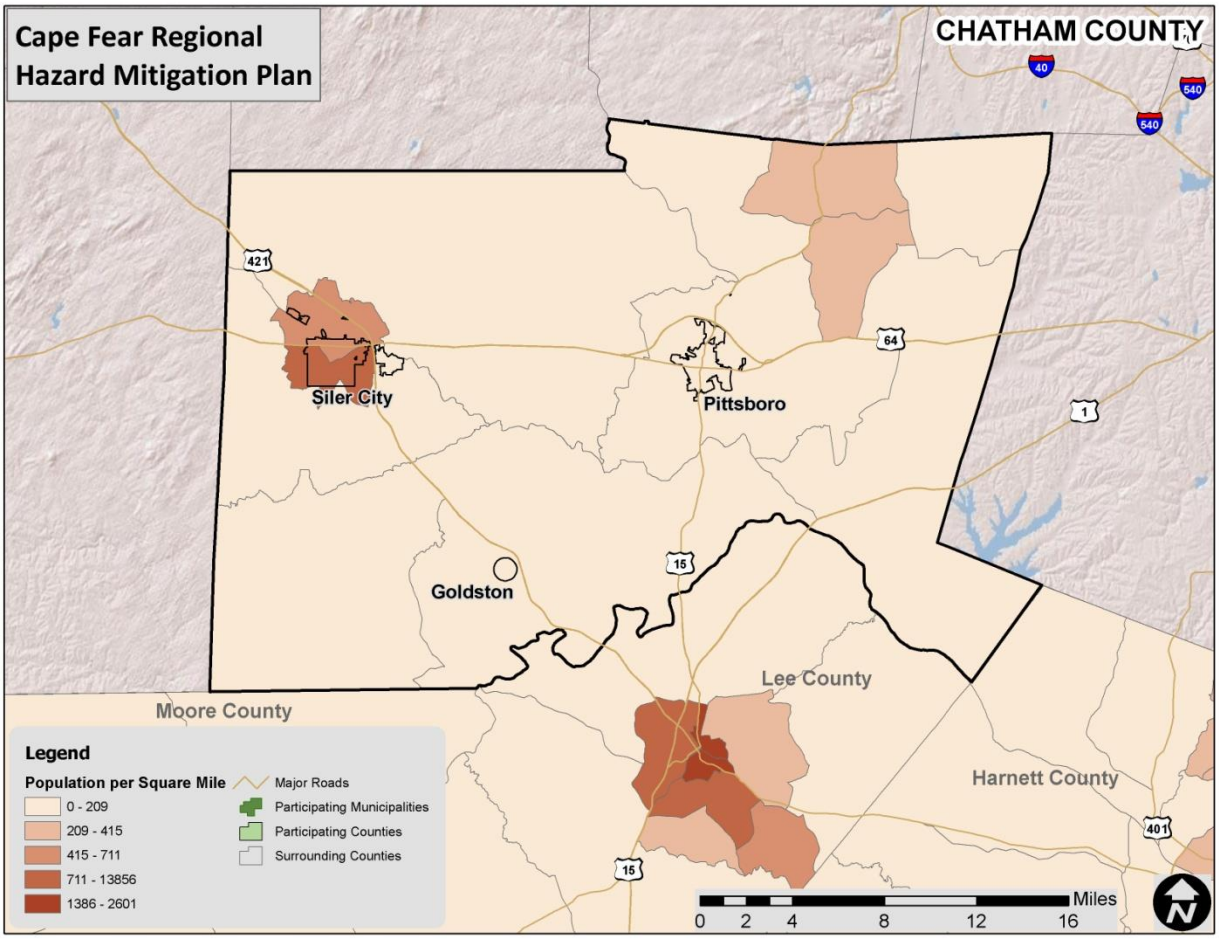
TABLE A.35: TOTAL POPULATION IN CHATHAM COUNTY

Jurisdiction	2010 Census Population
Chatham County	**63,505**
Town of Goldston	268
Town of Pittsboro	3,743
Town of Siler City	7,887

Source: United States Census 2010

In addition, **Figure A.17** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE A.17: POPULATION DENSITY IN CHATHAM COUNTY



Source: United States Census Bureau, 2010

A.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans was approved (in 2010), Chatham County has experienced some growth and development. **Table A.36** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE A.36: BUILDING COUNTS FOR CHATHAM COUNTY

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Goldston	160	0	0.0%
Pittsboro	1,511	0	0.0%
Siler City	2,973	54	1.8%

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Unincorporated Area	24,037	145	0.6%
CHATHAM COUNTY TOTAL	**28,681**	**199**	**0.7%**

Source: United States Census Bureau

Table A.37 shows population growth estimates for the county from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE A.37: POPULATION GROWTH FOR CHATHAM COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Goldston	268	276	279	282	5.2%
Pittsboro	3,780	3,873	3,906	3,962	4.8%
Siler City	7,903	8,039	8,149	8,169	3.4%
Unincorporated Area	51,813	53,069	53,565	54,404	5.0%
CHATHAM COUNTY TOTAL	**63,764**	**65,257**	**65,899**	**66,817**	**4.8%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the county since 2010. However, Siler City has experienced a slightly higher rate of development compared to the rest of the Cape Fear Region, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been a slight increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, primary and secondary TRI site buffers, or Shearon Harris Nuclear Station's 10-mile buffer.

A.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Chatham County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total county exposure, and thus risk, was presented in **Table A.33**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table A.48**.

The hazards presented in this section include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

Hurricane and Tropical Storm

Historical evidence indicates that Chatham County has a significant risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section A.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table A.38.** Only losses to buildings, contents, and inventory are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE A.38: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Chatham County	$511,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table A.39.**

TABLE A.39: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Goldston	71.6	81.4	98.8	107.7
Pittsboro	70.9	80.7	98.4	106.5
Siler City	69.4	78.9	97.0	105.1
Unincorporated Area	72.2	81.4	100.0	107.7
MAXIMUM WIND SPEED REPORTED	**72.2**	**81.4**	**100.0**	**107.7**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Chatham County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Chatham County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Chatham County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table A.40** summarizes the findings.

TABLE A.40: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Chatham County	$12,000

Source: Hazus-MH 2.1

Social Vulnerability

It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table A.49**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Chatham County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Chatham County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section A.2.10), county level tax parcel data, and GIS analysis. **Table A.41** presents the potential at-risk property where available. The majority of Chatham County is identified as a moderate incidence area by the USGS landslide data. All parts of the county are also of moderate landslide susceptibility, excluding a small area in the southeast corner. Since no areas of high incidence were identified, the moderate incidence level was used to identify different areas of concern for the analysis below.

TABLE A.41: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Goldston	23	28	$1,777,877
Pittsboro	1,923	1,591	$283,695,816

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	Moderate		
Siler City	2,808	2,889	$254,476,937
Unincorporated Area	31,947	28,229	$4,542,643,845
CHATHAM COUNTY TOTAL	36,701	32,737	$5,082,594,475

Source: United States Geological Survey

Social Vulnerability

Given moderate susceptibility across nearly the entire county, it is assumed that the total population is at risk.

Critical Facilities

All critical facilities are located in a moderate susceptibility area. There are 37 critical facilities in Chatham County located in the moderate incidence area (moderate susceptibility), including 1 EOC, 14 fire stations, 1 medical care facility, 4 police stations, and 17 schools. The remaining 6 critical facilities are located in the low landslide incidence area (moderate susceptibility). A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Chatham County, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Chatham County is susceptible to flood events. A total of 23 flood events have been reported by the National Climatic Data Center resulting in just over $9,000 dollars in damages. On an annualized level, these damages amount to $452 for Chatham County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table A.42** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE A.42: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Goldston	0	0	$0	0	0	$0
Pittsboro	82	17	$25,250,289	3	1	$235,864
Siler City	210	77	$19,683,496	9	12	$5,483,543

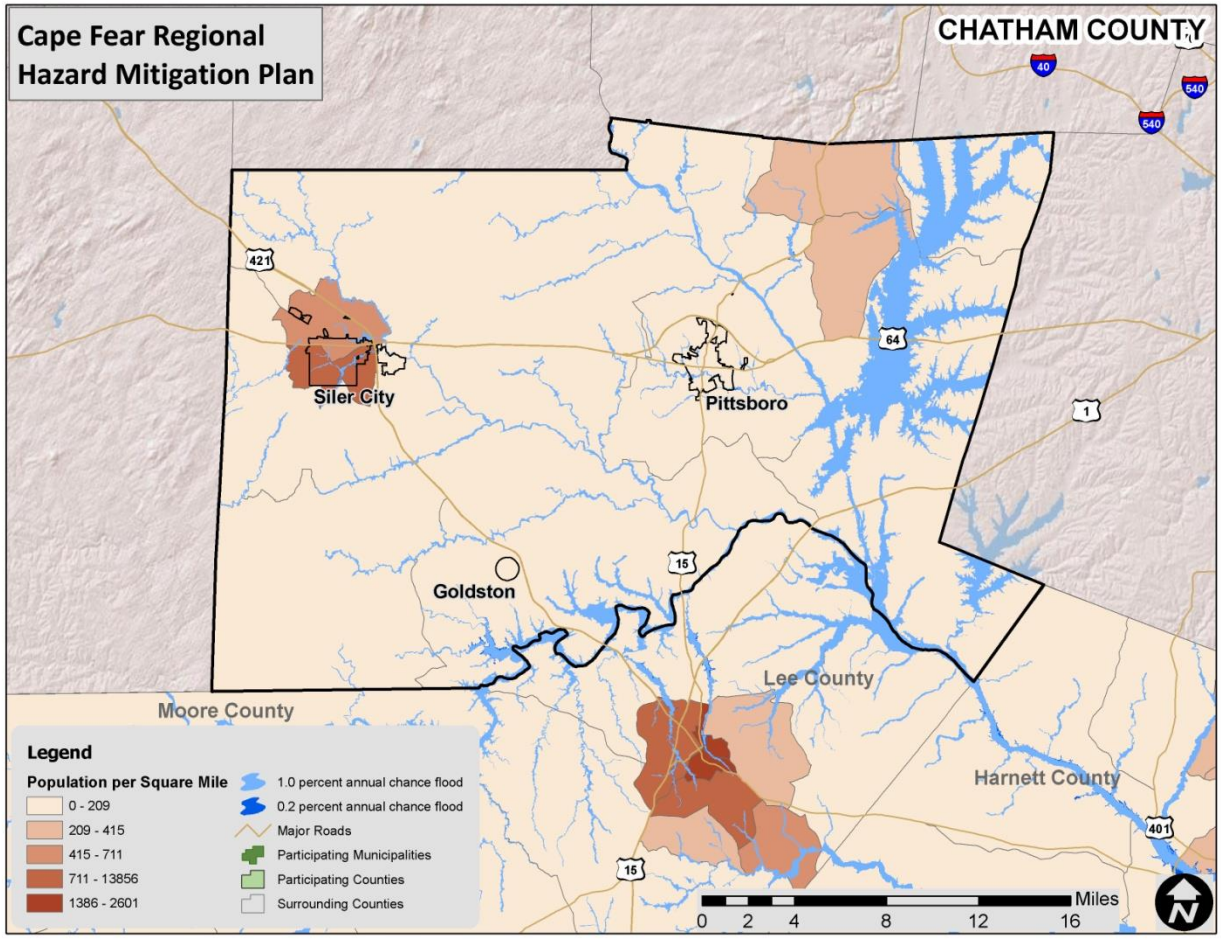
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Unincorporated Area	3,018	143	$260,757,657	14	6	$1,313,140
CHATHAM COUNTY TOTAL	**3,310**	**237**	**$305,691,442**	**26**	**19**	**$7,032,547**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure A.18** is presented to gain a better understanding of at risk population.

FIGURE A.18 : POPULATION DENSITY NEAR FLOODPLAINS IN CHATHAM COUNTY



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in the Chatham County 1.0-percent annual chance floodplain or 0.2-percent annual chance floodplain based on FEMA DFIRM

boundaries and GIS analysis. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Chatham County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

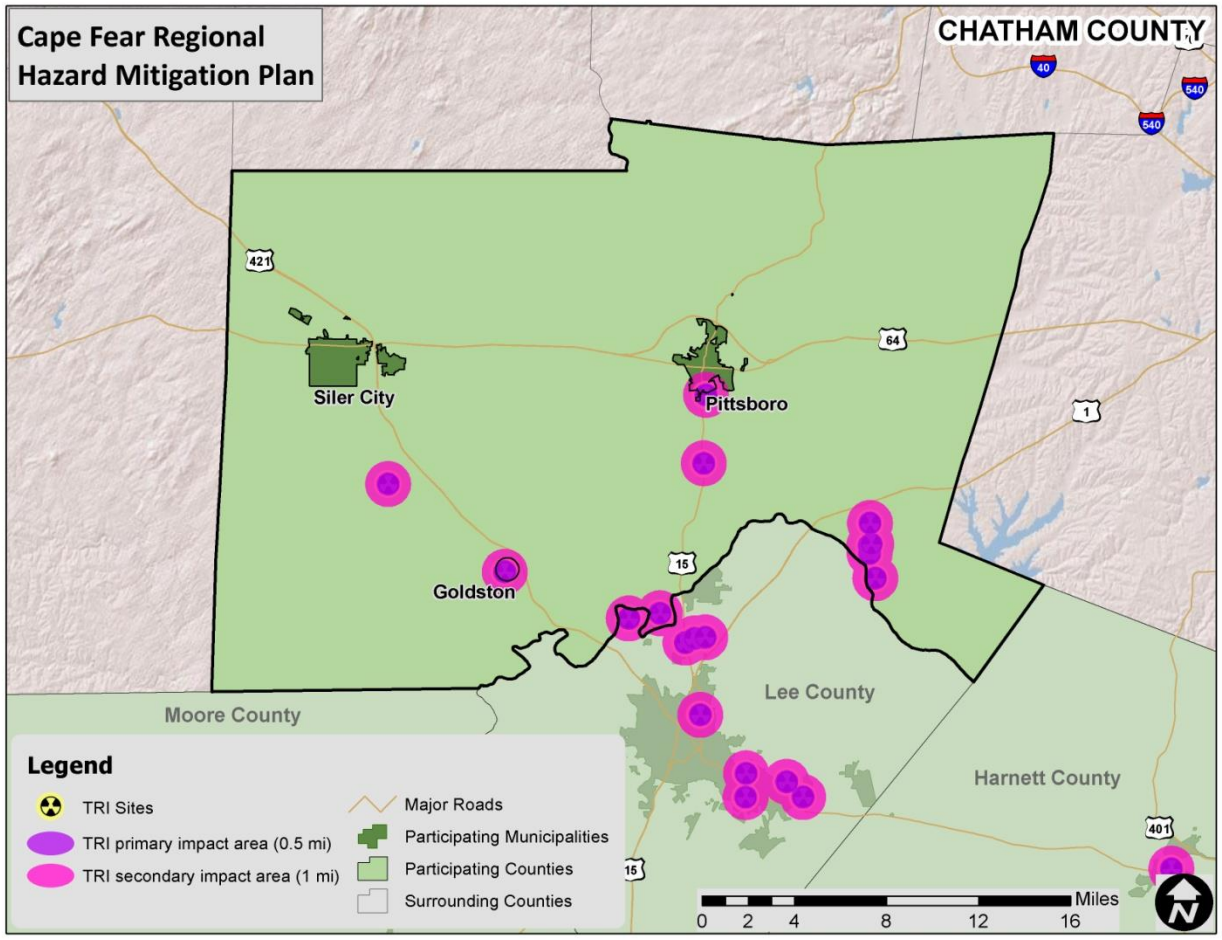
Although historical evidence and existing Toxic Release Inventory sites indicate that Chatham County is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Chatham County.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[22] In both scenarios, two sizes of buffers—0.5 mile and 1.0 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Chatham County, along with buffers, were used for analysis as shown in **Figure A.19.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure A.20** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table A.43** (fixed sites), **Table A.44** (mobile road sites) and **Table A.45** (mobile railroad sites).[23]

[22] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

FIGURE A.19 : TRI SITES WITH BUFFERS IN CHATHAM COUNTY



Source: Environmental Protection Agency

TABLE A.43: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Goldston	191	207	$12,798,039	208	245	$14,109,087
Pittsboro	267	224	$40,835,250	543	429	$86,176,897
Siler City	0	0	$0	0	0	$0
Unincorporated Area	371	371	$55,194,348	1,130	1,041	$102,571,158
CHATHAM COUNTY TOTAL	**1,633**	**1,095**	**$234,225,793**	**6,215**	**4,518**	**$1,014,557,943**

FIGURE A.20 : MOBILE HAZMAT BUFFERS IN CHATHAM COUNTY

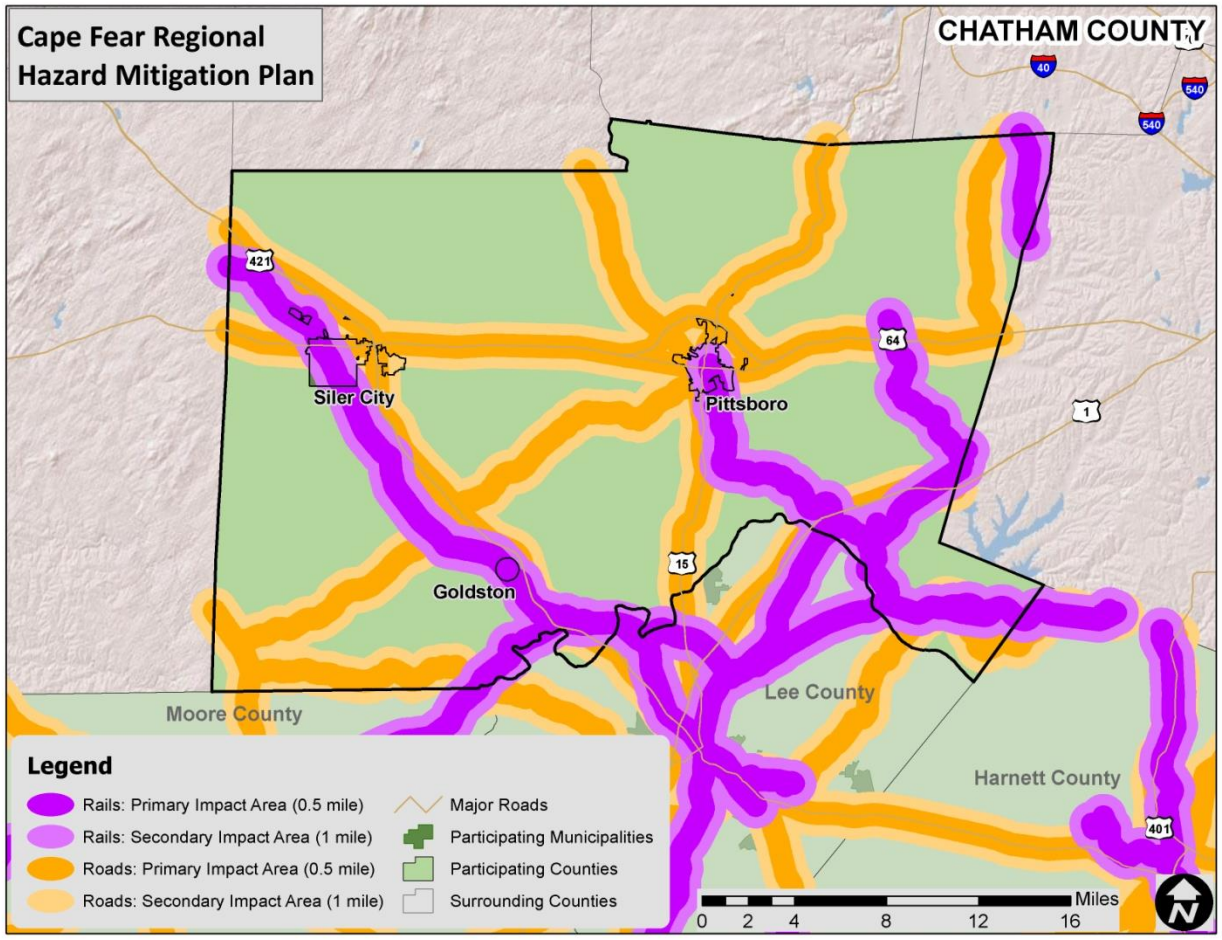


TABLE A.44: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Goldston	61	69	$5,226,391	208	239	$14,109,087
Pittsboro	1,899	1,577	$278,581,181	1,923	1,591	$283,695,816
Siler City	1,555	1,525	$140,202,599	2,404	2,463	$215,052,134
Unincorporated Area	10,398	10,368	$1,126,483,224	16,807	16,000	$1,797,760,718
CHATHAM COUNTY TOTAL	**13,913**	**13,539**	**$1,550,493,395**	**21,342**	**20,293**	**$2,310,617,755**

TABLE A.45: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Goldston	208	245	$14,109,087	208	245	$14,109,087
Pittsboro	980	773	$152,957,766	1,628	1,414	$237,350,609
Siler City	1,790	1,558	$152,421,343	2,613	2,371	$220,529,904
Unincorporated Area	3,845	3,476	$458,158,605	7,250	6,320	$880,960,792
CHATHAM COUNTY TOTAL	**6,823**	**6,052**	**$777,646,801**	**11,699**	**10,350**	**$1,352,950,392**

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 7 Chatham County facilities located in a HAZMAT risk zone. The primary impact zone includes 4 facilities: 3 fire stations and 1 school. The remaining 3 at-risk critical facilities are located in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Chatham County revealed that there are 29 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 24 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes the following critical facilities: 1 EOC, 7 fire stations, 1 medical care facility, 3 police stations, and 10 schools. The remaining 7 at-risk critical facilities are located in the secondary road buffer area. The primary railroad buffer area includes the following critical facilities: 7 fire stations, 3 police stations, and 5 schools. The remaining 9 at-risk critical facilities are located in the secondary railroad buffer. Although this is a worst case scenario model, it indicates that many of the critical facilities in Chatham County are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Chatham County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

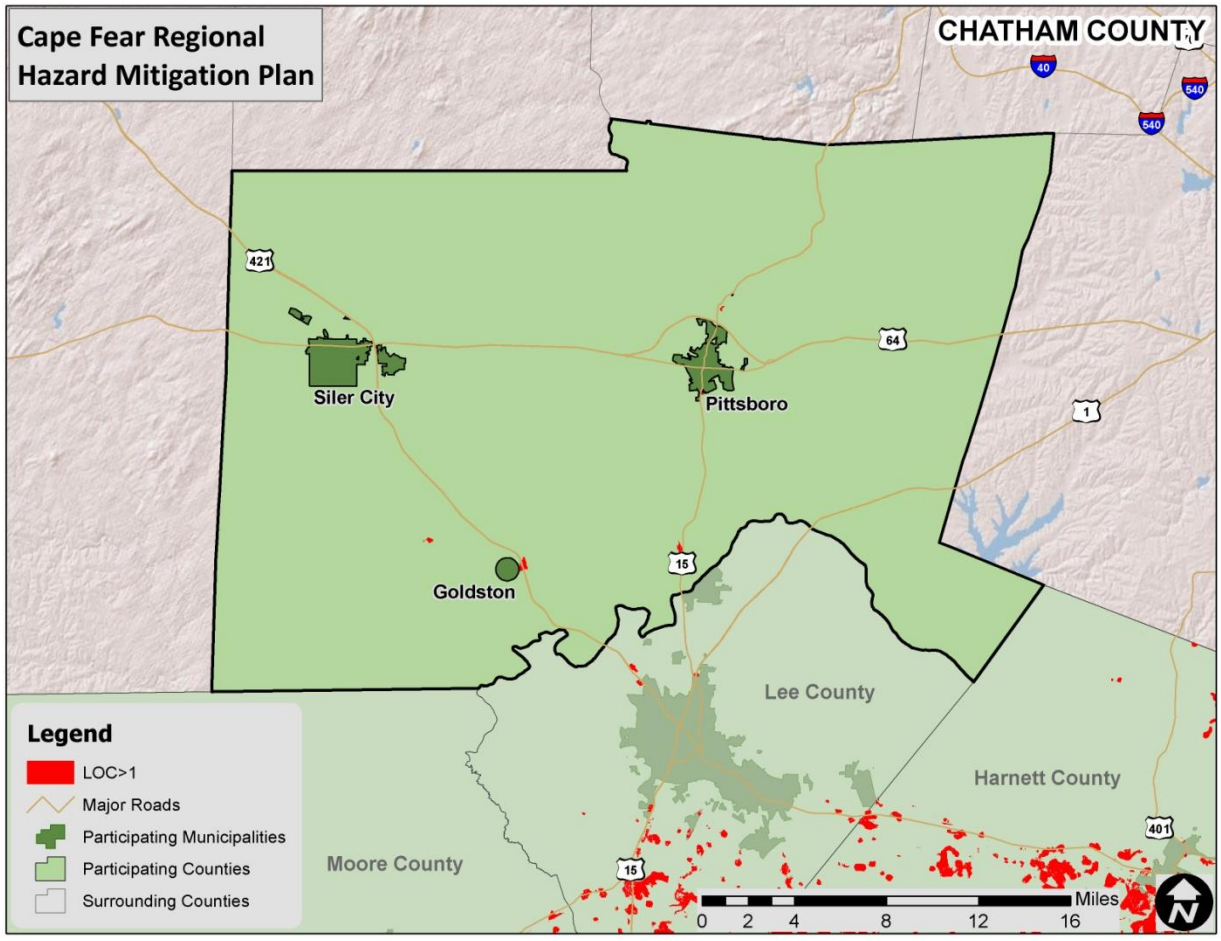
Wildfire

Although historical evidence indicates that Chatham County is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure A.21**, **Figure A.22**, **Figure A.23**, and **Figure A.24** show the Level of Concern data. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The county contains much less land where the value falls into the at-risk category compared to the other Cape Fear counties, therefore, it has considerably less risk than other areas of the region.

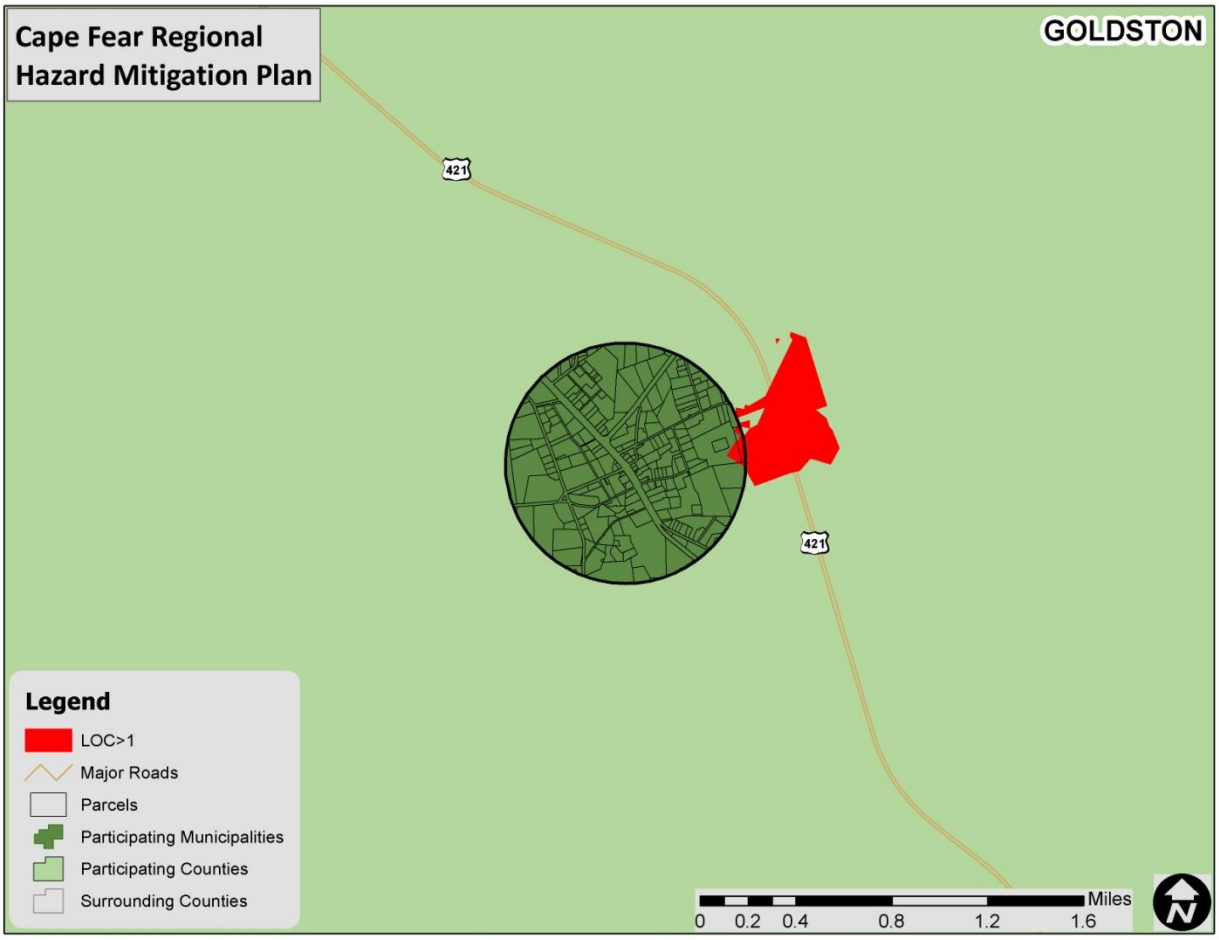
Table A.46 shows the results of the analysis.

FIGURE A.21: WILDFIRE RISK AREAS IN CHATHAM COUNTY



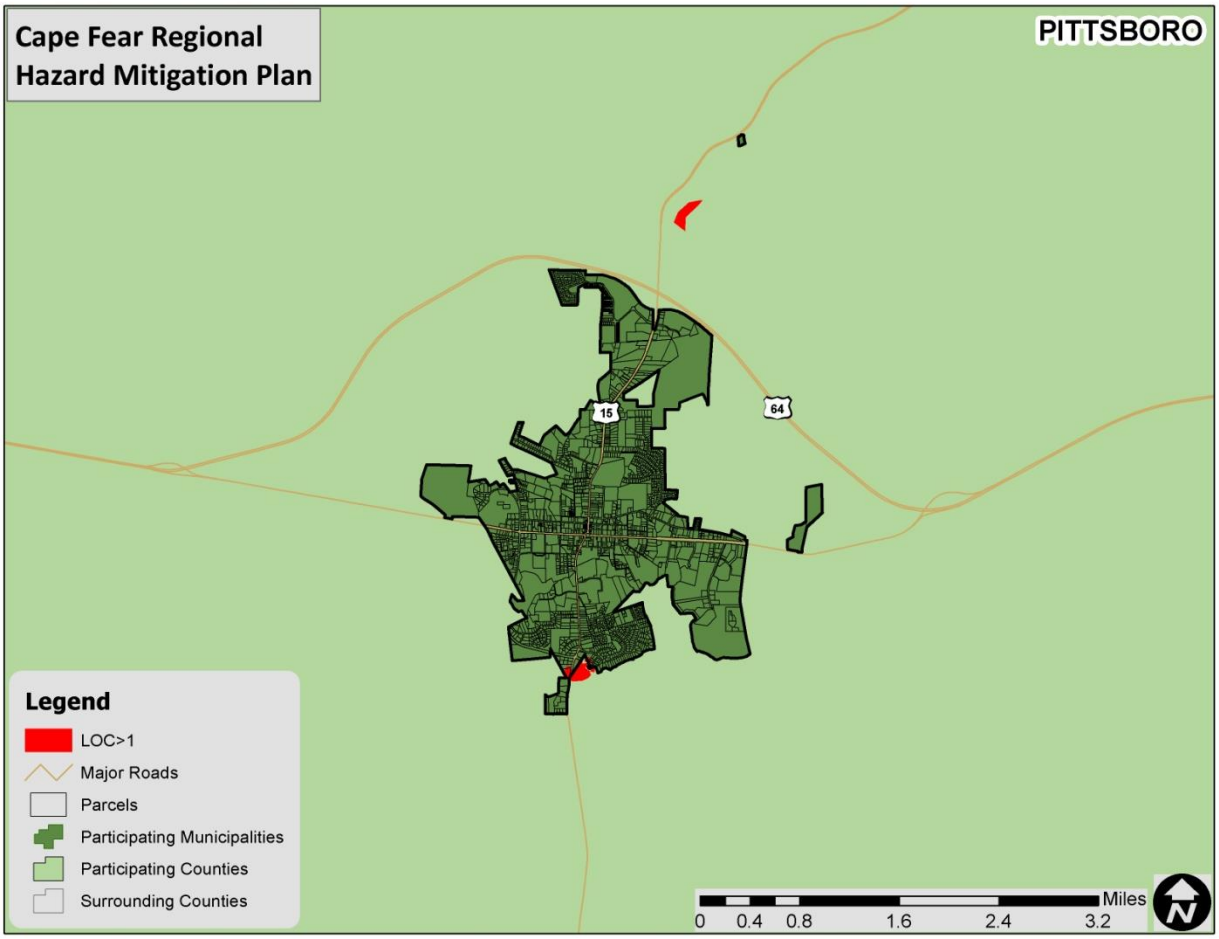
Source: Southern Wildfire Risk Assessment Data

FIGURE A.22: WILDFIRE RISK AREAS IN GOLDSTON



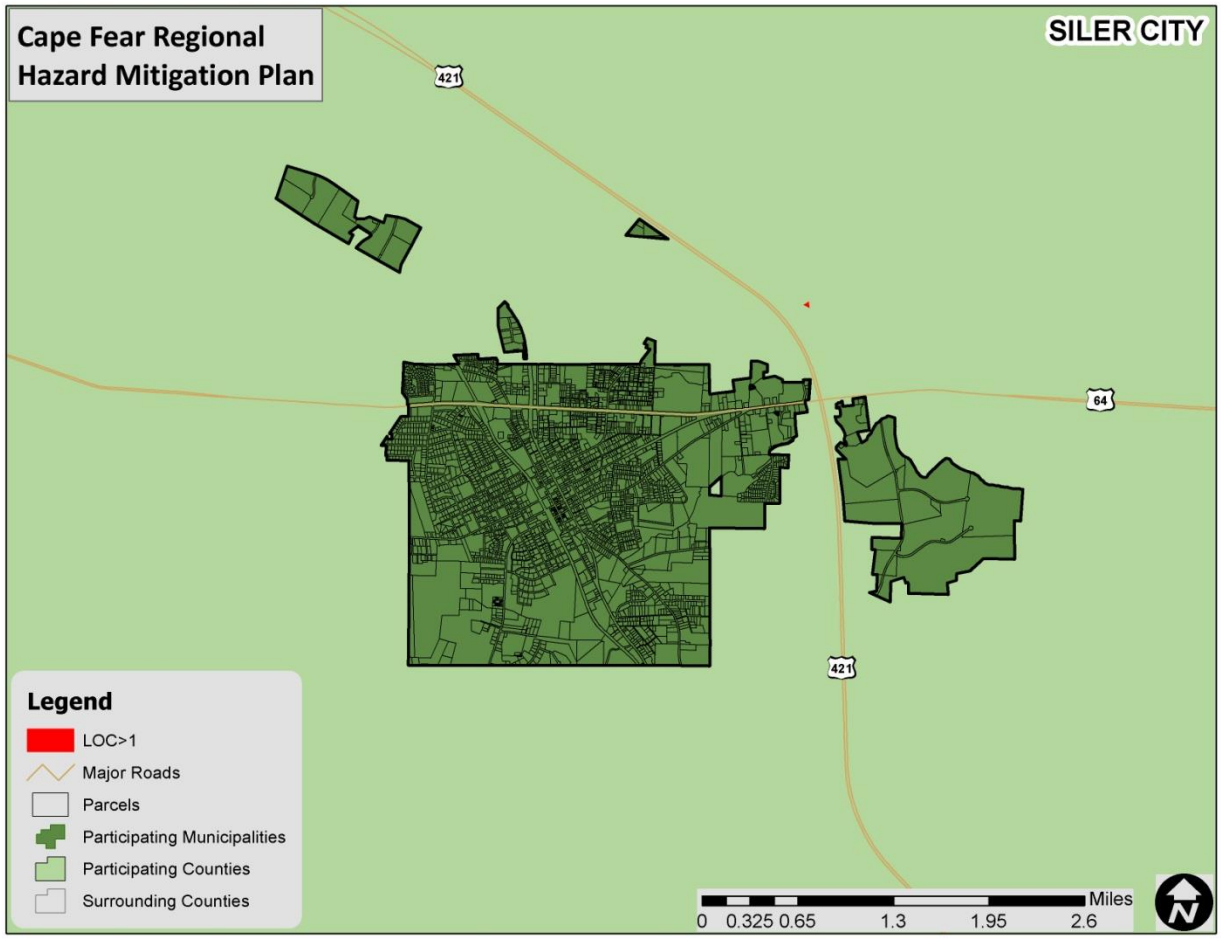
Source: Southern Wildfire Risk Assessment Data

FIGURE A.23: WILDFIRE RISK AREAS IN PITTSBORO



Source: Southern Wildfire Risk Assessment Data

FIGURE A.24: WILDFIRE RISK AREAS IN SILER CITY



Source: Southern Wildfire Risk Assessment Data

TABLE A.46: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Goldston	1	0	$23,683
Pittsboro	4	3	$565,768
Siler City	0	0	$0
Unincorporated Area	46	27	$7,431,113
CHATHAM COUNTY TOTAL	**51**	**30**	**$8,020,564**

Looking at jurisdictional level, there are few at-risk areas. However, some parts of the county (notably the unincorporated area east of Goldston) do have areas where the level of concern is above 1.

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility in a few places across the county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in wildfire areas of concern. This reflects a reduced risk in Chatham County compared to the other Cape Fear counties. However, it should also be noted that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Chatham County.

Nuclear Accident

The location of Shearon Harris Nuclear Station east of Chatham County demonstrates that the county is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. All of Chatham County is located within one of the risk zones. **Table A.47** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE A.47: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Goldston	0	0	$0	208	245	$14,109,087
Pittsboro	0	0	$0	1,923	1,591	$283,695,816
Siler City	0	0	$0	2,808	2,889	$254,476,937
Unincorporated Area	3,122	3,156	$340,412,640	37,197	34,762	$4,865,178,959
CHATHAM COUNTY TOTAL	**3,122**	**3,156**	**$340,412,640**	**42,136**	**39,487**	**$5,417,460,799**

Source: International Atomic Energy Agency

[24] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[25] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Social Vulnerability
Since all areas of the county are within at least the 50-mile buffer area, the total population is considered to be at risk to a nuclear accident. However, populations in the southeast part of the county are considered to be at an elevated risk.

Critical Facilities
The critical facility analysis revealed that there are 4 critical facilities located in the 10-mile nuclear buffer area in Chatham County. This includes 3 fire stations and 1 school. All critical facilities in the county are located within the 50-mile nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table A.49** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in Chatham County, though areas in the southeast corner of the county are at a higher risk than others. All structures in the county are at some risk given that they are all located within the 50-mile buffer area.

Conclusions on Hazard Vulnerability

Table A.48 presents a summary of annualized loss for each hazard in Chatham County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

TABLE A.48: ANNUALIZED LOSS FOR CHATHAM COUNTY

Event	Chatham County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	Negligible
Hurricane & Tropical Storm	$511,000
Lightning	$50,750
Severe Thunderstorm / High Wind	$25,249
Tornado	$18,229
Winter Storm & Freeze	$40,343
Geologic Hazards	
Earthquake	$12,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$452

Event	Chatham County
Other Hazards	
HAZMAT Incident	Negligible
Wildfire	Negligible
Nuclear Accident	Negligible
Terror Threat	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table A.49** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE A.49: AT-RISK CRITICAL FACILITIES IN CHATHAM COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
CHATHAM COUNTY																							
BENNETT VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
BONLEE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X			X	X			X	X			X
BENNETT VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
SILK HOPE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X													X
SILK HOPE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X													X
STALEY VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X						X		X			X
MONCURE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X		X	X
NORTHVIEW VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X						X		X	X	X			X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X											X
NORTH CHATHAM VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X				X	X
MONCURE VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X			X	X			X	X		X	X
PITTSBORO SUBSTATION 2	Fire Station	X	X	X	X	X	X	X	X	X		X											X
PITTSBORO SUBSTATION 3	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X					X
Bennett School	School	X	X	X	X	X	X	X	X	X		X					X	X					X
Siler City Elementary	School	X	X	X	X	X	X	X	X	X		X					X	X					X
J. S. Waters	School	X	X	X	X	X	X	X	X	X		X				X	X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Chatham Central H.S.	School	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
Bonlee School	School	X	X	X	X	X	X	X	X	X		X			X	X			X	X			X
Chatham Middle School	School	X	X	X	X	X	X	X	X	X		X							X	X			X
Silk Hope School	School	X	X	X	X	X	X	X	X	X													X
Moncure School	School	X	X	X	X	X	X	X	X	X		X					X	X	X	X		X	X
North Chatham School	School	X	X	X	X	X	X	X	X	X		X											X
Perry Harrison	School	X	X	X	X	X	X	X	X	X		X											X
Northwood H.S.	School	X	X	X	X	X	X	X	X	X		X					X	X					X
Virginia Cross School	School	X	X	X	X	X	X	X	X	X		X						X		X			X
Margaret Pollard Middle School	School	X	X	X	X	X	X	X	X	X		X											X
GOLDSTON VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X					X	X			X	X			X
CHATHAM COUNTY EMERGENCY OPERATIONS	EOC	X	X	X	X	X	X	X	X	X		X					X	X		X			X
PITTSBORO VOL FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
PITTSBORO POLICE	Police Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
CHATHAM SHERIFF	Police Station	X	X	X	X	X	X	X	X	X		X					X	X		X			X
Horton Middle School	School	X	X	X	X	X	X	X	X	X		X				X	X	X	X	X			X
Pittsboro Elementary	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
School Administration	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
SILER CITY FIRE DEPT	Fire Station	X	X	X	X	X	X	X	X	X		X						X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
CHATHAM HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X		X					X	X					X
SILER CITY POLICE	Police Station	X	X	X	X	X	X	X	X	X		X						X	X	X			X
HIGHWAY PATROL	Police Station	X	X	X	X	X	X	X	X	X		X					X	X	X	X			X
SAGE Academy	School	X	X	X	X	X	X	X	X	X		X					X	X		X			X
Jordan Matthews H.S.	School	X	X	X	X	X	X	X	X	X		X						X		X			X

A.4 CHATHAM COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Chatham County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

A.4.1 Planning and Regulatory Capability

Table A.50 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Chatham County. 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE A.50: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
CHATHAM COUNTY	✓	✓		✓	✓	✓		✓	✓			✓	✓		✓	✓	✓			✓	✓	✓	
Goldston	✓	✓						✓					✓							✓	✓		
Pittsboro	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	*		✓	✓	✓	
Siler City	✓	✓			✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Chatham County has previously adopted a hazard mitigation plan. All of three the participating municipalities were also included in this plan.

Emergency Operations Plan
Chatham County maintains an emergency operations plan through its Emergency Management Department. This plan has been adopted by each of the municipalities within the county.

Continuity of Operations Plan
Chatham County has a continuity of operations plan in place that is updated annually.

General Planning

Comprehensive Land Use Plan
Chatham County and the Town of Cary have adopted a joint land use plan which covers the area located east of Jordan Lake in Chatham County. The county has also adopted a countywide land conservation and development plan which was signed by the governing boards of Goldston, Pittsboro and Siler City. Pittsboro and Siler City have also adopted municipal-level land use plans.

Capital Improvements Plan
Chatham County has a seven-year capital improvement plan in place. Pittsboro and Siler City also have municipal capital improvement plans in place.

Zoning Ordinance
Chatham County, Pittsboro, and Siler City have adopted zoning ordinances. Siler City includes zoning regulations as part of its local unified development ordinance. Pittsboro and Chatham County have adopted stand-alone zoning ordinances. Pittsboro is in the process of developing a unified development ordinance which will replace the current zoning ordinance once it is adopted.

Subdivision Ordinance
Chatham County, Pittsboro, and Siler City have adopted subdivision regulations. Again, Siler City includes subdivision regulations as part of its local unified development ordinance. Pittsboro and Chatham County have adopted stand-along subdivision ordinances. Pittsboro is in the process of developing a unified development ordinance which will replace the current subdivision ordinance once it is adopted.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Chatham County Inspections is responsible for building code enforcement within the county, Pittsboro, and Goldston. Siler City administers its own building code enforcement.

Floodplain Management

Table A.51 provides NFIP policy and claim information for each participating jurisdiction in Chatham County.

TABLE A.51: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
CHATHAM COUNTY†	03/04/97	01/02/08	119	$35,230,600	0	$0

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Goldston*	--	--	--	--	--	--
Pittsboro	02/02/07	01/02/08	19	$3,978,300	0	$0
Siler City	07/02/87	01/02/08	18	$2,456,700	3	$135,191

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Chatham County, Pittsboro, and Siler City all participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Chatham County has adopted a comprehensive parks and recreation master plan which has also been adopted by the Town of Pittsboro.

Stormwater Management Plan
Although Chatham County and its municipalities do not have stormwater management plans in place, the county, Pittsboro, and Siler City have adopted stormwater management regulations through various local ordinances.

A.4.2 Administrative and Technical Capability

Table A.52 provides a summary of the capability assessment results for Chatham County 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 A.52: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
CHATHAM COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	✓
Goldston		✓	✓	✓			✓	✓		
Pittsboro	✓	✓	✓	✓	✓		✓	✓		
Siler City	✓	✓	✓	✓	✓		✓	✓	✓	

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

A.4.3 Fiscal Capability

Table A.53 provides a summary of the results for Chatham County 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) according to the previous county hazard mitigation plan.

TABLE A.53: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.
CHATHAM COUNTY	✓	✓	✓						✓	✓
Goldston	✓	✓	✓						✓	✓
Pittsboro	✓	✓	✓						✓	✓
Siler City	✓	✓	✓						✓	✓

A.4.4 Political Capability

The previous hazard mitigation plan indicates that Chatham County has experienced the devastating effects of natural hazards (i.e., recent hurricanes and ice storms). The citizens, property owners, business owners, and elected officials of the county are committed to implementing a hazard mitigation plan in order to reduce community vulnerability. The Chatham County Board of Commissioners, the professional staff, and the citizens of the county are continually striving to make Chatham County a safer community in which to live, work, and play. The county recognizes that implementation of a hazard mitigation plan is an essential component in helping to achieve these goals.

A.4.5 Conclusions on Local Capability

Table A.54 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 33.3, which falls into the moderate capability ranking.

TABLE A.54: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CHATHAM COUNTY	46	High

Jurisdiction	Overall Capability Score	Overall Capability Rating
Goldston	16	Limited
Pittsboro	35	Moderate
Siler City	36	Moderate

A.5 CHATHAM COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Chatham County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

A.5.1 Mitigation Goals

Chatham County developed six mitigation goals in coordination with the other participating Cape Fear Region jurisdictions. The regional mitigation goals are presented in **Table A.55**.

TABLE A.55: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

A.5.2 Mitigation Action Plan

The mitigation actions proposed by Chatham County, the Town of Goldston, the Town of Pittsboro, and the Town of Siler City are listed in the following individual Mitigation Action Plans.

Chatham County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2019	Funding for a land use plan update was eliminated in 2010. Staff has discussed options for updating the land use plan with the Planning Board and Board of Commissioners in 2014. In 2012, The Board of Commissioners adopted a joint land use plan with the Town of Cary for an area in the northeastern portion of the county. The plan includes a section with approaches for mitigating adverse water quality impacts to Jordan Lake in Section 5.3. Further, the plan includes a discussion about notification requirements for controlled burn areas for property owners near Jordan Lake in Section 6.4.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works	Local	2018	Stormwater Ordinance adopted in November 2008 and amended in 2012. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works	Local	2018	Updated riparian buffer requirements adopted in 2008 and revised in 2012. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning	Local	2015, Annual Update	Educational materials are provided to the public as they are made available to the county. The county will continue to re-evaluate public education materials and update them on an annual basis as necessary.
PEA-2	Develop an Environmental Health program that will, in part, address environmental concerns that might develop from a natural disaster.	Flood	High	Chatham County Environmental Health, Chatham County Public Works	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Goldston Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2019	Funding for a land use plan update was eliminated in 2010. Staff has discussed options for updating the land use plan with the Planning Board and Board of Commissioners in 2014. In 2012, The Board of Commissioners adopted a joint land use plan with the Town of Cary for an area in the northeastern portion of the county. The plan includes a section with approaches for mitigating adverse water quality impacts to Jordan Lake in Section 5.3. Further, the plan includes a discussion about notification requirements for controlled burn areas for property owners near Jordan Lake in Section 6.4.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections, Town of Goldston Administration	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections, Town of Goldston Administration	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Town of Goldston Administration	Local	2018	Stormwater Ordinance adopted in November 2008 and amended in 2012. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Town of Goldston Administration	Local	2018	Updated riparian buffer requirements adopted in 2008 and revised in 2012. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, Town of Goldston Administration	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Town of Goldston Administration	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Town of Goldston Administration	Local	2015, Annual Updates	Educational materials are provided to the public as they are made available to the county. The county will continue to evaluate public education materials and update them as necessary on an annual basis.
PEA-2	Develop an Environmental Health program that will, in part, address environmental concerns that might develop from a natural disaster.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Town of Goldston Administration	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Pittsboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2019	Land Use Plan Adopted October 22, 2012. This plan will be re-evaluated and updated on a regular basis so this action will remain in the plan.
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Chatham County Building Inspections, Town of Pittsboro Engineering	Local	2015, After Disaster Events	Building inspectors have been trained to perform inspections of flood damaged structures and will perform those duties as needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Chatham County Building Inspections, Town of Pittsboro Engineering	Local	2015, After Disaster Events	The County has a public information officer who coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Town of Pittsboro Public Works	Local	2019	Adopted Stormwater Ordinance November 12, 2013. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Town of Pittsboro Planning	Local	2019	Adopted Riparian Buffer Ordinance February 14, 2011. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contact with floodplain management staff. This list will continue to be updated annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Town of Pittsboro Fire	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Town of Pittsboro Planning	Local	2015, Annual Update	Educational materials are provided to the public as they are made available to the county. The county will continue to re-evaluate public education materials and update them on an annual basis as necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	The Chatham County Environmental Health has received training on erosion and sedimentation methods. This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Resources within the department and filled the position with a professional engineer that is also a certified flood manager (CFM). On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Town of Pittsboro Public Works and Administration	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006-2007	Completed.
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Chatham County Planning and Zoning	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Chatham County Planning and Zoning	Local	2008	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Revise and update the regulator floodplain maps.	Flood	High	Chatham County Planning and Zoning	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Chatham County Planning and Zoning	Local	2008	Completed.

Town of Siler City Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	At the next Land Use Plan Update, review and include hazard mitigation objectives.	All	Moderate	Siler City	Local	2019	The Town was planning on updating the Land Development Plan starting in FY 14/15 with the assistance of the NC Department of Commerce Division of Community Assistance. However, that has been put on hold due to budget cuts in the Division of Community Assistance. No alternative has been determined at this time.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Building Inspections—Flood Damaged Structures. Any and all portions of buildings that have been submerged for any length of time will be inspected for flood related damage as well as other conditions that may be dangerous to life, health or other property. Plan for Damaged Structures: 1. Overall damage assessment/data collection (visual inspection from roadways). 2. Data compiled and geographical areas assigned to teams. 3. Second detailed assessment by area teams. 4. Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. 5. All construction that is repaired, replaced, dried or sealed will be inspected before covered. 6. Structure inspected for certificate of compliance.	Flood	High	Siler City	Local	2015, After Disaster Events	Building inspectors are trained to perform inspections of flood damaged structures and will perform those duties as needed. All building inspections should be the same as Chatham County. Town staff would perform the functions instead of county personnel. In the past the Town has conducted the audits for County EOC and passed that information along to EOC. We also can do after hours inspections to accommodate citizens. The only thing we know that is different is that the county waived inspection fees during a windstorm event. We would have to have approval from the Town Board of Commissioners to waive Town fees. Our Town Code also has a section that states damage beyond 50% valuation eliminates the option of repairing the structure if it located in the flood area.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Policy and procedures related to storm damage and disconnected utility services: 1) inform public via television, radio and newspaper of the necessary steps to have utilities restored; 2) restrict travel as necessary while collecting damage assessment data; 3) conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Siler City	Local	2015, After Disaster Events	The Town Manager coordinates all communication with the media. Building inspectors job responsibilities include damage assessments, inspections, and overtime duty to expedite utility reconnections.
P-4	Create a Storm Water Management Ordinance to require storm water control from development.	Flood	High	Chatham County Public Works, Siler City Public Works	Local	2018	The Town amended storm water ordinance in 2009 to comply with State law. The Stormwater Ordinance will need to be re-evaluated and updated in the future.
P-5	Revise the existing Watershed Protection Ordinance to provide onsite stream determinations and increased riparian buffer widths on existing streams and newly classified riparian areas.	Flood	High	Chatham County Planning and Zoning, Chatham County Public Works, Siler City Public Works	Local	2018	The Town amended watershed protection and stream buffer requirements in 2003. The WPO will need to be re-evaluated and updated in the future.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Moderate	Chatham County Planning and Zoning, Siler City Planning	Local	2015, Annual Updates	List of repetitive flood loss properties is available from the NC Department of Public Safety and staff has direct contacts with floodplain management staff. This list will continue to be updated annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Chatham County Emergency Services, Siler City Fire	Local	2019	CodeRed emergency notification system. The minutes available for notifications increased from 30,000 to 60,000 in 2014. Going forward, the county will continue to work to improve warning time for citizens to evacuate.
ES-2	Improve shelter capacities with alternate power/heat sources.	Winter Storm	High	Chatham County Emergency Services, , Siler City Fire	Local	2019	Increased from 4 to 6 shelters. The shelters either have backup generators or the county has portable generators for each shelter. The county will continue to try to improve shelter capacity and will work to outfit those shelters with alternate power.
ES-3	Establish program to maintain continuity of government operations.	All	High	Chatham County Emergency Services, Siler City Fire	Local	Completed	Chatham County COOP Plan was completed in 2012. This action will be removed at the next update as a capability.
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Chatham County Emergency Services, , Siler City Fire	Local	Completed	The county completed a new alternate communications center / EOC in 2012. This action will be removed at the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Chatham County Emergency Services, Siler City Fire	Local	Completed	The county depends on DOT to identify detour routes. Emergency Services attends regularly scheduled meetings with DOT to address concerns. This action will be removed at the next update as a capability.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Chatham County public library system.	All	High	Chatham County Planning and Zoning, Siler City Planning	Local	2015, Annual Updates	Educational materials are provided to the public as they are made available to the county. The county will continue to evaluate public education materials and update them as necessary on an annual basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	The Chatham County Environmental Health has received training on erosion and sedimentation methods. This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Resources within the department and filled the position with a professional engineer that is also a certified flood manager (CFM). On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.	Flood	High	Chatham County Environmental Health, Chatham County Public Works, Siler City Public Works	Local	2015, Annual Evaluation	This program has been restructured to be in the Chatham County Public Works Department and includes two positions. The County has also created a position of Director of Environmental Quality within the department and filled the position with a professional engineer. On an annual basis, these people make numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owners or developer and are usually handled through the development review process.
Previously Completed Mitigation Actions							
	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Moderate	Siler City	Local	2006-2007	Completed.
	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Moderate	Siler City	Local	2006	Completed.
	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Moderate	Siler City	Local	2008	Completed.
	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Moderate	Siler City	Local	2008	Completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Revise and update the regulator floodplain maps.	Flood	High	Siler City	Federal, State	2006	Completed.
	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	Siler City	Local	2008	Completed.

Annex B
Harnett County

This annex includes jurisdiction-specific information for Harnett County and its participating municipalities. It consists of the following five subsections:

- B.1 Harnett County Community Profile
- B.2 Harnett County Risk Assessment
- B.3 Harnett County Vulnerability Assessment
- B.4 Harnett County Capability Assessment
- B.5 Harnett County Mitigation Strategy

B.1 HARNETT COUNTY COMMUNITY PROFILE

B.1.1 Geography and the Environment

Harnett County is located in the south central portion of North Carolina lying partially in the Coastal Plain and partially in the Piedmont. It comprises five municipalities, the Town of Angier, Town of Coats, Town of Dunn, Town of Erwin, and Town of Lillington, as well as many small unincorporated communities. An orientation map is provided as **Figure B.1**.

The eastern two-thirds of Harnett County generally exhibits topographic features common to the Coastal Plains and is an area of level to gently rolling terrain. The western portion of the county resembles the Piedmont and is an area of steeper hills and slightly higher average elevation. The Cape Fear River and several other tributaries including the Upper Little River, Lower Little River, and Black River are the major water bodies in the county. The total area of the county is 601 square miles, 6 square miles of which is water area.

From December to February, the average high temperature is in the mid to low 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter. Snow and sleet is usually light and occurs on average once or twice per year.

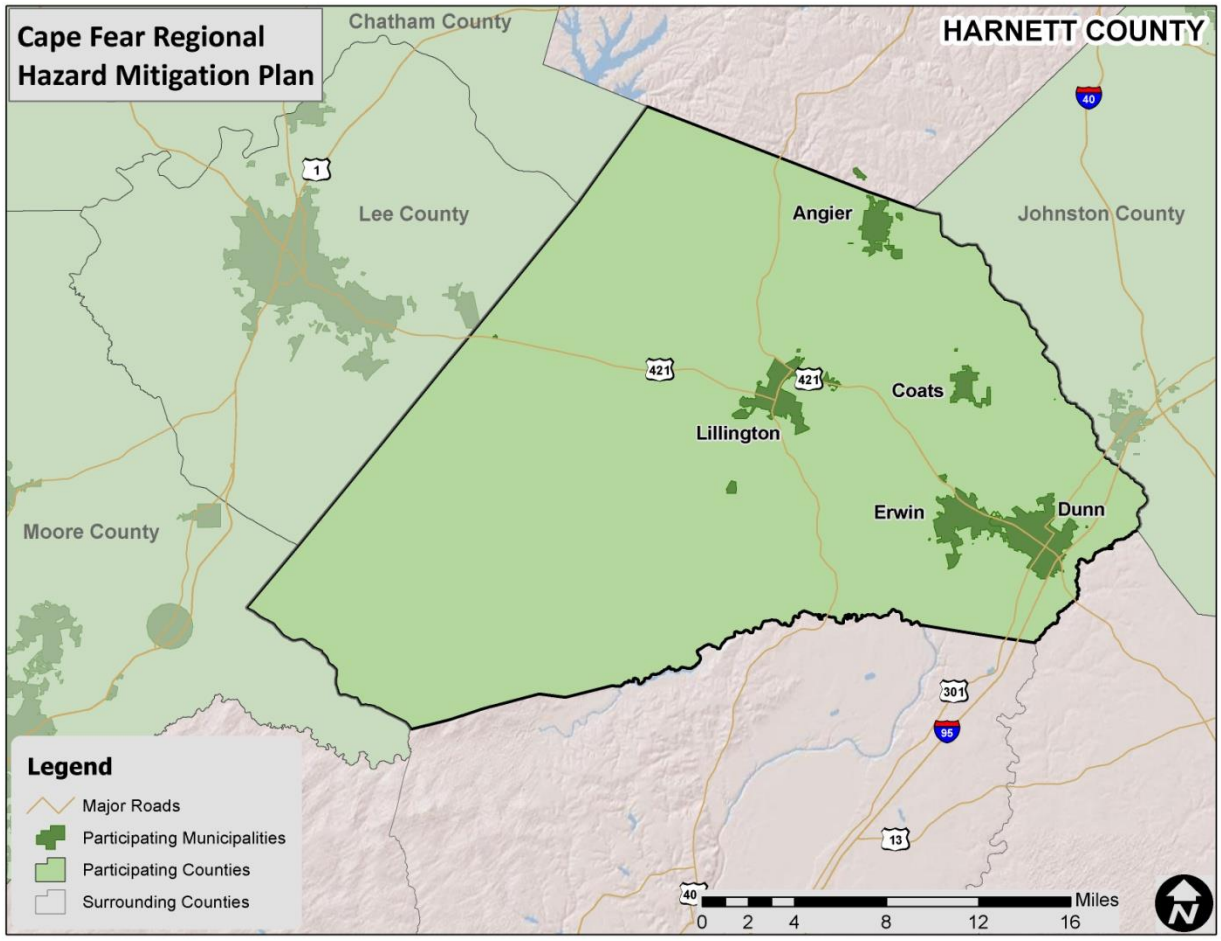
During the spring months, the days are warm and the nights are cool. Average high temperatures increase from the lower 60s in March to the upper 70s in May. There is a similar increase in average low temperatures, which start in the upper 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring.

The summer is characterized by warm temperatures and rather high humidity. Average high temperatures range from the mid to upper 80s and low temperatures average in the mid to upper 60s. Summer precipitation is normally the greatest, but also the most variable, and thunderstorms are common events.

Autumn is typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the lower 80s in September and fall

to the low to mid 60s by November. Average lows also drop significantly from the low 60s to high 30s from September to November. Autumn is the driest season.

FIGURE B.1: HARNETT COUNTY ORIENTATION MAP



B.1.2 Population and Demographics

According to the 2010 Census, Harnett County has a population of 114,678 people, however, as of July 1 2012, the Census Bureau estimates the population at 122,135 for the county. The county has seen 26 percent growth between 2000 and 2010, and the average population density is 193 people per square mile. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for the county and participating municipalities are presented in **Table B.1**.

TABLE B.1: POPULATION COUNTS FOR HARNETT COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Harnett County	**67,822**	**91,025**	**114,678**	**26.0%**
Town of Angier	2,235	3,419	4,350	27.2%
Town of Coats	1,493	1,845	2,112	14.5%

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
City of Dunn	8,336	9,196	9,263	0.7%
Town of Erwin	4,061	4,537	4,405	-2.9%
Town of Lillington	2,048	2,195	3,194	45.5%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Harnett County is 33.5 years. The racial characteristics of the county and participating municipalities are presented in **Table A.2**. Whites make up the majority of the population in the county, accounting for around 68 percent of the population.

TABLE B.2: DEMOGRAPHICS OF HARNETT COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Harnett County	**68.3%**	**20.9%**	**1.2%**	**0.9%**	**0.1%**	**5.5%**	**3.1%**	**10.8%**
Town of Angier	61.7%	21.7%	0.8%	0.6%	0.0%	13.1%	2.1%	20.3%
Town of Coats	72.3%	12.2%	0.9%	0.2%	0.0%	11.5%	2.9%	16.4%
City of Dunn	50.2%	42.5%	1.0%	0.8%	0.1%	3.2%	2.2%	5.3%
Town of Erwin	74.0%	17.3%	0.9%	0.3%	0.0%	4.9%	2.6%	7.4%
Town of Lillington	53.5%	39.8%	0.9%	0.9%	0.3%	2.9%	1.6%	8.8%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

B.1.3 Housing

According to the 2010 U.S. Census, there are 46,731 housing units in Harnett County, the majority of which are single family homes or mobile homes. Housing information for the county and towns is presented in **Table B.3**. As shown in the table, the county and towns all have a very low percentage of seasonal units.

TABLE B.3: HOUSING CHARACTERISTICS OF HARNETT COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Harnett County	**38,605**	**46,731**	**0.6%**	**$123,500**
Town of Angier	1,478	1,829	0.2%	$138,200
Town of Coats	844	935	0.3%	$97,400
City of Dunn	4,100	4,417	0.6%	$104,700
Town of Erwin	2,032	2,015	0.4%	$87,700
Town of Lillington	894	1,122	0.2%	$108,800

Source: United States Census Bureau

B.1.4 Infrastructure

Transportation

There are several major highways that cross Harnett County. Interstate 95 passes directly through the county, traversing northeast to southwest through Dunn. US Route 421 is the major east-west thoroughfare which connects Harnett County to Lee County. US-401 is the major north-south thoroughfare which connects Harnett County to Wake County and the Triangle. Highway 210 runs between Angier and Lillington and south into Fayetteville. There is also a designated scenic byway in Harnett County, Averasboro Battlefield Scenic Byway, which follows the route of Union General William T. Sherman's march through the Cape Fear River Valley.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to Harnett County. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 40 miles from Lillington. An additional relief airport, Raleigh Exec, is also located nearby in Sanford and provides additional capacity to the RDU airport. An additional general aviation airport servicing the county is the Harnett Regional Jetport.

Utilities

Electrical power in Harnett County is provided by one public utility and two electricity cooperatives. Duke Energy Progress serves major portions of the county while Central Electric Membership Corporation serves rural customers in southwestern corner of the county and South River Electric Membership Corporation services rural areas in the central and southeastern portion of the county.

Water and sewer service in the county is provided by Harnett County Department of Public Utilities, which provides service to county residents as well as surrounding communities. The Towns of Angier and Erwin and the City of Dunn have their own water supply systems (that serve their respective jurisdictions) and the Towns of Angier, Erwin, and Lillington and the City of Dunn provide their own wastewater collection and treatment services as well. Approximately 98 percent of all Harnett County residents have access to public water; however, some parts of the county do require the use of wells and septic systems.

Community Facilities

There are a number of buildings and community facilities located throughout Harnett County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 19 fire stations, 9 police stations, and 33 public schools located within the county.

There are three medical care facilities located in Harnett County. The largest of the facilities is the Betsy Johnson Hospital, a 199-bed acute care hospital, located in Dunn, and the other two facilities are Good Hope Hospital located in Erwin and Central Harnett Hospital located just outside of Lillington.

In addition to the Cape Fear River Trail Park and Raven Rock State Park, the county contains numerous local parks and recreation areas. These facilities offer recreational opportunities to area residents and many visitors each year.

B.1.5 Land Use

Harnett County is experiencing growth and development due to its proximity to the major metropolitan areas in the Triangle and Triad. There are several incorporated municipalities located throughout the county which make up most of the county's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with some agricultural and recreational uses in the more rural areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

B.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Harnett County had an average annual employment of 44,724 workers and an average unemployment rate of 10.6 percent (compared to 8.0 percent for the state). In 2012, the Educational Services industry employed the most people, with 17.4 percent of the workforce, followed by Retail Trade (16.8%); Health Care and Social Assistance (14.4%); and Accommodation and Food Services (10.2%). The American Community Survey (ACS) found the average annual median household income in Harnett County was $44,242 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

B.2 HARNETT COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Harnett County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

B.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, Harnett County has had drought occurrences in each of the last fourteen years (2000-2013). **Table B.4** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE B.4: HISTORICAL DROUGHT OCCURRENCES IN HARNETT COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Harnett County
2000	MODERATE
2001	SEVERE
2002	**EXCEPTIONAL**
2003	ABNORMAL
2004	ABNORMAL
2005	SEVERE
2006	SEVERE
2007	**EXCEPTIONAL**
2008	**EXCEPTIONAL**
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE

Source: North Carolina Drought Monitor

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Harnett County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

B.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Harnett County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Harnett County. Two events were reported.

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

July 20, 2005 – *Excessive Heat* – A migrant worker collapsed and died from heat stroke in Harnett County near Erwin. The man collapsed on a tobacco farm and was transported to UNC Hospital where he later died.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1915. The recorded maximum for Harnett County can be found below in **Table B.5**.

TABLE B.5: HIGHEST RECORDED TEMPERATURE IN HARNETT COUNTY

Location	Date	Temperature (F)
Dunn 4 NW	8/22/1983	108
HARNETT COUNTY MAXIMUM	--	**108**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the county. The most centralized location is Dunn. **Table B.6** shows the average maximum temperatures from 1971 to 2000 at the Dunn 4 NW observation station which can be used as a general comparison for the county.

TABLE B.6: AVERAGE MAXIMUM TEMPERATURE IN DUNN 4 NW, HARNETT COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	50.8	54.9	63.2	72.0	78.8	85.4	88.9	87.1	81.7	72.4	63.2	54.0

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Harnett County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county.

B.2.3 Hailstorm

Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Harnett County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

Historical Occurrences

According to the National Climatic Data Center, 108 recorded hailstorm events have affected Harnett County since 1975.[1] **Table B.7** is a summary of the hail events in Harnett County. **Table B.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in over $105,000 (2013 dollars) in property damages. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE B.7: SUMMARY OF HAIL OCCURRENCES IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	3	0/0	$72,567

[1] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected Harnett County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Coats	5	0/0	$0
Dunn	8	0/0	$0
Erwin	9	0/0	$0
Lillington	15	0/0	$0
Unincorporated Area	68	0/0	$32,598
HARNETT COUNTY TOTAL	**108**	**0/0**	**$105,165**

Source: National Climatic Data Center

TABLE B.8: HISTORICAL HAIL OCCURRENCES IN HARNETT COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Angier				
ANGIER	8/5/1997	1.75 in.	0/0	$72,567
ANGIER	4/1/2001	0.75 in.	0/0	$0
ANGIER	5/18/2006	0.88 in.	0/0	$0
Coats				
COATS	5/26/1998	0.88 in.	0/0	$0
COATS	6/3/2000	1.75 in.	0/0	$0
COATS	4/1/2001	1.00 in.	0/0	$0
COATS	10/21/2005	0.75 in.	0/0	$0
COATS	5/20/2006	1.00 in.	0/0	$0
Dunn				
DUNN	7/5/1997	0.75 in.	0/0	$0
DUNN	1/16/1998	0.75 in.	0/0	$0
DUNN	6/3/2000	0.75 in.	0/0	$0
DUNN	5/12/2001	0.88 in.	0/0	$0
DUNN	5/12/2001	0.88 in.	0/0	$0
DUNN	5/9/2008	1.00 in.	0/0	$0
DUNN	5/22/2012	0.88 in.	0/0	$0
DUNN	5/22/2012	1.00 in.	0/0	$0
Erwin				
ERWIN	4/15/1996	0.75 in.	0/0	$0
ERWIN	5/6/1996	1.00 in.	0/0	$0
ERWIN	5/11/1996	0.88 in.	0/0	$0
ERWIN	4/1/1998	1.75 in.	0/0	$0
ERWIN	4/1/1998	0.75 in.	0/0	$0
ERWIN	4/11/1999	1.00 in.	0/0	$0
ERWIN	5/21/2000	1.00 in.	0/0	$0
ERWIN	6/12/2006	1.00 in.	0/0	$0
ERWIN	5/20/2008	1.75 in.	0/0	$0
Lillington				
Lillington	4/26/1993	0.75 in.	0/0	$0
Lillington	5/19/1995	1.00 in.	0/0	$0
LILLINGTON	4/15/1996	0.75 in.	0/0	$0
LILLINGTON	5/24/1996	1.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
LILLINGTON	9/8/1996	0.75 in.	0/0	$0
LILLINGTON	3/20/1998	1.75 in.	0/0	$0
LILLINGTON	5/8/1998	0.75 in.	0/0	$0
LILLINGTON	8/26/1999	1.00 in.	0/0	$0
LILLINGTON	8/26/1999	0.75 in.	0/0	$0
LILLINGTON	8/27/2001	0.75 in.	0/0	$0
LILLINGTON	5/25/2003	1.75 in.	0/0	$0
LILLINGTON	5/14/2006	0.75 in.	0/0	$0
LILLINGTON	6/13/2007	0.88 in.	0/0	$0
LILLINGTON	5/20/2008	1.75 in.	0/0	$0
LILLINGTON	5/20/2008	1.75 in.	0/0	$0
Unincorporated Area				
Harnett County	7/8/1975	0.75 in.	0/0	$0
Harnett County	7/15/1975	0.75 in.	0/0	$0
Harnett County	5/18/1976	1.75 in.	0/0	$0
Harnett County	4/27/1982	1.75 in.	0/0	$0
Harnett County	3/28/1984	1.75 in.	0/0	$0
Harnett County	4/14/1984	0.75 in.	0/0	$0
Harnett County	4/14/1984	0.75 in.	0/0	$0
Harnett County	5/8/1984	1.00 in.	0/0	$0
Harnett County	3/24/1985	0.75 in.	0/0	$0
Harnett County	3/24/1985	0.75 in.	0/0	$0
Harnett County	6/5/1985	1.75 in.	0/0	$0
Harnett County	2/19/1986	1.25 in.	0/0	$0
Harnett County	4/26/1986	0.75 in.	0/0	$0
Harnett County	6/24/1986	1.00 in.	0/0	$0
Harnett County	7/27/1986	1.75 in.	0/0	$0
Harnett County	6/2/1988	1.75 in.	0/0	$0
Harnett County	6/9/1988	0.75 in.	0/0	$0
Harnett County	6/9/1988	2.75 in.	0/0	$0
Harnett County	3/6/1989	0.75 in.	0/0	$0
Harnett County	6/5/1989	1.75 in.	0/0	$0
Harnett County	7/1/1990	0.75 in.	0/0	$0
Harnett County	5/18/1992	0.75 in.	0/0	$0
Harnett County	6/19/1992	0.75 in.	0/0	$0
Harnett County	7/5/1992	0.75 in.	0/0	$0
Harnett County	7/26/1992	0.75 in.	0/0	$0
Harnett County	11/25/1992	0.75 in.	0/0	$0
Harnett County	5/1/1994	0.75 in.	0/0	$0
NR Kipling	3/23/1995	0.75 in.	0/0	$0
Harnett County	5/15/1995	1.75 in.	0/0	$0
ANDERSON CREEK	5/8/1998	1.00 in.	0/0	$0
OLIVIA	5/23/1998	0.88 in.	0/0	$0
SPOUT SPGS	6/2/1998	1.00 in.	0/0	$0
ANDERSON CREEK	3/21/1999	0.75 in.	0/0	$0
ANDERSON CREEK	5/21/2000	1.00 in.	0/0	$0
CENTRAL PORTION	6/3/2000	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
PINEVIEW	7/16/2000	1.00 in.	0/0	$0
SPOUT SPGS	7/16/2000	1.75 in.	0/0	$0
MAMERS	4/1/2001	1.00 in.	0/0	$0
COKESBURY	6/22/2001	0.75 in.	0/0	$0
MAMERS	6/22/2001	1.00 in.	0/0	$0
ANDERSON CREEK	5/31/2003	0.88 in.	0/0	$0
OLIVIA	7/2/2003	0.75 in.	0/0	$0
ANDERSON CREEK	4/10/2004	0.75 in.	0/0	$0
OLIVIA	5/22/2004	0.75 in.	0/0	$0
PINEVIEW	5/22/2004	0.75 in.	0/0	$0
PINEVIEW	5/23/2004	0.88 in.	0/0	$0
ANDERSON CREEK	5/30/2004	1.75 in.	0/0	$0
ANDERSON CREEK	7/8/2004	1.75 in.	0/0	$0
ANDERSON CREEK	3/28/2005	0.88 in.	0/0	$0
PINEVIEW	7/13/2005	1.00 in.	0/0	$0
SEMINOLE	1/11/2006	0.75 in.	0/0	$0
ANDERSON CREEK	4/3/2007	1.75 in.	0/0	$0
JOHNSONVILLE	4/15/2007	0.88 in.	0/0	$0
BUIES CREEK	6/29/2007	1.00 in.	0/0	$0
LUART	5/9/2008	0.75 in.	0/0	$0
BUIES CREEK	5/20/2008	1.00 in.	0/0	$0
BUIES CREEK	6/14/2008	0.75 in.	0/0	$0
NORRINGTON XRDS	6/20/2008	0.75 in.	0/0	$0
BUIES CREEK	6/22/2008	2.00 in.	0/0	$0
BOONE TRAIL	8/7/2008	0.75 in.	0/0	$0
ANDERSON CREEK	4/24/2009	2.75 in.	0/0	$32,598
ANDERSON CREEK	4/24/2009	1.25 in.	0/0	$0
NORRINGTON XRDS	4/24/2009	0.75 in.	0/0	$0
KIPLING	8/5/2009	0.75 in.	0/0	$0
KIPLING	7/29/2010	1.00 in.	0/0	$0
BOONE TRAIL	5/22/2012	0.75 in.	0/0	$0
BOONE TRAIL	5/22/2012	0.75 in.	0/0	$0
JOHNSONVILLE	5/23/2012	1.00 in.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Harnett County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

B.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Harnett County. The entire county is equally susceptible to hurricane and tropical storms.

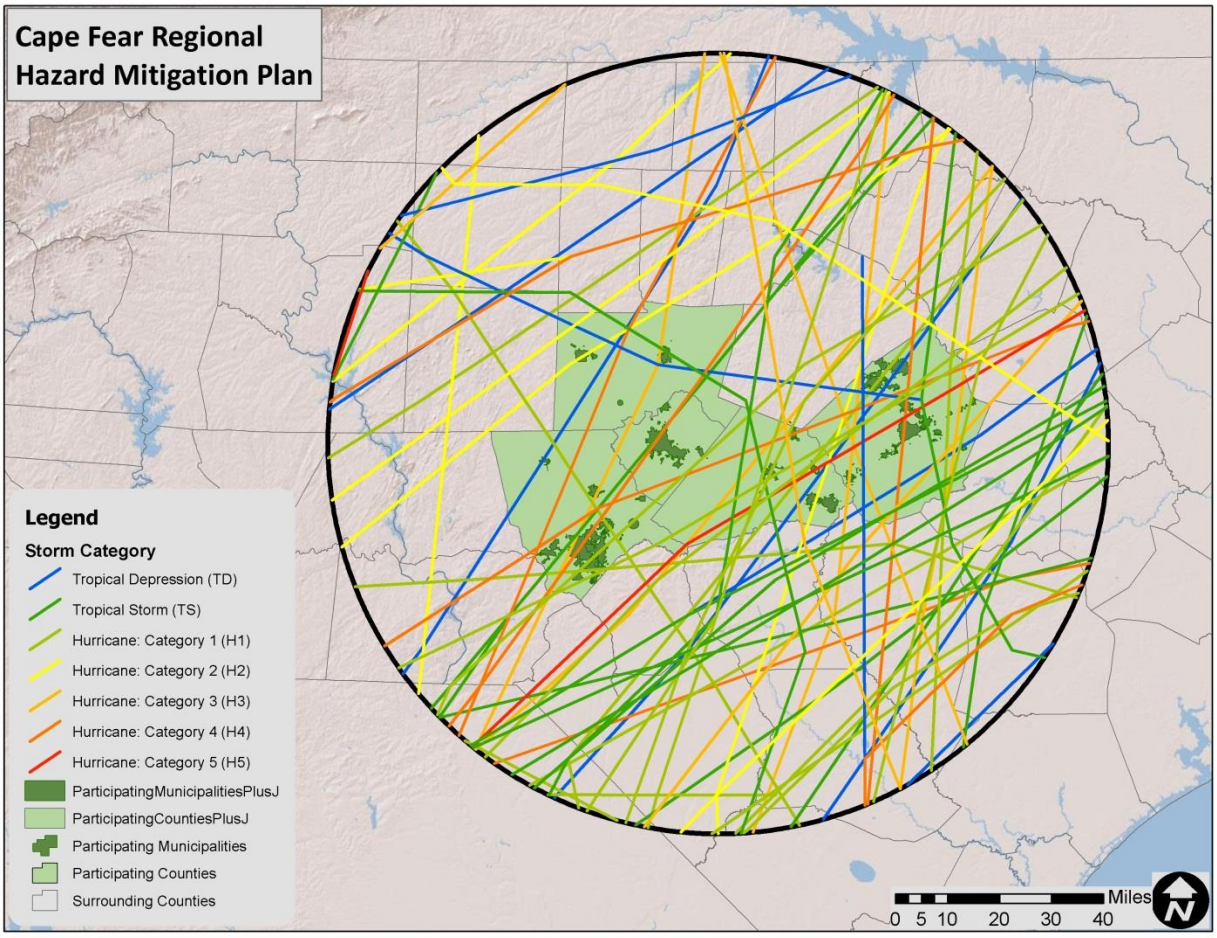
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[2] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

Of the recorded storm events, 16 have traversed directly through Harnett County as shown in **Figure B.2**. **Table B.9** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cape Fear Region) and Maximum Category of the storm based on the Saffir-Simpson Scale for each event.

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE B.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE B.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center has reported six events associated with a hurricane or tropical storm in Harnett County since 1996. These storms are listed in **Table B.10** and are generally representative of storms with the greatest impact on the county over that time period.

TABLE B.10: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN HARNETT COUNTY

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
8/27/1998	Hurricane Bonnie	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$645,322,144
8/30/2004	Tropical Depression Gaston	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that three disaster declarations were made in 1996 (Hurricane Fran), 1999 (Hurricane Floyd), and 2003 (Hurricane Isabel) for the county.[3]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in Harnett County as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Tropical Storm Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per

[3] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

Probability of Future Occurrences
Given the inland location of the county, Harnett County is less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the county's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historic evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. When the county is impacted, the damage could be significant, threatening lives and property throughout the planning area.

B.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Harnett County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been four recorded lightning events in Harnett County since 1997, as listed in summary **Table B.11**.[4] These events resulted in almost $118,000 (2013 dollars) in damages and caused one injury. A complete listing of events can be found in **Table B.12**. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE B.11: SUMMARY OF LIGHTNING OCCURRENCES IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	0	0/0	$0
Coats	0	0/0	$0
Dunn	1	0/0	$1,087
Erwin	0	0/0	$0
Lillington	1	0/0	$36,283

[4] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in Harnett County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Unincorporated Area	2	0/1	$80,211
HARNETT COUNTY TOTAL	**4**	**0/1**	**$117,581**

Source: National Climatic Data Center

TABLE B.12: HISTORIC LIGHTNING OCCURRENCES IN HARNETT COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Angier				
None Reported	--	--	--	--
Coats				
None Reported	--	--	--	--
Dunn				
DUNN	7/16/09	0/0	$1,087	Power lines were reported down across Tilghman Drive in Dunn, North Carolina, from an apparent lightning strike.
Erwin				
None Reported	--	--	--	--
Lillington				
LILLINGTON	6/18/97	0/0	$36,283	THE HARNETT COUNTY SHERIFF REPORTED THAT A HOUSE WAS STRUCK BY LIGHTNING, CAUSING SIGNIFICANT ROOF DAMAGE.
Unincorporated Area				
OLIVIA	6/5/06	0/1	$0	
COKESBURY	3/28/10	0/0	$80,211	Lightning struck three full sized pine trees where the runners then ripped through the electrical heating and air conditioning compressor behind the house before entering the home through its exterior receptacles. The electrical wiring through the home was completely destroyed. The lightning also severely damaged a full size SUV.

*Property Damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Harnett County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Harnett County is located in

an area of the country that experienced an average of 4 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

B.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Harnett County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Harnett County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms were at least partially responsible for one disaster declaration in Harnett County in 2011.[5] According to NCDC, there have been 158 reported thunderstorm wind and high wind events since 1968 in Harnett County.[6] These events caused almost $1.1 million (2013 dollars) in damages. There were also reports of one fatality and six injuries. **Table B.13** summarizes this information. **Table B.14** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event. [7]

TABLE B.13: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	6	0/0	$0
Coats	7	0/0	$7,864
Dunn	11	0/0	$39,736
Erwin	4	0/0	$0
Lillington	21	0/0	$40,515
Unincorporated Area	109	1/6	$1,086,189
HARNETT COUNTY TOTAL	**158**	**1/6**	**$1,086,189**

Source: National Climatic Data Center

TABLE B.14: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN HARNETT COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Angier					
Angier	7/10/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0

[5] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[6] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional thunderstorm events have occurred in Harnett County. As additional local data becomes available, this hazard profile will be amended.
[7] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
ANGIER	6/4/2004	TSTM WIND	60 kts.	0/0	$0
ANGIER	6/11/2006	TSTM WIND	50 kts.	0/0	$0
ANGIER	6/11/2006	TSTM WIND	50 kts.	0/0	$0
ANGIER	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
ANGIER	9/14/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
Coats					
Coats	7/17/1994	THUNDERSTORM WINDS	0 kts.	0/0	$7,864
COATS	11/8/1996	TSTM WIND	50 kts.	0/0	$0
COATS	6/8/2006	TSTM WIND	50 kts.	0/0	$0
COATS	7/27/2006	TSTM WIND	50 kts.	0/0	$0
COATS	3/2/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS	7/16/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS	7/16/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
Dunn					
DUNN	2/21/1997	TSTM WIND	50 kts.	0/0	$0
DUNN	8/18/2000	TSTM WIND	50 kts.	0/0	$0
DUNN	9/25/2000	TSTM WIND	50 kts.	0/0	$0
DUNN	5/13/2002	TSTM WIND	50 kts.	0/0	$0
DUNN	7/11/2003	TSTM WIND	50 kts.	0/0	$0
DUNN	1/14/2006	TSTM WIND	60 kts.	0/0	$0
DUNN	6/12/2006	TSTM WIND	50 kts.	0/0	$28,871
DUNN	6/12/2006	TSTM WIND	50 kts.	0/0	$0
DUNN	7/27/2006	TSTM WIND	50 kts.	0/0	$0
DUNN	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
DUNN	7/27/2009	THUNDERSTORM WIND	50 kts.	0/0	$10,866
Erwin					
ERWIN	7/16/1997	TSTM WIND	50 kts.	0/0	$0
ERWIN	3/8/2005	TSTM WIND	60 kts.	0/0	$0
ERWIN	7/31/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
ERWIN	7/31/2009	THUNDERSTORM WIND	50 kts.	0/0	$1,015
Lillington					
Lillington	1/24/1993	THUNDERSTORM WINDS	0 kts.	0/0	$0
LILLINGTON	4/20/1996	TSTM WIND	0 kts.	0/0	$0
LILLINGTON	5/24/1996	TSTM WIND	0 kts.	0/0	$29,693
LILLINGTON	6/24/1996	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	7/25/1996	TSTM WIND	0 kts.	0/0	$0
LILLINGTON	7/28/1996	TSTM WIND	0 kts.	0/0	$0
LILLINGTON	7/22/1998	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	3/3/1999	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	5/13/2002	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	11/5/2002	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	7/10/2003	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	7/10/2003	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	9/17/2004	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	6/11/2006	TSTM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
LILLINGTON	7/27/2006	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	7/28/2006	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	8/30/2006	TSTM WIND	50 kts.	0/0	$0
LILLINGTON	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
LILLINGTON	5/20/2008	THUNDERSTORM WIND	50 kts.	0/0	$10,822
LILLINGTON	7/27/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
LILLINGTON	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
Unincorporated Area					
Harnett County	7/19/1968	TSTM WIND	0 kts.	0/0	$0
Harnett County	4/2/1970	TSTM WIND	70 kts.	0/0	$0
Harnett County	7/6/1971	TSTM WIND	0 kts.	0/0	$0
Harnett County	5/28/1973	TSTM WIND	0 kts.	0/0	$0
Harnett County	5/29/1973	TSTM WIND	0 kts.	0/0	$0
Harnett County	3/24/1975	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/8/1975	TSTM WIND	0 kts.	0/0	$0
Harnett County	9/22/1975	TSTM WIND	0 kts.	0/0	$0
Harnett County	4/4/1976	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/9/1976	TSTM WIND	87 kts.	0/0	$0
Harnett County	5/13/1978	TSTM WIND	0 kts.	0/0	$0
Harnett County	3/17/1980	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/16/1982	TSTM WIND	0 kts.	0/0	$0
Harnett County	9/20/1982	TSTM WIND	0 kts.	0/0	$0
Harnett County	9/20/1982	TSTM WIND	0 kts.	0/0	$0
Harnett County	2/23/1983	TSTM WIND	0 kts.	0/0	$0
Harnett County	3/20/1984	TSTM WIND	0 kts.	0/0	$0
Harnett County	4/14/1984	TSTM WIND	0 kts.	0/0	$0
Harnett County	4/14/1984	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/16/1984	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/27/1984	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/5/1985	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/5/1985	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/10/1985	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/28/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/21/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/29/1986	TSTM WIND	0 kts.	0/0	$0
Harnett County	5/25/1987	TSTM WIND	0 kts.	0/0	$0
Harnett County	8/4/1987	TSTM WIND	0 kts.	0/0	$0
Harnett County	8/4/1987	TSTM WIND	0 kts.	0/0	$0
Harnett County	8/21/1987	TSTM WIND	0 kts.	0/0	$0
Harnett County	8/29/1987	TSTM WIND	0 kts.	0/0	$0
Harnett County	5/17/1988	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/2/1988	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Harnett County	6/26/1988	TSTM WIND	0 kts.	0/0	$0
Harnett County	2/21/1989	TSTM WIND	0 kts.	1/5	$0
Harnett County	5/5/1989	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/2/1989	TSTM WIND	0 kts.	0/0	$0
Harnett County	6/15/1989	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/16/1989	TSTM WIND	0 kts.	0/0	$0
Harnett County	2/16/1990	TSTM WIND	0 kts.	0/1	$0
Harnett County	5/1/1990	TSTM WIND	0 kts.	0/0	$0
Harnett County	5/2/1990	TSTM WIND	0 kts.	0/0	$0
Harnett County	7/1/1990	TSTM WIND	0 kts.	0/0	$0
Harnett County	3/19/1992	TSTM WIND	0 kts.	0/0	$0
Harnett County	3/19/1992	TSTM WIND	0 kts.	0/0	$0
Harnett County	4/24/1992	TSTM WIND	52 kts.	0/0	$0
Harnett County	4/24/1992	TSTM WIND	0 kts.	0/0	$0
Buies Creek	8/27/1994	THUNDERSTORM WINDS	0 kts.	0/0	$0
Mamers	1/7/1995	THUNDERSTORM WINDS	0 kts.	0/0	$917,387
NW North Carolina	3/8/1995	HIGH WINDS	0 kts.	0/0	$0
Harnett County	6/12/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Harnett County	2/3/1998	HIGH WIND	35 kts.	0/0	$0
Harnett County	2/16/1998	HIGH WIND	52 kts.	0/0	$0
ANDERSON CREEK	5/23/1998	TSTM WIND	50 kts.	0/0	$0
OLIVIA	6/3/1998	TSTM WIND	50 kts.	0/0	$0
KIPLING	4/17/2000	TSTM WIND	50 kts.	0/0	$0
COUNTYWIDE	9/25/2000	TSTM WIND	50 kts.	0/0	$0
BUIES CREEK	9/24/2001	TSTM WIND	50 kts.	0/0	$13,154
SEMINOLE	7/31/2002	TSTM WIND	50 kts.	0/0	$0
Harnett County	3/7/2004	HIGH WIND	65 kts.	0/0	$6,446
MAMERS	5/2/2004	TSTM WIND	60 kts.	0/0	$0
COKESBURY	5/23/2004	TSTM WIND	50 kts.	0/0	$0
DUNCAN	6/11/2006	TSTM WIND	50 kts.	0/0	$0
SEMINOLE	7/4/2006	TSTM WIND	50 kts.	0/0	$0
ANDERSON CREEK	7/15/2006	TSTM WIND	50 kts.	0/0	$0
ANDERSON CREEK	7/19/2006	TSTM WIND	50 kts.	0/0	$0
ANDERSON CREEK	7/19/2006	TSTM WIND	50 kts.	0/0	$0
PINEVIEW	7/28/2006	TSTM WIND	50 kts.	0/0	$0
OVERHILLS	3/2/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
JOHNSONVILLE	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
BUIES CREEK	6/29/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
BUIES CREEK	8/26/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
PINEVIEW	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
PINEVIEW	7/22/2008	THUNDERSTORM WIND	62 kts.	0/0	$0
ERWIN ARPT	7/31/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
OLIVIA	8/7/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
Harnett County	9/6/2008	HIGH WIND	50 kts.	0/0	$13,528
ANDERSON CREEK	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$21,732
ANDERSON CREEK	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
SPOUT SPGS	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
NORRINGTON XRDS	7/23/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BOONE TRAIL	7/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BUIES CREEK STWRT AR	6/22/2010	THUNDERSTORM WIND	50 kts.	0/0	$10,695
ANDERSON CREEK	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$1,604
LUART	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$5,347
LUART	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$2,139
MAMERS	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$10,695
ROCKEFELLER ESTATES	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
ANDERSON CREEK	7/8/2010	THUNDERSTORM WIND	50 kts.	0/0	$21,390
CHALYBEATE	7/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
BUNNLEVEL	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
NORRINGTON XRDS	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$41,453
NORRINGTON XRDS	6/21/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
ANDERSON CREEK	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
ANDERSON CREEK	9/6/2011	THUNDERSTORM WIND	50 kts.	0/0	$15,545
OLIVIA	6/22/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
FLAT BRANCH	6/25/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
RAWLS	6/29/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
BUNNLEVEL	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$2,030
SENTER	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
BUNNLEVEL	7/9/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
COKESBURY	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
LUART	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
PINEVIEW	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

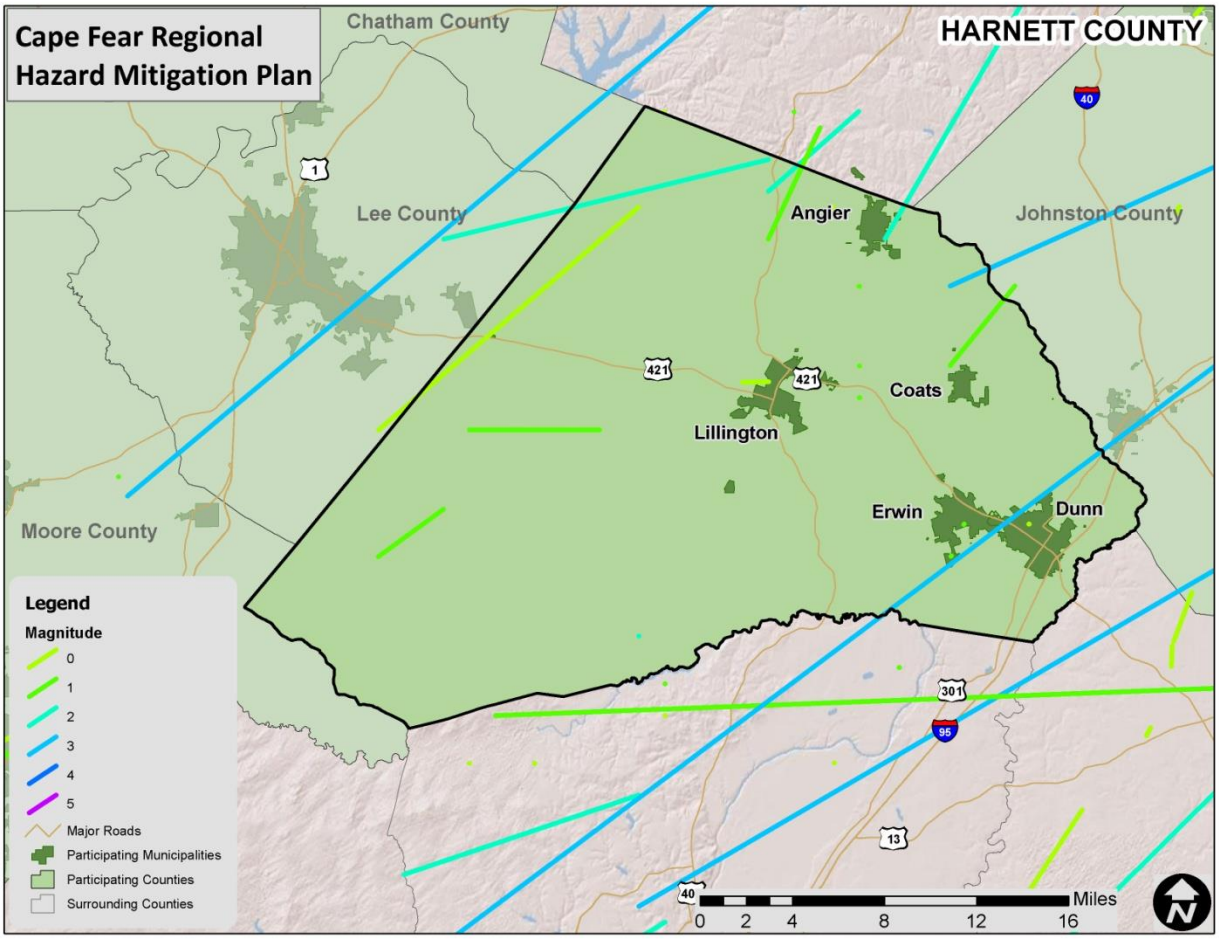
Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

B.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Harnett County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Harnett County is uniformly exposed to this hazard. With that in mind, Figure **B.3** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE A.3: HISTORICAL TORNADO TRACKS IN HARNETT COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes were at least partially responsible for one disaster declaration in Harnett County in 2011.[8] According to the National Climatic Data Center, there have been a total of 23 recorded tornado events in Harnett County since 1960 (**Table B.15**), resulting in nearly $22 million (2013 dollars) in property damages.[9] In addition, 1 fatality and 34 injuries were reported (**Table B.16**). The magnitude of these tornadoes ranges from F0 to F3 in intensity, although an F4 or F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 53 years.

TABLE B.15: SUMMARY OF TORNADO OCCURRENCES IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	1	0/0	$0

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[9] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in Harnett County. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Coats	1	0/0	$0
Dunn	0	0/0	$0
Erwin	0	0/0	$0
Lillington	1	0/0	$0
Unincorporated Area	20	1/34	$21,809,098
HARNETT COUNTY TOTAL	**23**	**1/34**	**$21,809,098**

Source: National Climatic Data Center

TABLE B.16: HISTORICAL TORNADO IMPACTS IN HARNETT COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Angier					
ANGIER	5/2/2004	F1	0/0	$0	A tornado produced damage from Jackson Road to Christian Light Road to Cokesbury Road. Three homes had roof damage, and a tree fell on a mobile home. Several sheds and vehicles were also damaged. About 3 dozen large trees were blown down or snapped.
Coats					
COATS	12/17/2000	F0	0/0	$0	Large tree limbs were blown down, smashing car windows.
Dunn					
None Reported	--	--	--	--	--
Erwin					
None Reported	--	--	--	--	--
Lillington					
LILLINGTON	9/14/2007	F0	0/0	$0	The public reported a brief tornado touchdown in the River Bluff Development on South River Road. Numerous trees were blown down in the area. The tornado touched down again briefly at 620 pm just northeast of Lillington.
Unincorporated Area					
Harnett County	2/18/1960	F1	0/0	$196,381	
Harnett County	11/2/1966	F2	0/0	$1,801,746	
Harnett County	1/5/1971	F2	0/0	$1,438,603	
Harnett County	5/17/1973	F1	0/0	$131,152	
Harnett County	5/15/1975	F1	0/0	$108,210	
Harnett County	6/16/1982	F2	0/0	$603,512	
Harnett County	7/1/1986	F1	0/0	$53,175	
Harnett County	7/1/1986	F0	0/0	$5,317	
Harnett County	6/12/1989	F1	0/0	$46,982	
Harnett County	10/23/1990	F1	0/0	$44,611	

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Harnett County	11/4/1992	F1	0/0	$4,152	
Harnett County	11/23/1992	F3	0/0	$0	
Harnett County	5/1/1994	F0	0/0	$7,864	Two miles south of Dunn, near the intersection of Highway 301 and Arrowhead Road, a small tornado destroyed a garage, which was attached to a manufactured home, on a brick foundation. The porch and the roof of the home were also damaged. Down the street a few yards, two large oak trees were uprooted and landed on the roof of a house.
Buies Creek	8/17/1994	F1	0/0	$786,355	Harnett county officials reported a tornado touched down near Buies Creek. The Emergency Management Team at the sight reported numerous trees down along with several mobile homes damaged to the point that people were trapped inside.
ANDERSON CREEK	12/17/2000	F0	0/0	$0	Windows were blown out of buildings at Ray Road and Hwy 210.
PINEVIEW	8/12/2004	F1	0/4	$0	A tornado touched down near the intersection of Highways 24 and 27, south of Pineview. The tornado moved across Heritage Park Subdivision and the Carolina Lakes Golf Course. Three mobile homes were blown off their foundations and were destroyed in and around Heritage Park. An additional two dozen homes sustained minor damage to siding, windows and shingles. The Spout Springs Presbyterian Church was also partially destroyed. In all, 120 buildings had minor damage, 23 had major damage, and 11 were condemned; of those 11, nine were completely destroyed. Four people were reported injured, three of which occurred in one of the mobile homes blown off its foundation.
ANDERSON CREEK	8/29/2004	F0	0/0	$0	A tornado touched down near Anderson Creek, snapping a couple of trees.
PINEVIEW	9/8/2004	F0	0/0	$0	A tornado touched down briefly near Barbecue, removing the tops of a few trees.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
OLIVIA	7/7/2005	F0	0/0	$0	A tornado touched down in Swann near the Harnett-Lee County Line. Several trees were blown down and twisted, and a few shingles were blown off of houses. The tornado lifted and touched down intermittently as it traveled northeast, causing minor tree damage. The tornado lifted after touching down a final time in Cokesbury.
ERWIN ARPT	4/16/2011	F2	1/24	$16,581,040	The tornado exited Cumberland County and entered Harnett County just south of Dunn. EF1 damage was common in the Dunn area, with areas of EF2 damage with wind speeds up to 130 mph. Mobile homes were completely wiped off of their foundations and trees were debarked. A second fatality occurred here when a 42 year-old Hispanic male died from injuries suffered from the tornado. The victim's body was found lying on a concrete slab, thrown from a mobile home that was destroyed. Several other residents in the mobile home park were injured, including one that was ejected from a trailer and impaled with an object, with another person trapped underneath debris. In total, 200 homes and businesses were damaged, with 40 home destroyed and another 40 homes having major damage.

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Harnett County experience a direct tornado strike. The probability of future tornado occurrences affecting Harnett County is likely (10 to 100 percent annual probability).

B.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States 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. Harnett County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in four disaster declarations in Harnett County. This includes severe ice storms in 1968 and 2002, the Blizzard of 1996, and a severe winter storm in 2000.[10] According to the National Climatic Data Center, there have been a total of 28 recorded winter storm events in Harnett County since 1993 (**Table B.17**).[11] These events resulted in over $812,000 (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table B.18**.

TABLE B.17: SUMMARY OF WINTER STORM EVENTS IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Harnett County	28	0/0	$812,486

Source: National Climatic Data Center

TABLE B.18: HISTORICAL WINTER STORM IMPACTS IN HARNETT COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Angier				
None Reported	--	--	--	--
Coats				
None Reported	--	--	--	--
Dunn				
None Reported	--	--	--	--
Erwin				
None Reported	--	--	--	--
Lillington				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	3/12/1993	WINTER STORM	2/10†	$806,869
HARNETT COUNTY	1/6/1996	ICE STORM	0/0	$0
HARNETT COUNTY	1/11/1996	ICE STORM	0/0	$0
HARNETT COUNTY	2/2/1996	ICE STORM	0/0	$0
HARNETT COUNTY	2/16/1996	HEAVY SNOW	0/0	$0
HARNETT COUNTY	1/19/1998	HEAVY SNOW	0/0	$0
HARNETT COUNTY	12/23/1998	ICE STORM	0/0	$0
HARNETT COUNTY	1/18/2000	WINTER STORM	0/0	$0
HARNETT COUNTY	1/20/2000	WINTER STORM	0/0	$0
HARNETT COUNTY	1/22/2000	WINTER STORM	0/0	$0

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[11] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional winter storm conditions have affected Harnett County.
[12] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
HARNETT COUNTY	1/24/2000	WINTER STORM	0/0	$0
HARNETT COUNTY	1/28/2000	WINTER STORM	0/0	$0
HARNETT COUNTY	11/19/2000	HEAVY SNOW	0/0	$0
HARNETT COUNTY	12/03/2000	WINTER STORM	0/0	$0
HARNETT COUNTY	1/3/2002	WINTER STORM	0/0	$0
HARNETT COUNTY	12/4/2002	WINTER STORM	0/0	$0
HARNETT COUNTY	2/16/2003	WINTER STORM	0/0	$0
HARNETT COUNTY	1/26/2004	WINTER STORM	0/0	$0
HARNETT COUNTY	2/26/2004	WINTER STORM	0/0	$0
HARNETT COUNTY	12/26/2004	WINTER STORM	0/0	$0
HARNETT COUNTY	2/1/2007	WINTER WEATHER	0/0	$0
HARNETT COUNTY	2/1/2007	WINTER STORM	0/0	$0
HARNETT COUNTY	12/7/2007	WINTER WEATHER	0/0	$5,617
HARNETT COUNTY	1/17/2008	WINTER WEATHER	0/0	$0
HARNETT COUNTY	1/19/2008	WINTER WEATHER	0/0	$0
HARNETT COUNTY	1/19/2008	WINTER STORM	0/0	$0
HARNETT COUNTY	2/4/2009	WINTER WEATHER	0/0	$0
HARNETT COUNTY	1/10/2011	WINTER STORM	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
†Deaths/injuries were not reported at the county level; potentially outside of the county.
Source: National Climatic Data Center

There have been several severe winter weather events in Harnett County. The text below describes two of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

Probability of Future Occurrences

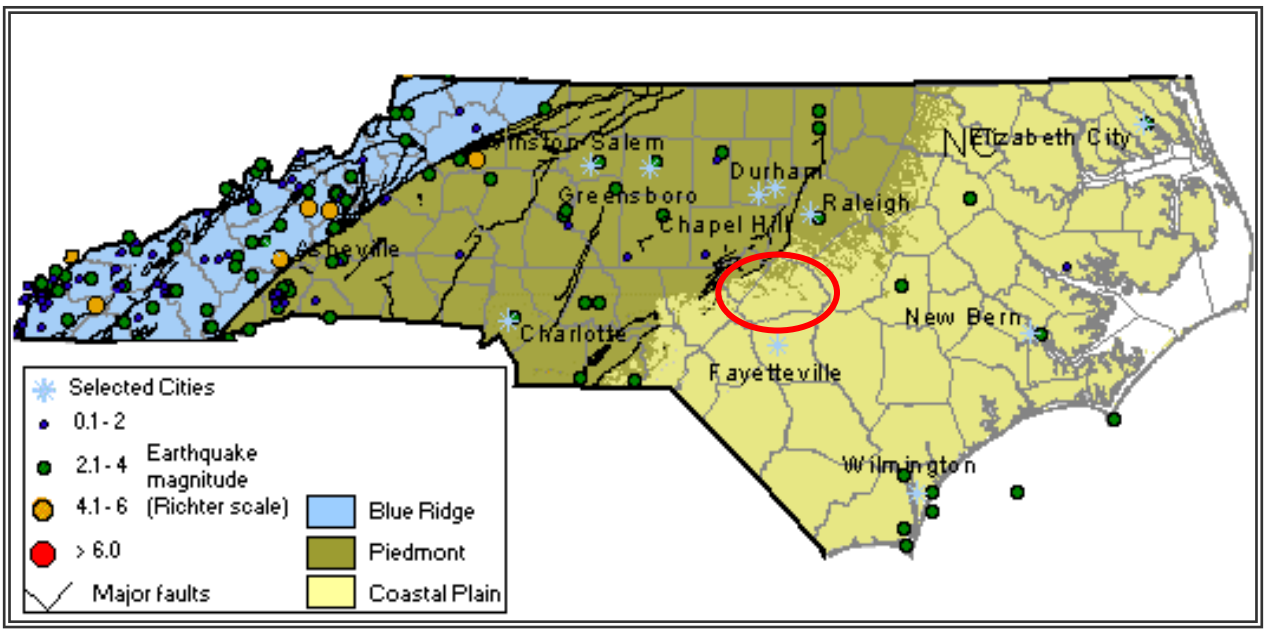
Winter storm events will remain a regular occurrence in Harnett County. According to historical information, Harnett County generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

B.2.9 Earthquake

Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure B.4** is a map showing geological and seismic information for North Carolina.

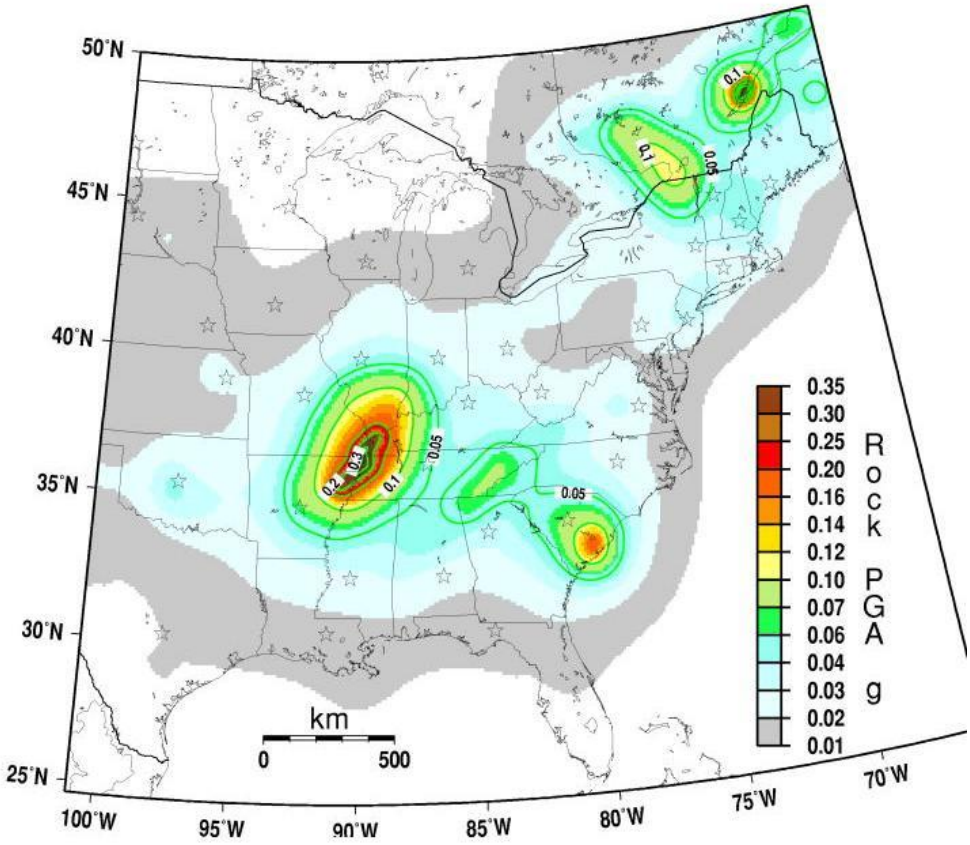
FIGURE B.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure B.5 shows the intensity level associated with Harnett County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data shows peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Harnett County lies within an approximate zone of level "2" to "4" ground acceleration. This indicates that the county exists within an area of low to moderate seismic risk.

FIGURE B.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

No earthquakes are known to have affected Harnett County since 1638. **Table B.19** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table B.20** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE B.19: SUMMARY OF SEISMIC ACTIVITY IN HARNETT COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Angier	0	--	--
Coats	0	--	--
Dunn	0	--	--
Erwin	0	--	--
Lillington	0	--	--

[13] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Unincorporated Area	0	--	--
HARNETT COUNTY TOTAL	**0**	**--**	**--**

Source: National Geophysical Data Center

TABLE B.20: SIGNIFICANT SEISMIC EVENTS IN HARNETT COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Angier				
None Reported	--	--	--	--
Coats				
None Reported	--	--	--	--
Dunn				
None Reported	--	--	--	--
Erwin				
None Reported	--	--	--	--
Lillington				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Harnett County is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 percent (unlikely).

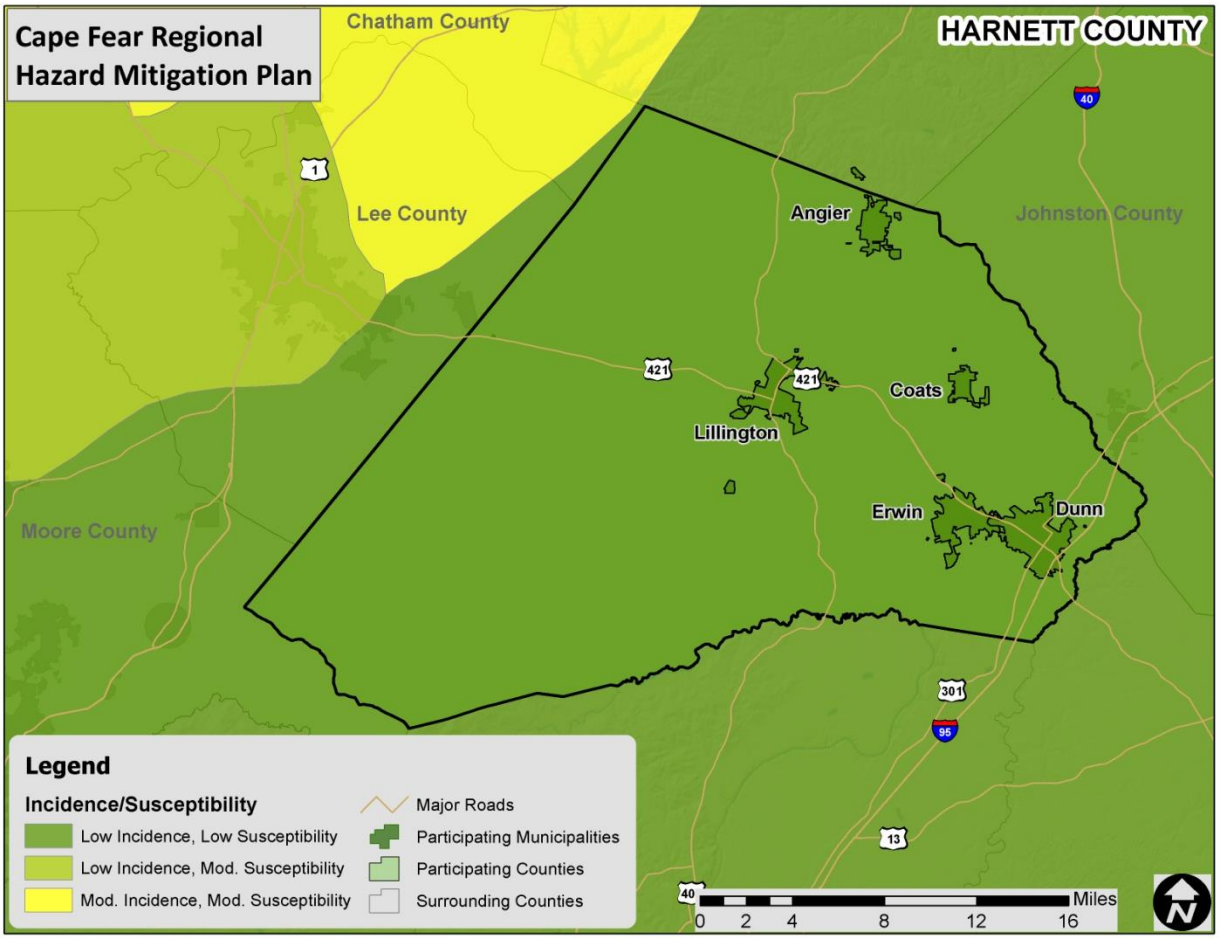
B.2.10 Landslide

Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout Harnett County.

According to **Figure B.6** below, the county has low landslide activity. There is low susceptibility across the county.

FIGURE B.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF HARNETT COUNTY

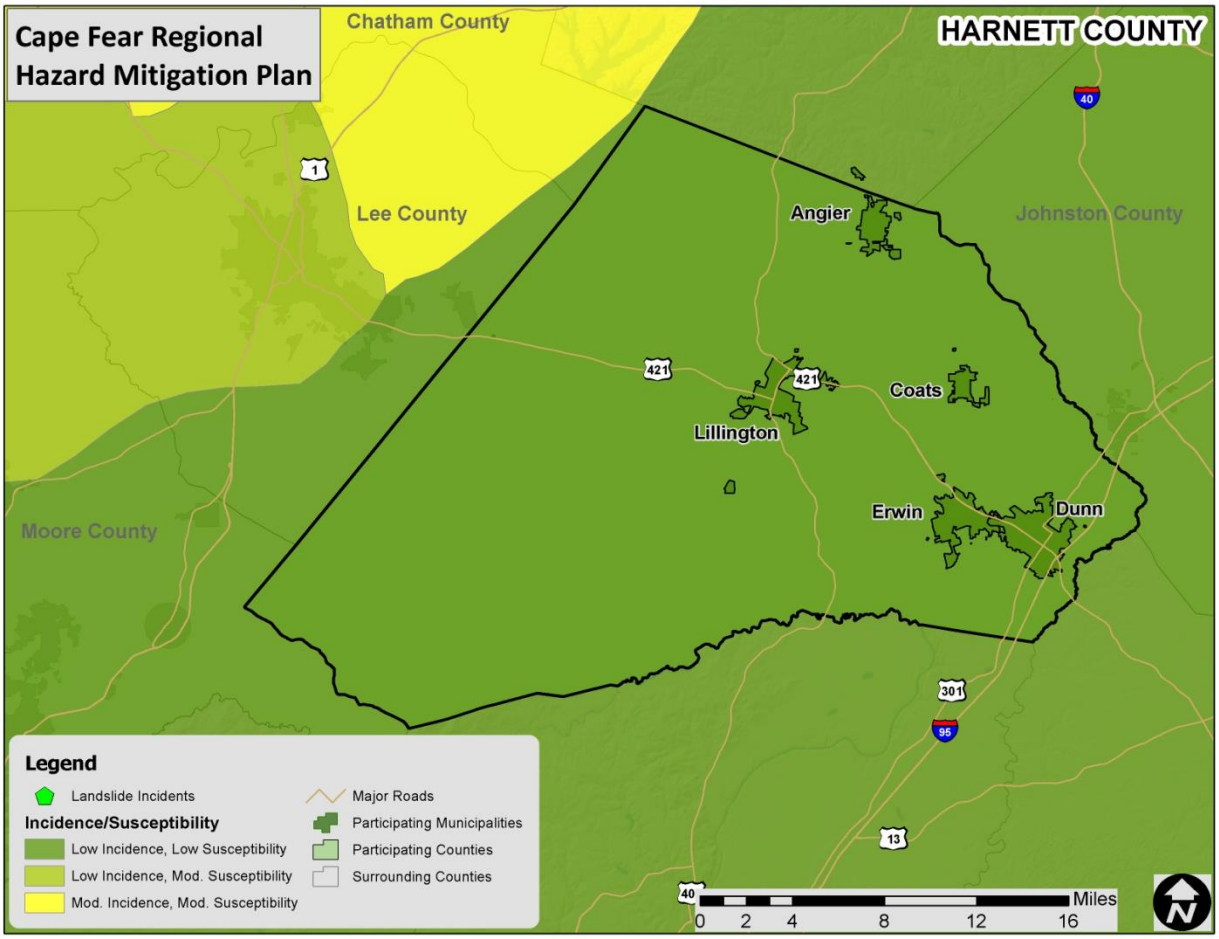


Source: United States Geological Survey

Historical Occurrences

Harnett County has low susceptibility to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the county, it should be noted that the North Carolina Geological Survey emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The locations of landslide events that occurred nearby the county are presented in **Figure B.7**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE B.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN HARNETT COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Harnett County have greater risk than others given factors such as steepness on slope and modification of slopes.

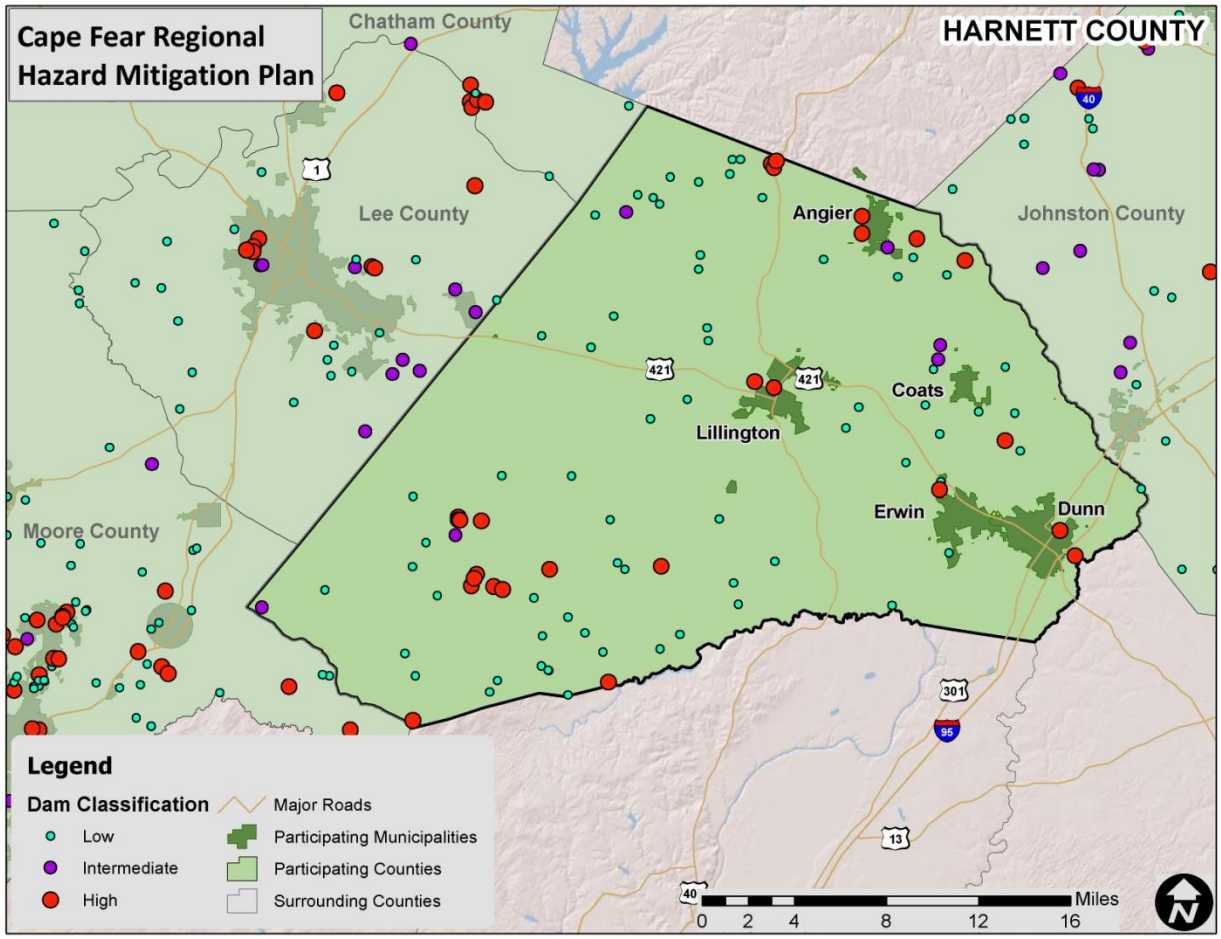
B.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 99 dams in Harnett County.[14] **Figure B.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, 28 are classified as high hazard potential. These high hazard dams are listed in **Table B.21**.

[14] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE B.8: HARNETT COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

TABLE B.21: HARNETT COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Harnett County				
Olde Farm Lake Dam	High	21.4	197	Private
Watkins Pond Dam	High	2.0	12	Private
Langdon Pond Dam	High			Private
Harnett Metals Dam	High	6.4	41	Private
Lake Lindsay Dam	High	43.5	536	Private
Blanchard Lake Dam #1	High	20.0	422	Private
Blanchard Lake Dam #2	High	1.8	86	Private
Blanchard Lake Dam #3	High	15.0	82	Private
Buffalo Lake Dam	High	65.4	1,974	Private
Lake Carolina	High	90.0	1,960	Private
Blanchard Dam #4	High	18.5	274	Private
Hannas Lake Dam	High	20.0	233	Private

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Mclamb Lake Dam	High	15.0	58	Private
Young Lake Dam	High	40.0	389	Private
Cambro Lake Dam	High	65.0	173	Private
White Lake Dam	High	3.0	27	Private
Silver Lake Dam	High	22.0	238	Private
Crystal Lake Dam	High	12.0	258	Private
Moore Dam	High			Private
Carolina Lakes Dam #1	High	13.0	140	Private
Carolina Lakes Dam #2	High	56.0	358	Private
Honeycutt Dam Lower	High	4.0	23	Private
Honeycutt Dam Upper	High	2.0	13	Private
Sherman Lakes Lower	High	5.0	34	Private
Sherman Lakes Upper	High	3.0	14	Private
Atkins Dam	High	2.0	10	Private
Harnett Co Raw Water Reservoir	High		6	Local Gov
Hamilton Lake Dam	High	3.9	24	Private

Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been no dam breaches reported in Harnett County. However, several breach scenarios in the county could be catastrophic.

The information below identifies additional historical information reported in the previous county hazard mitigation plan.

Harnett County

No information on past dam failure events in the county was provided.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

B.2.12 Erosion

Location and Spatial Extent

Erosion in Harnett County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Harnett County soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the county, particularly along the banks of rivers and streams, but it is not an extreme threat. No areas of concern were reported by the planning team.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Harnett County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Little information could be found beyond the hazard mitigation plan; however, there was no recorded history of significant erosion events and it was found to be a hazard with a low potential impact.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Harnett County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent).

B.2.13 Flood

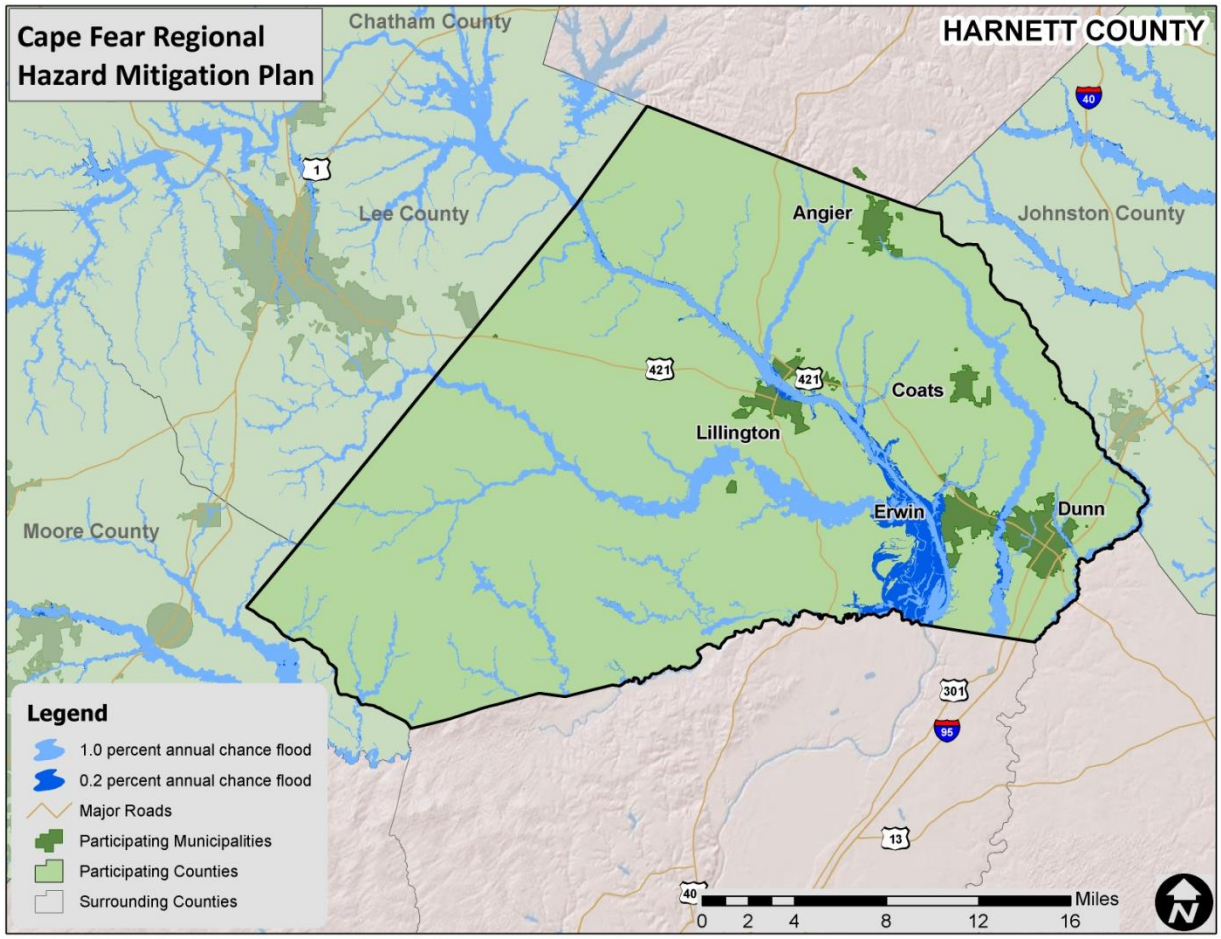
Location and Spatial Extent

There are areas in Harnett County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[15] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 601 square miles that make up Harnett County, there are 52.9 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 11.8 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 10.8 percent of the total land area in Harnett County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure B.9**, **Figure B.10**, **Figure B.11**, **Figure B.12**, **Figure B.13**, and **Figure B.14** illustrate the location and extent of currently mapped special flood hazard areas for Harnett County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

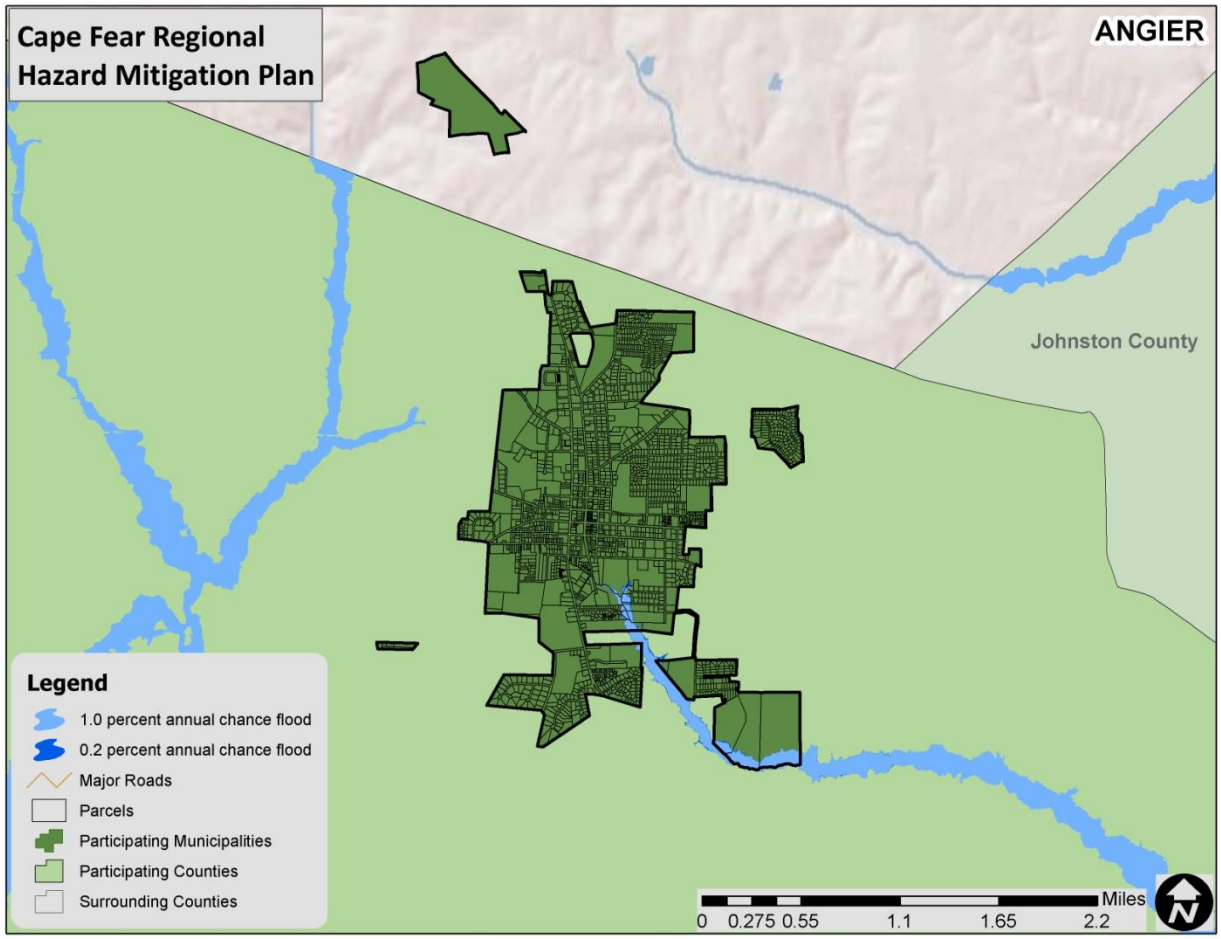
[15] The county-level DFIRM data used for Harnett County were updated in 2009.

FIGURE B.9: SPECIAL FLOOD HAZARD AREAS IN HARNETT COUNTY



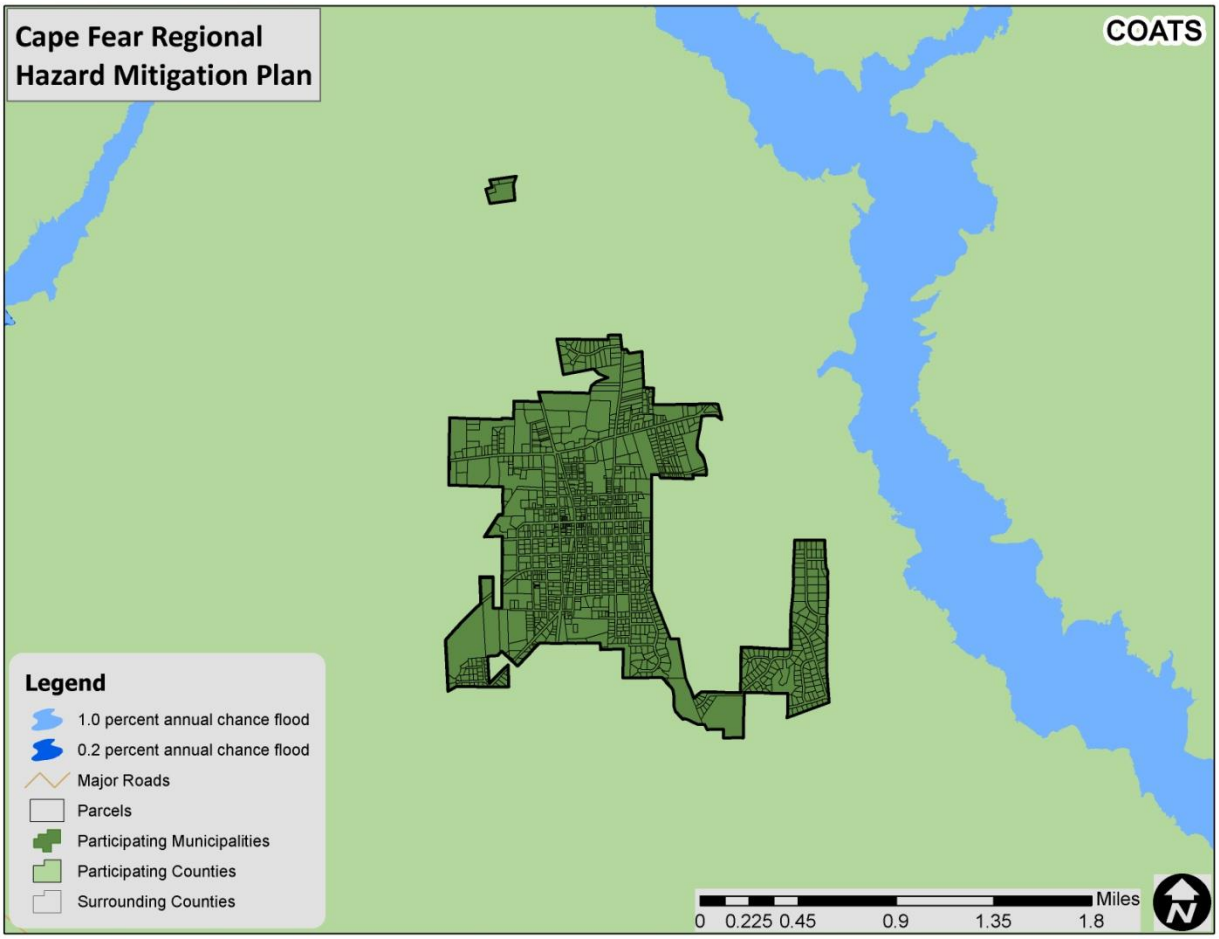
Source: Federal Emergency Management Agency

FIGURE B.10: SPECIAL FLOOD HAZARD AREAS IN ANGIER



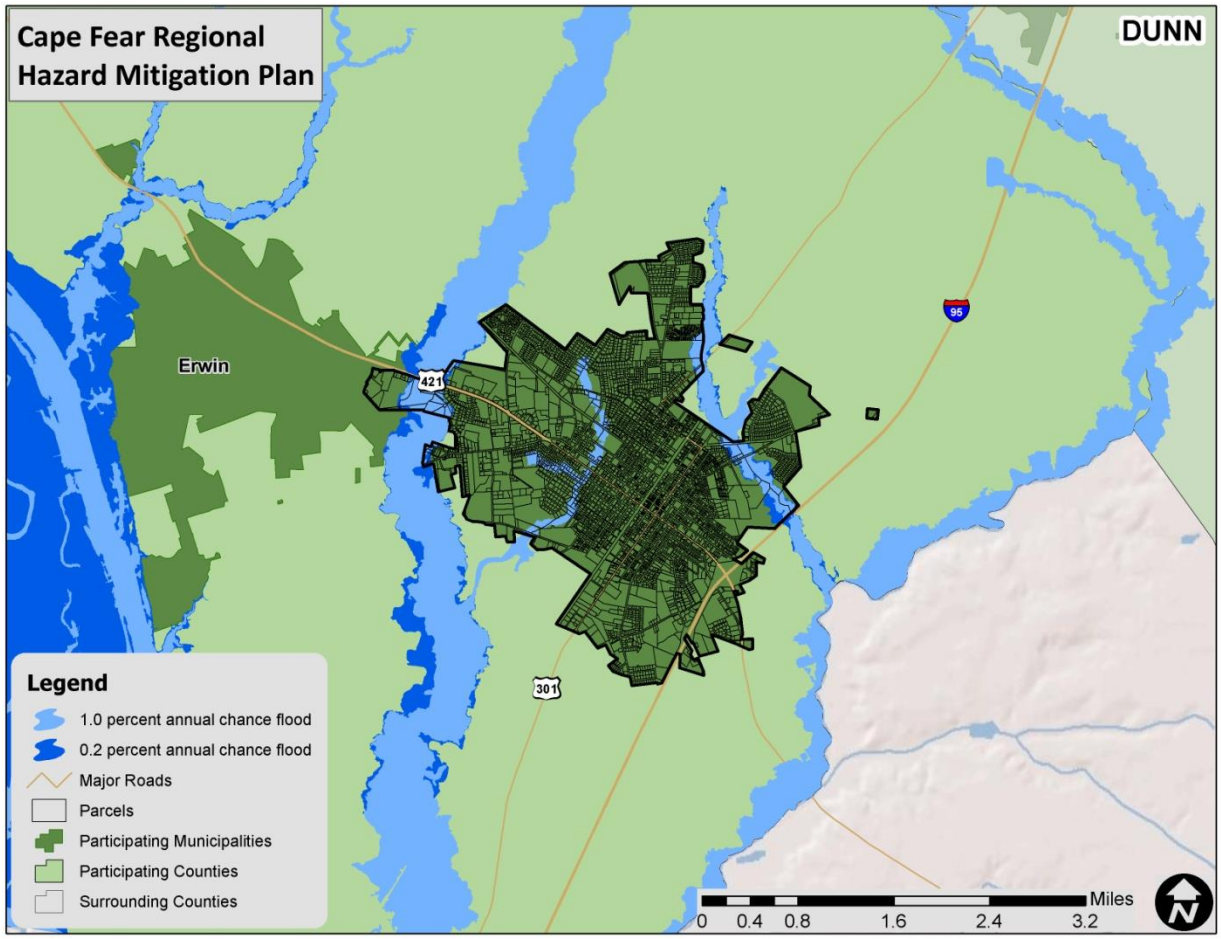
Source: Federal Emergency Management Agency

FIGURE B.11: SPECIAL FLOOD HAZARD AREAS IN COATS



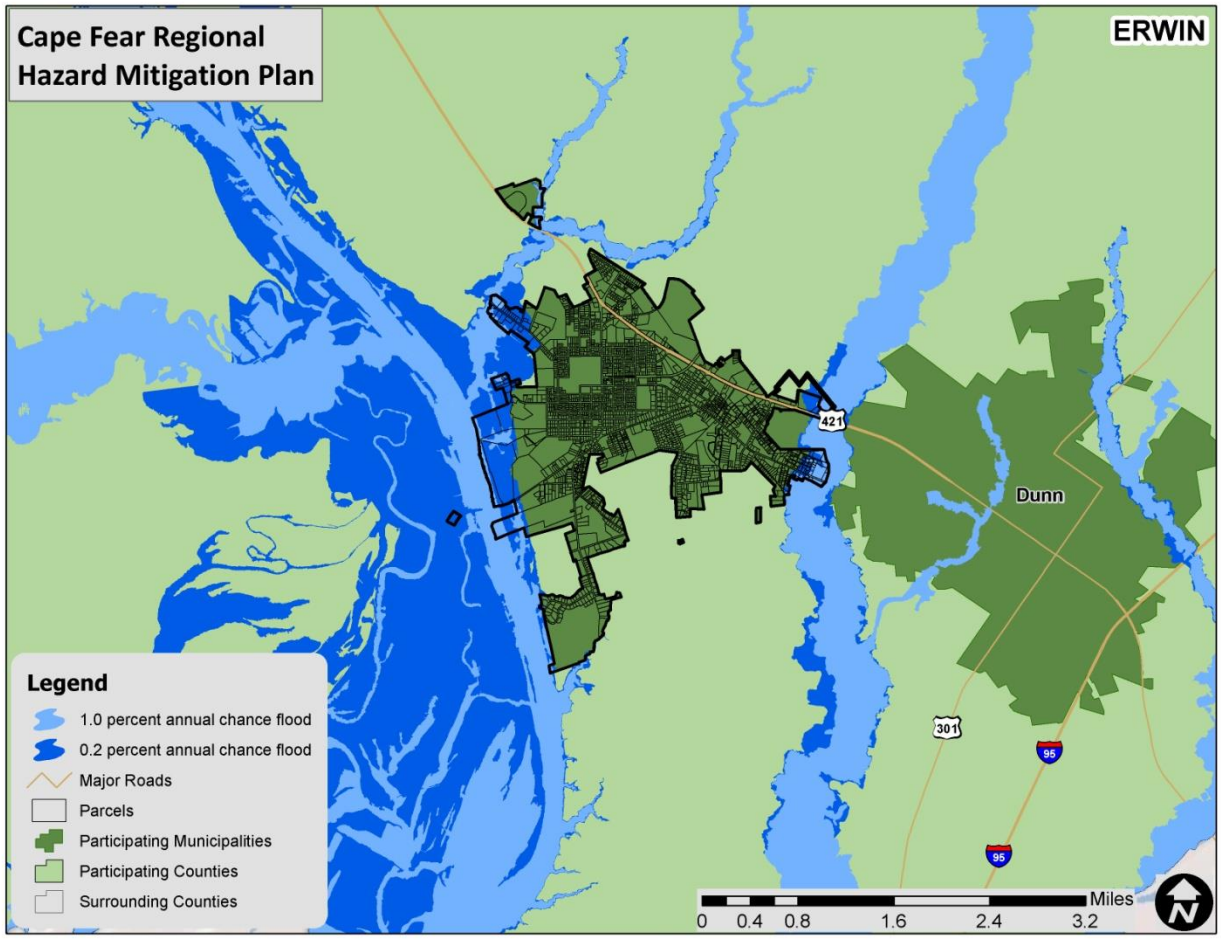
Source: Federal Emergency Management Agency

FIGURE B.12: SPECIAL FLOOD HAZARD AREAS IN DUNN



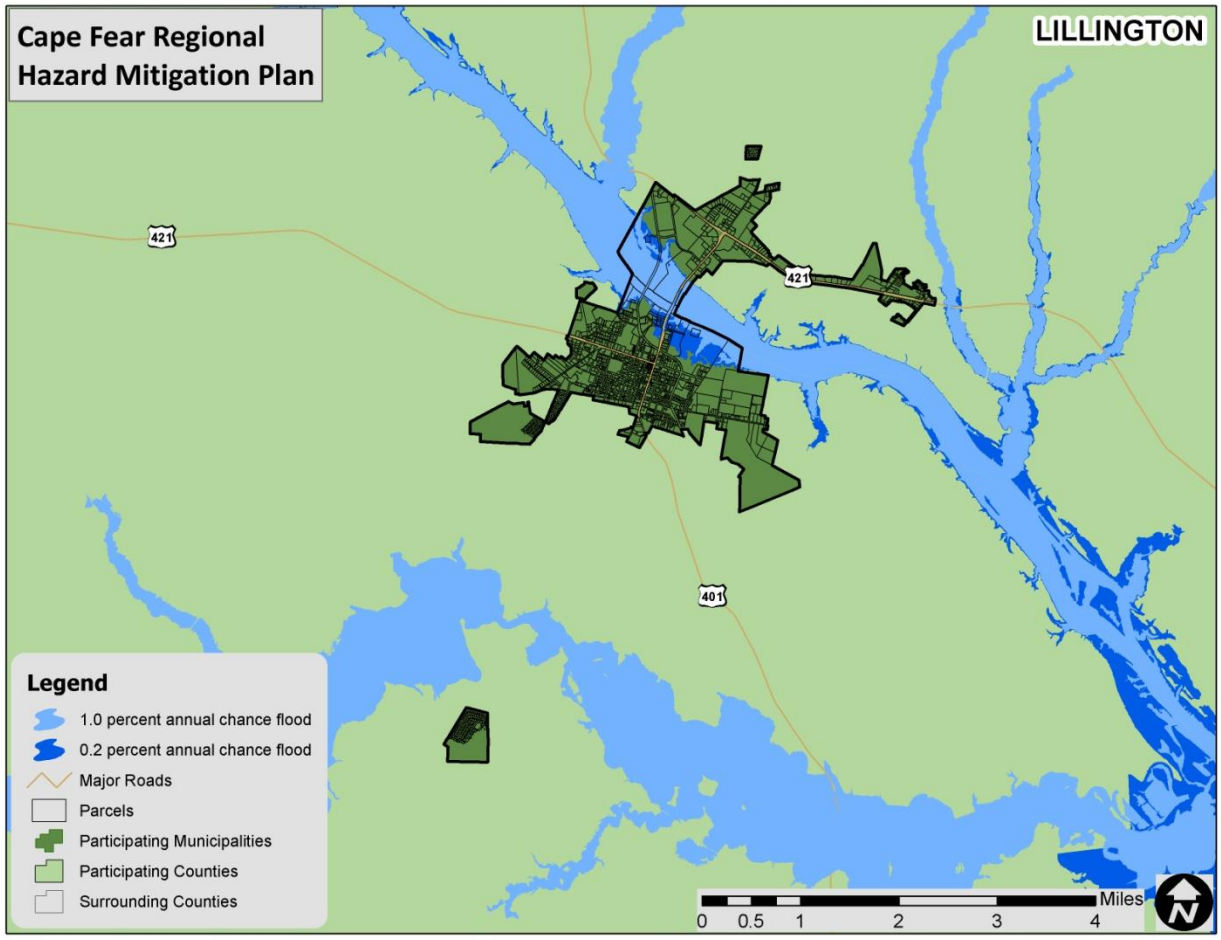
Source: Federal Emergency Management Agency

FIGURE B.13: SPECIAL FLOOD HAZARD AREAS IN ERWIN



Source: Federal Emergency Management Agency

FIGURE B.14: SPECIAL FLOOD HAZARD AREAS IN LILLINGTON



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding was at least partially responsible for one disaster declaration in Harnett County in 2011.[16] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 15 events in Harnett County since 1993.[17] A summary of these events is presented in **Table B.22**. These events accounted for just over $9,000 (2013 dollars) in property damage in the county.[18] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table B.23**.

TABLE B.22: SUMMARY OF FLOOD OCCURRENCES IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	0	0/0	$0

[16]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[17] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[18] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Coats	0	0/0	$0
Dunn	1	0/0	$0
Erwin	0	0/0	$0
Lillington	2	0/0	$0
Unincorporated Area	12	0/0	$9,040
HARNETT COUNTY TOTAL	**15**	**0/0**	**$9,040**

Source: National Climatic Data Center

TABLE B.23: HISTORICAL FLOOD EVENTS IN HARNETT COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Angier				
None Reported	--	--	--	--
Coats				
None Reported	--	--	--	--
Dunn				
DUNN	8/27/2002	FLASH FLOOD	0/0	$0
Erwin				
None Reported	--	--	--	--
Lillington				
LILLINGTON	8/10/2003	FLASH FLOOD	0/0	$0
LILLINGTON	9/6/2008	FLASH FLOOD	0/0	$0
Unincorporated Area				
Harnett County	3/23/1993	FLASH FLOODS	0/0	$0
COUNTYWIDE	7/23/1997	FLASH FLOOD	0/0	$0
COUNTYWIDE	7/24/1997	FLASH FLOOD	0/0	$0
Harnett County	1/27/1998	FLOOD	0/0	$0
Harnett County	2/4/1998	FLOOD	0/0	$0
Harnett County	2/18/1998	FLOOD	0/0	$0
COUNTYWIDE	9/15/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	10/17/1999	FLASH FLOOD	0/0	$0
Harnett County	3/20/2003	FLOOD	0/0	$9,040
WEST PORTION	6/14/2006	FLASH FLOOD	0/0	$0
SPOUT SPGS	9/14/2007	FLASH FLOOD	0/0	$0
LUART	9/22/2009	FLASH FLOOD	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been 14 flood losses reported in Harnett County through the National Flood Insurance Program (NFIP) since 1978, totaling over $84,000 in claims payments. A summary of these figures for the county is provided in **Table B.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many

additional instances of flood loss in Harnett County were either uninsured, denied claims payment, or not reported.

TABLE B.24: SUMMARY OF INSURED FLOOD LOSSES IN HARNETT COUNTY

Location	Flood Losses	Claims Payments
Angier	0	$0
Coats*	--	--
Dunn	6	$41,512
Erwin	0	$0
Lillington	0	$0
Unincorporated Area	8	$42,688
HARNETT COUNTY TOTAL	**14**	**$84,200**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency, National Flood Insurance Program

Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

As of July 2013, there is one non-mitigated repetitive loss property located in Harnett County, which accounted for two losses and almost $3,000 in claims payments under the NFIP. The average claim amount for this property is $1,403. The property is single family residential. Without mitigation this property will likely continue to experience flood losses. **Table B.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Harnett County.

TABLE B.25: REPETITIVE LOSS PROPERTIES IN HARNETT COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Angier	0	--	0	$0	$0	$0	$0
Coats*	--	--	--	--	--	--	--
Dunn	1	Single Family	2	$2,121	$684	$2,805	$1,403
Erwin	0	--	0	$0	$0	$0	$0
Lillington	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
HARNETT COUNTY TOTAL	**1**		**2**	**$2,121**	**$684**	**$2,805**	**$1,403**

* These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Harnett County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent

annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

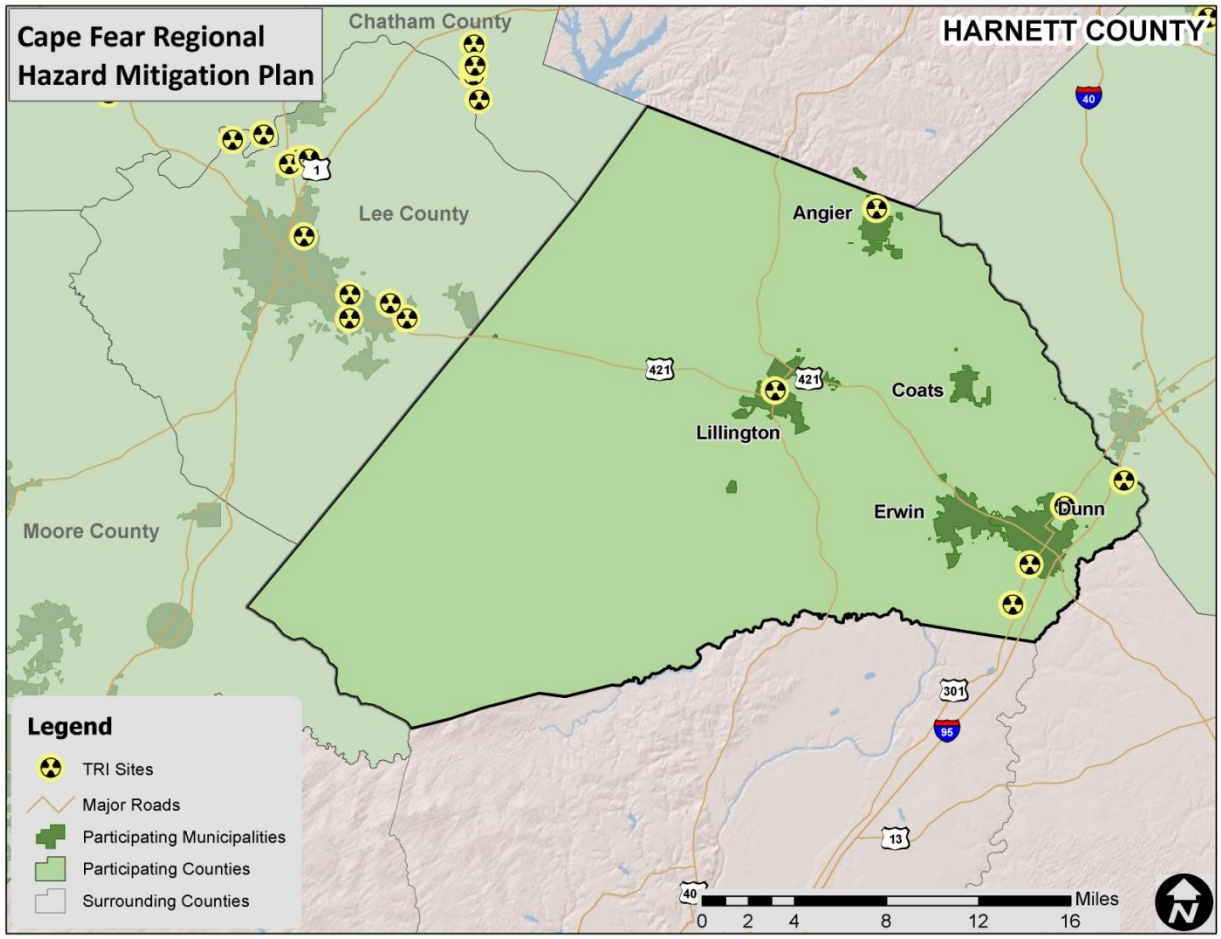
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Dunn, Erwin, and Lillington have more floodplain and thus a higher risk of flood than Angier and Coats. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

B.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Harnett County has six TRI sites. These sites are shown in **Figure B.15.**

FIGURE B.15: TOXIC RELEASE INVENTORY (TRI) SITES IN HARNETT COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 11 recorded HAZMAT incidents in Harnett County since 1983 (**Table B.26**). These events resulted in almost $17,000 (2013 dollars) in property damage as well as one fatality and one injury. **Table B.27** presents detailed information on historic HAZMAT incidents in Harnett County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE B.26: SUMMARY OF HAZMAT INCIDENTS IN HARNETT COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Angier	0	0/0	$0
Coats	1	0/0	$0
Dunn	4	1/1	$0
Erwin	1	0/0	$0
Lillington	5	0/0	$16,607
Unincorporated Area	0	0/0	$0
HARNETT COUNTY TOTAL	**11**	**1/1**	**$16,607**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE B.27: HAZMAT INCIDENTS IN HARNETT COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Angier							
None Reported	--	--	--	--	--	--	--
Coats							
I-1995100391	9/29/1995	COATS	Highway	No	0/0	$0	3 LGA
Dunn							
I-1993030410	2/13/1993	DUNN	Highway	Yes	1/1	$0	8,800 LGA
I-2001062021	6/20/2001	DUNN	Highway	No	0/0	$0	3 LGA
I-2013040240	4/3/2013	DUNN	Highway	No	0/0	$0	2 LGA
E-2013080406	8/19/2013	DUNN	Highway	No	0/0	$0	5 LGA
Erwin							
I-1993010576	1/4/1993	ERWIN	Highway	Yes	0/0	$0	500 LGA
Lillington							
I-1983110275	10/20/1983	LILLINGTON	Highway	Yes	0/0	$0	8,300 LGA
I-1991020530	1/24/1991	LILLINGTON	Highway	Yes	0/0	$0	6,923 LGA
I-1992050293	4/3/1992	LILLINGTON	Highway	Yes	0/0	$16,607	6,300 LGA
X-2008060428	6/11/2008	LILLINGTON	Highway	No	0/0	$0	0
I-2013080122	7/12/2013	LILLINGTON	Highway	No	0/0	$0	0.0625 LGA
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

*Property damage is reported in 2013 dollars.

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of six toxic release inventory sites in Harnett County and prior roadway incidents, it is possible that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

B.2.15 Wildfire

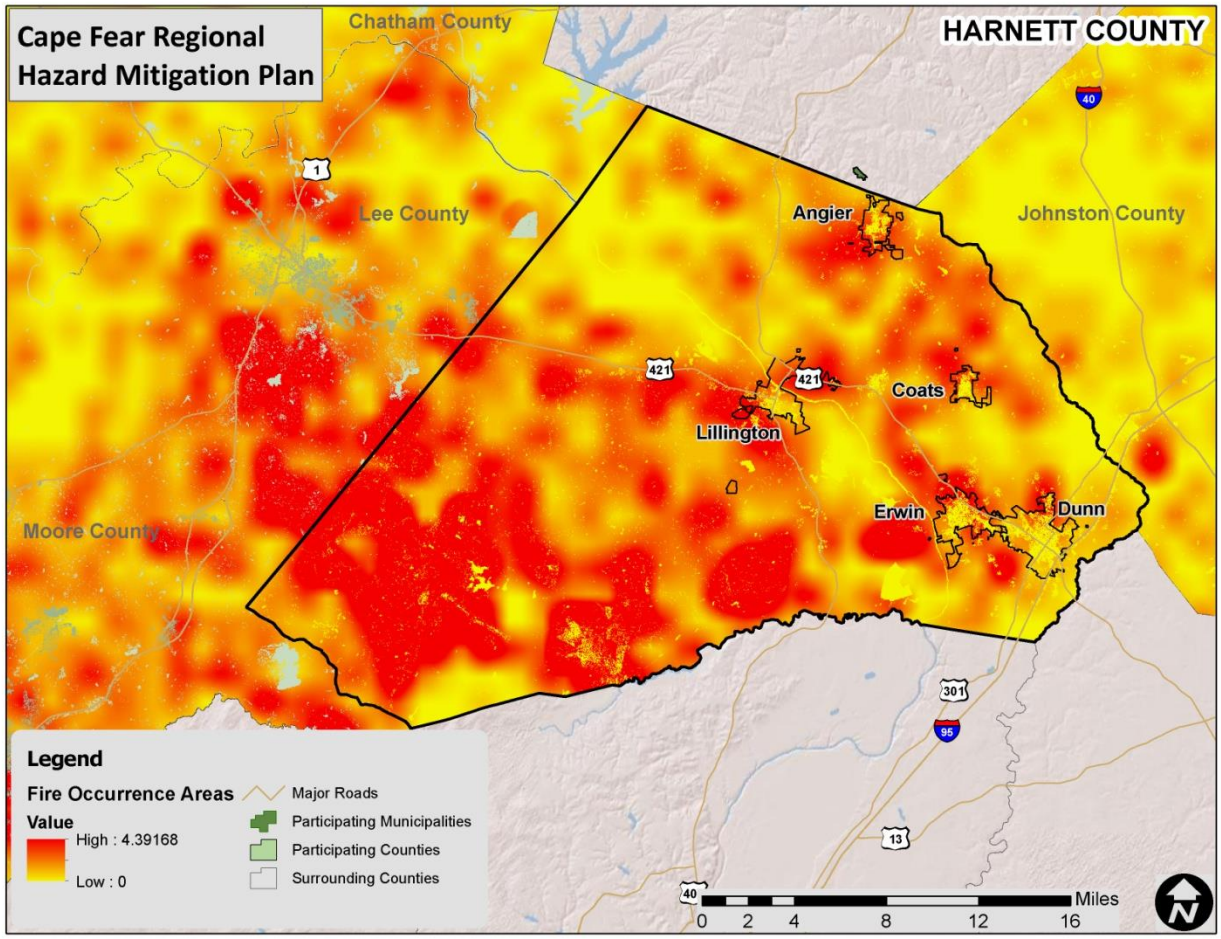
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic location.

Historical Occurrences

Figure B.16 shows the Fire Occurrence Areas (FOA) in Harnett County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE B.16: HISTORIC WILDFIRE EVENTS IN HARNETT COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Harnett County experienced an average of 141 wildfires annually which burn an average of 551 acres per year. The data indicates that most of these fires are small, averaging four acres per fire. **Table B.28** lists the number of reported wildfire occurrences in the county between the years 2003 and 2012.

TABLE B.28: HISTORICAL WILDFIRE OCCURRENCES IN HARNETT COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Harnett County										
Number of Fires	89	147	179	201	266	105	85	118	133	89
Number of Acres	143.5	367.5	513.5	1,063.3	969.7	609.6	279.2	415.6	818.2	333.6

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Harnett County. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could

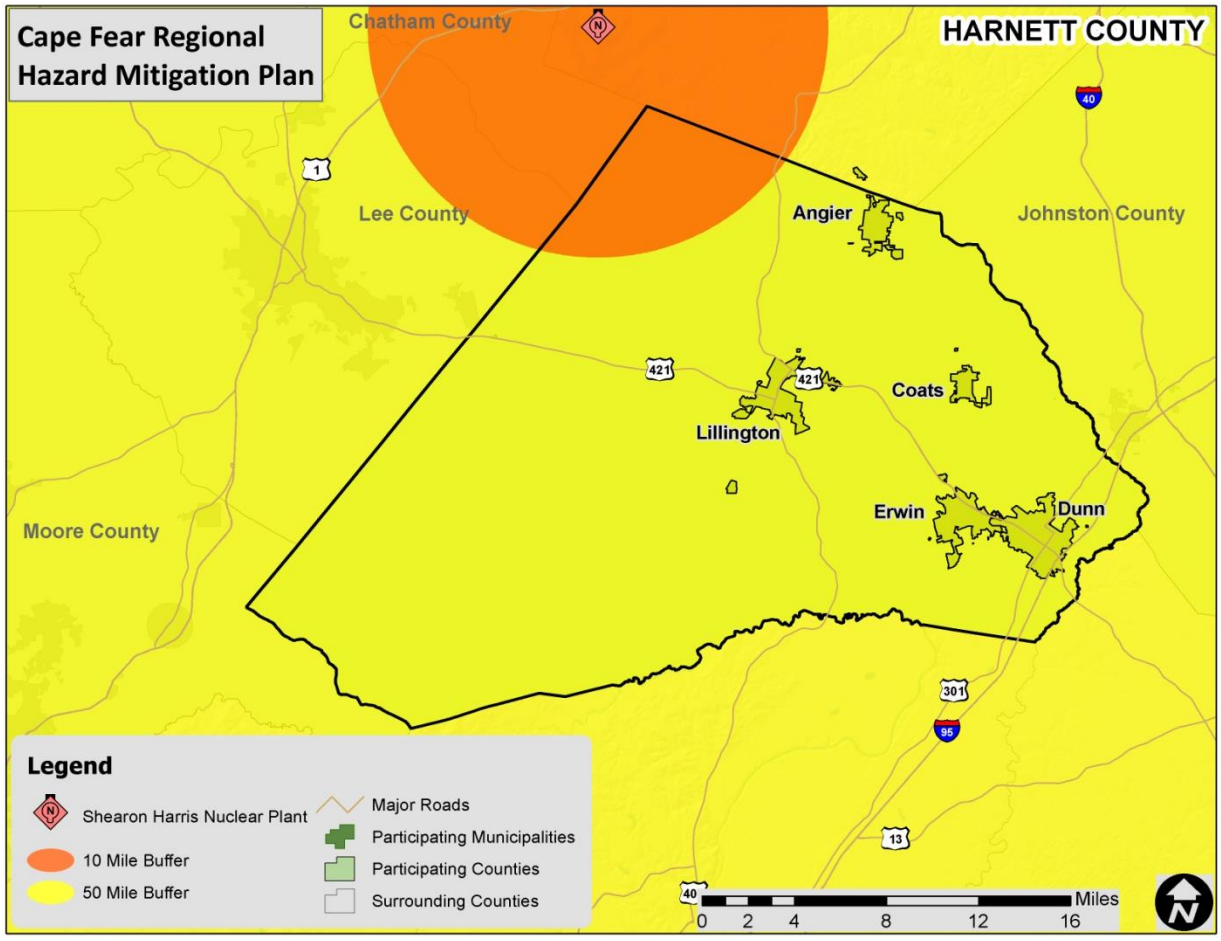
increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Harnett County for future wildfire events is likely (10 to 100 percent annual probability).

B.2.16 Nuclear Accident

Location and Spatial Extent

The entire county is at risk to a nuclear incident. However, areas in the northern part of the county are more susceptible due to their proximity to the Shearon Harris Nuclear Station. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure B.17**). All areas of the county that are not located within the 10 mile radius are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

FIGURE B.17: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES IN HARNETT COUNTY



Source: International Atomic Energy Agency

Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986. There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.[19]

Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

[19] More information on Shearon Harris Emergency Declaration events can be found in Section 5: *Hazard Profiles*.

B.2.17 Terror Threat

Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table B.29** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE B.29 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section B.3.3) are at a heightened level of risk in Harnett County, there are several that have been identified as the likely primary targets. These critical facilities include the Harnett County Emergency Operations Center, Central Harnett Hospital, and Betsy Johnson Hospital.

Historical Occurrences

Although there have been no major terror events in Harnett County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

Probability of Future Occurrences

Harnett County has no recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

B.2.18 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table B.30 describes the extent of each natural hazard identified for Harnett County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE B.30: EXTENT OF HARNETT COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Harnett County has received this ranking three times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Harnett County is 108 degrees Fahrenheit (reported on August 22, 1983).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Harnett County was 2.75 inches (last reported April 24, 2009). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Harnett County was an Unnamed 1893 Storm which reached a maximum wind speed of 70 knots in the county.
Lightning	According to the Vaisala flash density map (Figure 5.5), Harnett County is located in an area that experiences 4 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 45-year history from the National Climatic Data Center, the strongest recorded wind event in Harnett County was reported on July 9, 1976 at 87 knots (approximately 100 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F3 (reported on November 23, 1992).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Harnett County was 7.2 inches on January 8, 1973. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from Harnett County. According to data provided by the National Geophysical Data Center, no earthquakes have impacted the county.

Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is low across Harnett County. There is also low susceptibility throughout the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 99 dams in Harnett County, 28 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Harnett County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 10.8 percent of the total land area in Harnett County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at the Cape Fear River at Lillington in 1945. Water reached a discharge of 150,000 cubic feet per second and the stream gage height was recorded at 33.19 feet. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 8,800 LGA released on the railway on February 13, 1993. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. The greatest number of fires to occur in Harnett County in any year was 266 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2006 when 1,063.3 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Nuclear Accident	Although there is no history of a nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in Harnett County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Harnett County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.20.2.

Table B.31 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE B.31: SUMMARY OF PRI RESULTS FOR HARNETT COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm/High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Unlikely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**1.3**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	**3.0**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Nuclear Accident	Unlikely	Critical	Small	6 to 12 hours	Less than 1 week	**2.2**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

B.2.19 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Harnett County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table B.32**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Harnett County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section B.3. It should be noted that

although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE B.32: CONCLUSIONS ON HAZARD RISK FOR HARNETT COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Flood Hurricane and Tropical Storm Tornado Hailstorm
MODERATE RISK	Drought Winter Storm and Freeze Wildfire Extreme Heat Lightning
LOW RISK	Hazardous Material Incident Nuclear Accident Terror Threat Dam and Levee Failure Erosion Earthquake Landslide

B.3 HARNETT COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Harnett County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

B.3.1 Asset Inventory

Table B.33 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Harnett County and its participating jurisdictions (study area of vulnerability assessment).[20]

[20] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE B.33: IMPROVED PROPERTY IN HARNETT COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[21]
Angier	1,862	$204,154,164	1,722	$152,433,474
Coats	1,002	$83,433,680	992	$61,881,400
Dunn	4,829	$608,930,378	4,114	$451,638,268
Erwin	2,470	$220,463,380	2,160	$159,419,650
Lillington	1,639	$244,373,348	1,055	$145,446,258
Unincorporated Area	52,768	$5,354,648,437	46,992	$3,595,206,557
HARNETT COUNTY TOTAL	**64,570**	**$6,716,003,387**	**57,035**	**$4,566,025,607**

Table B.34 lists the fire stations, police stations, EMS/rescue stations, emergency operations centers (EOCs), medical care facilities, schools and other critical facilities located in Harnett County. Local governments at the county level provided a majority of the data for this analysis; however, gaps in the data were filled using Hazus 2.1 to obtain the location of some critical facilities for which spatial data was not available. In addition, **Figure B.18** shows the locations of essential facilities in Harnett County. **Table B.49**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county and Hazus 2.1.

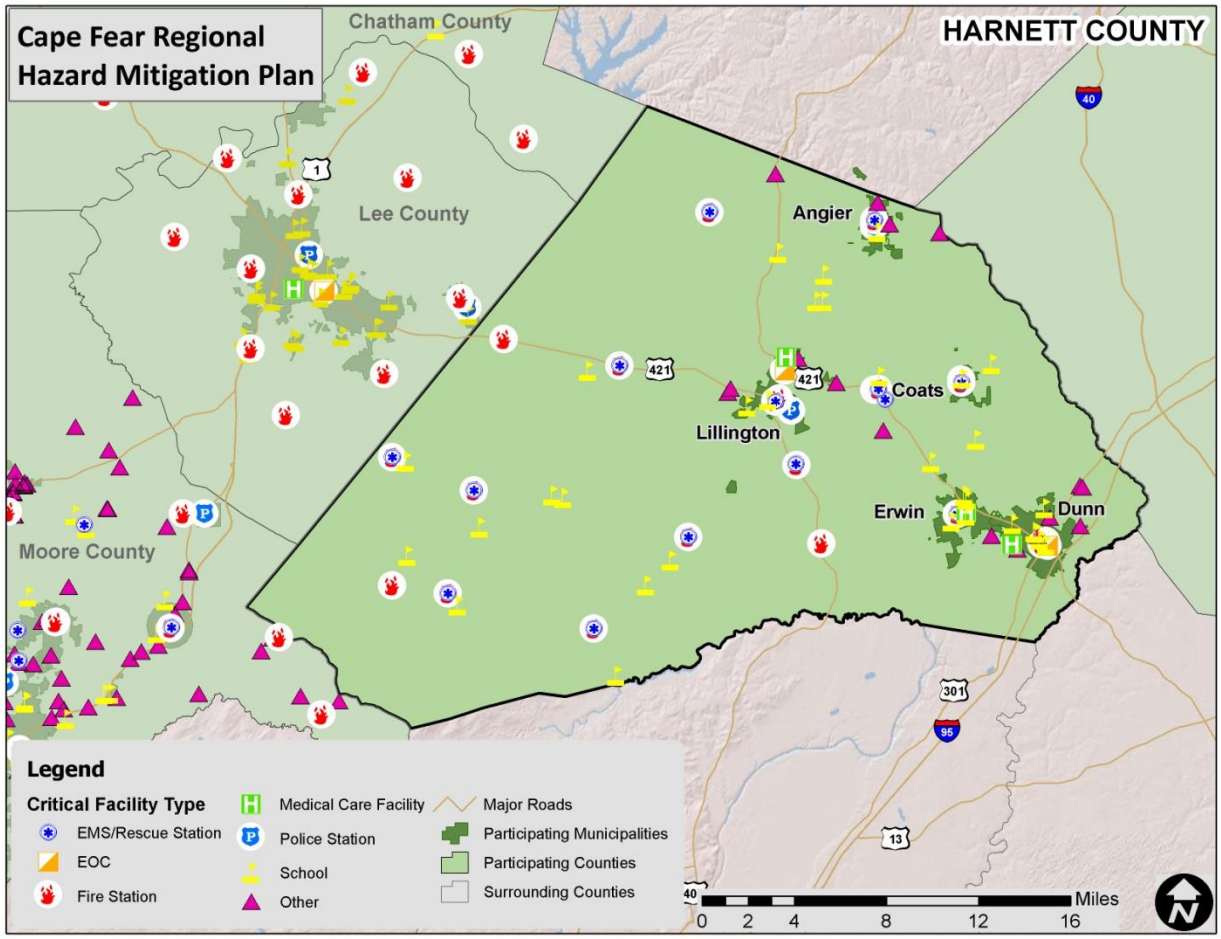
TABLE B.34: CRITICAL FACILITY INVENTORY IN HARNETT COUNTY

Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Angier	1	1	1	0	0	1	2
Coats	1	1	1	0	0	1	0
Dunn	2	1	1	2	1	6	3
Erwin	1	1	1	2	0	4	1
Lillington	2	4	1	0	1	2	2
Unincorporated Area	12	1	10	2	0	19	8
HARNETT COUNTY TOTAL	**19**	**9**	**15**	**6**	**2**	**33**	**16**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.
Source: Local Government; Hazus-MH

[21] Building value for each county is based on the number of parcels with an improved building value greater than zero.

FIGURE B.18: CRITICAL FACILITY LOCATIONS IN HARNETT COUNTY



Source: Local Governments; Hazus-MH 2.1

B.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Harnett County that are potentially at risk to these hazards.

Table B.35 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Harnett County according to Census data is 114,678 persons. Additional population estimates are presented above in Section B.1.

TABLE B.35: TOTAL POPULATION IN HARNETT COUNTY

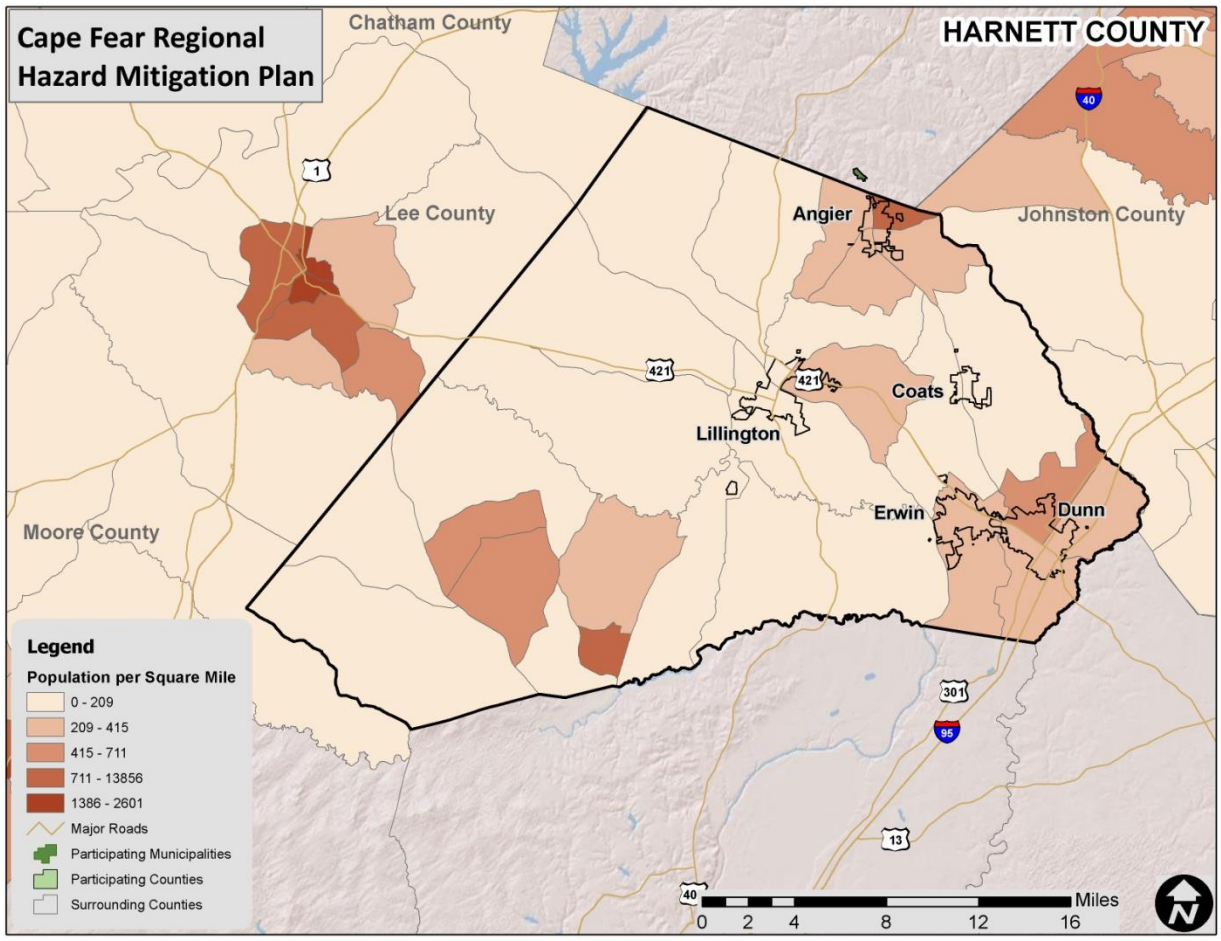
Jurisdiction	2010 Census Population
Harnett County	**114,678**
Town of Angier	4,350
Town of Coats	2,112
City of Dunn	9,263

Jurisdiction	2010 Census Population
Town of Erwin	4,405
Town of Lillington	3,194

Source: United States Census 2010

In addition, **Figure B.19** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE B.19: POPULATION DENSITY IN HARNETT COUNTY



Source: United States Census Bureau, 2010

B.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans was approved (in 2011), Harnett County has experienced some growth and development. **Table B.36** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE B.36: BUILDING COUNTS FOR HARNETT COUNTY

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Angier	2,146	16	0.7%
Coats	1,088	0	0.0%
Dunn	4,457	0	0.0%
Erwin	2,039	0	0.0%
Lillington	986	0	0.0%
Unincorporated Area	39,210	502	1.3%
HARNETT COUNTY TOTAL	**49,926**	**518**	**1.0%**

Source: United States Census Bureau

Table B.37 shows population growth estimates for the county from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE B.37: POPULATION GROWTH FOR HARNETT COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Angier	4,382	4,498	4,592	4,718	7.7%
Coats	2,134	2,209	2,276	2,340	9.7%
Dunn	9,330	9,497	9,633	9,758	4.6%
Erwin	4,436	4,527	4,591	4,637	4.5%
Lillington	3,209	3,285	3,345	3,408	6.2%
Unincorporated Area	92,235	95,237	97,695	100,126	8.6%
HARNETT COUNTY TOTAL	**115,726**	**119,253**	**122,132**	**124,987**	**8.0%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the county since 2010. However, unincorporated Harnett County has experienced a slightly higher rate of development compared to the rest of the Cape Fear Region, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. Additionally, there have been slightly higher rates of population growth in Angier, Coats, and Lillington. Since the population has increased in these municipalities, there are now greater numbers of people exposed to the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been a slight increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, primary and secondary TRI site buffers, or Shearon Harris Nuclear Station's 10-mile buffer.

B.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Harnett

County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total county exposure, and thus risk, was presented in **Table B.33**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table B.48**.

The hazards presented in this section include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

Hurricane and Tropical Storm

Historical evidence indicates that Harnett County has a significant risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section B.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table B.38.** Only losses to buildings, contents, and inventory are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE B.38: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Harnett County	$1,669,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table B.39.**

TABLE B.39: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Angier	77.0	86.3	105.7	111.9
Coats	78.9	88.3	107.6	114.2
Dunn	81.3	90.5	109.9	116.9
Erwin	81.3	90.5	109.9	116.9
Lillington	78.0	88.0	106.5	113.5
Unincorporated Area	81.3	90.5	109.9	116.9
MAXIMUM WIND SPEED REPORTED	**81.3**	**90.5**	**109.9**	**116.9**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities
Given equal vulnerability across Harnett County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Harnett County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Harnett County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table B.40** summarizes the findings.

TABLE B.40: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Harnett County	$21,000

Source: Hazus-MH 2.1

Social Vulnerability
It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table B.49**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Harnett County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Harnett County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section B.2.10), county level tax parcel data, and GIS analysis. **Table B.41** presents the potential at-risk property where available. All areas of Harnett County are

identified as low incidence areas by the USGS landslide data. All areas are also of low landslide susceptibility. Since no areas of high incidence were identified in the region, the moderate incidence level was used to identify different areas of concern for the analysis below.

TABLE B.41: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Angier	0	0	$0
Coats	0	0	$0
Dunn	0	0	$0
Erwin	0	0	$0
Lillington	0	0	$0
Unincorporated Area	1	0	$0
HARNETT COUNTY TOTAL	**1**	**0**	**$0**

Source: United States Geological Survey

Social Vulnerability
Given low susceptibility across the entire county, it is assumed that the total population is at low risk.

Critical Facilities
All critical facilities are located in a low susceptibility area. All facilities in Harnett County are also located in a low incidence area. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a landslide has low potential to impact the existing and future buildings, facilities, and populations in Harnett County, though some areas may be at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Harnett County is susceptible to flood events. A total of 15 flood events have been reported by the National Climatic Data Center resulting in just over $9,000 dollars in damages. On an annualized level, these damages amount to $452 for Harnett County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table B.42** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE B.42: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

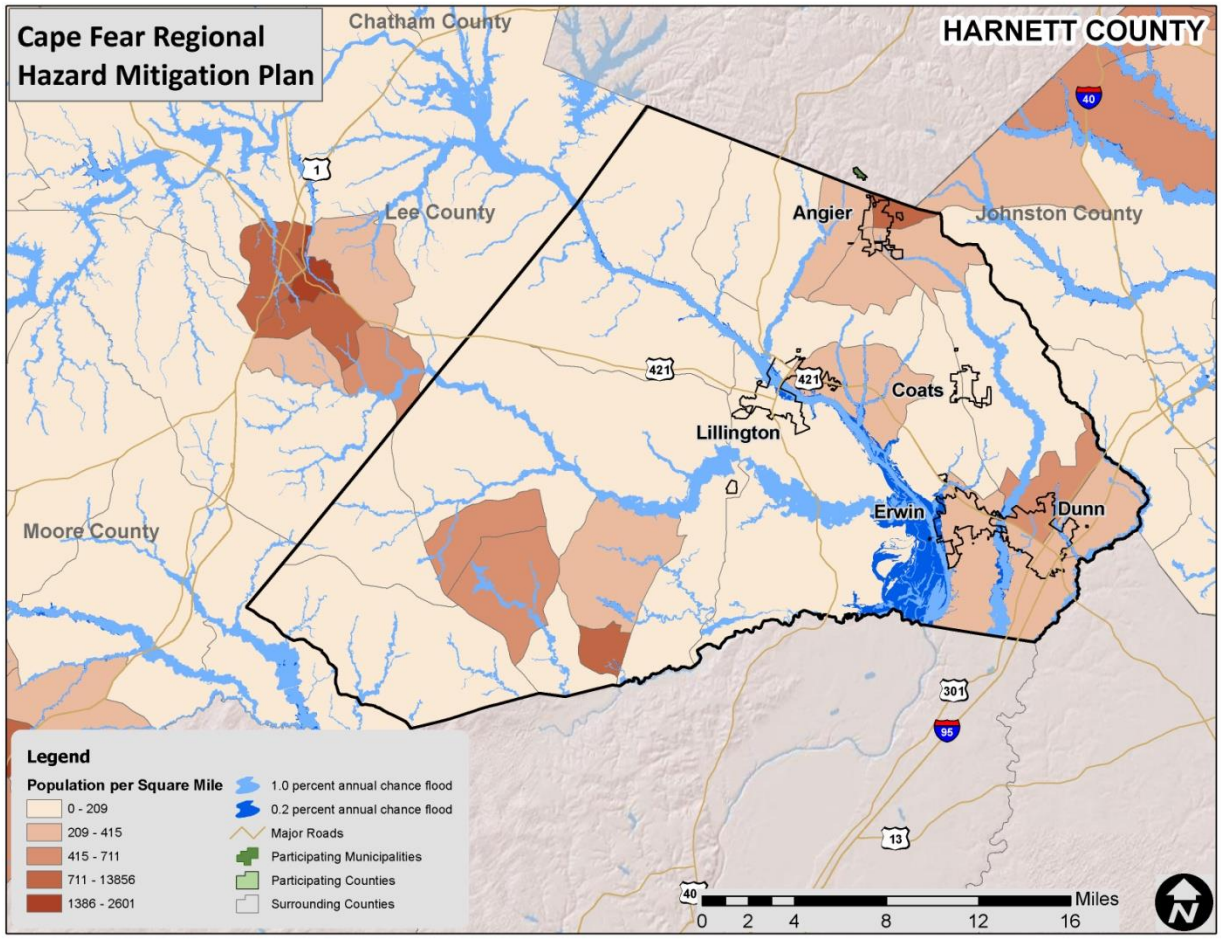
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Angier	13	1	$438,820	2	1	$754,550
Coats	0	0	$0	0	0	$0
Dunn	218	99	$22,443,480	31	19	$1,792,580
Erwin	58	15	$12,418,680	64	55	$3,430,800
Lillington	20	7	$709,240	25	20	$8,325,230
Unincorporated Area	3,382	328	$176,383,160	640	412	$26,025,880
HARNETT COUNTY TOTAL	**3,691**	**450**	**$212,393,380**	**762**	**507**	**$40,329,040**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure B.20** is presented to gain a better understanding of at risk population.

FIGURE B.20 : POPULATION DENSITY NEAR FLOODPLAINS IN HARNETT COUNTY



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are a no critical facilities located in the Harnett County 1.0-percent annual chance floodplain or 0.2-percent annual chance floodplain based on FEMA DFIRM boundaries and GIS analysis. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Harnett County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

Historical evidence indicates that Harnett County is susceptible to hazardous materials events. A total of 11 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety

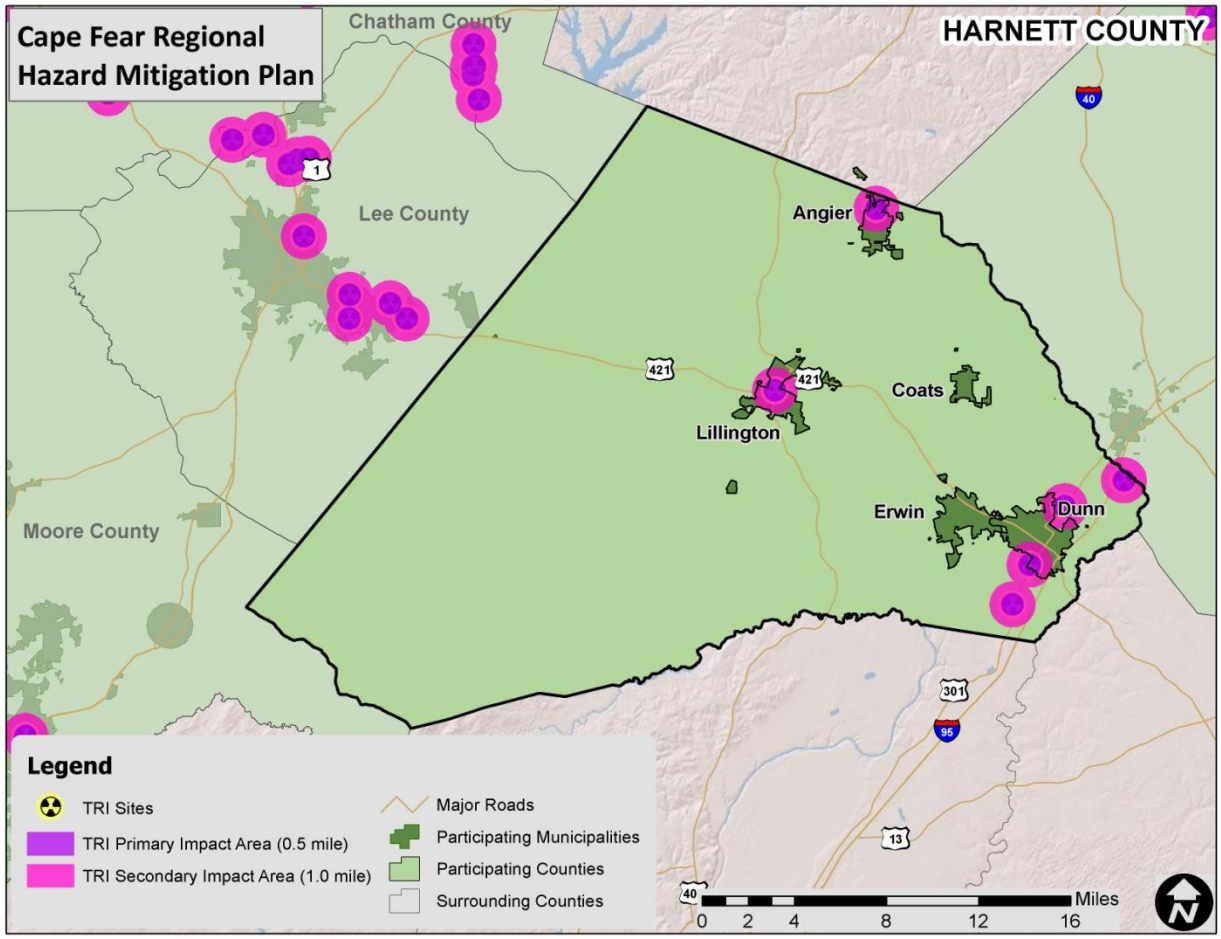
Administration resulting in almost $17,000 in property damages, 1 fatality, and 1 injury. On an annualized level, these damages amount to $554 for Harnett County.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[22] In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Harnett County, along with buffers, were used for analysis as shown in **Figure B.21.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure B.22** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table B.43** (fixed sites), **Table B.44** (mobile road sites) and **Table B.45** (mobile railroad sites).[23]

[22] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

FIGURE B.21 : TRI SITES WITH BUFFERS IN HARNETT COUNTY



Source: Environmental Protection Agency

TABLE B.43: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Angier	475	439	$49,692,030	1,283	1,180	$102,306,420
Coats	0	0	$0	0	0	$0
Dunn	118	97	$13,287,460	1,572	1,355	$131,464,850
Erwin	0	0	$0	0	0	$0
Lillington	310	204	$23,614,090	1,020	755	$86,084,870
Unincorporated Area	319	224	$62,637,200	1,235	982	$131,997,991
HARNETT COUNTY TOTAL	**1,222**	**964**	**$149,230,780**	**5,110**	**4,272**	**$451,854,131**

FIGURE B.22 : MOBILE HAZMAT BUFFERS IN HARNETT COUNTY

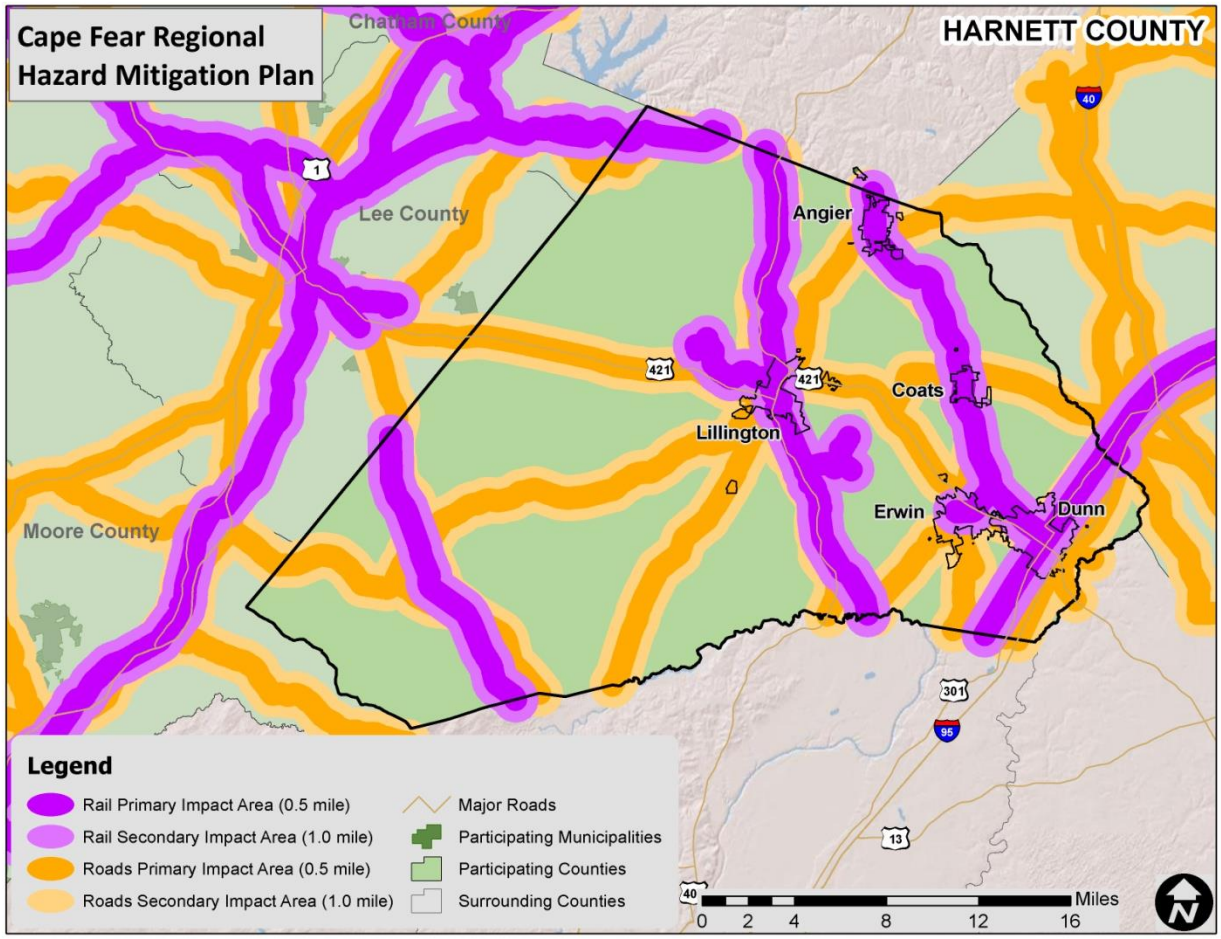


TABLE B.44: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Angier	1,744	1,614	$144,327,984	1,862	1,722	$152,433,474
Coats	900	846	$53,792,220	997	974	$61,414,920
Dunn	4,075	3,395	$372,827,698	4,829	4,113	$451,638,268
Erwin	2,173	1,902	$136,380,170	2,470	2,160	$159,419,650
Lillington	1,584	970	$141,390,598	1,632	1,049	$144,987,408
Unincorporated Area	19,394	17,163	$1,215,561,787	30,678	27,086	$2,004,509,985
HARNETT COUNTY TOTAL	**29,870**	**25,890**	**$2,064,280,457**	**42,468**	**37,104**	**$2,974,403,705**

TABLE B.45: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Angier	1,600	1,414	$131,870,374	1,787	1,625	$146,193,924
Coats	878	771	$52,624,330	962	912	$58,097,190
Dunn	3,350	2,661	$295,703,910	4,744	4,011	$444,654,578
Erwin	1,379	1,260	$86,821,570	2,211	1,937	$139,041,490
Lillington	930	723	$84,644,550	1,242	919	$119,800,278
Unincorporated Area	7,329	6,311	$463,022,768	13,874	12,066	$931,153,145
HARNETT COUNTY TOTAL	**15,466**	**13,140**	**$1,114,687,502**	**24,820**	**21,470**	**$1,838,940,605**

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 17 Harnett County facilities located in a HAZMAT risk zone. The primary impact zone includes 5 facilities: 2 fire stations, 1 EMS/rescue station, 1 police station, and 1 other facility. The remaining 12 at-risk critical facilities are located in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Harnett County revealed that there are 95 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 62 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes the following critical facilities: 12 EMS/rescue stations, 2 EOCs, 16 fire stations, 4 medical care facilities, 8 police stations, 27 schools, and 12 other facilities. The remaining 14 at-risk critical facilities are located in the secondary road buffer area. The primary railroad buffer area includes the following critical facilities: 8 EMS/rescue stations, 2 EOCs, 11 fire stations, 2 medical care facilities, 8 police stations, 13 schools, and 7 other facilities. The remaining 11 at-risk critical facilities are located in the secondary railroad buffer. Although this is a worst case scenario model, it indicates that many of the critical facilities in Harnett County are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Harnett County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

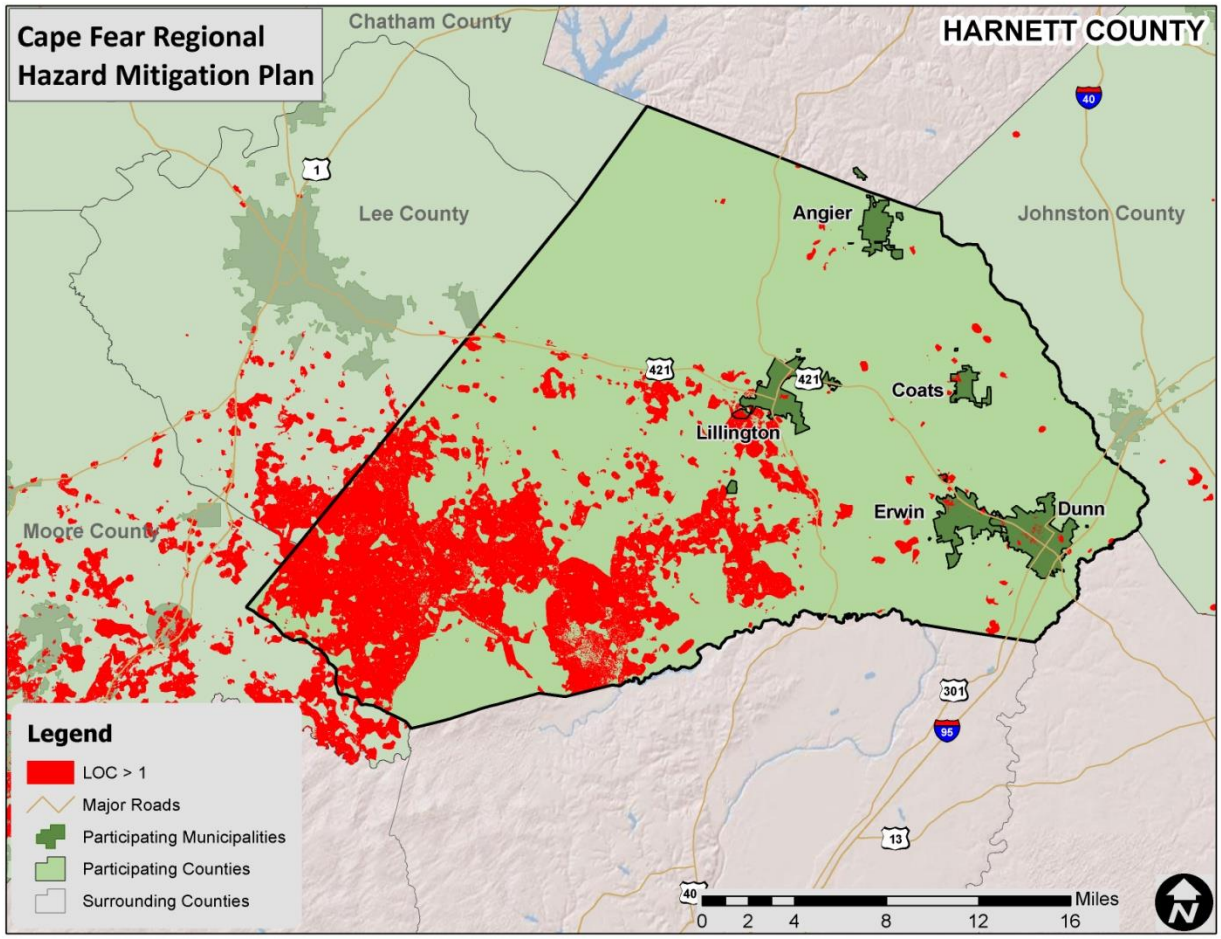
Wildfire

Although historical evidence indicates that Harnett County is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure B.23**, **Figure B.24**, **Figure B.25**, **Figure B.26**, **Figure B.27**, and **Figure B.28** show the Level of Concern data. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The county contains some lands where the value falls into the at-risk category, and though it has somewhat less land labeled as at-risk compared to other regions of North Carolina, the level of concern in those areas that are considered at-risk is somewhat higher than other areas of the state. Since all of this land area is on the lower fifth of the overall LOC scale, there is likely considerably less risk in the county than in other areas of the country.

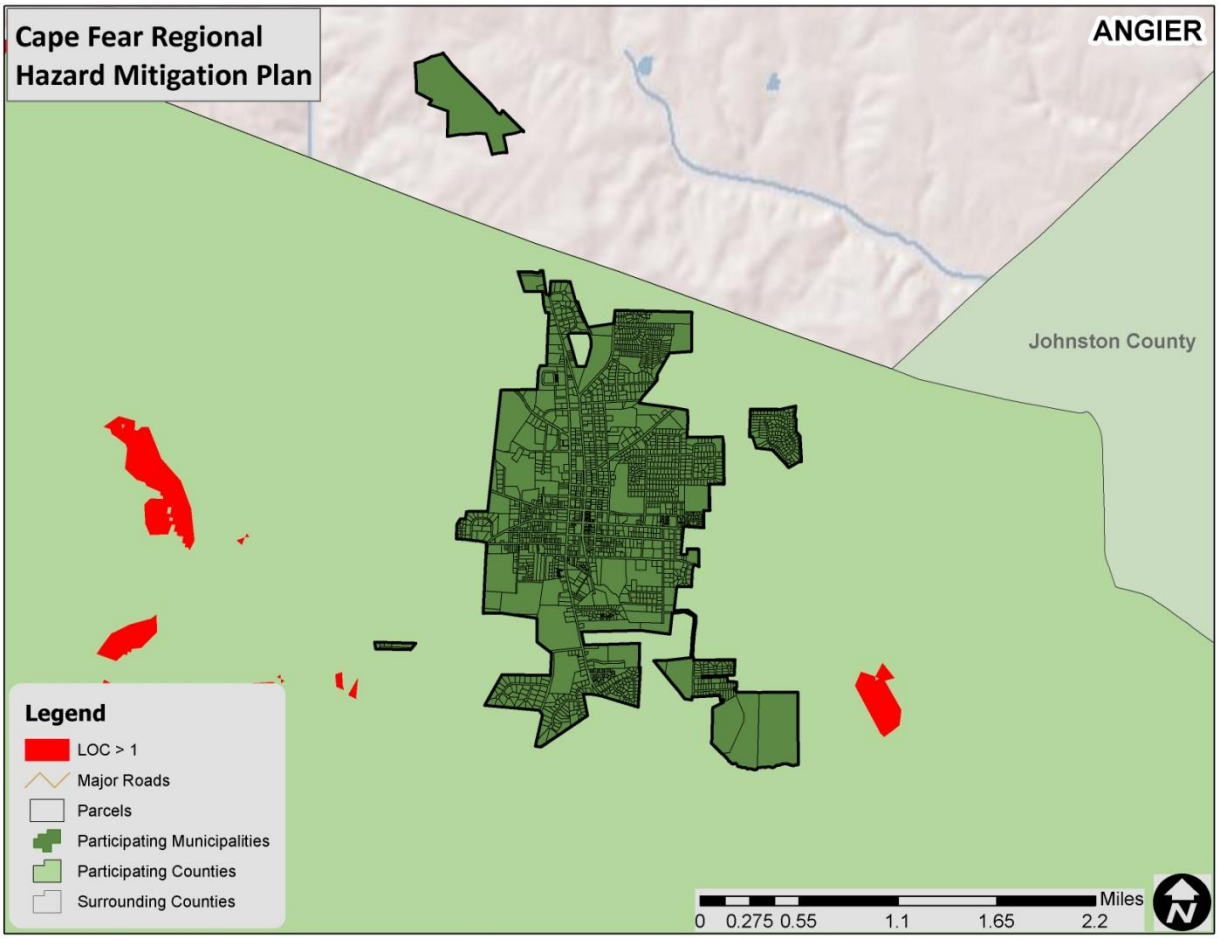
Table B.46 shows the results of the analysis.

FIGURE B.23: WILDFIRE RISK AREAS IN HARNETT COUNTY



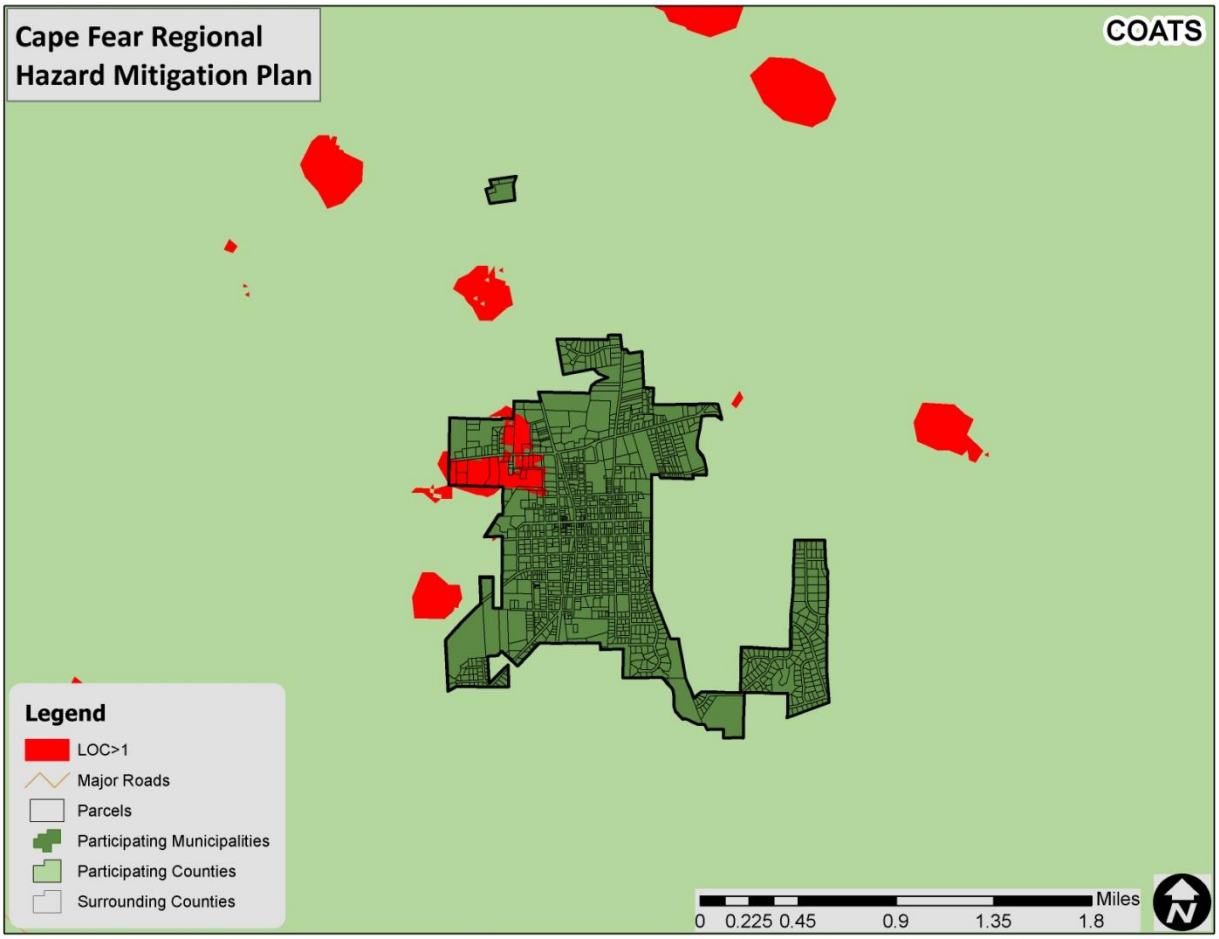
Source: Southern Wildfire Risk Assessment Data

FIGURE B.24: WILDFIRE RISK AREAS IN ANGIER



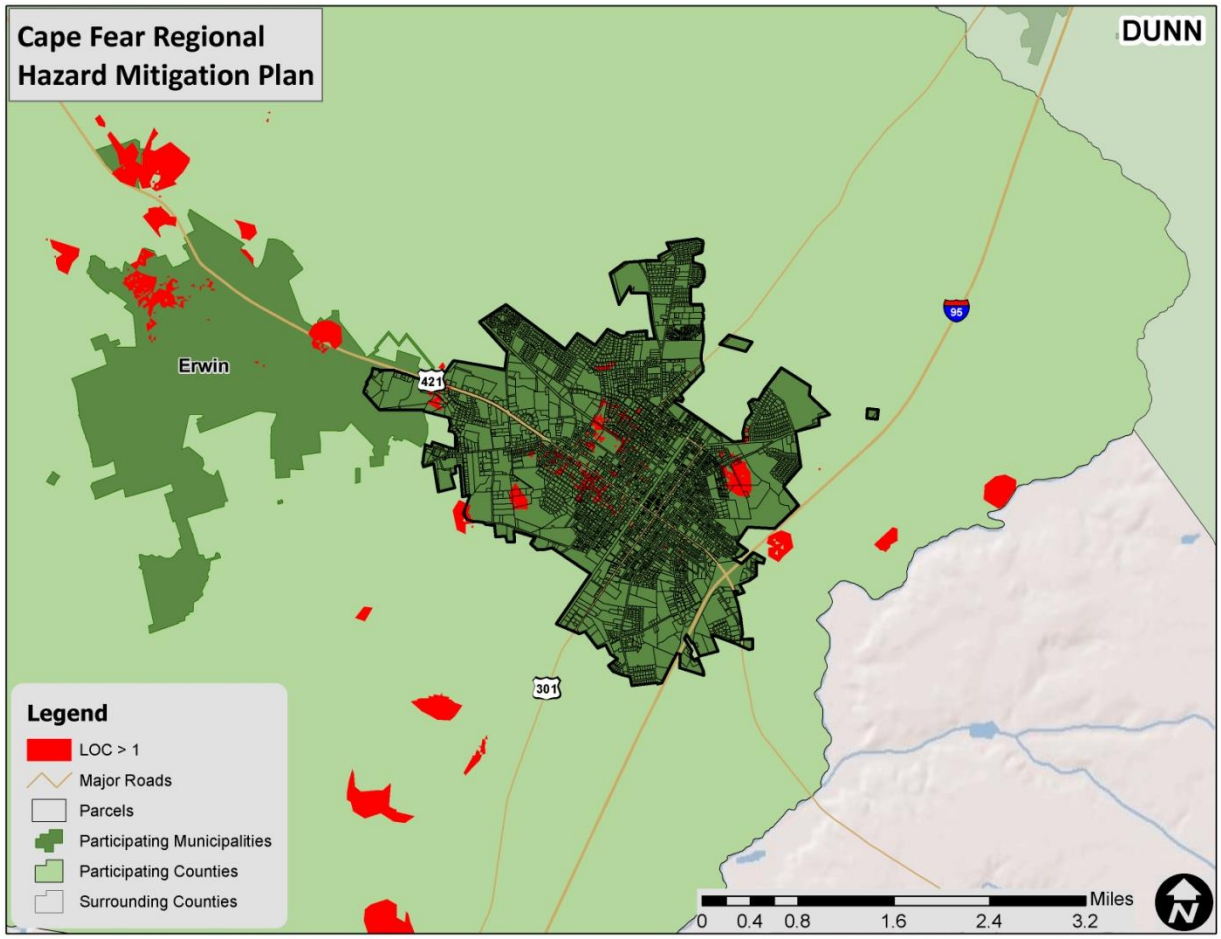
Source: Southern Wildfire Risk Assessment Data

FIGURE B.25: WILDFIRE RISK AREAS IN COATS



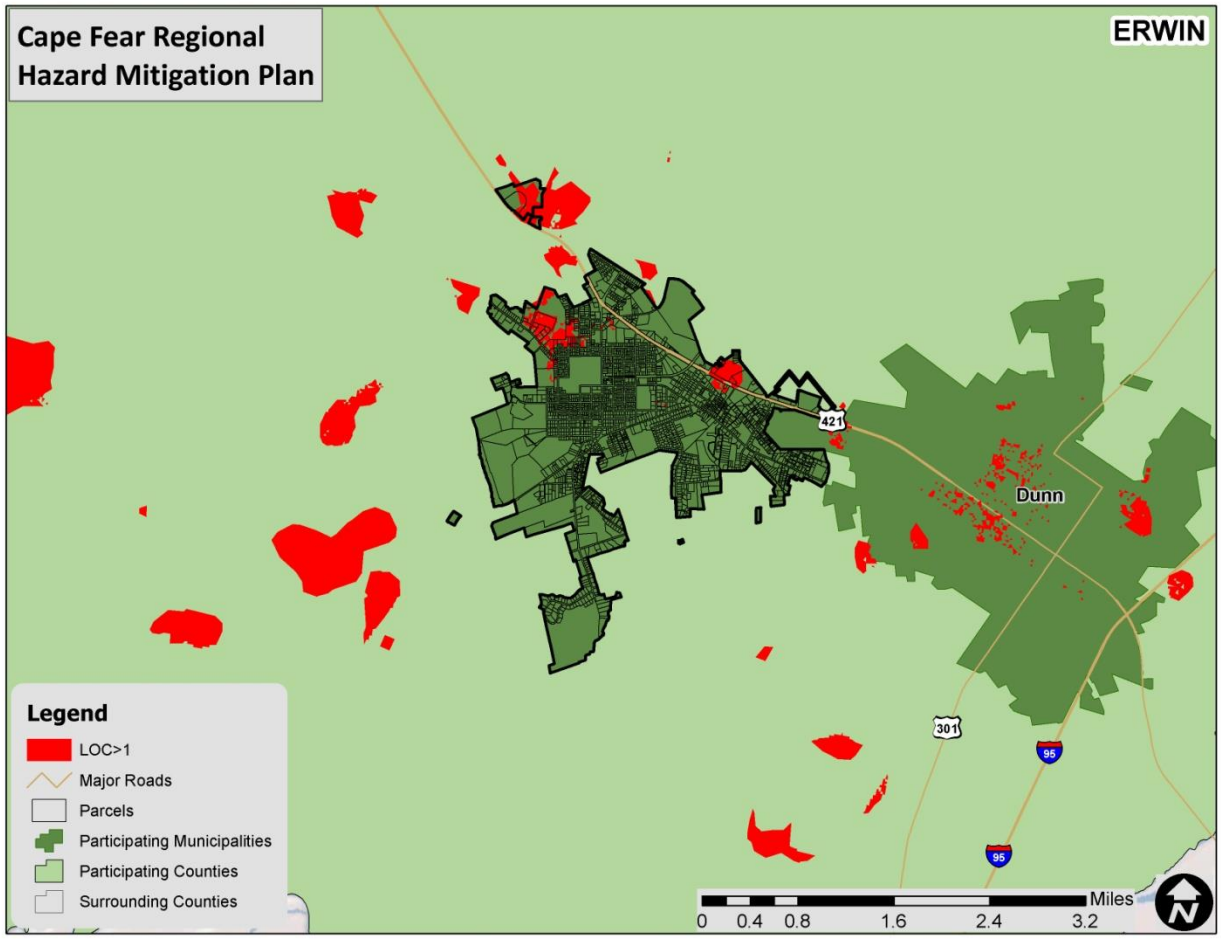
Source: Southern Wildfire Risk Assessment Data

FIGURE B.26: WILDFIRE RISK AREAS IN DUNN



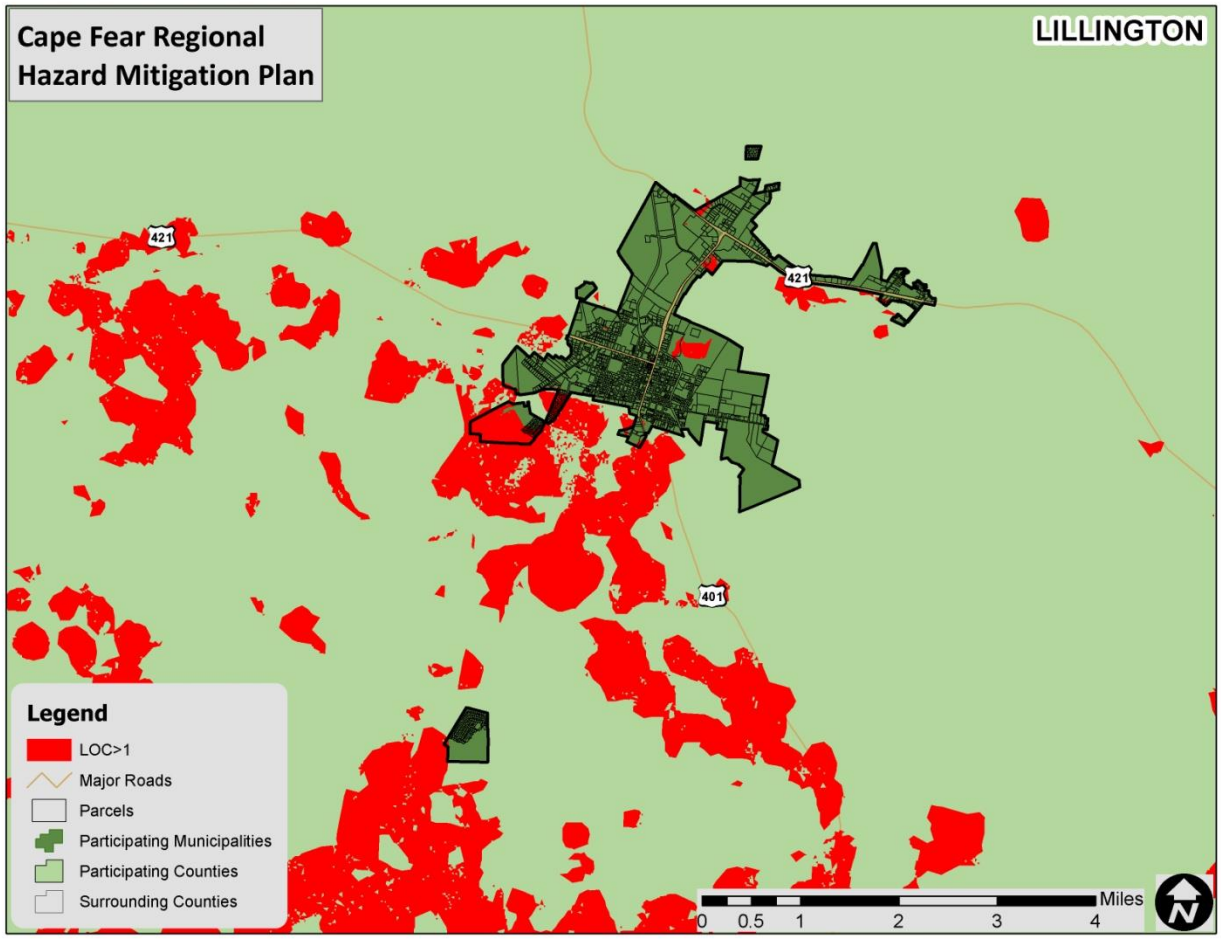
Source: Southern Wildfire Risk Assessment Data

FIGURE B.27: WILDFIRE RISK AREAS IN ERWIN



Source: Southern Wildfire Risk Assessment Data

FIGURE B.28: WILDFIRE RISK AREAS IN LILLINGTON



Source: Southern Wildfire Risk Assessment Data

TABLE B.46: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Angier	0	0	$0
Coats	31	17	$4,560,240
Dunn	491	264	$56,593,760
Erwin	115	43	$8,519,980
Lillington	127	15	$9,641,298
Unincorporated Area	20,981	13,239	$1,550,347,531
HARNETT COUNTY TOTAL	**21,745**	**13,578**	**$1,629,662,809**

Looking at jurisdictional level, unincorporated areas in the eastern half of the county face the highest level of concern areas. However, the municipalities (notably Lillington) also have some areas where the level of concern is above 1.

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are 10 critical facilities located in wildfire areas of concern, including 2 EMS/rescue stations, 4 fire stations, and 4 schools. It should also be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Harnett County.

Nuclear Accident

The location of Shearon Harris Nuclear Station north of Harnett County demonstrates that the county is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. All of Harnett County is located within one of the risk zones. **Table B.47** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE B.47: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Angier	0	0	$0	1,862	1,722	$152,433,474
Coats	0	0	$0	1,002	992	$61,881,400
Dunn	0	0	$0	4,829	4,114	$451,638,268
Erwin	0	0	$0	2,470	2,160	$159,419,650
Lillington	0	0	$0	1,639	1,055	$145,446,258
Unincorporated Area	2,835	3,420	$168,946,050	52,768	46,992	$3,595,206,557
HARNETT COUNTY TOTAL	**2,835**	**3,420**	**$168,946,050**	**64,570**	**57,035**	**$4,566,025,607**

Source: International Atomic Energy Agency

[24] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[25] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Social Vulnerability
Since all areas of the county are within at least the 50-mile buffer area, the total population is considered to be at risk to a nuclear accident. However, populations in the northern part of the county are considered to be at an elevated risk.

Critical Facilities
The critical facility analysis revealed that there are 3 critical facilities located in the 10-mile nuclear buffer area in Harnett County. This includes 1 EMS/rescue station, 1 fire station, and 1 other facility. All critical facilities in the county are located within the 50-mile nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table B.49** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in Harnett County, though areas in the north corner of the county are at a higher risk than others. All structures in the county are at some risk given that they are all located within the 50-mile buffer area.

Conclusions on Hazard Vulnerability
Table B.48 presents a summary of annualized loss for each hazard in Harnett County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

TABLE B.48: ANNUALIZED LOSS FOR HARNETT COUNTY

Event	Harnett County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	$5,393
Hurricane & Tropical Storm	$1,669,000
Lightning	$13,998
Severe Thunderstorm / High Wind	$29,061
Tornado	$411,492
Winter Storm & Freeze	$40,624
Geologic Hazards	
Earthquake	$21,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$452

Event	Harnett County
Other Hazards	
HAZMAT Incident	$554
Wildfire	Negligible
Nuclear Accident	Negligible
Terror Threat	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table B.49** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE B.49: AT-RISK CRITICAL FACILITIES IN HARNETT COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
HARNETT COUNTY																							
BENHAVEN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X
HARNETT EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
BENHAVEN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
SPOUT SPRINGS EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
BOONE TRAIL EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
BUIES CREEK EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
FLAT BRANCH EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
FLATWOODS EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COUNTY EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X												X	X
ANDERSON CREEK EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
BUIES CREEK FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FLATWOODS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
FLAT BRANCH FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
BOONE TRAIL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
BENHAVEN FIRE	Fire Station	X	X	X	X	X	X	X	X	X								X					X
BENHAVEN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
SPOUT SPRINGS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
SPOUT SPRINGS FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
BUNNLEVEL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
BOONE TRAIL FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
NORTHWEST HARNETT FIRE	Fire Station	X	X	X	X	X	X	X	X	X												X	X
ANDERSON CREEK FIRE	Fire Station	X	X	X	X	X	X	X	X	X													X
CENTRAL HARNETT HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
CENTRAL HARNETT HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
Harnett County Airpo	Other	X	X	X	X	X	X	X	X	X								X					X
JOHNSON BETTER CARE FACILITY	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
STAGE COACH MANOR	Other	X	X	X	X	X	X	X	X	X								X					X
PINECREST GARDENS OF LILLINGTON	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
KNOLLWOOD GARDENS OF LILLINGTON	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CORE FAMILY CARE INC	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
UNPRECEDENTED CARE	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SENTERS REST HOME	Other	X	X	X	X	X	X	X	X	X							X	X	X	X		X	X
CAMPBELL UNIVERSITY WELCOME CTR	Police Station	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Benhaven Elem	School	X	X	X	X	X	X	X	X	X								X		X	X		X
West Harnett High	School	X	X	X	X	X	X	X	X	X							X	X					X
West Harnett Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
Highland Elem	School	X	X	X	X	X	X	X	X	X													X
Johnsonville Elem	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Cameron Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cape Fear Christian	School	X	X	X	X	X	X	X	X	X							X	X					X
Coats Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Coats-Erwin Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Buies Creek Elem	School	X	X	X	X	X	X	X	X	X								X					X
Harnett Central Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
Harnett Central High	School	X	X	X	X	X	X	X	X	X								X					X
North Harnett Primary	School	X	X	X	X	X	X	X	X	X							X	X					X
Lafayette Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Boone Tral Elem	School	X	X	X	X	X	X	X	X	X								X					X
Anderson Creek Primary	School	X	X	X	X	X	X	X	X	X							X	X					X
South Harnett Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Overhills Middle	School	X	X	X	X	X	X	X	X	X							X	X			X		X
Overhills High	School	X	X	X	X	X	X	X	X	X							X	X			X		X
ANGIER BLACK RIVER EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X		X
ANGIER & BLACK RIVER FIRE	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X		X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
PRIMROSE VILLA INC- (II, III, & IV)	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
OAK HILL LIVING CENTER	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
ANGIER POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Angier Elem	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
COATS GROVE EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COATS GROVE FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
COATS POLICE DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Coats Christian	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CITY OF DUNN - PD	EOC	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
DUNN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
BETSY JOHNSON HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X								X					X
BETSY JOHNSON HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X								X					X
DUNN REHABILITATION & NURSING CENTER	Other	X	X	X	X	X	X	X	X	X						X		X		X			X
SENIOR CITIZENS VILLAGE/MOORE HEALTH CAR	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
MAGNOLIA LIVING CENTER LLC	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
DUNN POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Excel Christian	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Faith Education	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Gospel Tabernacle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Dunn Middle	School	X	X	X	X	X	X	X	X	X						X		X		X			X
Harnett Primary	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Wayne Ave Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
ERWIN EMS	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
ERWIN FIRE	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
GOOD HOPE BEHAVORIAL HEALTH SERVICES	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X	X	X			X
GOOD HOPE BEHAVORIAL HEALTH SERVICES	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X	X	X			X
BRITTHAVEN OF HARNETT	Other	X	X	X	X	X	X	X	X	X								X					X
ERWIN POLICE DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Malthouse Appleworks School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Erwin Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Gentry Elem	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Triton High	School	X	X	X	X	X	X	X	X	X							X	X		X			X
LILLINGTON FIRST RESPONDER	EMS/Rescue Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
CENTRAL DISPATCH- SHERIFF DEPT	EOC	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
LILLINGTON FIRE	Fire Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SUMMERVILLE FIRE	Fire Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
BROOKFIELD RETIREMENT CENTER	Other	X	X	X	X	X	X	X	X	X							X	X					X
HARNETT MANOR	Other	X	X	X	X	X	X	X	X	X							X	X					X
LILLINGTON POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
NC STATE HIGHWAY PATROL	Police Station	X	X	X	X	X	X	X	X	X								X	X	X			X
SHERIFF DEPARTMENT	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
HARNETT COUNTY DETENTION CENTER	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Star Academy	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Lillington-Shawtown Elem	School	X	X	X	X	X	X	X	X	X							X	X					X

B.4 HARNETT COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Harnett County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

B.4.1 Planning and Regulatory Capability

Table B.50 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Harnett County. 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE B.50: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
HARNETT COUNTY	✓	✓		✓	✓			✓	✓			✓	✓		✓	✓	✓	✓		✓	✓	✓	
Angier	✓	✓		✓	✓			✓				✓			✓	✓	✓	✓		✓	✓	✓	
Coats	✓			✓				✓				✓				✓	✓			✓	✓		
Dunn	✓	✓		✓				✓				✓			✓	✓	✓			✓	✓	✓	
Erwin	✓	✓		✓				✓				✓			✓	✓	✓			✓	✓	✓	
Lillington	✓	✓		✓				✓				✓			✓	✓	✓			✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Harnett County has previously adopted a hazard mitigation plan. All of the participating municipalities were also included in this plan.

Emergency Operations Plan
Harnett County maintains an emergency operations plan through its Emergency Management Department. This plan has been adopted by each of the municipalities within the county.

Continuity of Operations Plan
Harnett County has a continuity of operations plan in place and there is an ongoing update of its database inventory.

General Planning

Comprehensive Land Use Plan
Harnett County has adopted a comprehensive land use plan. Each of the participating municipalities has also adopted a land use or comprehensive plan except the Town of Coats.

Capital Improvements Plan
Harnett County and all of its municipalities have capital improvement plans in place.

Zoning Ordinance
Harnett County and all of its municipalities have adopted zoning ordinances. The county and the Town of Angier include zoning regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand-alone zoning ordinances.

Subdivision Ordinance
Harnett County and all of its municipalities have adopted subdivision regulations. Again, the county and the Town of Angier include subdivision regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand-along subdivision ordinances.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Harnett County Inspections provides building code inspections and enforcement to the county and all municipalities within the county, with the exception of Dunn, which enforces the building code within its jurisdiction.

Floodplain Management

Table B.51 provides NFIP policy and claim information for each participating jurisdiction in Harnett County.

TABLE B.51: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
HARNETT COUNTY†	04/16/90	07/17/07	300	$70,957,100	8	$42,688
Angier	02/03/00	07/17/07	11	$3,303,000	0	$0
Coats*	--	--	--	--	--	--
Dunn	09/04/86	07/17/07	53	$9,639,100	6	$41,512
Erwin#	02/28/97	07/17/07	13	$3,077,600	0	$0
Lillington	09/04/86	07/17/07	2	$700,000	0	$0

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
#Probation effective April 28, 2006
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Harnett County, Angier, Dunn, Erwin, and Lillington all participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Harnett County has adopted a comprehensive recreation and parks systemwide master plan that includes of its municipalities. The City of Dunn and the Town of Lillington have also adopted municipal-level parks and recreation plans.

Stormwater Management Plan
Although Harnett County and its municipalities do not have stormwater management plans in place, the county and Angier have adopted stormwater management regulations through various local ordinances. The county requires applicants for development to receive stormwater approvals through the state program.

B.4.2 Administrative and Technical Capability

Table B.52 provides a summary of the capability assessment results for Harnett County 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 B.52: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
HARNETT COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	✓
Angier	✓	✓	✓	✓	✓		✓	✓		
Coats		✓		✓			✓	✓		
Dunn	✓	✓	✓	✓	✓		✓	✓		
Erwin	✓	✓		✓	✓		✓	✓		
Lillington	✓	✓	✓	✓	✓		✓	✓		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

B.4.3 Fiscal Capability

Table B.53 provides a summary of the results for Harnett County 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) according to the previous county hazard mitigation plan.

TABLE B.53: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.
HARNETT COUNTY	✓	✓	✓						✓	✓
Angier	✓	✓	✓						✓	✓
Coats	✓	✓	✓						✓	✓
Dunn	✓	✓	✓						✓	✓
Erwin	✓	✓	✓						✓	✓
Lillington	✓	✓	✓						✓	✓

B.4.4 Political Capability

The previous hazard mitigation plan indicates that Harnett County is working to establish hazard mitigation in its day-to-day operations. In taking this step, the county will have to de-politicize many of the issues surrounding mitigation efforts. Public education and awareness campaigns about the economic efficiency and social utility of mitigative measures can help foster its general acceptance by citizens and politicians in the long run. Close governmental coordination is needed for the prevention of damage and recovery from natural disasters. This refers to coordination and cooperation between agencies in a local government, between governments within a county, and between local, state, and federal governments. This provides Harnett County, Angier, Coats, Dunn, Erwin, and Lillington with the political capability to carry out this plan and its hazard mitigation goals and objectives.

B.4.5 Conclusions on Local Capability

Table B.54 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 32.0, which falls into the moderate capability ranking.

TABLE B.54: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
HARNETT COUNTY	45	High
Angier	36	Moderate
Coats	17	Limited
Dunn	33	Moderate
Erwin	29	Moderate
Lillington	32	Moderate

B.5 HARNETT COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Harnett County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

B.5.1 Mitigation Goals

Harnett County developed six mitigation goals in coordination with the other participating Cape Fear Region jurisdictions. The regional mitigation goals are presented in **Table B.55**.

TABLE B.55: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

B.5.2 Mitigation Action Plan

The mitigation actions proposed by Harnett County, the Town of Angier, the Town of Coats, the City of Dunn, the Town of Erwin, and the Town of Lillington are listed in the following individual Mitigation Action Plans.

Harnett County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	The County will make it policy that any property owner wanting to build in a floodplain, must wait for 48 hours until a complete review of the elevation certificate can be made, to determine that the FEMA form is filled out correctly and the information is accurate.	Flood	High	Harnett County Planning Department	Local	2015, Annual Review and Update	This is currently a part of our standard operating procedure when it comes to permitting in the floodplain. We will continue to adhere to this policy.
P-2	The County will start a GIS project that will create a data layer of all known properties that are located within the floodplain to be used for future development planning purposes.	Flood	High	Harnett County GIS, Planning Department	Local, State	2015, Updated with new data	The County has mapped these properties in accordance with the latest FEMA studies, and the layers are continuously updated as we receive new data.
P-3	The County will further extend its Conservation zoning overlay district to protect more riparian zones of intermittent blue-line streams.	Flood	High	Harnett County Planning Department	Local	December 2017	The county has been working on extending the conservation overlay district, but there were more affected blue line streams than anticipated, so there is still work that needs to be done.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Distribute information to citizens in the Inspections department on how to retrofit homes to help prevent wind and flood damage during natural hazards.	Flood, High Wind, Hurricane, Thunderstorm, Tornado	Moderate	Harnett County Planning Department	FEMA, NCEM	2015, Updated with new data	The Planning Department crafted a brochure on this subject matter. Citizens are informed of best management practices in the field of construction to properly plan for, and prevent damage to structures. Severe weather advisories are sent out by emergency personnel on a consistent basis, and are perpetually updated.
PP-2	Continue to apply for pre- & post-disaster grants to buyout or elevate flood prone properties within Country Walk subdivision.	Flood	High	Planning department, Community Development, Building Inspections	Local/State/ Federal	2015, Annually	The county has implemented buyout/elevation projects in the past and will continue to do so as opportunities exist for these projects through mitigation funding.
PP-3	The County will partner with a local sand mining facility to retrofit a pit into a future reservoir	Flood	Moderate	Harnett County Planning Department	None; unless BRAC Regional Task Force acquires other funding	2020	The county has looked into carrying out this project but it is still a work in progress so it will remain in the plan.
Natural Resource Protection							
NRP-1	Explore requiring all new major subdivisions to set aside land for open space and restrict any building in environmentally sensitive areas.	Flood	High	Harnett County Planning Department	None	2015, Implemented with new development	The Harnett County UDO has outlined this objective as the "Compatibility Concept Model" and solicits offerings of open space for greater density within a given development.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	The County will conduct a training exercise each year to ensure that County emergency resource distribution operations, such as response time, communication, and coordination with DOT, are adequate for natural hazard events.	All	High	Harnett County Emergency Management	Local	2015, Annually	The County in conjunction with other local entities performs at least 3 exercises a year. These training sessions consist of a wide range of scenarios and settings.
Public Education and Awareness							
PEA-1	The County will hold an Emergency Management open house on October 1st each year to inform the public and County employees about all natural hazards and their corresponding mitigation techniques.	All	Moderate	Emergency Management Director	Local, State, sell advertisements for public information handed out at meetings	2015, Annually	Emergency Management plans this year to start conducting an annual "Open House" where they educate both the public and other staff members. These sessions are to take place in October which coincides with hurricane season.
PEA-2	The County will provide a GIS training tool that will be aimed at educating surveyors and builders about responsible growth in regard to hazard mitigation.	All	High	Harnett County GIS, Planning Department	Local, State	June 2015	We are currently working interdepartmentally to devise a strategy, and tool that will be easy to access and operate by the general public.

Town of Angier Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Create and define suitable areas for growth by updating existing land use plan or creation of a new land use plan.	All	Moderate	Zoning/Planning Administrator, Town Administrator	Local	2019	The town has updated its existing land use plan to identify areas suitable for growth. However, further updates of the land use plan will be required, so this action will remain in the plan.
P-2	Create a yearly checklist that will help monitor and protect infrastructure and existing structures.	All	High	Public Works Director, Building Inspector	Local, State	2015, Annual review and update	The town has developed a checklist that will help it to monitor its infrastructure and existing structures. This list will require annual review and update.
P-3	The Town will involve county officials with future growth plans and patterns, and hold community-visioning meetings to educate the public and developers about future growth and hazard mitigation planning.	All	Moderate	Town Administrator, Planning Director, Town/County Boards	Local	2015, Annual meetings	The town has involved county officials in future growth plans and has held meetings with the community to discuss growth and hazard mitigation topics. In the future, the town will continue to keep these stakeholders involved in planning for growth in a way that will reduce risk.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Create new ordinances and/or strengthen existing ordinances to protect and preserve environmentally sensitive areas and open space.	Flood	High	Town Administrator, Planning/Zoning Administrator, Town/County Boards	Local	2018	Ordinances have been developed in a way that attempts to minimize degradation to environmentally sensitive areas and to preserve open space. Nevertheless, there are still revisions that could be made to the town's ordinances that would further reduce risk and the tow n will look into making those changes going forward.
Structural Projects							
SP-1	Try to set aside monies for long range Capital Improvement Projects that would help protect public health and safety.	All	Moderate	Town/County Manager, Planning Director, Finance Director	Local	2019	In the past, the town has set aside funding for Capital Improvements that would protect public health and safety, but there are so many projects that need to be completed that this action will remain in the plan to demonstrate the need for additional funding of projects in the future.
Emergency Services							
ES-1	Pursue state and Federal grants that would help improve emergency services along with mitigation planning.	All	Moderate	Town/County Manager, Planning Director, Finance Director	Local	2018	The town has pursued state and federal grants in the past and has had some moderate success in getting funding for projects. However, the town would like to continue to pursue funding for mitigation related projects to build on past projects.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Make a list available for distribution at the Inspections Department of contractors and consultants knowledgeable or experienced in retrofitting techniques and construction.	All	Moderate	Chief Building Inspector, Harnett County Planning and Inspections Department	Local, Possible Grant	2015, Annual review and update	The town has developed a list of contractors that are knowledgeable in the area of retrofitting homes and other structures. This list is available at the Inspections Department but needs to be reviewed and updated annually.

Town of Coats Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	The Town will initiate a policy to identify and remove potentially dangerous trees and vegetation along public roadways.	Thunderstorm, High Wind, Hurricane, Winter Storm	High	Town of Coats Board of Commissioners	Local	Completed	The town has initiated a program to remove dangerous trees and vegetation along public roadways and will continue to implement this program going forward. This action will be removed as a capability at the next update.
P-2	The Town will conduct quarterly inspections of all storm sewers and open ditches in order to evaluate their readiness and to make corrections as needed. The Town will review and update its Storm Water Readiness Plan.	Flood	High	Town of Coats Public Works Department	Local	2015, Quarterly	The town has regularly conducted inspections of all storm sewers and ditches in order to ensure they are in suitable condition for managing stormwater. The town will update its Stormwater Readiness Plan in the future and perform quarterly inspections of its infrastructure system.
P-3	Ensure that all redevelopment and growth is sustainable to natural hazards through the development of new Zoning and Subdivision regulations.	All	High	Town of Coats Planning Board and Board of Commissioners	Local	2015, Annual review and update	The town has developed new zoning and subdivision regulations, but these regulations need to be reviewed and updated annually so that the town can improve the way it redevelops and grows in terms of mitigating hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	The Town will become a member of the National Flood Insurance Program.	Flood	High	Town of Coats Board of Commissioners	Local	Completed	The town is currently a member of the NFIP. This action will be removed from the next update as a capability.
P-5	The Town will develop a checklist to be used for an annual inspection of all Public Buildings to ensure they remain as structurally secure to hazard events as possible.	All	High	Coats Public Works Department, Town Manager, Town Board	Local	January 2015, Annual review	The town has developed a checklist to ensure all public buildings and structures are in the best condition possible to resist hazard events. In the future, the town will continue to improve its inspections process for public buildings and identify projects that could be implemented to further reduce risk.
P-6	The Town will utilize information obtained from the county GIS floodplain project to prevent redevelopment in flood prone areas and to help identify any currently developed areas that may be at risk.	Flood	Moderate	Town Manager, Town Planning Board, Town Board	Local	2015, Annually review growth areas	The town has utilized its GIS database to help prevent development in known hazard areas such as the floodplain. The town will continue to regulate development in the floodplain in a way that will reduce risk.
P-7	The Town will include in its new Zoning Ordinance an Open Space District Classification that will effectively set aside any environmentally sensitive areas and restrict any development therein.	Flood		Town Manager, Town Planning Board	Local	2017	The town has included the Open Space District classification in its zoning ordinance, but the town will need to identify and protect additional areas by designating them as that classification in order to further reduce risk.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	The Town will update its Land Use Plan with special emphasis being given to any environmentally sensitive or flood-prone areas.	Flood		Town Manager, Town Planning Board	Local	2015, Annual review and update	The town has updated its Land Use Plan in the past and this has led to the identification of flood prone and environmentally sensitive areas. However, the town will also work to identify additional flood prone areas in the future by reviewing the LUP on an annual basis.
Structural Projects							
SP-1	The Town will target infrastructure needs during the development of the annual Town budget.	All	High	Coats Public Works Department, Town Manager, Town Board	Local	January 2015, Annual review and update	In the past, the town has looked at long term infrastructure needs when developing the town budget. Many of these projects have overlapped with mitigation. On an annual basis going forward, the town will evaluate additional infrastructure projects that can help reduce risk and protect citizens.
Emergency Services							
ES-1	The Town will update and revise its Emergency Services and Disaster Response Readiness Plan.	All	High	Town of Coats Public Works Department, Coats Police Department, Town Manager, Town Board	Local	2015, Major reviews semi-annually	The town has kept up a consistent review and update process for its Emergency and Disaster Readiness Plan. However, in order to maintain its plan and ensure it is maximizing its risk-reducing capabilities, the town will update this plan at least twice per year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	The Town will educate and solicit public input concerning hazard mitigation strategies and policies through semiannual Town Meetings.	All	Moderate	Board of Commissioners & Planning Board, Harnett County EMC	Local	2015, Annual update on strategies	Semi-annual town meetings have been held each year since the last update of this plan. The town has pushed out strategies for mitigation during these meetings and sought input from residents. As such, the town will continue to hold these meetings at least twice per year to review strategies and update citizens on the latest techniques for mitigation.
PEA-2	The Town will develop an informational flier to be distributed each year that will provide our citizenry with the information and suggestions useful during natural disasters.	All	Moderate	Coats Public Works Department, Town Manager, Town Board	Local	2016	The town has developed an informational flyer and it has been distributed to citizens. This flyer will need to be updated and sent out again on at least an annual basis. The town will work on updating this with the latest information on pertaining to homeowner mitigation.

City of Dunn Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Create policy to annually trim trees and cut down dead trees under the city's supervision prior to April 15th.	Thunderstorm, High Wind, Hurricane, Winter Storm	Moderate	Public Works Department, City Council & Planning Board	Local	2015, Annually	A policy has been adopted to trim trees and cut down dead trees. This is done every year, at least twice a year. The city will continue to implement this action going forward.
P-2	Create and modify existing policies to prevent building in areas prone to flooding and/or wind damage.	Flood, Thunderstorm, High Wind, Hurricane, Tornado	Moderate	Planning Department, City Council & Planning Board	Local, State	2019, pending funding	The city has some policies in place to prevent building in flood/wind prone areas, but needs to do a study of its stormwater system and lacks the funding to do so.
P-3	Create a policy to require private property owners to remove storm debris (trees, limbs, etc.) within 45 days to prevent potential fire hazards to existing structures.	Wildfire	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2019	Deferred, this policy does not exist, but we will begin to work on creating this policy.
P-4	Create policy to inspect public buildings on annual basis for areas that need repair to keep the buildings as structurally sound as possible.	All	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2015, Annually	Completed. Building inspectors do this at least once a year. The building inspections department will continue to inspect public buildings to ensure they are structurally sound.
P-5	Create a policy to prevent redevelopment in areas that are especially prone to flooding and wind damage, especially repetitive loss structures in the City.	Flood, High Wind, Hurricane, Thunderstorm, Tornado	Moderate	Inspections & Planning Department, Planning Board, City Council, Public Works	Local, State	2019	Deferred. Although this policy does not exist currently and is not necessarily anticipated to be implemented in the immediate term, it may be revisited in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Create a stormwater management ordinance and provide the inspectors and/or code enforcement officers with the authority to complete inspections of businesses that could cause potential harm to the environment in the case of a natural hazard occurrence.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	2018	Deferred. This ordinance is not in place, but is still a priority for the City and we will work on this. Funds needed to hire the appropriate firm/engineer to draft the ordinance.
P-7	Ensure proper stormwater best management practices are implemented for repetitive loss property, and for area in its vicinity if development occurs	Flood	Moderate	City Council,, Planning Department, Public Works Department	Local funding; Grants that may become available either annually or after a declared event	2015, Annually	Best Management Practices are in place for stormwater in the vicinity of the repetitive loss property, but the area will need to continue to be monitored and evaluated.
Property Protection							
PP-1	Seek funding to retrofit or acquire repetitive loss property.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council	Local, State, Federal	2018	Deferred. No funding has been available to retrofit or acquire the property. Funding needed.
Natural Resource Protection							
NRP-1	Create a policy to establish vegetative buffers on all properties bordering drainage canals, creeks, streams, etc. to prevent water contamination.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	Completed	Completed. We have a landscape ordinance that requires buffers. This action will be removed as a capability during the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
NRP-2	Create policy to require quarterly checks on these buffers to ensure that they are free of debris and are being maintained properly.	Flood	Moderate	Planning Department, Planning Board, Inspections Department, City Council, Public Works, County Environmental Health Department	Local, State	2015	The city currently does not have a policy to check on the buffers, but this needs to be done.
Public Education and Awareness							
PEA-1	Create a brochure to increase public awareness of the benefits of being more conscientious of mitigation activities that minimize loss of property/property damage.	All	Moderate	Administration, City Council	Local, Grant Money	2016	Deferred. No brochure has been created but this is still a priority of the City.

Town of Erwin Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Encourage activities that will make structures less susceptible to damage during natural hazard events through improving the Erwin code of ordinances and creation of a storm-water management plan.	All	Moderate	Town of Erwin Planning Department and Planning Board	Local, Grant	2016	The town has developed a stormwater management plan that it updates regularly and the Town Engineer is working on 2 area drainage projects.
P-2	Meet quarterly with other local governments to discuss new ideas that will help Erwin provide safe and responsible growth patterns for the future.	All	Moderate	Erwin Planning Department	Local	2015	Done on an as-needed basis, but staff will work to re-establish communication on a regular basis.
P-3	Encourage growth only in areas suitable for development and preserve open space in environmentally sensitive areas through enforcement of a Comprehensive Land Use Plan.	Flood	Moderate	Town of Erwin Planning Board	Local	2019	The Land Use Plan was updated and adopted in 2014. The town will continue to review and update the plan going forward so this action will remain in the plan.
P-4	Collect data on repetitive stormwater incidents to create GIS layer for the town.	Flood, Hurricane, Thunderstorm	Moderate	Planning and Zoning	Local Budget	2015	New action
P-5	Continue being a member of the National Flood Insurance Program. Review all zoning permit applications to ensure compliance with the Town's Flood Damage Prevention Ordinance.	Flood	High	Planning and Zoning; Town Engineer	Local Budget	2014	New action. The Town updated its Flood Damage Prevention Ordinance in 2014 and, before the end of 2014, will have completed abatement projects to have its probationary status lifted.
Structural Projects							
SP-1	Implement East Erwin Drainage Project with design and permitting in FY2014.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2014 (for permitting)	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Implement South 13th Street Drainage Project, proposed for completion in FY2016.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2016	New action
SP-3	As part of stormwater management plan, conduct regular schedule of ditch maintenance.	Flood, Hurricane, Tornado, Thunderstorm	High	Town Engineer and Public Works	Local Operating Budget, Federal/State Grants	2015, Annual Evaluation	New action
Emergency Services							
ES-1	Renew and update disaster response/readiness plan.	All	Moderate	Erwin Board of Commissioners, Fire & Emergency Services Director	Local	2015, Annual review and update	In conjunction with Harnett County, the town updates its response/readiness plan on an annual basis and will continue to review and update annually.
Public Education and Awareness							
PEA-1	Improve education and outreach to the community regarding flood hazards and flood mitigation through dissemination of mitigation pamphlets in the Town Hall.	Flood	High	Chief Building Inspector	Local	6 months following adoption of the plan	Have printed new FEMA brochures & handouts for citizen availability. The town will continue to evaluate and update education materials on an annual basis.
PEA-2	Maintain a system for identifying Town's special needs citizens.	All	Moderate	Police Department	Local	2019	New action
PEA-3	Provide education materials on preparedness/mitigation measures on www.erwin-nc.org to include ReadyNC.org and www.dhs.gov/ready.	All	Moderate	Planning and Zoning	Local Budget	2014	New action

Town of Lillington Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	To include in our rewrite of our Zoning Ordinance and Subdivision Ordinance sound planning practices that allow only responsible growth in floodplain areas. Note: All new buildings are inspected by Harnett County. The Town will coordinate with the County to make sure that all applicable building codes are followed with regard to hurricane or high wind standards.	Flood, Hurricane, High Wind	High	Town Board of Commissioners, Town Manager	Local	2015	The town has worked to develop ordinances that include standards for responsible growth in hazard areas. These standards are in place, but will need to be reviewed and updated in order to improve the allowable growth in high hazard areas further.
P-2	The Town will aim to have floodplain data and other useful tools available online to aid with responsible growth.	Flood	High	Town Manager	Local	2015, Annual update	The town has developed a number of tools that have been displayed online and which can help citizens better understand responsible growth strategies. These tools and information will need to be updated on an annual basis.
Natural Resource Protection							
NRP-1	Rewrite Zoning Ordinance to protect natural areas along the Cape Fear River and to determine the correct riparian buffer to preserve open space and limit development.	Flood	High	Town Manager	Local	Completed	The Zoning Ordinance has been re-written to protect natural areas along the Cape Fear River and to preserve open space and limit development. This ordinance is in place so this action is complete and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Retrofit all Town owned buildings to safeguard against natural disasters and distribute information to the community on how to retrofit privately owned structures.	All	Low	Town Manger and Director of Public Works	Local	2015	The town has retrofitted many public buildings, but it will need to continue to work to meet the goal of retrofitting all buildings, especially as new techniques are developed to make structures more resilient. The town will additionally work to improve its outreach to homeowners to help them better understand the benefits of retrofitting and the best strategies for doing so.
Emergency Services							
ES-1	To protect life and property through continuing efforts to improve emergency response and preparation.	All	Moderate	Town Manager, Local Fire Chiefs	Local	2015, Annual review	The town is fully committed to emergency response and preparation activities and has been well prepared for major events in the past. In the future, the town will continue to put a strong emphasis on these activities and ensure it is ready for the next disaster event.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Send out newsletter to inform the community of disasters and mitigation. For example, information may concern when hurricane season begins and ends and may ask citizens to inspect their property for possible hurricane/high wind susceptibility.	All	Moderate	Town Manager	Local	2015, Annually	The town sends out an annual newsletter to let property owners know when hurricane season has begun and ends. The town also puts out a lot of information on the strategies property owners can take to protect their property from natural disasters. This information will need to be reviewed at least any

Annex C
Johnston County

This annex includes jurisdiction-specific information for Johnston County and its participating municipalities. It consists of the following five subsections:

- C.1 Johnston County Community Profile
- C.2 Johnston County Risk Assessment
- C.3 Johnston County Vulnerability Assessment
- C.4 Johnston County Capability Assessment
- C.5 Johnston County Mitigation Strategy

C.1 JOHNSTON COUNTY COMMUNITY PROFILE

C.1.1 Geography and the Environment

Johnston County is located in the East Central region of North Carolina. It comprises 11 municipalities, the Town of Archer Lodge, Town of Benson, Town of Clayton, Town of Four Oaks, Town of Kenly, Town of Micro, Town of Pine Level, Town of Princeton, Town of Selma, Town of Smithfield, and Town of Wilson's Mills, as well as many small unincorporated communities. An orientation map is provided as **Figure C.1**.

The southeastern half of Johnston County generally exhibits topographic features common to the Coastal Plains and is an area of level to gently rolling terrain. The northwestern half of the county resembles the Piedmont and is an area of steeper hills and slightly higher average elevation. The Neuse Rive, Little River, and Holts Lake are the major water bodies in the county. The total area of the county is 796 square miles, 4 square miles of which is water area.

From December to February, the average high temperature is in the mid to low 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter. Snow and sleet is usually light and occurs on average once or twice per year.

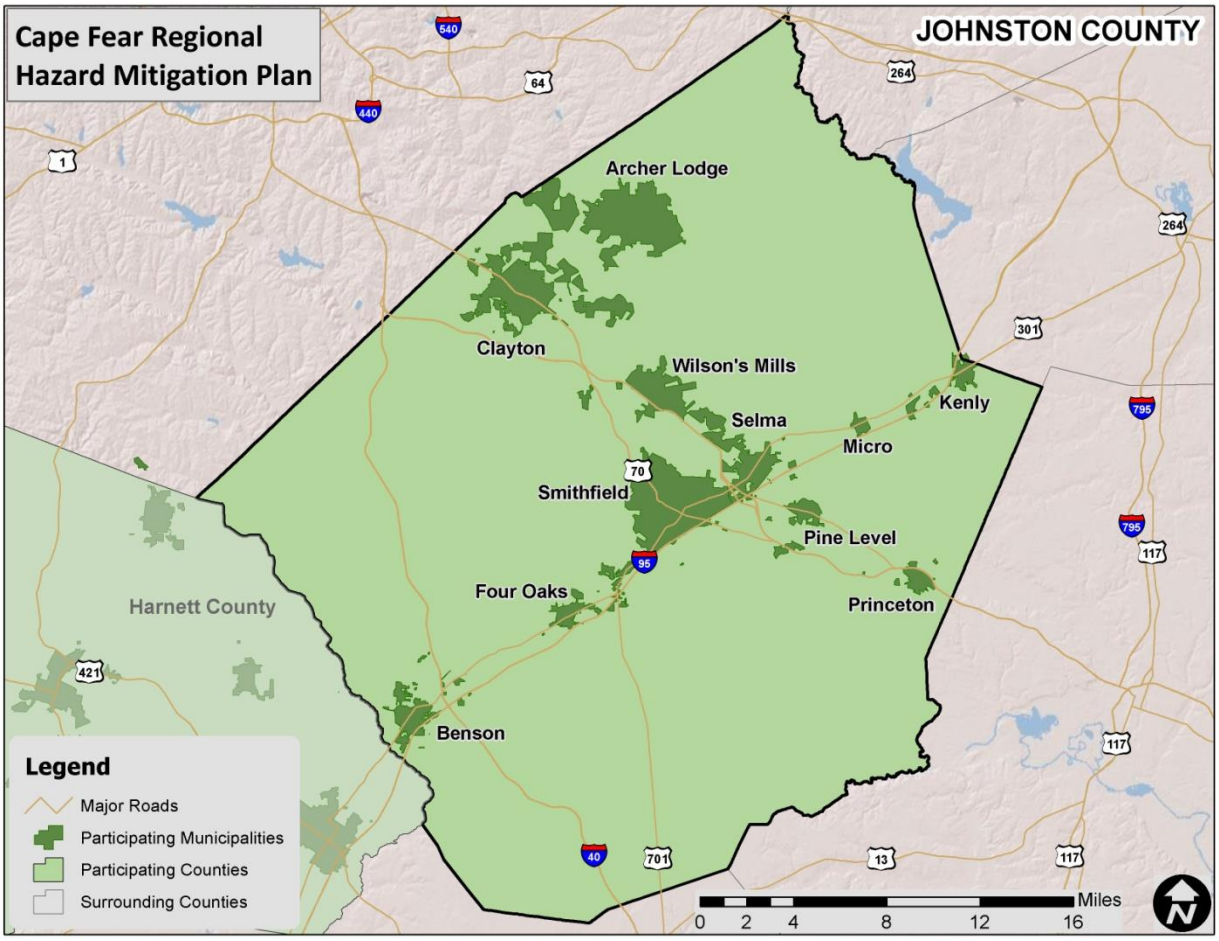
During the spring months, the days are warm and the nights are cool. Average high temperatures increase from the lower 60s in March to the nearly 80°F in May. There is a similar increase in average low temperatures, which start in the high 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring.

The summer is characterized by warm temperatures and rather high humidity. Average high temperatures range from the mid 80s to almost 90°F and low temperatures average in the lower to upper 60s. Summer precipitation is normally the greatest, but also the most variable, and thunderstorms are common events.

Autumn is typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the lower 80s in September and fall

to the low to mid 60s by November. Average lows also drop significantly from the high 50s to upper 30s from September to November. Autumn is the driest season.

FIGURE C.1: JOHNSTON COUNTY ORIENTATION MAP



C.1.2 Population and Demographics

According to the 2010 Census, Johnston County has a population of 168,878 people. The county has seen almost 39 percent growth between 2000 and 2010, and the average population density is 213 people per square mile. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for the county and three participating municipalities are presented in **Table C.1**.

TABLE C.1: POPULATION COUNTS FOR JOHNSTON COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Johnston County	**81,306**	**121,965**	**168,878**	**38.5%**
Town of Archer Lodge	--	--	4,292	--
Town of Benson	2,810	2,923	3,311	13.3%
Town of Clayton	4,756	6,973	16,116	131.1%

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Town of Four Oaks	1,308	1,424	1,921	34.9%
Town of Kenly	1,549	1,569	1,339	-14.7%
Town of Micro	417	454	441	-2.9%
Town of Pine Level	1,217	1,313	1,700	29.5%
Town of Princeton	1,181	1,066	1,194	12.0%
Town of Selma	4,600	5,914	6,073	2.7%
Town of Smithfield	7,540	11,510	10,966	-4.7%
Town of Wilson's Mills	--	1,291	2,277	76.4%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Johnston County is 36.3 years. The racial characteristics of the county are presented in **Table C.2**. Whites make up the majority of the population in the county, accounting for around 74 percent of the population.

TABLE C.2: DEMOGRAPHICS OF JOHNSTON COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Johnston County	**74.2%**	**15.1%**	**0.6%**	**0.6%**	**0.0%**	**7.5%**	**2.0%**	**12.9%**
Town of Archer Lodge	81.0%	8.8%	0.6%	0.3%	0.0%	7.2%	2.1%	12.2%
Town of Benson	60.2%	26.6%	0.4%	0.5%	0.0%	10.1%	2.3%	14.0%
Town of Clayton	69.5%	21.8%	0.4%	1.4%	0.0%	4.9%	2.1%	10.7%
Town of Four Oaks	69.8%	17.5%	0.9%	0.2%	0.0%	8.6%	3.0%	14.1%
Town of Kenly	58.5%	35.3%	0.7%	0.7%	0.0%	4.1%	0.8%	8.1%
Town of Micro	78.2%	12.5%	0.0%	0.2%	0.0%	8.4%	0.7%	9.5%
Town of Pine Level	73.2%	15.2%	0.7%	0.1%	0.0%	9.1%	1.6%	12.9%
Town of Princeton	67.2%	25.5%	0.8%	0.9%	0.0%	3.9%	1.7%	5.9%
Town of Selma	38.8%	37.2%	0.5%	0.2%	0.1%	20.3%	2.9%	34.8%
Town of Smithfield	56.9%	27.2%	0.5%	0.8%	0.1%	12.5%	1.9%	19.3%
Town of Wilson's Mills	57.0%	30.7%	0.7%	0.4%	0.0%	9.0%	2.2%	18.7%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

C.1.3 Housing

According to the 2010 U.S. Census, there are 67,682 housing units in Johnston County, the majority of which are single family homes or mobile homes. Housing information for the county and towns is presented in **Table C.3**. As shown in the table, the county and towns all have a very low percentage of seasonal units.

TABLE C.3: HOUSING CHARACTERISTICS OF JOHNSTON COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Johnston County	**50,196**	**67,682**	**0.6%**	**$136,200**
Town of Archer Lodge	--	1,536	0.6%	$149,200
Town of Benson	1,364	1,554	0.8%	$117,100
Town of Clayton	3,006	6,648	0.4%	$151,000
Town of Four Oaks	667	888	0.3%	$113,300
Town of Kenly	754	703	0.6%	$108,200
Town of Micro	225	212	0.0%	$74,000
Town of Pine Level	652	760	0.5%	$117,200
Town of Princeton	525	571	0.7%	$88,300
Town of Selma	2,515	2,590	0.3%	$92,300
Town of Smithfield	4,674	4,834	0.5%	$120,500
Town of Wilson's Mills	505	823	0.5%	$106,600

Source: United States Census Bureau

C.1.4 Infrastructure

Transportation

There are several major highways that cross Johnston County. Interstate 95 is one of two interests that pass directly through Johnston County, traversing northeast to southwest from Harnett County through Benson, Four Oaks, Smithfield, Selma, and Kenly. The second interstate that passes through Johnston County is Interstate 40, which travels northwest to southwest along the southwest edge of the county, connecting it to Wake County and the Triangle. US-70 also connects the county to the Triangle, traversing northwest to southeast through Johnston County. There is also a designated scenic byway in Johnston County, Blue-Gray Scenic Byway, which parallels the Neuse River and Hannah's Creek.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to Johnston County. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 45 miles from Smithfield. An additional relief airport, Raleigh Exec, is also located nearby just outside of Sanford and provides additional capacity to the RDU airport. An additional general aviation airport servicing the county is the Johnston County Airport in Smithfield.

Utilities

Electrical power in Johnston County is provided by one public utility, three electricity cooperatives, and several municipalities. Duke Energy Progress serves major portions of the county while South River Electric Membership Corporation serves a small area in southeastern corner of the county, Tri-County Electric Membership Corporation serves a small area on the eastern edge of the county, and Wake Electric Membership Corporation services a small area in the northern part of the county. The Towns of Benson, Clayton, Selma, and Smithfield are all members of the North Carolina Eastern Municipal Power Association and are affiliated with ElectriCities of North Carolina; as such, they provide municipally-owned and operated electric service to their residents.

Water and sewer service in the county is provided by the Johnston County Public Utilities Department, which provides service to county residents as well as residents of the Towns of Archer Lodge and

Wilson's Mills. The remaining towns in Johnston County have their own water supply and wastewater collection systems. Some parts of the county do require the use of wells and septic systems.

Community Facilities

There are a number of buildings and community facilities located throughout Johnston County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 12 fire stations, 8 police stations, and 46 public schools located within the county.

There are two medical care facilities located in Johnston County. These facilities are operated by Johnston Health. The Johnston Medical Center is a 199-bed acute care hospital located in Smithfield with a secondary location in Clayton.

In addition to the Neuse River Greenway Trail and Clemmons Educational State Forest, the county contains numerous local parks and recreation areas. These facilities offer recreational opportunities to area residents and many visitors each year.

C.1.5 Land Use

Johnston County is experiencing growth and development due to its proximity to the major metropolitan area in the Triangle. There are several incorporated municipalities located throughout the county which make up most of the county's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with some agricultural and recreational uses in the more rural areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

C.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Johnston County had an average annual employment of 74,971 workers and an average unemployment rate of 8.2 percent (compared to 8.0 percent for the state). In 2012, the Manufacturing industry employed 14.8 percent of the county's workforce followed closely by Retail Trade (14.3%) then Health Care and Social Assistance (12.2%) and Educational Services (11.8%). The American Community Survey (ACS) found the average annual median household income in Johnston County was $50,132 in Johnston County from 2008 to 2012 compared to $46,450 for the state of North Carolina.

C.2 JOHNSTON COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Johnston County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

C.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, Johnston County has had drought occurrences in each of the last fourteen years (2000-2013). **Table C.4** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE C.4: HISTORICAL DROUGHT OCCURRENCES IN JOHNSTON COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Johnston County
2000	ABNORMAL
2001	SEVERE
2002	**EXTREME**
2003	ABNORMAL
2004	ABNORMAL
2005	MODERATE
2006	SEVERE
2007	**EXCEPTIONAL**
2008	**EXCEPTIONAL**
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE

Source: North Carolina Drought Monitor

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Johnston County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

C.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Johnston County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Johnston County. Two events were reported:

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

July 23, 1999 – *Excessive Heat* – A farm worker was overcome by heat exhaustion. He was taken to the local hospital where his body temperature was measured at 108. A 3 year old boy died after he apparently got into his parents car and could not get out.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1892. The recorded maximum for Johnston County can be found below in **Table C.5**.

TABLE C.5: HIGHEST RECORDED TEMPERATURE IN JOHNSTON COUNTY

Location	Date	Temperature (F)
Clayton WTP	8/18/1988	107
JOHNSTON COUNTY MAXIMUM	--	**107**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the county. The most centralized location is Smithfield. **Table C.6** shows the average maximum temperatures from 1971 to 2000 at the Smithfield observation station which can be used as a general comparison for the county.

TABLE C.6: AVERAGE MAXIMUM TEMPERATURE IN SMITHFIELD, JOHNSTON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	51.4	55.2	63.7	72.4	79.8	86.3	89.9	87.9	82.5	72.7	63.6	54.8

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Johnston County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county.

C.2.3 Hailstorm

Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Johnston County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

Historical Occurrences

According to the National Climatic Data Center, 155 recorded hailstorm events have affected Jonston County since 1973.[1] **Table C.7** is a summary of the hail events in Johnston County. **Table C.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in almost $1.3 million (2013 dollars) in property damages. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE C.7: SUMMARY OF HAIL OCCURRENCES IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	3	0/0	$0
Benson	16	0/0	$290,268
Clayton	21	0/0	$5,075
Four Oaks	11	0/0	$0
Kenly	6	0/0	$890,783
Micro	0	0/0	$0
Pine Level	2	0/0	$0
Princeton	16	0/0	$0
Selma	2	0/0	$0
Smithfield	13	0/0	$8,069
Wilson's Mills	8	0/0	$0
Unincorporated Area	57	0/0	$55,928
JOHNSTON COUNTY TOTAL	**155**	**0/0**	**$1,250,123**

Source: National Climatic Data Center

[1] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected Jonhston County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

TABLE C.8: HISTORICAL HAIL OCCURRENCES IN JOHNSTON COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Archer Lodge				
ARCHERS LODGE	5/11/1996	0.75 in.	0/0	$0
ARCHERS LODGE	7/16/1997	0.75 in.	0/0	$0
ARCHERS LODGE	7/22/2008	0.88 in.	0/0	$0
Benson				
Benson	7/26/1995	1.00 in.	0/0	$0
BENSON	5/6/1996	0.75 in.	0/0	$0
BENSON	8/5/1997	2.75 in.	0/0	$290,268
BENSON	5/26/1998	1.75 in.	0/0	$0
BENSON	7/22/1998	1.25 in.	0/0	$0
BENSON	7/22/1998	1.00 in.	0/0	$0
BENSON	6/3/2000	0.75 in.	0/0	$0
BENSON	8/18/2003	2.00 in.	0/0	$0
BENSON	8/18/2003	1.00 in.	0/0	$0
BENSON	5/5/2006	0.75 in.	0/0	$0
BENSON	5/5/2006	0.75 in.	0/0	$0
BENSON	5/20/2006	1.75 in.	0/0	$0
BENSON	4/21/2008	1.00 in.	0/0	$0
BENSON	8/5/2009	1.25 in.	0/0	$0
BENSON	6/21/2011	1.00 in.	0/0	$0
BENSON	5/22/2012	0.75 in.	0/0	$0
Clayton				
Clayton	6/12/1995	2.00 in.	0/0	$0
CLAYTON	5/11/1996	0.75 in.	0/0	$0
CLAYTON	5/7/1998	1.00 in.	0/0	$0
CLAYTON	6/3/1998	1.25 in.	0/0	$0
CLAYTON	8/13/2000	0.75 in.	0/0	$0
CLAYTON	7/18/2003	0.75 in.	0/0	$0
CLAYTON	8/18/2003	0.75 in.	0/0	$0
CLAYTON	5/20/2006	1.00 in.	0/0	$0
CLAYTON	5/20/2006	1.00 in.	0/0	$0
CLAYTON	5/20/2006	1.25 in.	0/0	$0
CLAYTON	5/26/2006	1.75 in.	0/0	$0
CLAYTON	5/26/2006	1.75 in.	0/0	$0
CLAYTON	6/6/2006	0.75 in.	0/0	$0
CLAYTON	6/11/2006	0.75 in.	0/0	$0
CLAYTON	5/10/2008	1.00 in.	0/0	$0
CLAYTON	7/25/2009	0.88 in.	0/0	$0
CLAYTON	5/23/2012	1.75 in.	0/0	$0
CLAYTON	5/23/2012	1.00 in.	0/0	$0
CLAYTON	5/23/2012	1.75 in.	0/0	$5,075
CLAYTON	7/1/2012	1.00 in.	0/0	$0
CLAYTON	7/1/2012	1.00 in.	0/0	$0
Four Oaks				
FOUR OAKS	7/25/1996	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
FOUR OAKS	9/11/1997	0.75 in.	0/0	$0
FOUR OAKS	5/8/1998	0.75 in.	0/0	$0
FOUR OAKS	4/4/1999	0.00 in.	0/0	$0
FOUR OAKS	7/11/2003	1.00 in.	0/0	$0
FOUR OAKS	5/18/2006	0.75 in.	0/0	$0
FOUR OAKS	6/12/2007	0.88 in.	0/0	$0
FOUR OAKS	7/27/2007	0.75 in.	0/0	$0
FOUR OAKS	4/12/2008	1.75 in.	0/0	$0
FOUR OAKS	6/22/2008	0.75 in.	0/0	$0
FOUR OAKS	5/23/2012	1.00 in.	0/0	$0
Kenly				
KENLY	5/29/1996	0.0 in.	0/0	$890,783
KENLY	4/21/1997	1.00 in.	0/0	$0
KENLY	5/1/1997	1.00 in.	0/0	$0
KENLY	5/26/2006	0.88 in.	0/0	$0
KENLY	5/29/2009	0.75 in.	0/0	$0
KENLY	8/2/2012	1.75 in.	0/0	$0
Micro				
None Reported	--	--	--	--
Pine Level				
PINE LEVEL	6/11/2008	0.75 in.	0/0	$0
PINE LEVEL	5/6/2009	1.00 in.	0/0	$0
Princeton				
Princeton	5/11/1995	1.00 in.	0/0	$0
PRINCETON	5/29/2003	0.75 in.	0/0	$0
PRINCETON	10/22/2005	0.75 in.	0/0	$0
PRINCETON	5/18/2006	1.25 in.	0/0	$0
PRINCETON	5/18/2006	0.75 in.	0/0	$0
PRINCETON	5/18/2006	0.75 in.	0/0	$0
PRINCETON	5/18/2006	1.00 in.	0/0	$0
PRINCETON	5/18/2006	1.75 in.	0/0	$0
PRINCETON	5/18/2006	0.88 in.	0/0	$0
PRINCETON	5/20/2006	1.00 in.	0/0	$0
PRINCETON	6/11/2006	0.75 in.	0/0	$0
PRINCETON	5/20/2008	0.88 in.	0/0	$0
PRINCETON	4/6/2009	0.75 in.	0/0	$0
PRINCETON	5/7/2009	0.75 in.	0/0	$0
PRINCETON	5/15/2012	1.00 in.	0/0	$0
PRINCETON	5/22/2012	1.00 in.	0/0	$0
Selma				
Selma	5/11/1995	1.00 in.	0/0	$0
SELMA	5/20/2008	0.88 in.	0/0	$0
Smithfield				
Smithfield	4/26/1993	0.75 in.	0/0	$0
Smithfield	5/19/1993	1.75 in.	0/0	$8,069
SMITHFIELD	7/5/1997	1.00 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
SMITHFIELD	4/1/2001	1.00 in.	0/0	$0
SMITHFIELD	7/5/2002	0.88 in.	0/0	$0
SMITHFIELD	7/5/2002	1.75 in.	0/0	$0
SMITHFIELD	5/18/2006	1.00 in.	0/0	$0
SMITHFIELD	7/27/2007	1.75 in.	0/0	$0
SMITHFIELD	7/28/2007	0.75 in.	0/0	$0
SMITHFIELD	5/10/2008	0.88 in.	0/0	$0
SMITHFIELD	5/10/2008	1.50 in.	0/0	$0
SMITHFIELD	5/20/2008	0.88 in.	0/0	$0
SMITHFIELD	6/9/2009	0.88 in.	0/0	$0
Wilson's Mills				
Wilson Mills	5/19/1993	1.50	0/0	$0
WILSON MILLS	4/15/1996	0.75	0/0	$0
WILSONS MILLS	5/10/2008	0.88	0/0	$0
WILSONS MILLS	5/10/2008	0.88	0/0	$0
WILSONS MILLS	5/20/2008	1.25	0/0	$0
WILSONS MILLS	6/9/2009	0.88	0/0	$0
WILSONS MILLS	5/4/2012	0.75	0/0	$0
WILSONS MILLS	7/1/2012	1.75	0/0	$0
Unincorporated Area				
JOHNSTON COUNTY	9/18/1973	1.75	0/0	$0
JOHNSTON COUNTY	4/19/1978	1.75	0/0	$0
JOHNSTON COUNTY	5/23/1983	1.75	0/0	$0
JOHNSTON COUNTY	3/28/1984	1.75	0/0	$0
JOHNSTON COUNTY	5/8/1984	0.75	0/0	$0
JOHNSTON COUNTY	5/8/1984	1.75	0/0	$0
JOHNSTON COUNTY	4/16/1985	0.75	0/0	$0
JOHNSTON COUNTY	7/16/1985	1.00	0/0	$0
JOHNSTON COUNTY	7/16/1985	0.75	0/0	$0
JOHNSTON COUNTY	5/21/1986	1.75	0/0	$0
JOHNSTON COUNTY	5/30/1986	1.75	0/0	$0
JOHNSTON COUNTY	5/30/1986	1.00	0/0	$0
JOHNSTON COUNTY	8/27/1986	1.75	0/0	$0
JOHNSTON COUNTY	5/3/1987	0.75	0/0	$0
JOHNSTON COUNTY	5/3/1987	0.75	0/0	$0
JOHNSTON COUNTY	5/5/1988	0.75	0/0	$0
JOHNSTON COUNTY	6/2/1988	1.75	0/0	$0
JOHNSTON COUNTY	4/25/1989	1.75	0/0	$0
JOHNSTON COUNTY	4/25/1989	1.25	0/0	$0
JOHNSTON COUNTY	6/7/1989	1.75	0/0	$0
JOHNSTON COUNTY	8/29/1990	1.00	0/0	$0
JOHNSTON COUNTY	8/29/1990	0.75	0/0	$0
JOHNSTON COUNTY	5/1/1994	1.75	0/0	$0
JOHNSTON COUNTY	5/1/1994	0.75	0/0	$0
NR Cleveland	3/23/1995	0.75	0/0	$0
JOHNSTON COUNTY	5/15/1995	0.88	0/0	$0
Nr Meadows	7/10/1995	1.00	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
FOUR OAKS	7/25/1996	0.75	0/0	$0
PEACOCK CROSSROADS	5/1/1997	0.88	0/0	$0
FOUR OAKS	9/11/1997	0.75	0/0	$0
FOUR OAKS	5/8/1998	0.75	0/0	$0
FOUR OAKS	4/4/1999	0.00	0/0	$0
COUNTYWIDE	7/5/1999	1.75	0/0	$55,928
COATS XRDS	9/25/2000	0.75	0/0	$0
HARDY XRDS	12/17/2000	1.50	0/0	$0
PARKERS MILL	3/31/2002	0.88	0/0	$0
DRUG STORE	7/5/2002	1.00	0/0	$0
COATS XRDS	7/9/2003	0.75	0/0	$0
FOUR OAKS	7/11/2003	1.00	0/0	$0
FOUR OAKS	5/18/2006	0.75	0/0	$0
COATS XRDS	6/11/2006	0.75	0/0	$0
FOUR OAKS	6/12/2007	0.88	0/0	$0
COATS XRDS	6/29/2007	0.75	0/0	$0
FOUR OAKS	7/27/2007	0.75	0/0	$0
BENTONVILLE	8/9/2007	0.75	0/0	$0
FOUR OAKS	4/12/2008	1.75	0/0	$0
COATS XRDS	5/20/2008	1.00	0/0	$0
DRUG STORE	5/20/2008	0.88	0/0	$0
DRUG STORE	5/20/2008	1.00	0/0	$0
FOUR OAKS	6/22/2008	0.75	0/0	$0
BLACKMAN XRDS	7/6/2008	1.00	0/0	$0
BLACKMAN XRDS	4/20/2009	0.75	0/0	$0
EMIT	5/7/2009	0.75	0/0	$0
BLACKMAN XRDS	5/7/2009	1.00	0/0	$0
SELMA ARPT	6/9/2009	1.75	0/0	$0
PARKERS MILL	6/9/2009	0.88	0/0	$0
COATS XRDS	7/23/2009	0.88	0/0	$0
PARKERS MILL	7/23/2009	1.00	0/0	$0
COATS XRDS	6/21/2011	1.00	0/0	$0
BLACKMAN XRDS	5/22/2012	1.00	0/0	$0
BLACKMAN XRDS	5/22/2012	1.00	0/0	$0
RAINS XRDS	5/22/2012	0.75	0/0	$0
PEACOCKS XRDS	5/22/2012	1.00	0/0	$0
COATS XRDS	5/23/2012	1.00	0/0	$0
DRUG STORE	5/23/2012	1.75	0/0	$0
FOUR OAKS	5/23/2012	1.00	0/0	$0
COATS XRDS	5/23/2012	0.75	0/0	$0
BLACKMAN XRDS	6/1/2012	1.00	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Johnston County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

C.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Johnston County. The entire county is equally susceptible to hurricane and tropical storms.

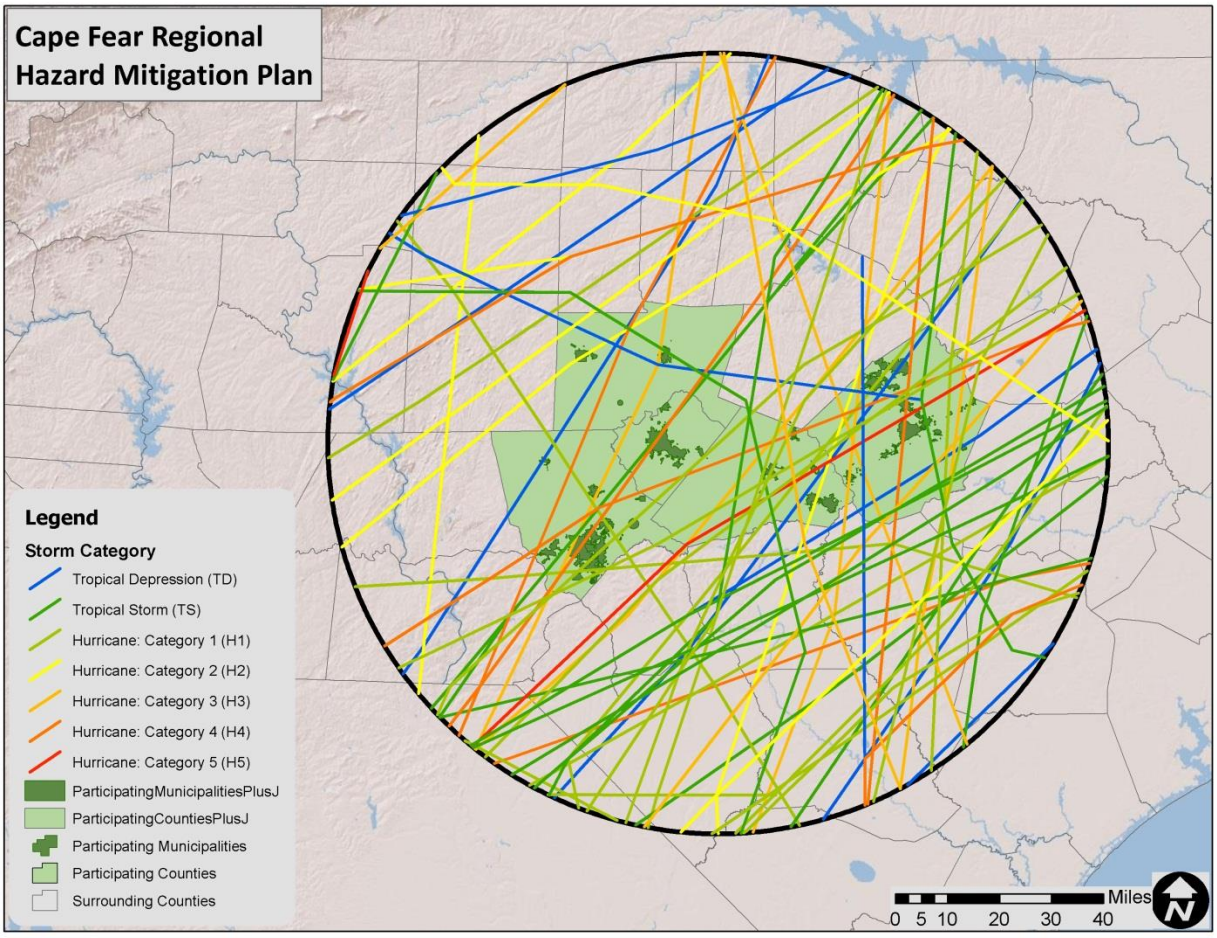
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[2] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

Of the recorded storm events, 22 have traversed directly through Johnston County as shown in **Figure C.2**. **Table C.9** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cape Fear Region) and Maximum Category of the storm based on the Saffir-Simpson Scale for each event.

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE C.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE C.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center has reported seven events associated with a hurricane or tropical storm in Johnston County since 1996. These storms are listed in **Table C.10** and are generally representative of storms with the greatest impact on the county over that time period.

TABLE C.10: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN JOHNSTON COUNTY

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
8/27/1998	Hurricane Bonnie	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$161,330,536
8/30/2004	Tropical Depression Gaston	0/0	$0
9/1/2006	Tropical Storm Ernesto	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that two disaster declarations were made in 1996 (Hurricane Fran), 1999 (Hurricane Floyd), 2003 (Hurricane Isabel), and 2011 (Hurricane Irene) for the county.[3]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in Johnston County as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Tropical Storm Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran

[3] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

Probability of Future Occurrences
Given the inland location of the county, Johnston County is less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the county's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historic evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. When the county is impacted, the damage could be significant, threatening lives and property throughout the planning area.

C.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Johnston County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been eight recorded lightning events in Johnston County since 1999, as listed in summary **Table C.11**.[4] These events resulted in almost $1.3 million (2013 dollars) in damages. A complete listing of those events can be found in **Table C.12**. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE C.11: SUMMARY OF LIGHTNING OCCURRENCES IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	1	0/0	$194,804
Benson	1	0/2	$0
Clayton	3	0/1	$21,659
Four Oaks	0	0/0	$0
Kenly	0	0/0	$0
Micro	0	0/0	$0

[4] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in Johnston County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Pine Level	0	0/0	$0
Princeton	0	0/0	$0
Selma	2	0/2	$0
Smithfield	0	0/0	$0
Wilson's Mills	0	0/0	$0
Unincorporated Area	1	0/1	$0
JOHNSTON COUNTY TOTAL	**8**	**0/6**	**$216,463**

Source: National Climatic Data Center

TABLE C.12: HISTORIC LIGHTNING OCCURRENCES IN JOHNSTON COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Archer Lodge				
ARCHERS LODGE	7/21/2008	0/0	$194,804	A vacant house in the Buffalo Creek Subdivision of Zebulon caught on fire after it was hit by lightning. Another nearby home on Amsterdam Drive was also hit by lightning.
Benson				
BENSON	8/20/2001	0/2	$0	The driver and a passenger on a bus were treated for injuries when lightning struck the bus on I-95 South.
Clayton				
CLAYTON	7/25/1999	0/1	$0	A fourteen year old was trying to hold up a metal pole that was supporting a tent. Lightning hit a nearby road...then ran through the ground to the boy's feet. He was treated by paramedics at his home. He was not seriously injured.
CLAYTON	9/14/2007	0/0	$5,617	EVENT NARRATIVE: A spotter reported a barn fire caused by lightning north of Clayton.
CLAYTON	7/8/2010	0/0	$16,042	A house was struck by lightning at 1052 Ridge Drive in Clayton. Damage was sustained by the house when fire damaged the attic and then proceeded to spread to a bedroom.
Four Oaks				
None Reported	--	--	--	--
Kenly				
None Reported	--	--	--	--

	Date	Deaths / Injuries	Property Damage*	Details
Micro				
None Reported	--	--	--	--
Pine Level				
None Reported	--	--	--	--
Princeton				
None Reported	--	--	--	--
Selma				
SELMA	6/16/2001	0/0	$0	Lightning struck a house on Live Oak Church Road. Damage unknown.
SELMA	7/19/2006	0/2	$0	Two residents struck by lightning.
Smithfield				
None Reported	--	--	--	--
Wilson's Mills				
None Reported	--	--	--	--
Unincorporated Area				
BENTONVILLE	7/27/2009	0/1	$0	Child struck by lightning in Bentonville. Injuries unknown but not considered to be serious.

*Property Damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Johnston County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Johnston County is located in an area of the country that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

C.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Johnston County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Johnston County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms were at least partially responsible for one disaster declaration in Johnston County in 2011.[5] According to NCDC, there have been 250 reported thunderstorm wind and high wind events since 1958 in Johnston County.[6] These events caused over $700,000 (2013 dollars) in damages. There were also reports of one injury. **Table C.13** summarizes this information. **Table C.14** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.[7]

TABLE C.13: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	7	0/0	$16,876
Benson	15	0/1	$77,228
Clayton	29	0/0	$6,109
Four Oaks	9	0/0	$10,363
Kenly	6	0/0	$15,497
Micro	5	0/0	$0
Pine Level	2	0/0	$4,587
Princeton	11	0/0	$13,982
Selma	7	0/0	$47,671
Smithfield	28	0/0	$160,478
Wilson's Mills	3	0/0	$0
Unincorporated Area	128	0/0	$363,640
JOHNSTON COUNTY TOTAL	**250**	**0/1**	**$716,431**

Source: National Climatic Data Center

TABLE C.14: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN JOHNSTON COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Archer Lodge					
ARCHERS LODGE	6/24/1996	TSTM WIND	50 kts.	0/0	$14,846
ARCHERS LODGE	11/16/2006	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHERS LODGE	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHER	6/27/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHERS LODGE	7/25/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHERS LODGE	5/4/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHER	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$2,030
Benson					
BENSON	8/5/1997	TSTM WIND	50 kts.	0/0	$0
BENSON	5/23/1998	TSTM WIND	50 kts.	0/0	$0

[5] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

[6] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional thunderstorm events have occurred in Johnston County. As additional local data becomes available, this hazard profile will be amended.

[7] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
BENSON	5/26/1998	TSTM WIND	50 kts.	0/1	$71,454
BENSON	3/3/1999	TSTM WIND	50 kts.	0/0	$0
BENSON	6/11/2004	TSTM WIND	50 kts.	0/0	$0
BENSON	4/17/2006	TSTM WIND	50 kts.	0/0	$0
BENSON	5/5/2006	TSTM WIND	50 kts.	0/0	$0
BENSON	6/12/2006	TSTM WIND	50 kts.	0/0	$5,774
BENSON	6/21/2006	TSTM WIND	50 kts.	0/0	$0
BENSON	6/29/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
BENSON	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BENSON	6/22/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BENSON	7/16/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BENSON	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
BENSON	9/18/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
Clayton					
CLAYTON	11/8/1996	TSTM WIND	50 kts.	0/0	$0
CLAYTON	3/21/1999	TSTM WIND	50 kts.	0/0	$0
CLAYTON	8/14/1999	TSTM WIND	0 kts.	0/0	$0
CLAYTON	4/17/2000	TSTM WIND	50 kts.	0/0	$0
CLAYTON	6/22/2000	TSTM WIND	50 kts.	0/0	$0
CLAYTON	6/1/2002	TSTM WIND	50 kts.	0/0	$0
CLAYTON	11/11/2002	TSTM WIND	50 kts.	0/0	$0
CLAYTON	7/10/2003	TSTM WIND	50 kts.	0/0	$0
CLAYTON	6/11/2004	TSTM WIND	60 kts.	0/0	$0
CLAYTON	9/17/2004	TSTM WIND	50 kts.	0/0	$0
CLAYTON	3/8/2005	TSTM WIND	50 kts.	0/0	$0
CLAYTON	7/28/2005	TSTM WIND	52 kts.	0/0	$0
CLAYTON	4/22/2006	TSTM WIND	50 kts.	0/0	$0
CLAYTON	5/26/2006	TSTM WIND	50 kts.	0/0	$0
CLAYTON	6/21/2006	TSTM WIND	50 kts.	0/0	$0
CLAYTON	11/16/2006	THUNDERSTORM WIND	54 kts.	0/0	$0
CLAYTON	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	4/15/2007	THUNDERSTORM WIND	52 kts.	0/0	$0
CLAYTON	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	3/4/2008	THUNDERSTORM WIND	52 kts.	0/0	$0
CLAYTON	3/4/2008	THUNDERSTORM WIND	51 kts.	0/0	$0
CLAYTON	7/31/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	1/25/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	6/23/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	11/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$5,347
CLAYTON	11/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	7/28/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON	9/6/2012	THUNDERSTORM WIND	50 kts.	0/0	$761
Four Oaks					
FOUR OAKS	4/4/1999	TSTM WIND/HAIL	0 kts.	0/0	$0
FOUR OAKS	7/10/2002	TSTM WIND	60 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
FOUR OAKS	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	6/29/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	8/26/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	6/9/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	1/25/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	1/25/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
FOUR OAKS	7/23/2011	THUNDERSTORM WIND	50 kts.	0/0	$10,363
Kenly					
KENLY	4/20/1996	TSTM WIND	0 kts.	0/0	$0
KENLY	5/29/1996	TSTM WIND	0 kts.	0/0	$0
KENLY	7/24/1999	TSTM WIND	50 kts.	0/0	$0
KENLY	8/27/2001	TSTM WIND	50 kts.	0/0	$0
KENLY	7/20/2010	THUNDERSTORM WIND	50 kts.	0/0	$5,347
KENLY	8/2/2012	THUNDERSTORM WIND	50 kts.	0/0	$010,150
Micro					
MICRO	4/8/2000	TSTM WIND	50 kts.	0/0	$0
MICRO	6/16/2001	TSTM WIND	50 kts.	0/0	$0
MICRO	7/5/2002	TSTM WIND	50 kts.	0/0	$0
MICRO	7/28/2006	TSTM WIND	50 kts.	0/0	$0
MICRO	7/8/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
Pine Level					
Pine Level	5/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$4,587
PINE LEVEL	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
Princeton					
PRINCETON	7/24/1999	TSTM WIND	50 kts.	0/0	$13,982
PRINCETON	6/14/2002	TSTM WIND	50 kts.	0/0	$0
PRINCETON	7/11/2003	TSTM WIND	50 kts.	0/0	$0
PRINCETON	5/20/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	6/8/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	6/11/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	6/21/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	7/19/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	7/19/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	7/29/2006	TSTM WIND	50 kts.	0/0	$0
PRINCETON	7/29/2006	TSTM WIND	50 kts.	0/0	$0
Selma					
SELMA	7/15/1996	TSTM WIND	0 kts.	0/0	$0
SELMA	3/3/1999	TSTM WIND	50 kts.	0/0	$0
SELMA	7/5/2002	TSTM WIND	60 kts.	0/0	$0
SELMA	3/8/2005	TSTM WIND	60 kts.	0/0	$47,671
SELMA	8/17/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SELMA	9/14/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SELMA	7/23/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
Smithfield					
Smithfield	8/3/1993	THUNDERSTORM WINDS	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Smithfield	7/18/1994	THUNDERSTORM WINDS	0 kts.	0/0	$0
Smithfield	5/10/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Smithfield	5/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$22,935
Smithfield	5/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$122,318
SMITHFIELD	6/24/1996	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	7/17/1996	TSTM WIND	0 kts.	0/0	$0
SMITHFIELD	7/4/1997	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	3/9/1998	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	6/22/2000	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	5/12/2001	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	5/12/2001	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	6/1/2001	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	5/25/2003	TSTM WIND	52 kts.	0/0	$0
SMITHFIELD	5/2/2004	TSTM WIND	60 kts.	0/0	$0
SMITHFIELD	5/18/2006	TSTM WIND	62 kts.	0/0	$0
SMITHFIELD	7/23/2006	TSTM WIND	50 kts.	0/0	$0
SMITHFIELD	11/16/2006	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	4/11/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	3/4/2008	THUNDERSTORM WIND	52 kts.	0/0	$0
SMITHFIELD	8/2/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	6/9/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	7/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	6/23/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	7/24/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SMITHFIELD	6/1/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
SMITHFIELD	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$10,150
Wilson's Mills					
WILSONS MILLS	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
WILSONS MILLS	7/22/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
WILSONS MILLS	11/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
Unincorporated Area					
JOHNSTON COUNTY	6/15/1958	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/15/1958	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/2/1970	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/2/1970	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/21/1970	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/25/1970	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/23/1971	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/28/1973	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	9/18/1973	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/24/1975	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/13/1978	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/3/1982	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	10/13/1983	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/4/1984	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
JOHNSTON COUNTY	5/8/1984	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/20/1984	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/6/1985	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/5/1985	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/5/1985	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/18/1985	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/29/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/30/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/30/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/20/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/24/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/28/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/28/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	7/10/1986	TSTM WIND	75 kts.	0/0	$0
JOHNSTON COUNTY	7/10/1986	TSTM WIND	55 kts.	0/0	$0
JOHNSTON COUNTY	7/12/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	7/27/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/10/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/11/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/20/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/20/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/27/1986	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/2/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/2/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/3/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/3/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/3/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/4/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/4/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/19/1987	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/16/1988	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/17/1988	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/19/1988	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	2/21/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	2/21/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/6/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/18/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/25/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/25/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/25/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/25/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/27/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	4/29/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/23/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/12/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/15/1989	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
JOHNSTON COUNTY	6/15/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/15/1989	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	5/1/1990	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	6/22/1990	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	7/11/1990	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	9/10/1990	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/2/1991	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/29/1991	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/9/1991	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	8/19/1991	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	3/19/1992	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	1/24/1993	THUNDERSTORM WINDS	0 kts.	0/0	$80,687
McGee's	4/26/1993	THUNDERSTORM WINDS	0 kts.	0/0	$80,687
SW Selma	5/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$30,580
JOHNSTON COUNTY	6/8/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Southern	6/26/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Wrn	7/10/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
NE	10/5/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
Sampson	10/5/1995	THUNDERSTORM WINDS	0 kts.	0/0	$21,406
COUNTYWIDE	5/6/1996	TSTM WIND	0 kts.	0/0	$0
MCGEE CROSSROADS	7/2/1996	TSTM WIND	0 kts.	0/0	$0
JOHNSTON COUNTY	2/16/1998	HIGH WIND	52 kts.	0/0	$0
DRUG STORE	8/18/2000	TSTM WIND	60 kts.	0/0	$19,742
COATS XRDS	4/1/2001	TSTM WIND	50 kts.	0/0	$0
DRUG STORE	5/13/2002	TSTM WIND	50 kts.	0/0	$0
PARKERS MILL	7/9/2003	TSTM WIND	50 kts.	0/0	$0
JOHNSTON COUNTY	3/7/2004	HIGH WIND	65 kts.	0/0	$6,446
EMIT	11/16/2006	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	8/21/2007	THUNDERSTORM WIND	52 kts.	0/0	$0
COATS XRDS	8/26/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
EMIT	6/11/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
EMIT	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	6/28/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SELMA ARPT	7/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BLACKMAN XRDS	7/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
EMIT	8/2/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BLACKMAN XRDS	8/7/2008	THUNDERSTORM WIND	50 kts.	0/0	$54,112
JOHNSTON COUNTY	9/6/2008	HIGH WIND	50 kts.	0/0	$13,528
BLACKMAN XRDS	1/7/2009	THUNDERSTORM WIND	51 kts.	0/0	$0
EMIT	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BLACKMAN XRDS	7/17/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
RAINS XRDS	7/25/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SELMA ARPT	7/25/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
LOWELL MILL	7/25/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BLACKMAN XRDS	7/27/2009	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
FLOWERS	7/27/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BLACKMAN XRDS	1/25/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$1,604
COATS XRDS	7/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
DRUG STORE	7/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$16,042
HARDY XRDS	7/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
DRUG STORE	7/20/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	3/6/2011	THUNDERSTORM WIND	50 kts.	0/0	$3,109
RAINS XRDS	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
BAGLEY	4/5/2011	THUNDERSTORM WIND	50 kts.	0/0	$20,726
HARDY XRDS	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
DRUG STORE	7/23/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	8/14/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	8/14/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
HARDY XRDS	9/6/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
PARKERS MILL	12/7/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
COATS XRDS	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$3,045
COATS XRDS	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
EMIT	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$10,150
BENTONVILLE	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
BENTONVILLE	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
FLOWERS	8/8/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
CLAYTON FLOWERS ARPT	9/8/2012	THUNDERSTORM WIND	50 kts.	0/0	$761

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

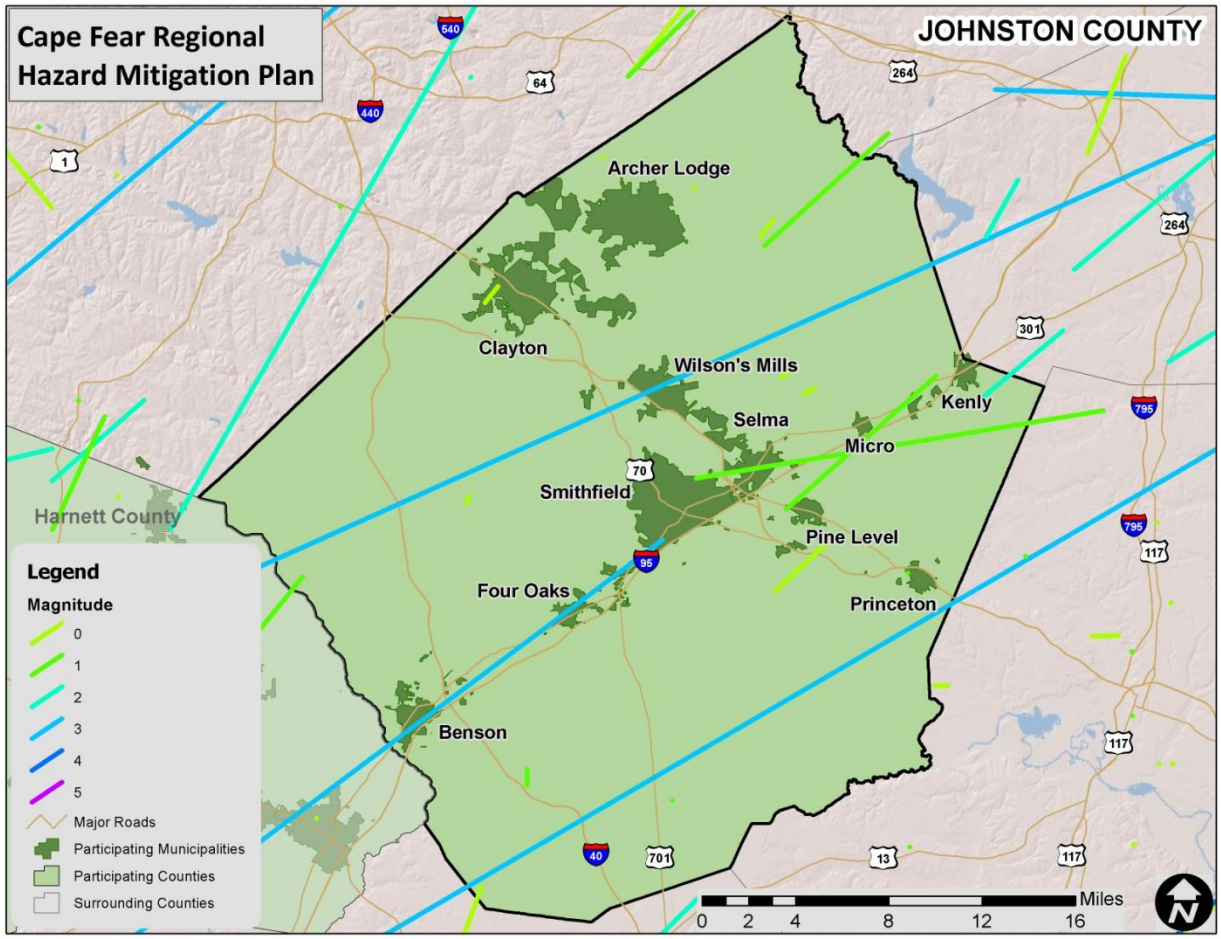
Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

C.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Johnston County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Johnston County is uniformly exposed to this hazard. With that in mind, Figure **C.3** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE C.3: HISTORICAL TORNADO TRACKS IN JOHNSTON COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes were at least partially responsible for one disaster declaration in Johnston County in 2011.[8] According to the National Climatic Data Center, there have been a total of 20 recorded tornado events in the Johnston County since 1973 (**Table C.15**), resulting in almost $31.2 million (2013 dollars) in property damages.[9] In addition, 1 fatality and 81 injuries were reported (**Table C.16**). The magnitude of these tornadoes ranges from F0 to F3 in intensity, although an F4 or F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 57 years.

TABLE C.15: SUMMARY OF TORNADO OCCURRENCES IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	1	0/0	$0

[8]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[9] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in Johnston County. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Benson	2	0/67	$25,907,875
Clayton	1	0/0	$0
Four Oaks	0	0/0	$0
Kenly	2	1/2	$541,121
Micro	1	0/0	$30,424
Pine Level	1	0/0	$0
Princeton	1	0/0	$0
Selma	0	0/0	$0
Smithfield	0	0/0	$0
Wilson's Mills	0	0/0	$0
Unincorporated Area	11	0/12	$4,714,086
JOHNSTON COUNTY TOTAL	**20**	**1/81**	**$31,193,506**

Source: National Climatic Data Center

TABLE C.16: HISTORICAL TORNADO IMPACTS IN JOHNSTON COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Archer Lodge					
ARCHER	8/27/2008	F0	0/0	$0	Local fire departments and law enforcement reported a brief tornado touchdown near the intersection of Covered Bridge Road and Thanksgiving Road. Multiple trees were snapped and uprooted in the highly wooded area.
Benson					
BENSON	9/14/2007	F0	0/0	$0	Law enforcement reported a tornado and multiple trees down on Stephenson Road.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
BENSON	4/16/2011	F2	0/67	$25,907,875	The tornado exited Harnett County and continued northeast into southern Johnston County. The tornado track south of Benson, where it crossed NC Highway 242 and NC Highway 50. Several modular homes were destroyed, and numerous other homes sustained major damage. There were also hundreds of trees that were uprooted or snapped in half. The tornado subsequently crossed Interstate 40 near mile Marker 330 and continued moving northeast to just south of Four Oaks before crossing Interstate 95 near mile marker 90. The tornado lifted just before reaching Smithfield, where little or no damage was observed. Throughout this part of the track there was a broad swath of EF0 damage with embedded areas of EF1 and EF2 damage. In total, 450 homes were damaged, of which 287 homes were completely destroyed.
Clayton					
CLAYTON	9/14/2007	F0	0/0	$0	A tornado touch downed at Clayton Middle School on Guy Road. A second tornado touched down from the same thunderstorm near the Jordan community.
Four Oaks					
None Reported	--	--	--	--	--
Kenly					
KENLY	10/11/2002	F1	0/0	$0	A tornado touched down just west of Kenly, causing F0 to strong F1 damage. It began near J. Howell Road and Old Highway 222, causing minor damage to a hog farm. The worst damage was along Bunn Road where 4 mobile homes were damaged, one of which was overturned and totally destroyed. The other mobile homes sustained projectile damage, and a roof was blown off a barn. The tornado traveled northeast and severely damaged a home on highway 222, collapsing the rear wall of the house. The damage path ended near the Wilson County border.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
KENLY	11/15/2008	F2	1/2	$541,121	The tornado initially touched down around just north of Piney Grove Church Road, and damage was limited to minor tree and structural damage. The tornado then tracked northeast, over bare fields and stands of mature trees for approximately three quarters of a mile, twisting off mature trees, before producing significant damage at the intersection of NC Hwy 222 and Crumpler Road. The strongest evidence of EF-2 damage was at this intersection, where a well-constructed single level brick home was destroyed. The entire roof was blown off this home, a large pine tree fell through the kitchen. All of the walls on the west side of the house were missing. In addition, one vehicle was flipped upside down and another, with an attached trailer, was moved approximately 30 feet down the home's driveway. The family of 4 was awakened as the damage occurred, but by great fortune, none sustained any injury. As the tornado crossed Scott Road, a double-wide mobile home was removed from its foundation and flipped approx. 50 feet. A 61 year old female occupant of this mobile home was killed, while her husband was transported to a medical facility. In addition, 3 other double-wide mobile homes were condemned as they sustained significant structural damage to roofs and southwest-facing exterior walls. A pickup truck was completely overturned in one of the driveways. Continuing northeast, the tornado moved across the Kenly International Airport. The tornado was likely aloft at this point, producing EF-1 damage to trees, but there was considerable debris from the homes on Scott Road strewn about the airport grounds. A portion of an open aircraft hangar constructed of sheet tin over a wooden frame was twisted and destroyed. There was also some damage to the Cessna 150 housed in this hangar.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Micro					
MICRO	5/5/2009	F0	0/0	$30,424	An EF-0 tornado touched down in the area of 2550 NC Highway 39. The tornado damaged the roofs of four buildings and blew a boat into a car causing moderate damage.
Pine Level					
PINE LEVEL	4/16/2011	F1	0/0	$0	A tornado touched down near Pine level, just south of Highway 70 and tracked northeast towards Micro in the vicinity of Highway 301. The tornado lifted just southwest of Kenly. Numerous trees were snapped in half or uprooted resulting in downed power-lines and damage to homes and businesses. Peak winds were estimated at 90 mph.
Princeton					
PRINCETON	6/4/2004	F0	0/0	$0	Police spotted a tornado near Oakland Church Road.
Unincorporated Area					
JOHNSTON COUNTY	5/29/1973	F1	0/0	$131,152	
JOHNSTON COUNTY	3/4/1977	F1	0/0	$96,155	
JOHNSTON COUNTY	11/4/1992	F1	0/0	$4,152	
JOHNSTON COUNTY	11/4/1992	F1	0/0	$0	
JOHNSTON COUNTY	11/23/1992	F3	0/12	$4,151,674	
EMIT	9/14/2007	F0	0/0	$0	There was a report of a brief tornado touchdown near the Jordan community.
PEACOCKS XRDS	11/15/2008	F1	0/0	$32,467	The tornado initially touched down just off Noah Road, where it uprooted several trees. It traveled north-northwest across bare fields, taking down mature trees for approximately one half mile. The tornado then crossed Wood Crossroads Road, where it produced significant roof damage to one double-wide mobile home and ripped the porch off a single level brick home. The tornado then proceeded north-northwest across open fields before producing minor damage on Five Point Roads to a aluminum skirt of a double-wide mobile home and other minor damage to sheds and storage buildings.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
BROGDEN	11/15/2008	F0	0/0	$81,168	The tornado initially touched down near Daughtry Road south of U.S. Highway 70 damaging several pine trees and causing minor roof damage. The tornado tracked northeast crossing Crocker Road where a car was smashed when a large carport collapsed. A travel trailer was overturned and a nearby home suffered shingle and siding damage. The tornado crossed Creechs Mill Road, where a horse farm had one small barn destroyed. A 30 foot horse trailer was also blown over and two large bay doors were blown in on the stables. The tornado proceeded northeast across Stevens Chapel Road and Country Store Road, damaging numerous trees and outbuildings along the way. Finally, at one dwelling, the tornado broke a garage window and blew out a garage door.
COATS XRDS	3/27/2009	F0	0/0	$0	Numerous trees were blown down and snapped in a wooded area behind an open field.
PARKERS MILL	3/27/2009	F0	0/0	$0	Five houses on OBJ Road sustained minor damage ranging from shingle damage, damaged garage doors, to blown out windows.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
EMIT	5/5/2009	F1	0/0	$217,318	An EF-1 tornado touched down initially just to the west of NC Highway 96 in a wooded area. The tornado cross NC Highway 96 and produced significant damage to several homes along and east of NC Highway 96. The homes sustained exterior and roof damage with uprooted or snapped tree damage consistent with EF-1 damage. The tornado proceeded to cross NC Highway 39. Several homes between Antioch Church Road and NC Highway 42 sustained damaged. The tornado continued to track east-northeast, causing roof shingle damage to the Antioch Fire Station and a nearby home. A mobile home near the fire department also sustained shingle and siding damage. The tornado then continued to track northeast across Barnes Lake Road and NC Highway 222, where it caused significant tree damage and some minor roof or shingle damage to surrounding homes or mobile homes. The tornado then exited the county, crossing over into southwest Nash County.

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Johnston County experience a direct tornado strike. The probability of future tornado occurrences affecting Johnston County is likely (10 to 100 percent annual probability).

C.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States 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. Johnston County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in four disaster declarations in Johnston County. This includes severe ice storms in 1968 and 2002, the Blizzard of 1996, and a severe winter storm in 2000.[10] According to the National Climatic Data Center, there have been a total of 30 recorded winter storm events in Johnston County since 1993 (**Table C.17**).[11] These events resulted in over $812,000 (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table C.18**.

TABLE C.17: SUMMARY OF WINTER STORM EVENTS IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Johnston County	30	0/0	$812,486

Source: National Climatic Data Center

TABLE C.18: HISTORICAL WINTER STORM IMPACTS IN JOHNSTON COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Archer Lodge				
None Reported	--	--	--	--
Benson				
None Reported	--	--	--	--
Clayton				
None Reported	--	--	--	--
Four Oaks				
None Reported	--	--	--	--
Kenly				
None Reported	--	--	--	--
Micro				
None Reported	--	--	--	--
Pine Level				
None Reported	--	--	--	--
Princeton				
None Reported	--	--	--	--
Selma				
None Reported	--	--	--	--
Smithfield				
None Reported	--	--	--	--
Wilson's Mills				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	3/12/1993	WINTER STORM	2/10†	$806,869

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[11] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional winter storm conditions have affected Johnston County.
[12] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Northern and Central	1/3/1994	HEAVY SNOW	0/0	$0
Northern Interior and	2/10/1994	ICE STORM	0/0	$0
JOHNSTON COUNTY	1/6/1996	ICE STORM	0/0	$0
JOHNSTON COUNTY	1/11/1996	ICE STORM	0/0	$0
JOHNSTON COUNTY	2/2/1996	ICE STORM	0/0	$0
JOHNSTON COUNTY	2/16/1996	HEAVY SNOW	0/0	$0
JOHNSTON COUNTY	1/19/1998	HEAVY SNOW	0/0	$0
JOHNSTON COUNTY	12/23/1998	ICE STORM	0/0	$0
JOHNSTON COUNTY	1/18/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/20/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/22/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/24/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/28/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	11/19/2000	HEAVY SNOW	0/0	$0
JOHNSTON COUNTY	12/3/2000	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/3/2002	WINTER STORM	0/0	$0
JOHNSTON COUNTY	12/4/2002	WINTER STORM	0/0	$0
JOHNSTON COUNTY	2/16/2003	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/26/2004	WINTER STORM	0/0	$0
JOHNSTON COUNTY	2/26/2004	WINTER STORM	0/0	$0
JOHNSTON COUNTY	12/26/2004	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/18/2007	WINTER WEATHER	0/0	$0
JOHNSTON COUNTY	2/1/2007	WINTER WEATHER	0/0	$0
JOHNSTON COUNTY	2/1/2007	WINTER STORM	0/0	$0
JOHNSTON COUNTY	12/7/2007	WINTER WEATHER	0/0	$5,617
JOHNSTON COUNTY	1/17/2008	WINTER WEATHER	0/0	$0
JOHNSTON COUNTY	1/19/2008	WINTER WEATHER	0/0	$0
JOHNSTON COUNTY	1/19/2008	WINTER STORM	0/0	$0
JOHNSTON COUNTY	1/10/2011	WINTER WEATHER	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
†Deaths/injuries were not reported at the county level; potentially outside of the county.
Source: National Climatic Data Center

There have been several severe winter weather events in Johnston County. The text below describes two of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

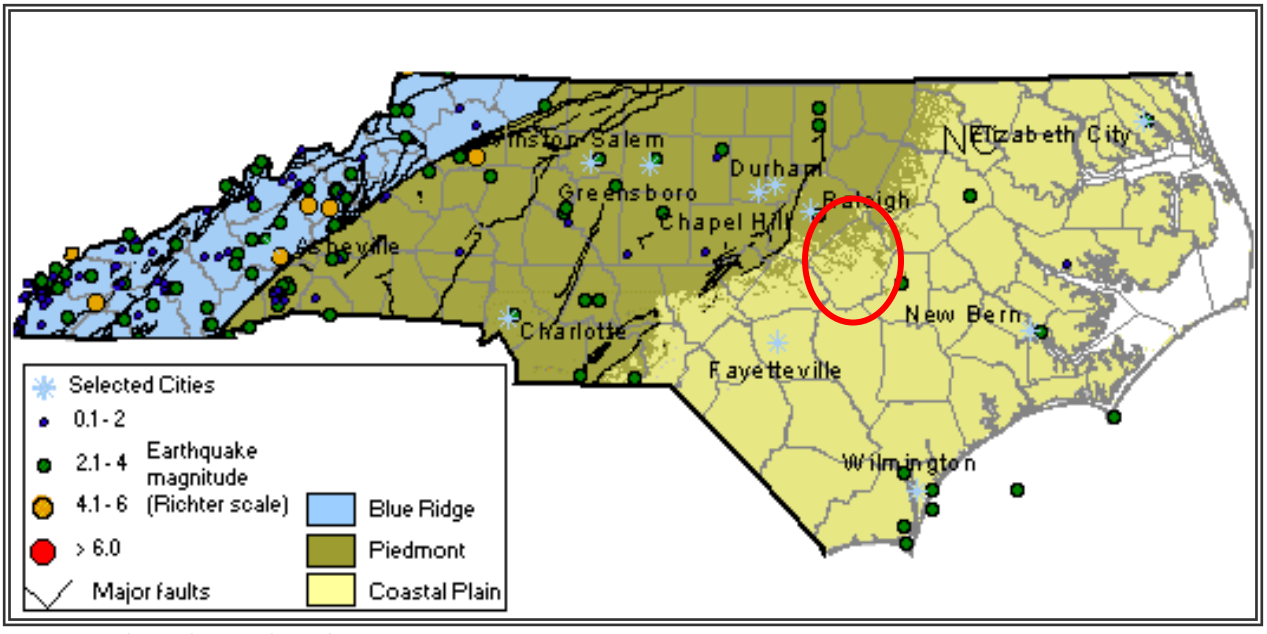
2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

Probability of Future Occurrences
Winter storm events will remain a regular occurrence in Johnston County. According to historical information, Johnston County generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

C.2.9 Earthquake

Location and Spatial Extent
Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure C.4** is a map showing geological and seismic information for North Carolina.

FIGURE C.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA

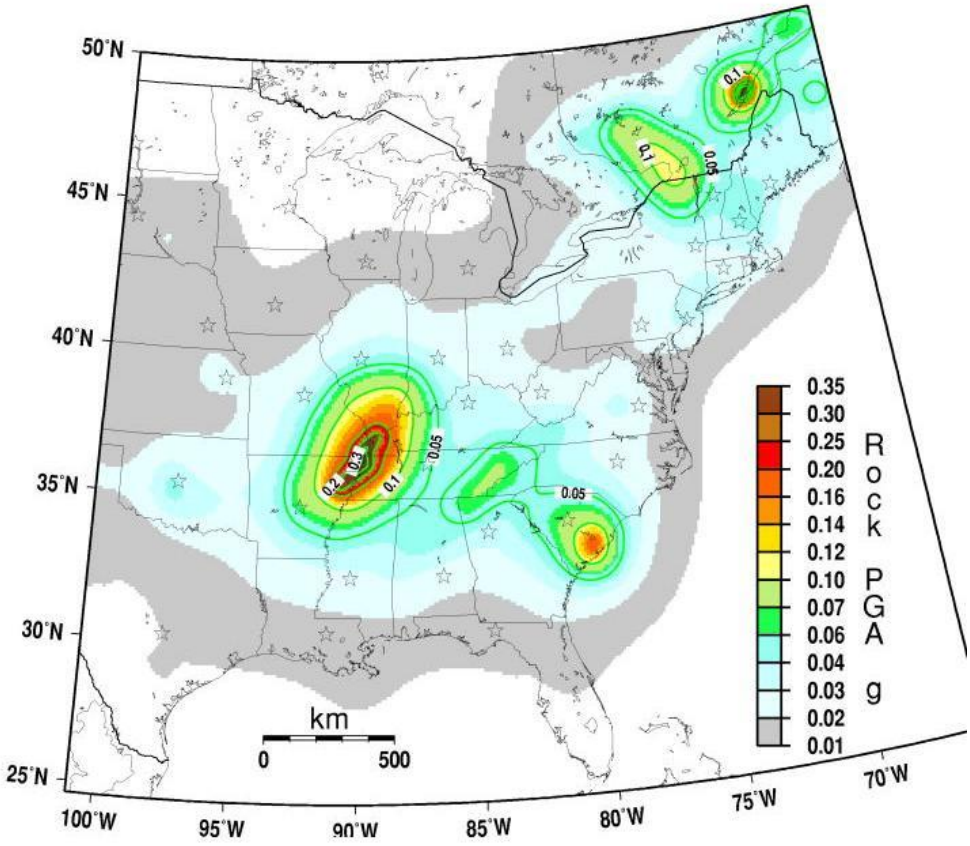


Source: North Carolina Geological Survey

Figure C.5 shows the intensity level associated with Johnston County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground

acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Johnston County lies within an approximate zone of level "2" to "3" ground acceleration. This indicates that the county exists within an area of low to moderate seismic risk.

FIGURE C.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

At least one earthquake is known to have affected Johnston County since 1969. It measured a IV on the Modified Mercalli Intensity (MMI) scale. **Table C.19** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table C.20** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

[13] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

TABLE C.19: SUMMARY OF SEISMIC ACTIVITY IN JOHNSTON COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Broadway	0	--	--
Sanford	0	--	--
Unincorporated Area	1	V	< 4.8
JOHNSTON COUNTY TOTAL	**1**	**IV**	**< 4.8**

Source: National Geophysical Data Center

TABLE C.20: SIGNIFICANT SEISMIC EVENTS IN JOHNSTON COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Archer Lodge				
None Reported	--	--	--	--
Benson				
None Reported	--	--	--	--
Clayton				
None Reported	--	--	--	--
Four Oaks				
None Reported	--	--	--	--
Kenly				
None Reported	--	--	--	--
Micro				
None Reported	--	--	--	--
Pine Level				
None Reported	--	--	--	--
Princeton				
None Reported	--	--	--	--
Selma				
Selma	11/20/1969	318.0 km	4.3	IV
Smithfield				
None Reported	--	--	--	--
Wilson's Mills				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Johnston County is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 percent (unlikely).

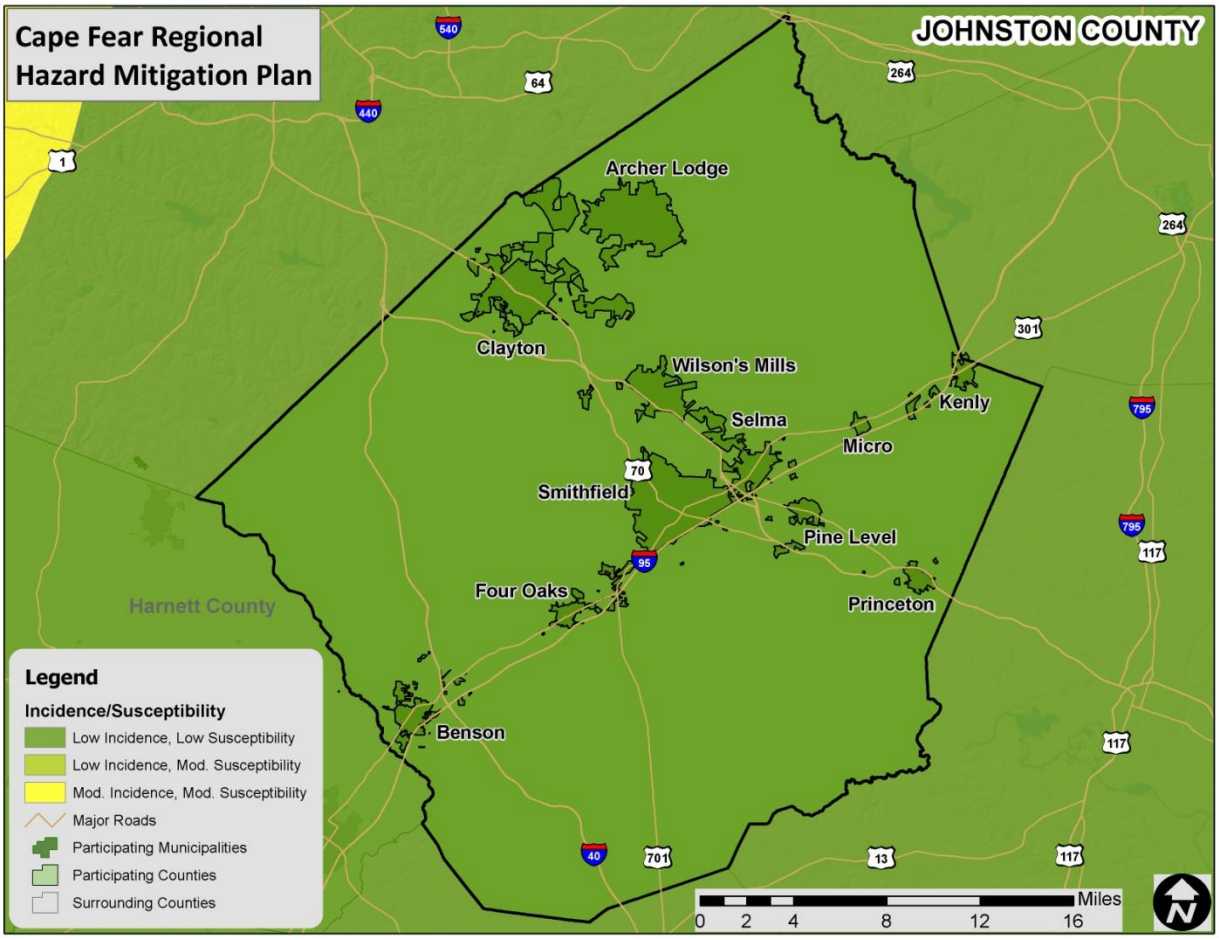
C.2.10 Landslide

Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout Johnston County.

According to **Figure C.6** below, the county has low landslide activity. There is low susceptibility across the county.

FIGURE C.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF JOHNSTON COUNTY



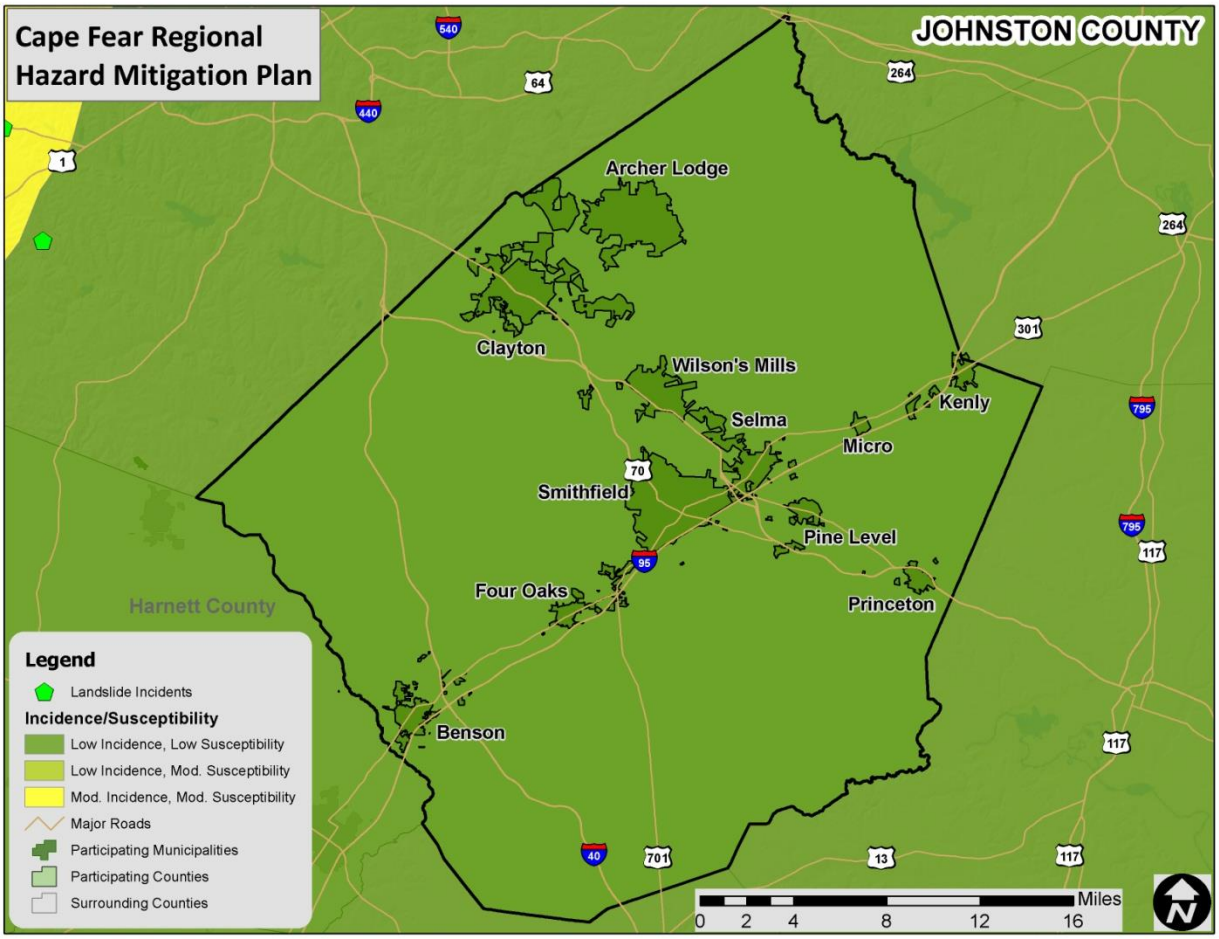
Source: United States Geological Survey

Historical Occurrences

Johnston County has low susceptibility to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the county, it should be noted that the North Carolina Geological Survey emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The

locations of landslide events that occurred nearby the county are presented in **Figure C.7**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE C.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN JOHNSTON COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

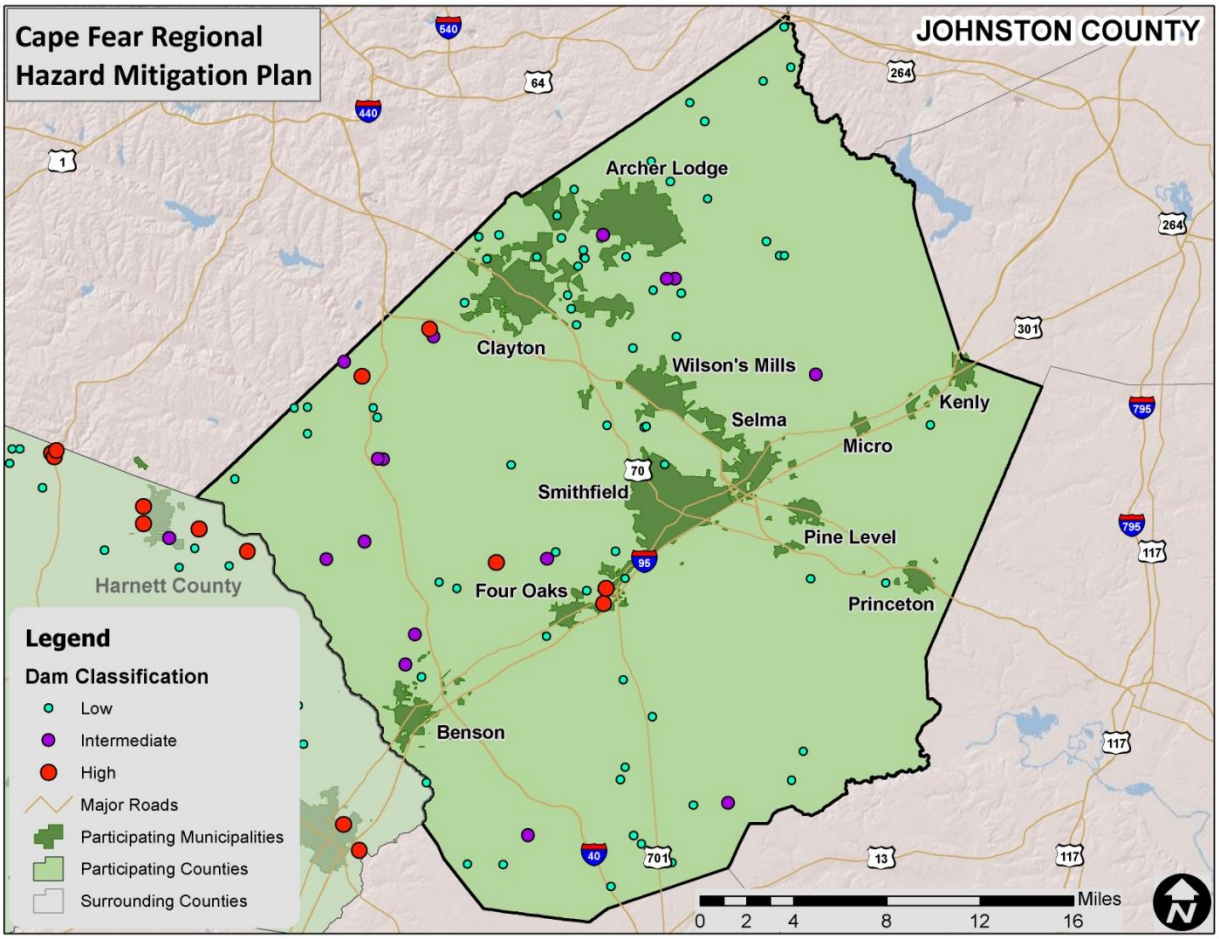
Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Johsnton County have greater risk than others given factors such as steepness on slope and modification of slopes.

C.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 89 dams in Johnston County.[14] **Figure C.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, five are classified as high hazard potential. These high hazard dams are listed in **Table C.21**.

FIGURE C.8: JOHNSTON COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

TABLE C.21: JOHNSTON COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Johnston County				
Keen Lake Dam #1	High		180	Private
Berry Downs Dam	High		48	Private
Gates Pond	High	10.0	52	Private
Son Lan Lee Shipwash Dam	High	1.8	2	Private

[14] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Miry Branch Dam	High	23.0	0	

Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been two dam breaches reported in Johnston County. Although no damage was reported with these events, several breach scenarios in the region could be catastrophic.

The information below identifies additional historical information reported in the previous county hazard mitigation plan.

Johnston County

Two dam breaches were reported, one at Keen Lake Dam #1 and one at Austin Lake Dam. There is little information provided about these two events and no date of occurrence or damage associated with these dam failures is identified.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

C.2.12 Erosion

Location and Spatial Extent

Erosion in Johnston County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Johnston County soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the county, particularly along the banks of rivers and streams, but it is not an extreme threat. No areas of concern were reported by the planning team.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Johnston County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Erosion was not addressed in the previous hazard mitigation plan.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Johnston County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent).

C.2.13 Flood

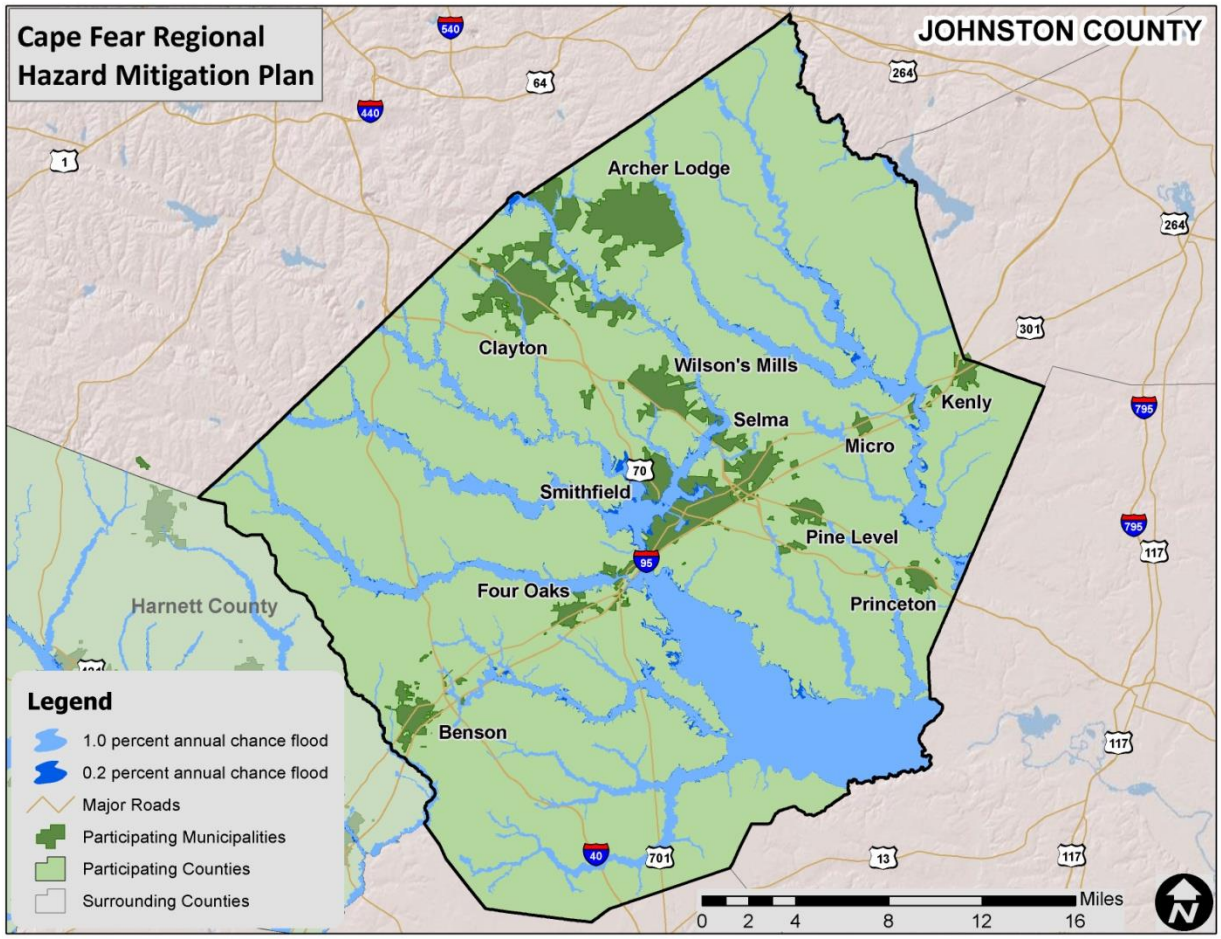
Location and Spatial Extent

There are areas in Johnston County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[15] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 796 square miles that make up Johnston County, there are 126.0 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 7.8 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 16.8 percent of the total land area in Johnston County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure C.9**, **Figure C.10**, **Figure C.11**, **Figure C.12**, **Figure C.13**, **Figure C.14**, **Figure C.15**, **Figure C.16**, **Figure C.17**, **Figure C.18**, **Figure C.19**, and **Figure C.20** illustrate the location and extent of currently mapped special flood hazard areas for Johnston County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

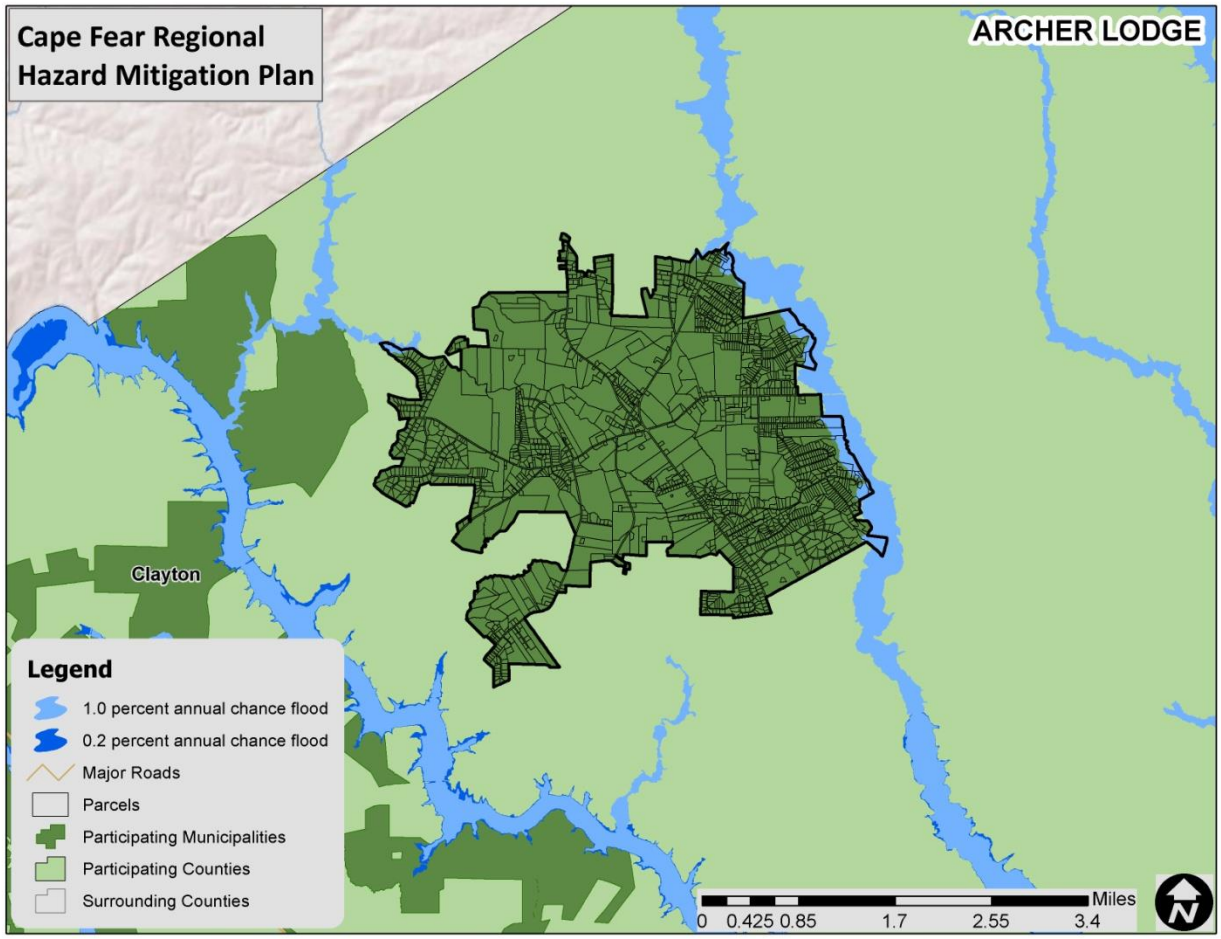
[15] The county-level DFIRM data used for Johnston County were updated in 2010.

FIGURE C.9: SPECIAL FLOOD HAZARD AREAS IN JOHNSTON COUNTY



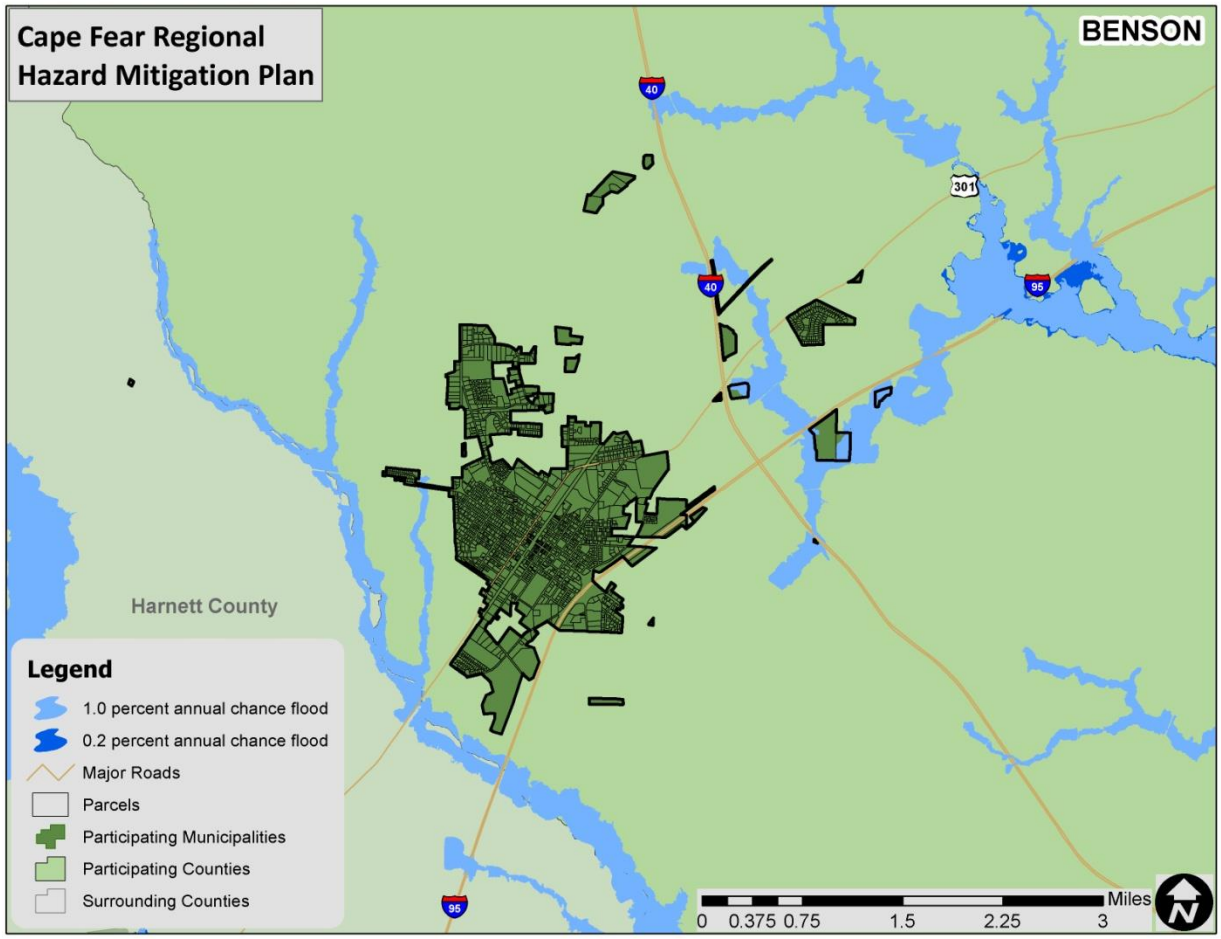
Source: Federal Emergency Management Agency

FIGURE C.10: SPECIAL FLOOD HAZARD AREAS IN ARCHER LODGE



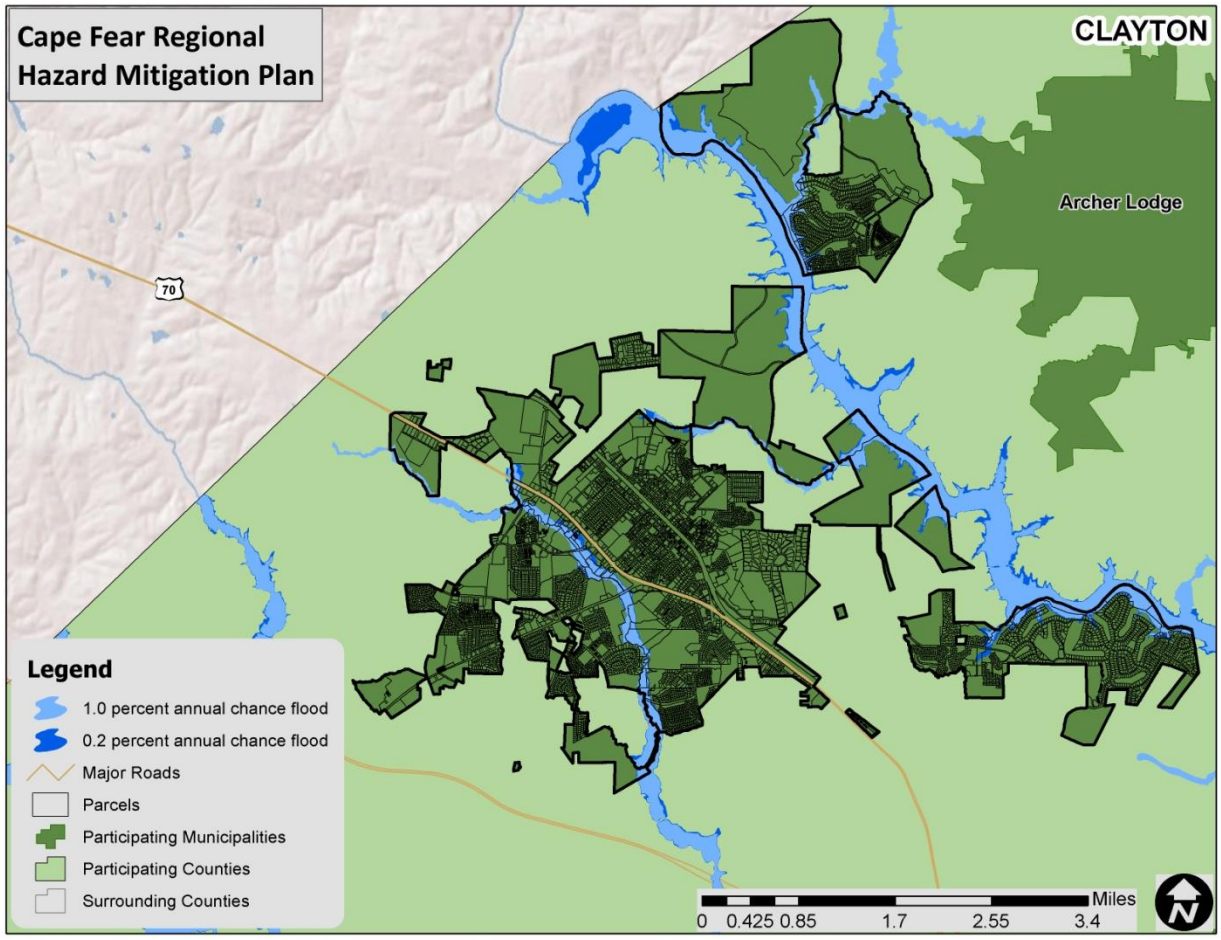
Source: Federal Emergency Management Agency

FIGURE C.11: SPECIAL FLOOD HAZARD AREAS IN BENSON



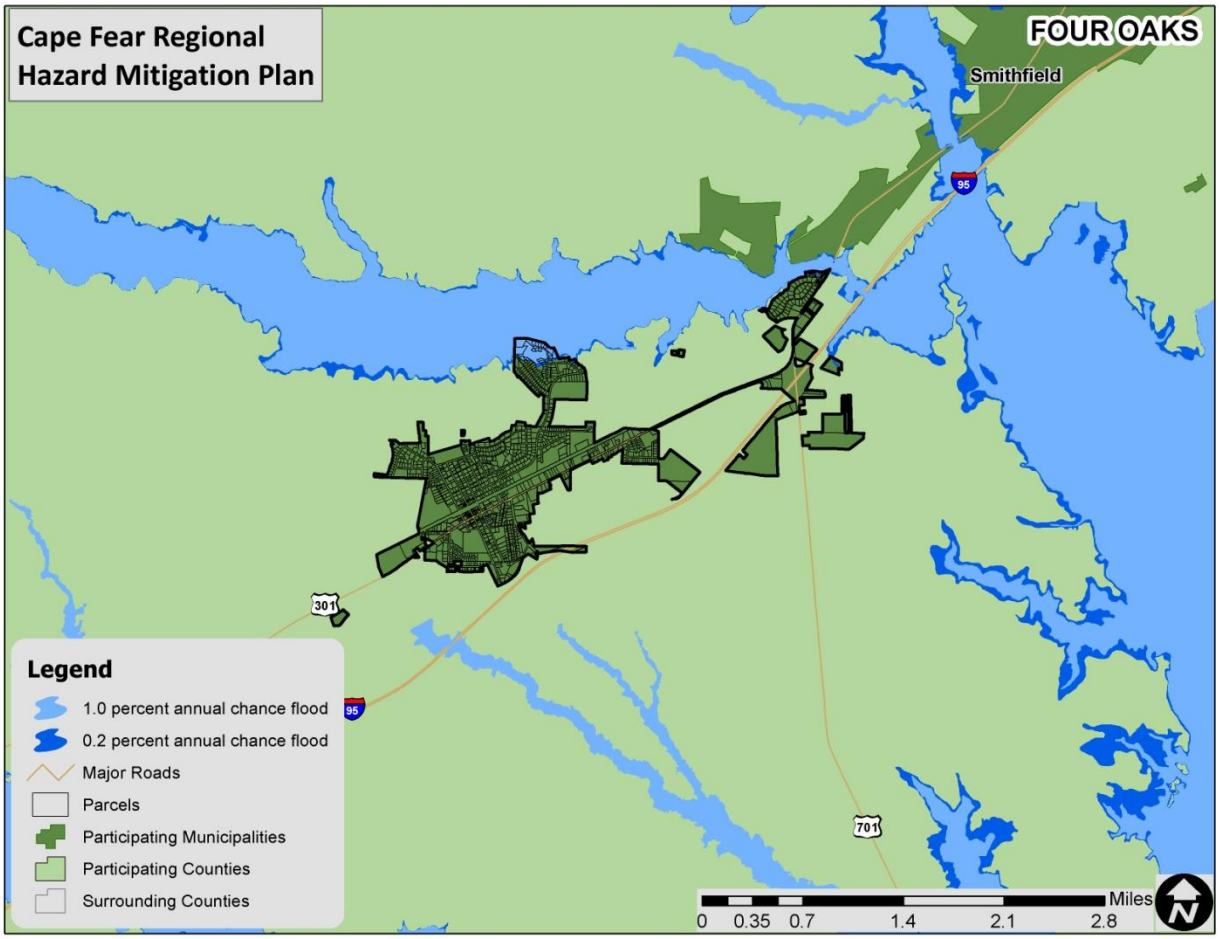
Source: Federal Emergency Management Agency

FIGURE C.12: SPECIAL FLOOD HAZARD AREAS IN CLAYTON



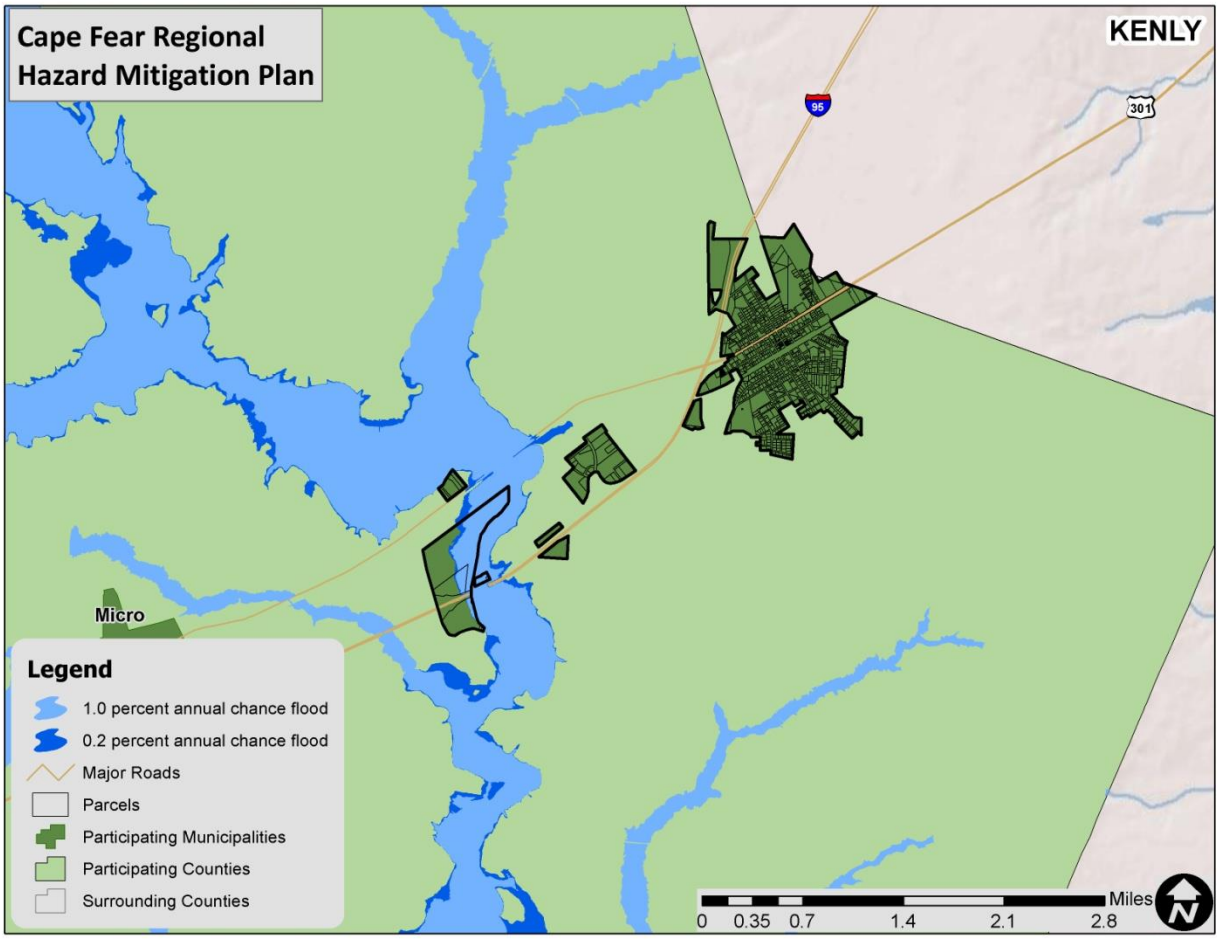
Source: Federal Emergency Management Agency

FIGURE C.13: SPECIAL FLOOD HAZARD AREAS IN FOUR OAKS



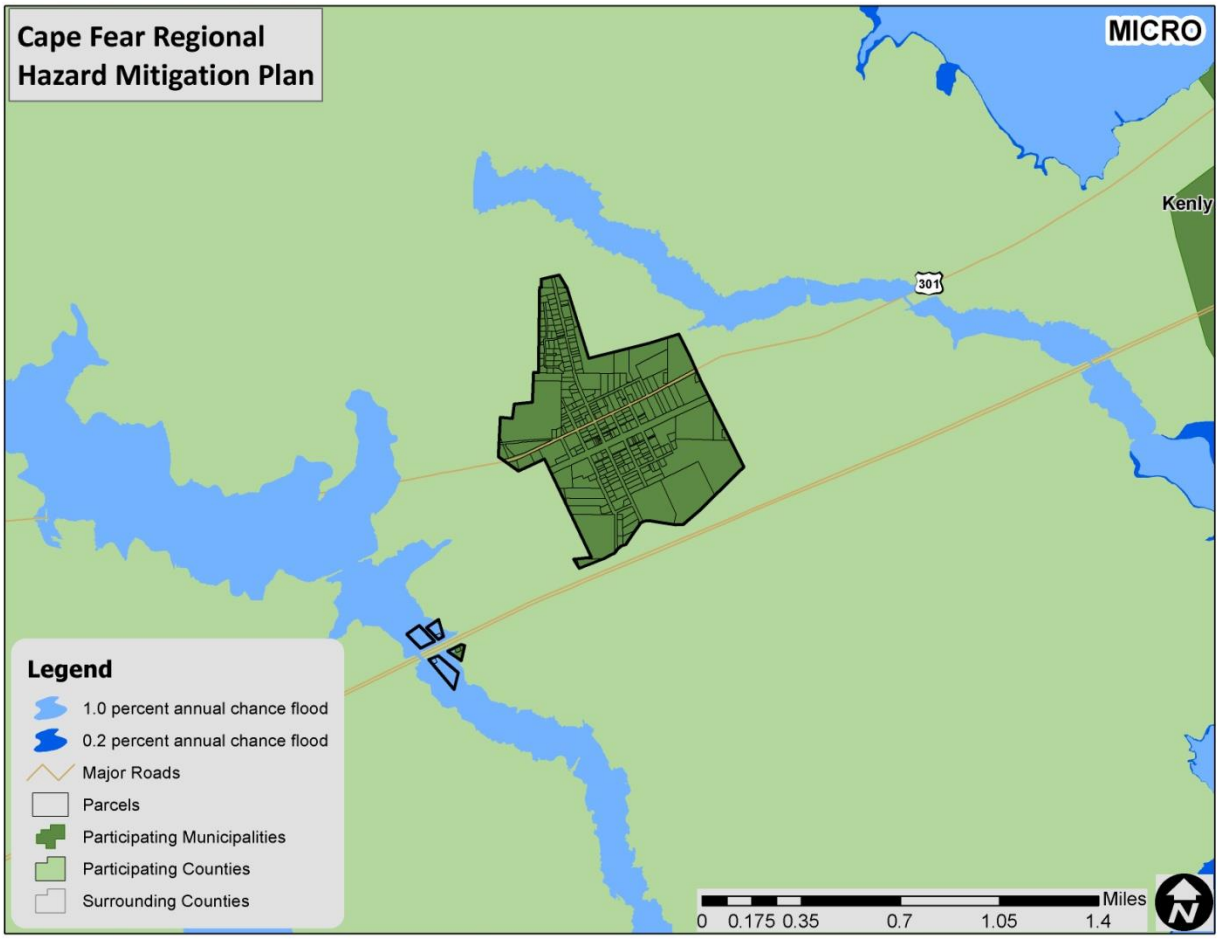
Source: Federal Emergency Management Agency

FIGURE C.14: SPECIAL FLOOD HAZARD AREAS IN KENLY



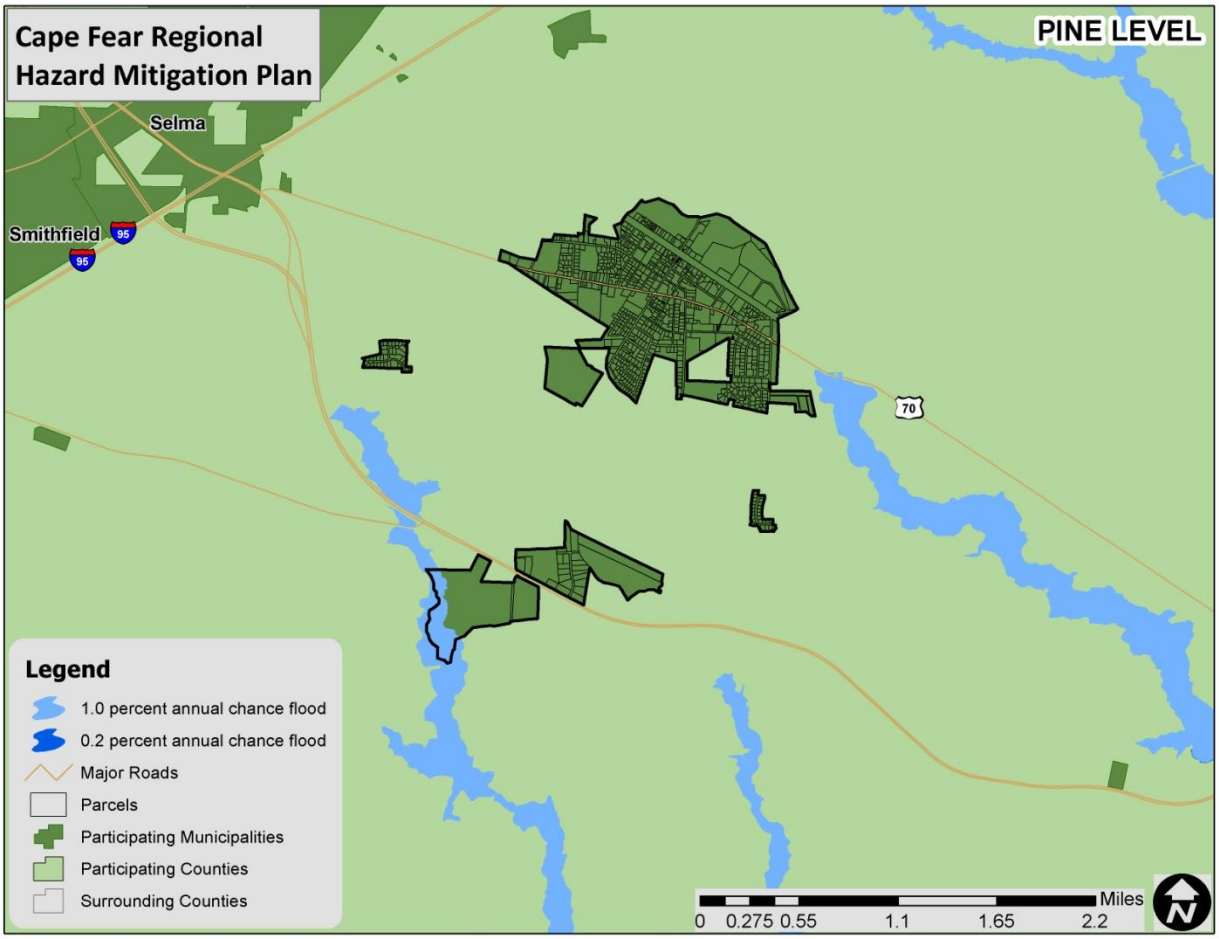
Source: Federal Emergency Management Agency

FIGURE C.15: SPECIAL FLOOD HAZARD AREAS IN MICRO



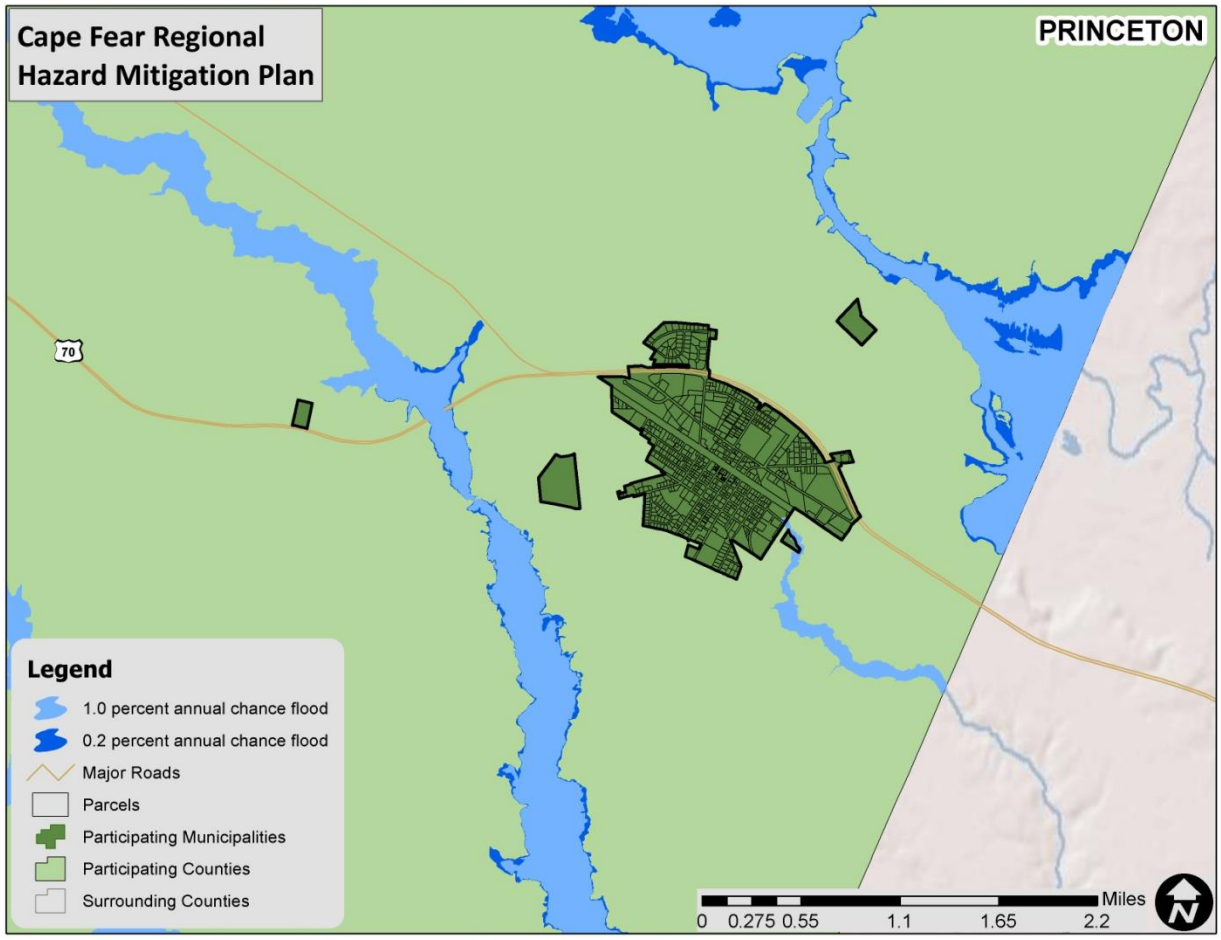
Source: Federal Emergency Management Agency

FIGURE C.16: SPECIAL FLOOD HAZARD AREAS IN PINE LEVEL



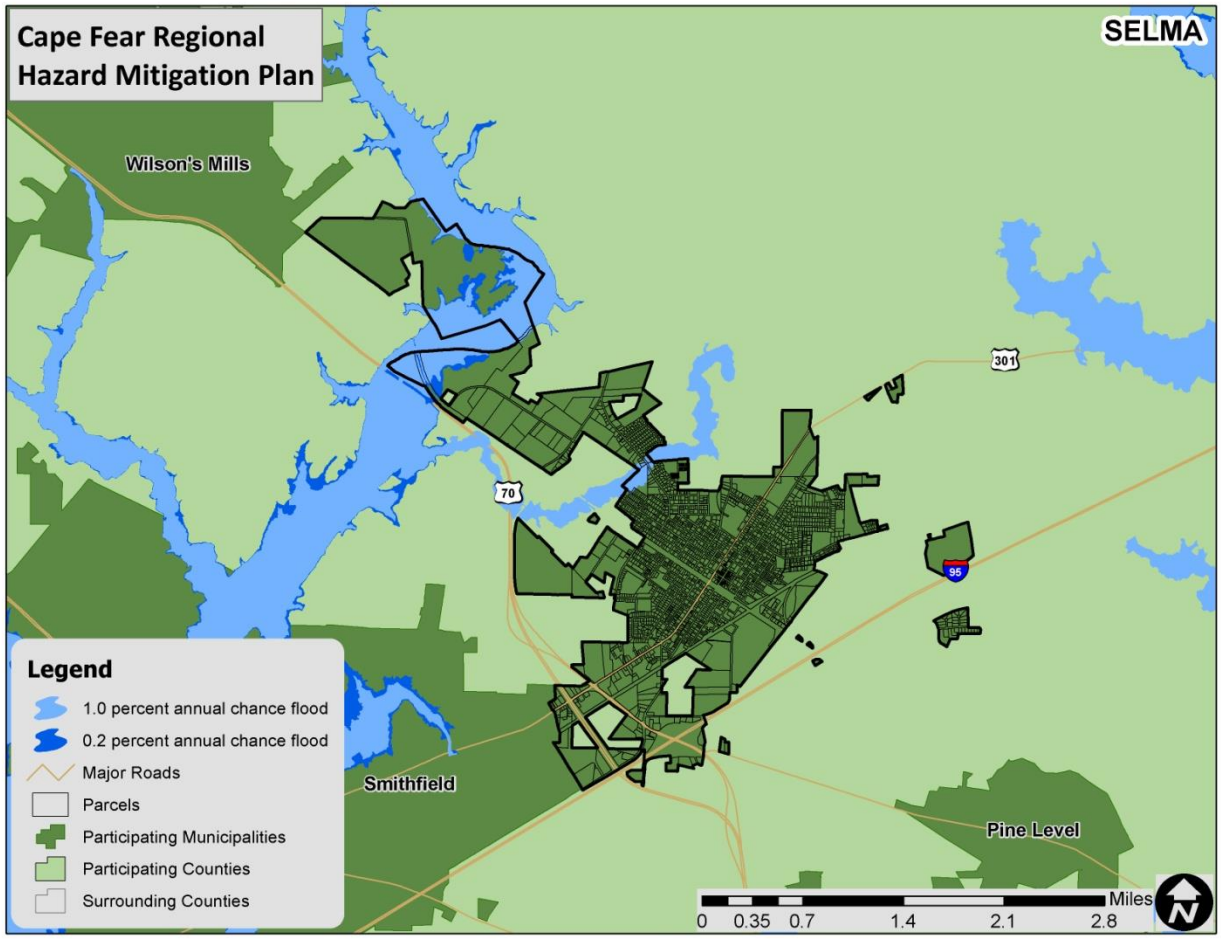
Source: Federal Emergency Management Agency

FIGURE C.17: SPECIAL FLOOD HAZARD AREAS IN PRINCETON



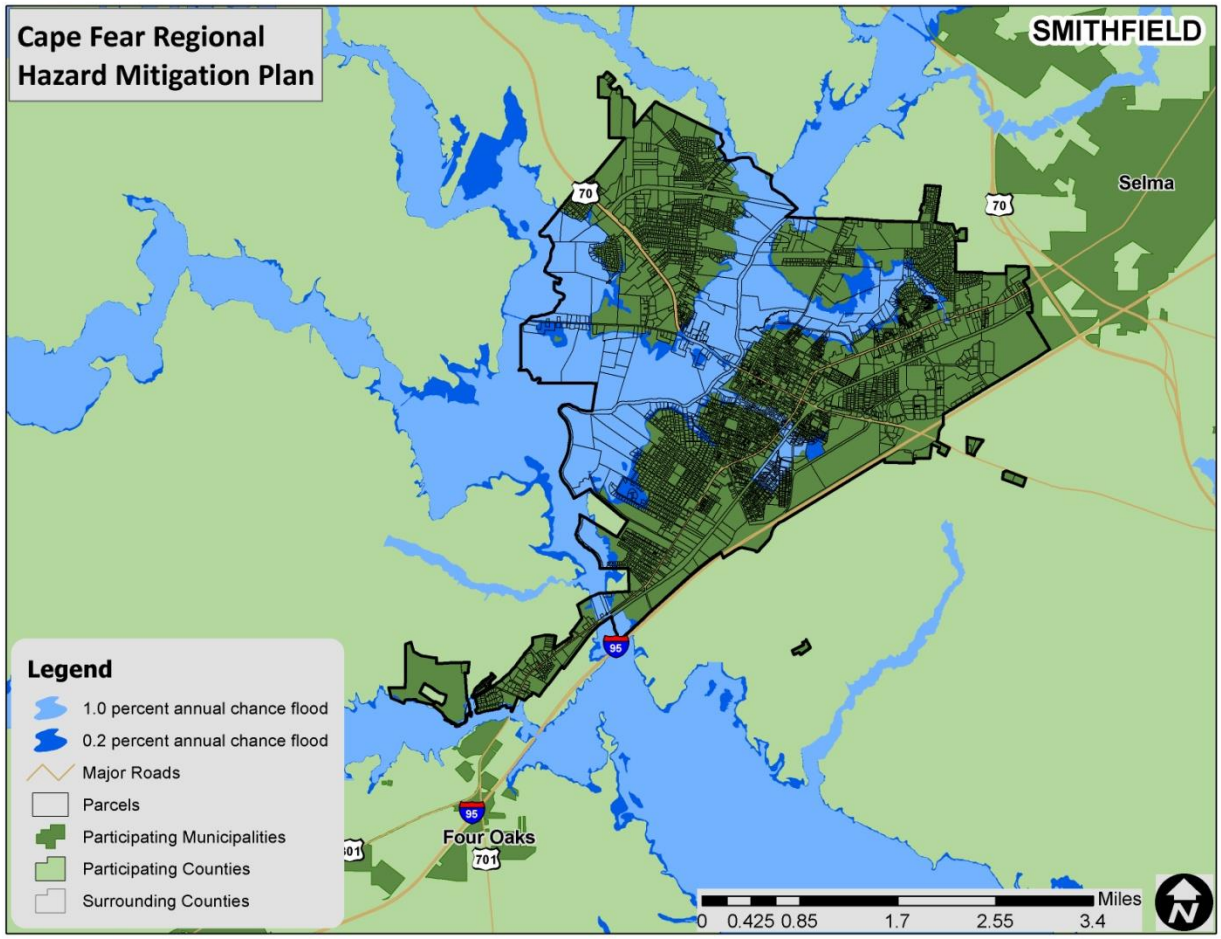
Source: Federal Emergency Management Agency

FIGURE C.18: SPECIAL FLOOD HAZARD AREAS IN SELMA



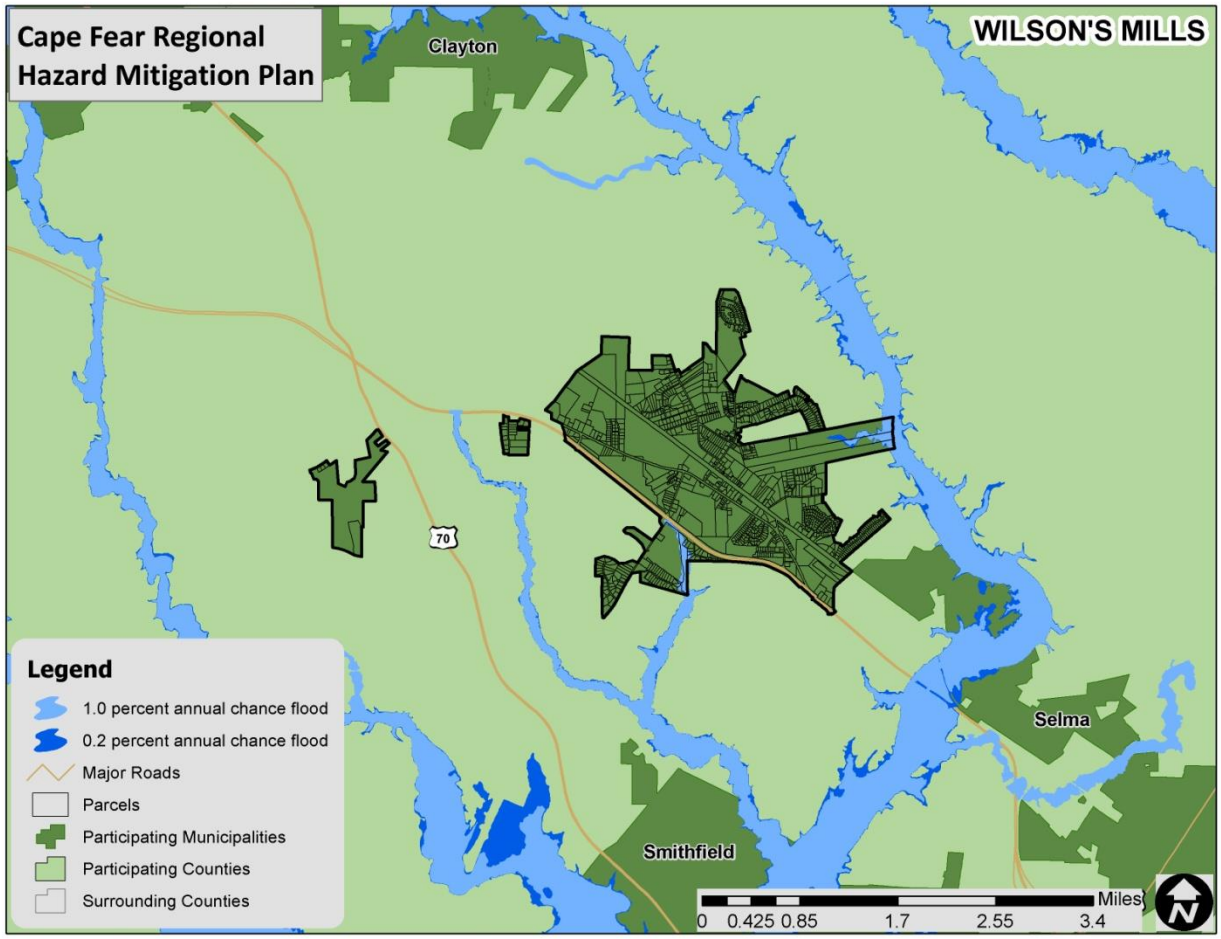
Source: Federal Emergency Management Agency

FIGURE C.19: SPECIAL FLOOD HAZARD AREAS IN SMITHFIELD



Source: Federal Emergency Management Agency

FIGURE C.20: SPECIAL FLOOD HAZARD AREAS IN WILSON'S MILLS



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding was at least partially responsible for one disaster declaration in Johnston County in 2011.[16] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 34 events in Johnston County since 1993.[17] A summary of these events is presented in **Table C.22**. These events accounted for almost $46,000 (2013 dollars) in property damage in the county and 3 fatalities were reported.[18] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table C.23**.

TABLE C.22: SUMMARY OF FLOOD OCCURRENCES IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	1	0/0	$0

[16] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[17] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[18] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Benson	2	0/0	$0
Clayton	5	0/0	$0
Four Oaks	0	0/0	$0
Kenly	0	0/0	$0
Micro	0	0/0	$0
Pine Level	0	0/0	$0
Princeton	1	0/0	$0
Selma	2	0/0	$0
Smithfield	5	0/0	$0
Wilson's Mills	1	0/0	$0
Unincorporated Area	17	3/0	$45,869
JOHNSTON COUNTY TOTAL	**34**	**3/0**	**$45,869**

Source: National Climatic Data Center

TABLE C.23: HISTORICAL FLOOD EVENTS IN JOHNSTON COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Archer Lodge				
ARCHERS LODGE	2/5/2010	FLOOD	0/0	$0
Benson				
BENSON	8/4/2000	FLASH FLOOD	0/0	$0
BENSON	9/14/2007	FLASH FLOOD	0/0	$0
Clayton				
Clayton	10/4/1995	FLASH FLOOD	0/0	$0
CLAYTON	8/3/2000	FLASH FLOOD	0/0	$0
CLAYTON	8/4/2000	FLASH FLOOD	0/0	$0
CLAYTON	8/15/2004	FLASH FLOOD	0/0	$0
CLAYTON	8/24/2010	FLASH FLOOD	0/0	$0
Four Oaks				
None Reported	--	--	--	--
Kenly				
None Reported	--	--	--	--
Micro				
None Reported	--	--	--	--
Pine Level				
None Reported	--	--	--	--
Princeton				
PRINCETON	9/30/2010	FLASH FLOOD	0/0	$0
Selma				
SELMA	3/9/1998	FLASH FLOOD	0/0	$0
SELMA	6/4/2004	FLASH FLOOD	0/0	$0
Smithfield				
Smithfield	10/5/1995	FLASH FLOOD	0/0	$0

	Date	Type	Deaths / Injuries	Property Damage*
SMITHFIELD	10/11/2002	FLASH FLOOD	0/0	$0
SMITHFIELD	6/4/2004	FLASH FLOOD	0/0	$0
SMITHFIELD	8/30/2004	FLASH FLOOD	0/0	$0
SMITHFIELD	9/14/2007	FLASH FLOOD	0/0	$0
Wilson's Mills				
WILSONS MILLS	3/29/2010	FLASH FLOOD	0/0	$0
JOHNSTON COUNTY	3/23/1993	FLASH FLOODS	0/0	$0
JOHNSTON COUNTY	6/12/1995	FLASH FLOOD	0/0	$0
JOHNSTON COUNTY	6/19/1995	FLASH FLOOD	0/0	$45,869
COUNTYWIDE	9/5/1996	FLASH FLOOD	0/0	$0
JOHNSTON COUNTY	1/19/1998	FLOOD	0/0	$0
JOHNSTON COUNTY	1/27/1998	FLOOD	0/0	$0
JOHNSTON COUNTY	2/10/1998	FLOOD	0/0	$0
COUNTYWIDE	9/15/1999	FLASH FLOOD	3/0	$0
COUNTYWIDE	9/21/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/27/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/28/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/28/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	9/28/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	10/17/1999	FLASH FLOOD	0/0	$0
COUNTYWIDE	6/16/2001	FLASH FLOOD	0/0	$0
WEST PORTION	7/9/2001	FLASH FLOOD	0/0	$0
WEST CENTRAL PORTION	6/14/2006	FLASH FLOOD	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been 79 flood losses reported in Johnston County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $2.3 million in claims payments. A summary of these figures for the county is provided in **Table C.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Johnston County were either uninsured, denied claims payment, or not reported.

TABLE C.24: SUMMARY OF INSURED FLOOD LOSSES IN JOHNSTON COUNTY

Location	Flood Losses	Claims Payments
Archer Lodge	0	$0
Benson	0	$0
Clayton	2	$1,498
Four Oaks	0	$0
Kenly	0	$0
Micro*	--	--
Pine Level	0	$0

Location	Flood Losses	Claims Payments
Princeton	0	$0
Selma	0	$0
Smithfield	48	$1,596,593
Wilson's Mills*	--	--
Unincorporated Area	29	$680,206
JOHNSTON COUNTY TOTAL	**79**	**$2,278,297**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: Federal Emergency Management Agency, National Flood Insurance Program

Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

As of July 2013, there are no non-mitigated repetitive loss properties located in Johnston County. **Table C.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Johnston County.

TABLE C.25: REPETITIVE LOSS PROPERTIES IN JOHNSTON COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Archer Lodge	0	--	0	$0	$0	$0	$0
Benson	0	--	0	$0	$0	$0	$0
Clayton	0	--	0	$0	$0	$0	$0
Four Oaks	0	--	0	$0	$0	$0	$0
Kenly	0	--	0	$0	$0	$0	$0
Micro*	--	--	--	--	--	--	--
Pine Level	0	--	0	$0	$0	$0	$0
Princeton	0	--	0	$0	$0	$0	$0
Selma	0	--	0	$0	$0	$0	$0
Smithfield	0	--	0	$0	$0	$0	$0
Wilson's Mills*	--	--	--	--	--	--	--
Unincorporated Area	0	--	0	$0	$0	$0	$0
JOHNSTON COUNTY TOTAL	**0**	**--**	**0**	**$0**	**$0**	**$0**	**$0**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Johnston County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

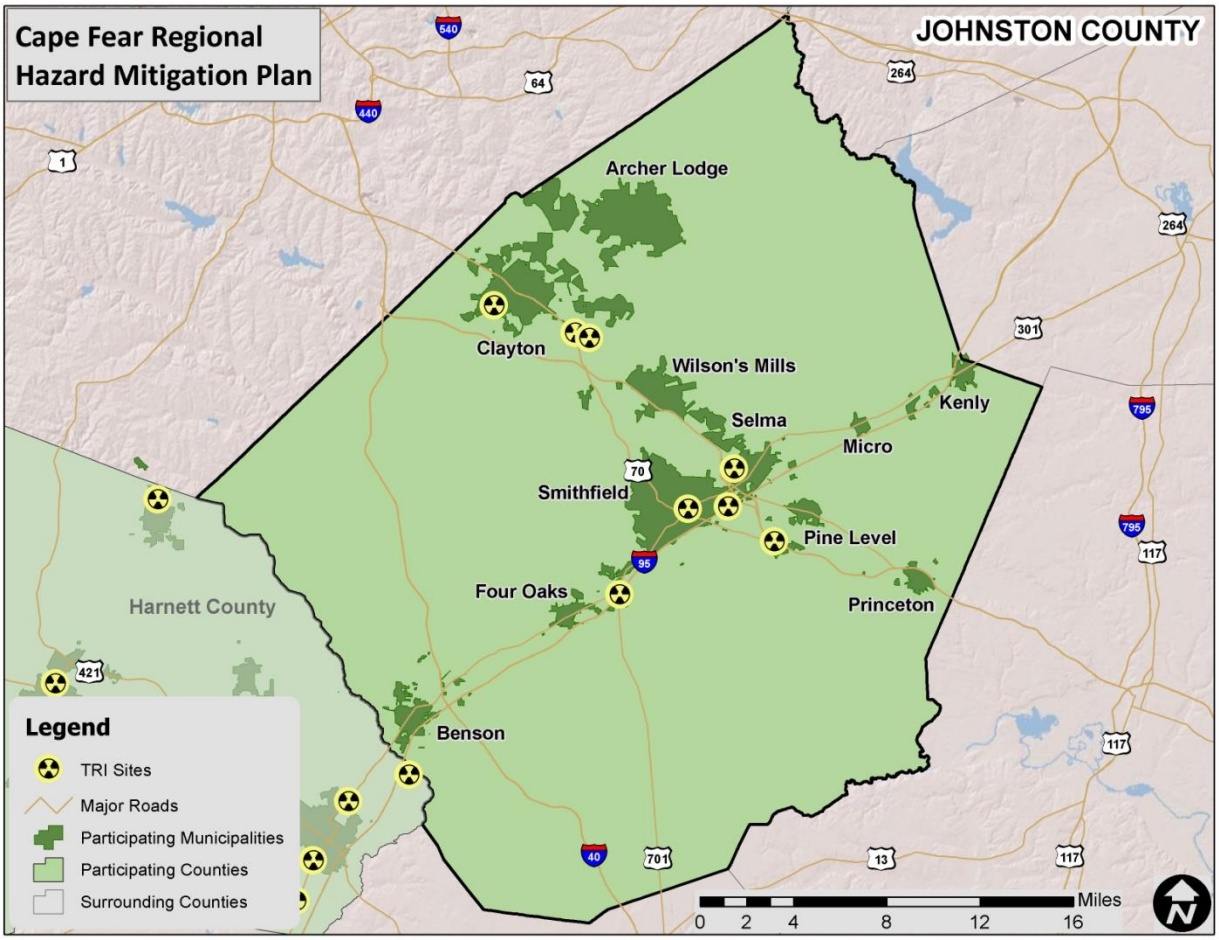
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Smithfield has more floodplain and thus a higher risk of flood than Micro. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for properties in the floodplain.

C.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Johnston County has eight TRI sites. These sites are shown in **Figure C.21.**

FIGURE C.21: TOXIC RELEASE INVENTORY (TRI) SITES IN JOHNSTON COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 76 recorded HAZMAT incidents in Johnston County since 1971 (**Table C.26**). These events resulted in over $23,000 (2013 dollars) in property damage as well as two fatalities and two injuries. **Table C.27** presents detailed information on historic HAZMAT incidents in Johnston County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE C.26: SUMMARY OF HAZMAT INCIDENTS IN JOHNSTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Archer Lodge	0	0/0	$0
Benson	3	0/0	$2,144
Clayton	7	0/0	$0
Four Oaks	1	0/0	$0
Kenly	10	0/1	$5,597
Micro	0	0/0	$0
Pine Level	1	0/0	$0
Princeton	2	0/0	$2,356
Selma	36	2/1	$11,918
Smithfield	14	0/0	$0
Wilson's Mills	1	0/0	$0
Unincorporated Area	1	0/0	$1,266
JOHNSTON COUNTY TOTAL	**76**	**2/2**	**$23,280**

Source: Unitd States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE C.27: HAZMAT INCIDENTS IN JOHNSTON COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Archer Lodge							
None Reported	--	--	--	--	--	--	--
Benson							
I-1997080858	8/8/1997	BENSON	Highway	No	0/0	$0	1 LGA
I-1998081322	8/13/1998	BENSON	Highway	Yes	0/0	$2,144	312.5 LGA
I-2004020566	1/16/2004	BENSON	Highway	No	0/0	$0	10 LGA
Clayton							
I-1989080254	7/31/1989	CLAYTON	Highway	Yes	0/0	$0	5,061 LGA
I-1996080136	6/27/1996	CLAYTON	Highway	No	0/0	$0	101 LGA
I-1997030952	2/28/1997	CLAYTON	Highway	No	0/0	$0	0.264172 LGA
I-2003100516	9/23/2003	CLAYTON	Highway	No	0/0	$0	25 SLB
I-2004061504	5/25/2004	CLAYTON	Highway	No	0/0	$0	0.1875 LGA
I-2006120260	10/29/2006	CLAYTON	Highway	Yes	0/0	$0	400 LGA
E-2010080128	8/2/2010	CLAYTON	Highway	No	0/0	$0	0.015625 LGA
Four Oaks							
I-2010090100	4/22/2010	FOUR OAKS	Highway	No	0/0	$0	0
Kenly							
I-1972050173	5/11/1972	KENLY	Highway	No	0/0	$0	0

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
I-1988060530	6/20/1988	KENLY	Highway	Yes	0/0	$0	340 LGA
I-1990060846	6/15/1990	KENLY	Highway	Yes	0/0	$0	400 LGA
I-1993010405	1/7/1993	KENLY	Highway	No	0/0	$0	8 SLB
I-1998010429	12/31/1997	KENLY	Highway	No	0/0	$0	15 LGA
I-2004080356	6/27/2004	KENLY	Highway	Yes	0/0	$0	150 LGA
I-2005040867	4/1/2005	KENLY	Highway	No	0/0	$0	0.000132 lGA
I-2008040402	3/5/2008	KENLY	Highway	Yes	0/0	$0	6,885 LGA
I-2008110446	7/16/2008	KENLY	Highway	Yes	0/1	$5,597	21.02118 GCF
E-2011050135	5/5/2011	KENLY	Highway	No	0/0	$0	2.5 LGA
Micro							
None Reported	--	--	--	--	--	--	--
Pine Level							
I-1979091263	8/25/1979	PINE LEVEL	Highway	Yes	0/0	$0	3,512 LGA
Princeton							
I-1997060065	4/3/1997	PRINCETON	Highway	Yes	0/0	$2,177	500 LGA
I-1998031242	3/8/1998	PRINCETON	Highway	Yes	0/0	$179	8,500 LGA
Selma							
I-1975080461	8/2/1975	SELMA	Highway	No	0/0	$0	0
I-1976070353	6/26/1976	SELMA	Highway	No	0/0	$0	42 LGA
I-1978020166	1/17/1978	SELMA	Rail	No	0/0	$0	20 LGA
I-1978120045	11/23/1978	SELMA	Highway	Yes	0/0	$0	2,750 LGA
I-1979090526	7/20/1979	SELMA	Highway	No	0/0	$0	0
I-1985060489	6/14/1985	SELMA	Highway	Yes	0/0	$0	1,250 LGA
I-1986050236	5/6/1986	SELMA	Highway	Yes	0/0	$0	900 LGA
I-1987090456	9/14/1987	SELMA	Highway	Yes	1/0	$0	9,100 LGA
I-1991020271	1/31/1991	SELMA	Highway	No	0/0	$0	18 LGA
I-1991080730	8/8/1991	SELMA	Highway	No	0/0	$0	25 LGA
I-1991100066	9/28/1991	SELMA	Highway	No	0/0	$0	1.5 LGA
I-1992020574	1/30/1992	SELMA	Highway	Yes	0/0	$0	422 LGA
I-1993060602	4/20/1993	SELMA	Highway	Yes	0/0	$0	904 LGA
I-1995030394	2/1/1995	SELMA	Rail	No	0/1	$0	0.03125 LGA
I-1997110267	10/30/1997	SELMA	Rail	No	0/0	$0	1 LGA
I-1998030066	1/27/1998	SELMA	Highway	Yes	0/0	$0	145 LGA
I-1998030248	2/25/1998	SELMA	Highway	No	0/0	$0	1 LGA
I-1998061389	6/9/1998	SELMA	Rail	No	0/0	$0	1 LGA
I-1998100666	9/21/1998	SELMA	Rail	No	0/0	$0	5 LGA
I-1998110988	10/13/1998	SELMA	Highway	No	0/0	$0	10 LGA
I-1999010557	1/15/1999	SELMA	Rail	No	0/0	$0	1 LGA
I-1999050622	4/13/1999	SELMA	Rail	No	0/0	$0	2 LGA
I-2000010637	1/9/2000	SELMA	Highway	No	0/0	$0	50 LGA
I-2001041108	4/14/2001	SELMA	Highway	No	0/0	$0	100 LGA
I-2002011342	10/23/2001	SELMA	Rail	No	0/0	$0	1 LGA
I-2002021325	12/18/2001	SELMA	Rail	No	0/0	$0	1 LGA
I-2006010667	1/10/2005	SELMA	Highway	Yes	1/0	$0	349 LGA
I-2005050505	3/16/2005	SELMA	Highway	No	0/0	$0	20 LGA
I-2006120466	9/8/2005	SELMA	Highway	Yes	0/0	$11,918	5,000 LGA

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
E-2006110023	10/18/2006	SELMA	Highway	No	0/0	$0	10 LGA
I-2007080426	6/6/2007	SELMA	Highway	Yes	0/0	$0	0 LGA
I-2007080426	6/6/2007	SELMA	Highway	Yes	0/0	$0	5 LGA
E-2009040179	3/18/2009	SELMA	Highway	No	0/0	$0	1 LGA
I-2010100303	8/18/2010	SELMA	Highway	No	0/0	$0	0
X-2011030093	3/2/2011	Selma	Rail	No	0/0	$0	0.25 LGA
X-2012060083	6/7/2012	SELMA	Rail	No	0/0	$0	0.007812 LGA
Smithfield							
I-1971010039	1/11/1971	SMITHFIELD	Highway	No	0/0	$0	0
I-1973010329	1/16/1973	SMITHFIELD	Highway	No	0/0	$0	0
I-1973110245	10/29/1973	SMITHFIELD	Highway	No	0/0	$0	0
I-1977040110	2/7/1977	SMITHFIELD	Highway	No	0/0	$0	0
I-1977030229	2/22/1977	SMITHFIELD	Highway	No	0/0	$0	0
I-1980071282	6/30/1980	SMITHFIELD	Highway	No	0/0	$0	0
I-1980071283	6/30/1980	SMITHFIELD	Highway	No	0/0	$0	0
I-1986040235	4/6/1986	SMITHFIELD	Highway	No	0/0	$0	5 LGA
I-1989050696	5/2/1989	SMITHFIELD	Highway	No	0/0	$0	10 LGA
I-1999071919	7/22/1999	SMITHFIELD	Highway	No	0/0	$0	10 LGA
I-2000061547	3/21/2000	SMITHFIELD	Highway	No	0/0	$0	0.000001 LGA
I-2000061640	5/30/2000	SMITHFIELD	Highway	No	0/0	$0	2 LGA
I-2001020363	1/18/2001	SMITHFIELD	Highway	No	0/0	$0	1 LGA
I-2002071159	7/10/2002	SMITHFIELD	Highway	No	0/0	$0	20 LGA
Wilson's Mills							
I-2004051096	4/20/2003	WILSON MILLS	Highway	Yes	0/0	$1,266	500 LGA
Unincorporated Area							
I-1998041039	3/12/1998	WILLOW SPRINGS	Highway	No	0/0	$0	10 LGA

*Property damage is reported in 2013 dollars.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of eight toxic release inventory sites in Johnston County and several roadway incidents, it is likely that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

C.2.15 Wildfire

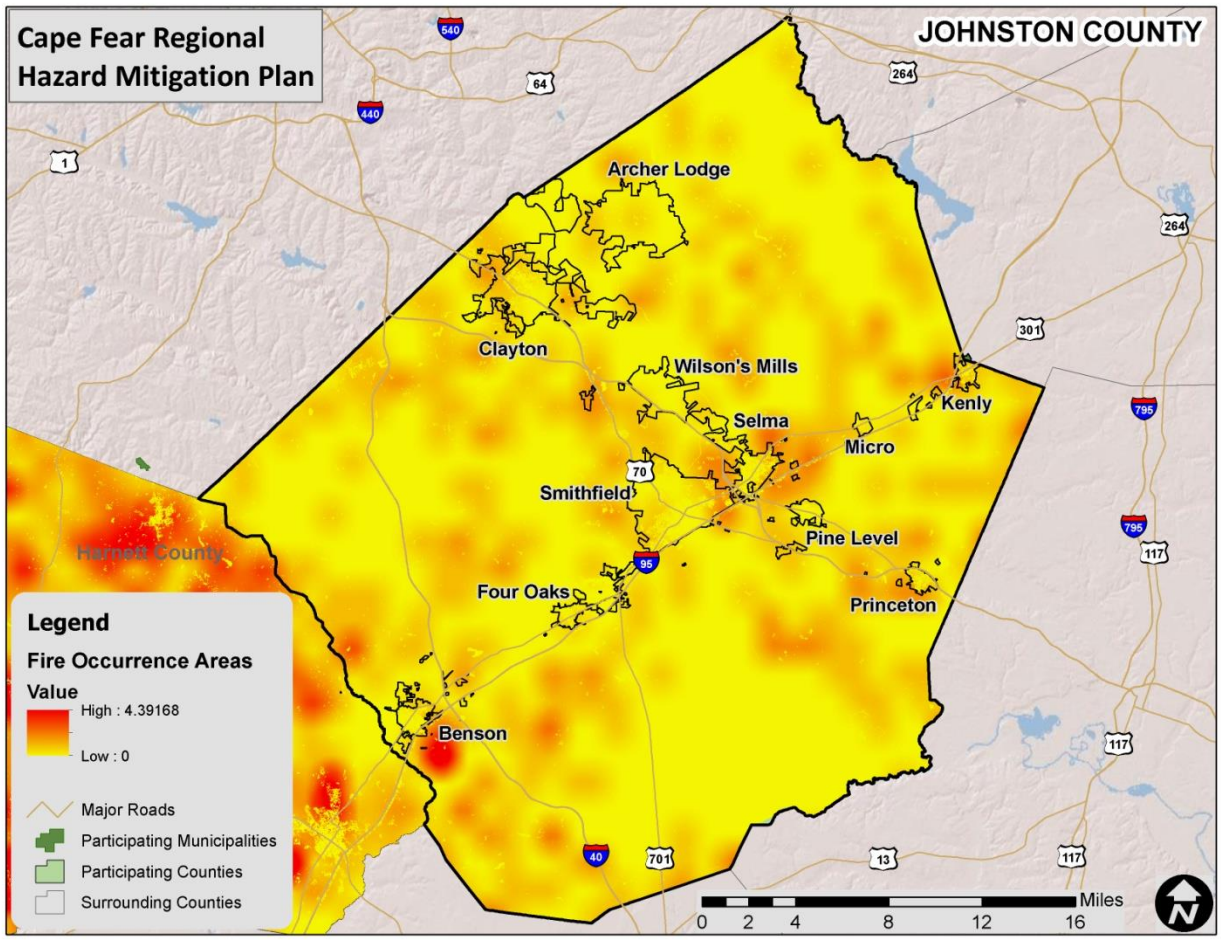
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic location.

Historical Occurrences

Figure C.22 shows the Fire Occurrence Areas (FOA) in Johnston County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE C.22: HISTORIC WILDFIRE EVENTS IN JOHNSTON COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Johnston County experienced an average of 37 wildfires annually which burn an average of 191 acres per year. The data indicates that most of these fires are small, averaging four acres per fire. **Table C.28** lists the number of reported wildfire occurrences in the county between the years 2003 and 2012.

TABLE C.28: HISTORICAL WILDFIRE OCCURRENCES IN JOHNSTON COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Johnston County										
Number of Fires	17	16	29	35	75	29	24	59	55	29
Number of Acres	49.9	263.4	112.9	93.1	384.2	198.5	199.8	188.6	257.3	164.1

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

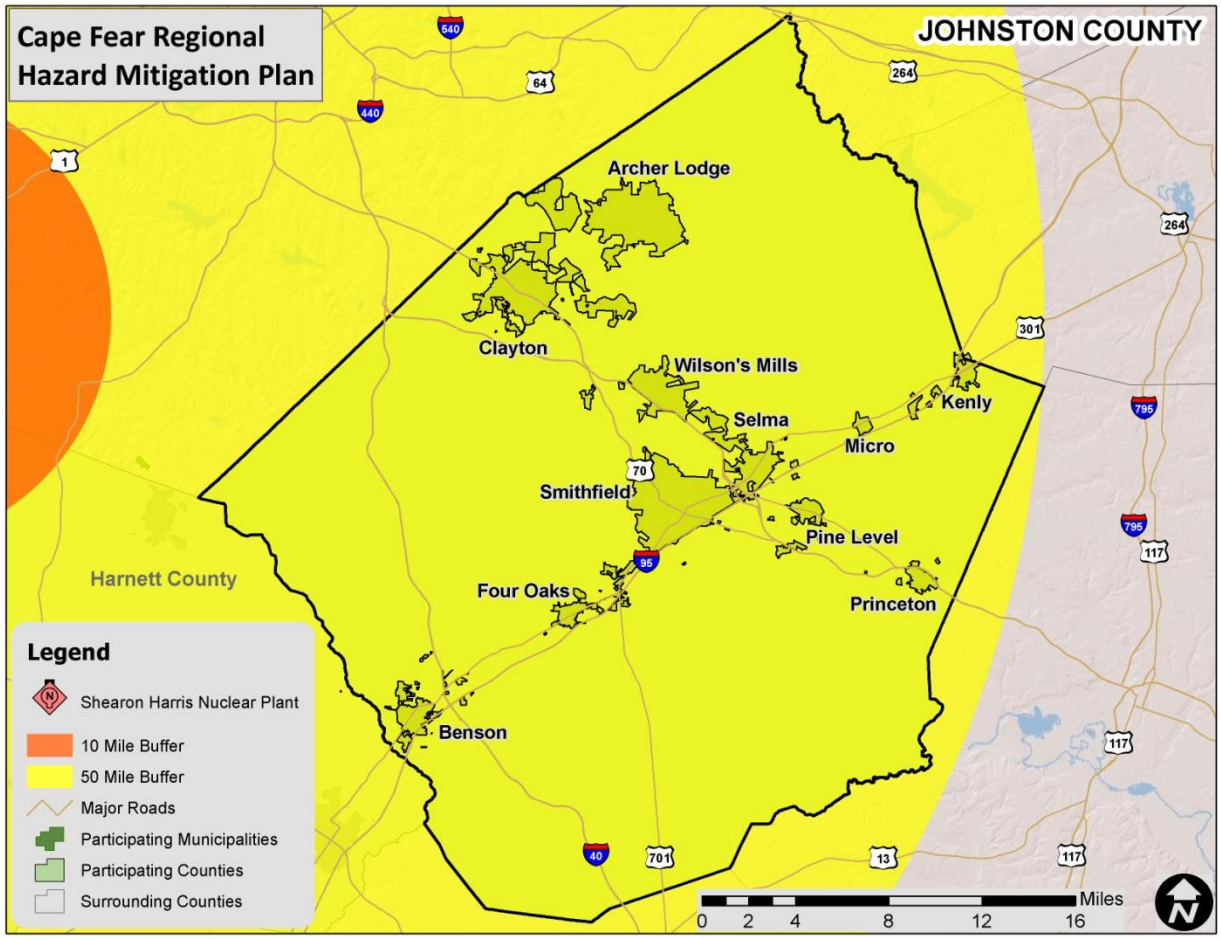
Wildfire events will be an ongoing occurrence in Johnston County. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Johnston County for future wildfire events is likely (10 to 100 percent annual probability).

C.2.16 Nuclear Accident

Location and Spatial Extent

The entire county is at risk to a nuclear incident due to its proximity to the Shearon Harris Nuclear Station. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure C.23**). All areas of the county are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

FIGURE C. 23: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES IN JOHNSTON COUNTY



Source: International Atomic Energy Agency

Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986. There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.[19]

Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

[19] More information on Shearon Harris Emergency Declaration events can be found in Section 5: *Hazard Profiles*.

C.2.17 Terror Threat

Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table C.29** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE C.29 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section C.3.3) are at a heightened level of risk in Johnston County, there are several that have been identified as the likely primary targets. These critical facilities include the Johnston County Emergency Operations Center and Johnston Medical Center.

Historical Occurrences

Although there have been no major terror events in Johnston County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

Probability of Future Occurrences

Johnston County has no recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

C.2.18 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table C.30 describes the extent of each natural hazard identified for Johnston County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE C.30: EXTENT OF JOHNSTON COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Johnston County has received this ranking two times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Johnston County is 107 degrees Fahrenheit (reported on August 18, 1988).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Johnston County was 2.75 inches (reported on August 5, 1997). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Johnston County was an Unnamed 1893 Storm which reached a maximum wind speed of 70 knots in the county.
Lightning	According to the Vaisala flash density map (Figure 5.5), Johnston County is located in an area that experiences 3 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 56-year history from the National Climatic Data Center, the strongest recorded wind event in Johnston County was reported on July 10, 1986 at 75 knots (approximately 86 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F3 (reported on November 23, 1992).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Johnston County was 18.0 inches on March 2, 1927. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from Johnston County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was IV (moderate) with a correlating Richter Scale measurement of approximately 4.8 (reported on November 20, 1969). The epicenter of this earthquake was located 318.0 km away.

Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is low across Johnston County. There is also low susceptibility throughout the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 89 dams in Johnston County, 5 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Johnston County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 16.8 percent of the total land area in Johnston County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at the Neuse River near Clayton on September 19, 1945. Water reached a discharge of 22,900 cubic feet per second and the stream gage height was recorded at 22.12 feet. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 9,100 LGA released on the highway on September 14, 1987. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. The greatest number of fires to occur in Johnston County in any year was 75 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2007 when 384.2 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Nuclear Accident	Although there is no history of a nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in Johnston County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Johnston County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.20.2.

Table C.31 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE C.31: SUMMARY OF PRI RESULTS FOR JOHNSTON COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm/High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Unlikely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**1.3**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Limited	Moderate	6 to 12 hours	Less than 1 week	**3.0**
Other Hazards						
Hazardous Materials Incident	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**
Nuclear Accident	Unlikely	Limited	Moderate	6 to 12 hours	Less than 1 week	**1.9**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

C.2.19 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Johnston County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table C.32**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Johnston County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section C.3. It should be noted that

although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE C.32: CONCLUSIONS ON HAZARD RISK FOR JOHNSTON COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Flood Hurricane and Tropical Storm Tornado Hailstorm Drought Winter Storm and Freeze
MODERATE RISK	Hazardous Material Incident Extreme Heat Wildfire Lightning
LOW RISK	Terror Threat Dam and Levee Failure Nuclear Accident Erosion Earthquake Landslide

C.3 JOHNSTON COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Johnston County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

C.3.1 Asset Inventory

Table C.33 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Johnston County and its participating jurisdictions (study area of vulnerability assessment).[20]

[20] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE C.33: IMPROVED PROPERTY IN JOHNSTON COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[21]
Archer Lodge	1,750	$247,693,690	1,595	$170,585,060
Benson	1,712	$257,648,473	1,458	$178,956,673
Clayton	7,504	$1,494,324,813	4,762	$1,031,714,203
Four Oaks	1,131	$129,732,334	915	$92,646,954
Kenly	741	$68,712,041	750	$48,529,791
Micro	244	$15,870,507	256	$11,897,567
Pine Level	795	$98,304,350	820	$70,814,330
Princeton	707	$104,664,930	628	$83,358,730
Selma	2,311	$308,607,010	2,506	$205,382,510
Smithfield	5,236	$1,182,116,491	4,798	$815,559,431
Wilson's Mills	1,093	$124,486,200	895	$82,053,740
Unincorporated Area	68,495	$9,536,489,839	61,125	$5,816,517,259
JOHNSTON COUNTY TOTAL	**91,719**	**$13,568,650,678**	**80,508**	**$8,608,016,248**

Table C.34 lists the fire stations, police stations, EMS/rescue stations, emergency operations centers (EOCs), medical care facilities, schools and other critical facilities located in Johnston County. Local governments at the county level provided a majority of the data for this analysis. In addition, **Figure C.24** shows the locations of essential facilities in Johnston County. **Table C.49**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county.

TABLE C.34: CRITICAL FACILITY INVENTORY IN JOHNSTON COUNTY

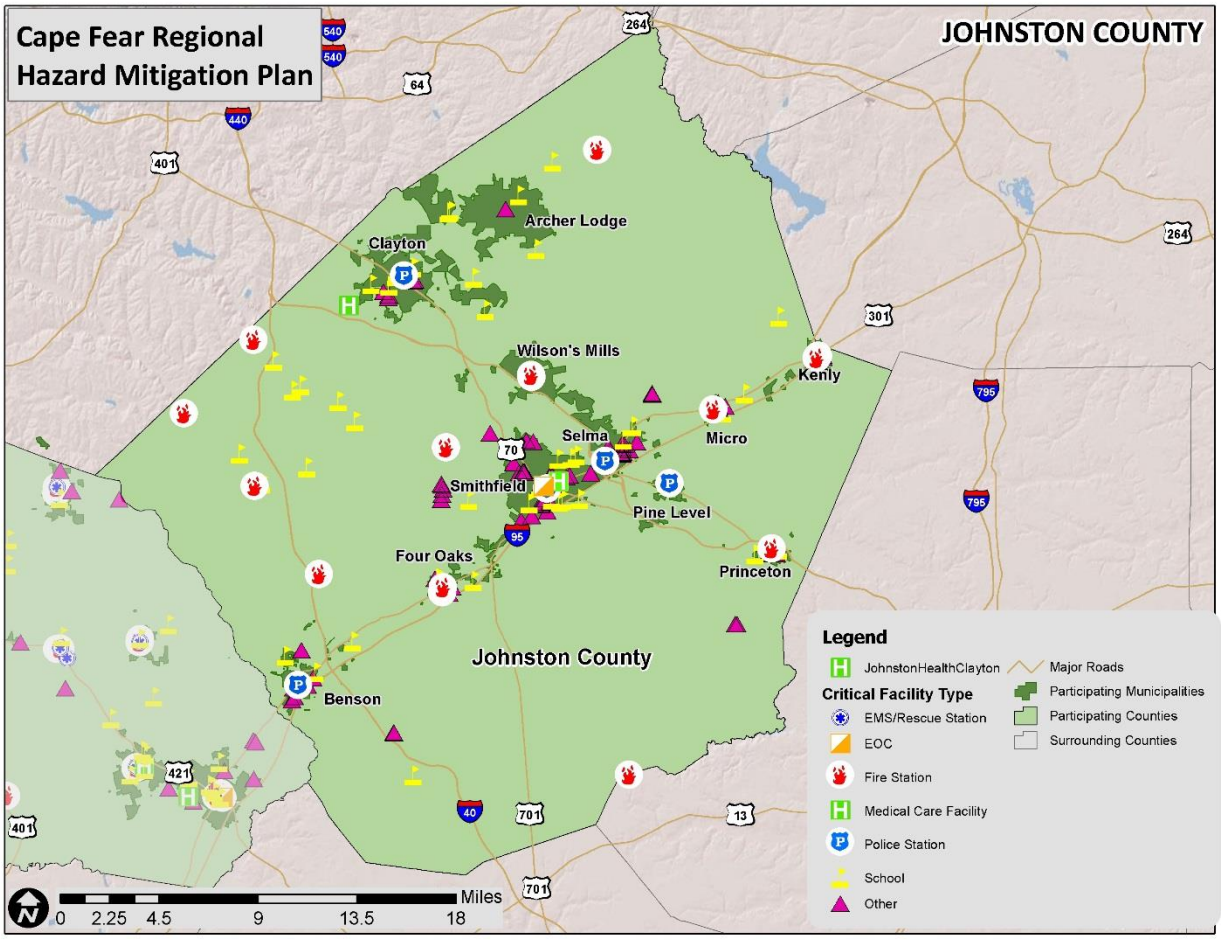
Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Archer Lodge	0	0	0	0	0	1	1
Benson	0	1	0	0	0	2	7
Clayton	0	1	0	1	0	7	8
Four Oaks	1	1	0	0	0	2	4
Kenly	1	1	0	0	0	0	6
Micro	1	0	0	0	0	1	5
Pine Level	0	1	0	0	0	1	3
Princeton	1	0	0	0	0	2	6
Selma	0	1	0	0	0	2	12
Smithfield	0	1	0	1	1	9	37
Wilson's Mills	1	1	0	0	0	1	2
Unincorporated Area	7	0	0	0	0	18	14
JOHNSTON COUNTY TOTAL	**12**	**8**	**0**	**2**	**1**	**46**	**105**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.

Source: Local Government; Hazus-MH

[21] Building value for each county is based on the number of parcels with an improved building value greater than zero.

FIGURE C.24: CRITICAL FACILITY LOCATIONS IN JOHNSTON COUNTY



Source: Local Governments

C.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Johnston County that are potentially at risk to these hazards.

Table C.35 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Johnston County according to Census data is 168,878 persons. Additional population estimates are presented above in Section C.1.

TABLE C.35: TOTAL POPULATION IN JOHNSTON COUNTY

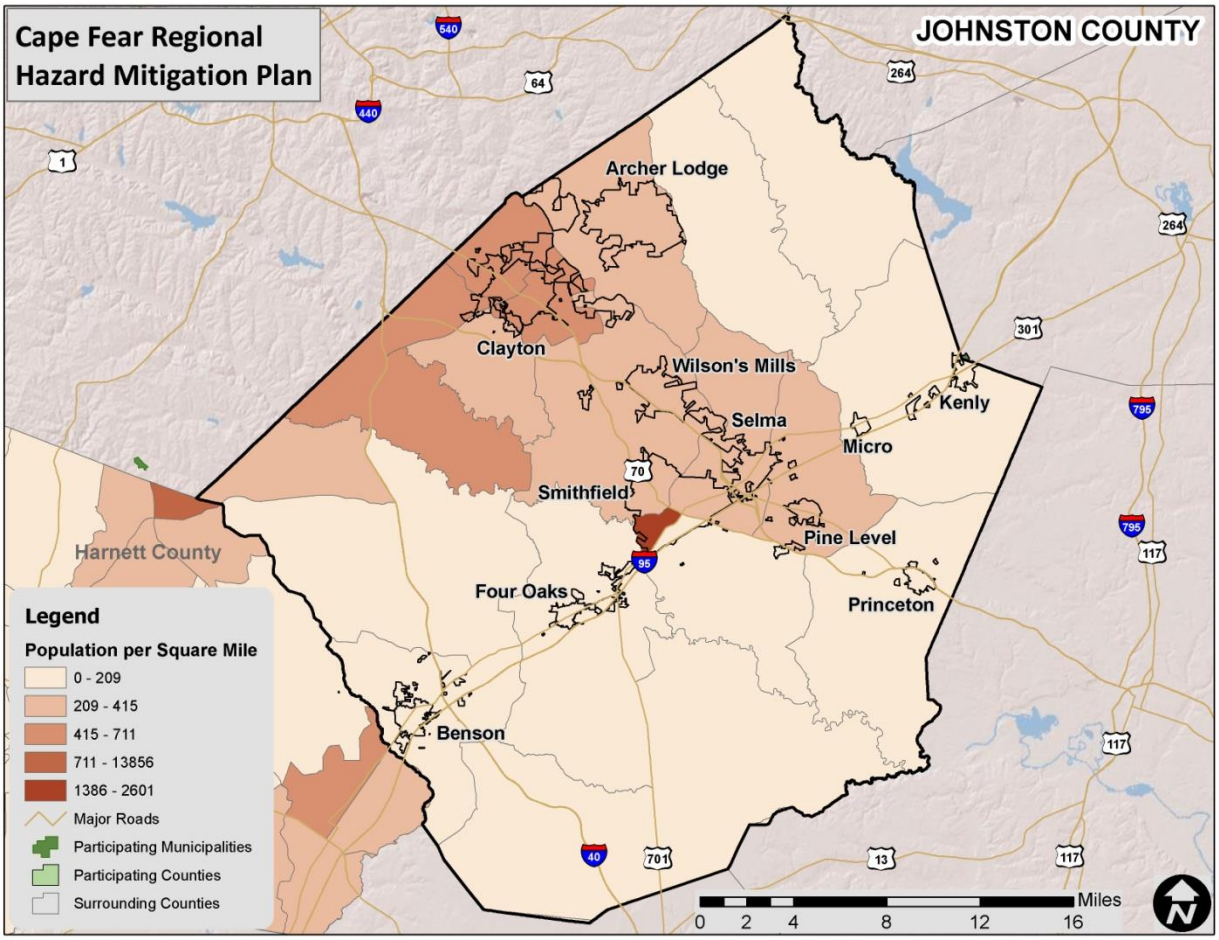
Jurisdiction	2010 Census Population
Johnston County	**168,878**
Town of Archer Lodge	4,292
Town of Benson	3,311

Jurisdiction	2010 Census Population
Town of Clayton	16,116
Town of Four Oaks	1,921
Town of Kenly	1,339
Town of Micro	441
Town of Pine Level	1,700
Town of Princeton	1,194
Town of Selma	6,073
Town of Smithfield	10,966
Town of Wilson's Mills	2,277

Source: United States Census 2010

In addition, **Figure C.25** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE C.25: POPULATION DENSITY IN JOHNSTON COUNTY



Source: United States Census Bureau, 2010

C.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans was approved (in 2011), Johnston County has experienced some growth and development. **Table C.36** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE C.36: BUILDING COUNTS FOR JOHNSTON COUNTY

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Archer Lodge	1,540	0	0.0%
Benson	1,599	0	0.0%
Clayton	6,657	0	0.0%
Four Oaks	907	0	0.0%
Kenly	736	0	0.0%
Micro	222	5	2.3%
Pine Level	793	0	0.0%
Princeton	572	0	0.0%
Selma	2,719	0	0.0%
Smithfield	4,970	0	0.0%
Wilson's Mills	873	0	0.0%
Unincorporated Area	45,947	348	0.8%
JOHNSTON COUNTY TOTAL	**67,535**	**353**	**0.5%**

Source: United States Census Bureau

Table C.37 shows population growth estimates for the county from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE C.37: POPULATION GROWTH FOR JOHNSTON COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Archer Lodge	4,290	4,378	4,435	4,516	5.3%
Benson	3,322	3,381	3,422	3,484	4.9%
Clayton	16,206	16,642	17,058	17,694	9.2%
Four Oaks	1,929	1,959	1,969	2,005	3.9%
Kenly	1,345	1,366	1,381	1,400	4.1%
Micro	442	451	457	464	5.0%
Pine Level	1,708	1,739	1,758	1,787	4.6%
Princeton	1,198	1,222	1,236	1,252	4.5%
Selma	6,089	6,152	6,189	6,237	2.4%
Smithfield	11,011	11,220	11,356	11,560	5.0%
Wilson's Mills	2,287	2,326	2,348	2,386	4.3%
Unincorporated Area	119,786	121,911	123,192	125,182	4.5%
JOHNSTON COUNTY TOTAL	**169,613**	**172,747**	**174,801**	**177,967**	**4.9%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the county since 2010. However, unincorporated Micro has experienced a slightly higher rate of development compared to the rest of the Cape Fear Region, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. Additionally, there has been a slightly higher ratesof population growth in Clayton. Since the population has increased in this municipality, there are now greater numbers of people exposed to the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been a slight increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, or primary and secondary TRI site buffers.

C.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Johnston County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total county exposure, and thus risk, was presented in **Table C.33**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table C.48.**

The hazards presented in this section include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

Hurricane and Tropical Storm

Historical evidence indicates that Johnston County has a significant risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section C.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table C.38.** Only losses to buildings, contents, and inventory are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE C.38: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Johnston County	$2,339,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table C.39.**

TABLE C.39: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Archer Lodge	77.7	87.1	104.4	111.0
Benson	80.8	90.1	109.2	116.0
Clayton	79.0	88.3	106.1	113.2
Four Oaks	80.8	90.3	108.8	115.5
Kenly	80.7	89.8	107.5	113.6
Micro	81.2	90.5	108.1	114.9
Pine Level	81.7	91.0	109.4	115.7
Princeton	83.2	92.4	110.2	116.2
Selma	81.2	90.5	108.1	114.9
Smithfield	81.7	91.0	109.4	115.7
Wilson's Mills	79.0	88.3	106.1	113.2
Unincorporated Area	77.7	87.1	110.8	117.4
MAXIMUM WIND SPEED REPORTED	**83.2**	**92.4**	**110.8**	**117.4**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Johnston County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Johnston County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Johnston County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table C.40** summarizes the findings.

TABLE C.40: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Johnston County	$20,000

Source: Hazus-MH 2.1

Social Vulnerability
It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table C.49**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Johnston County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Johnston County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section C.2.10), county level tax parcel data, and GIS analysis. **Table C.41** presents the potential at-risk property where available. All areas of Johnston County are identified low incidence areas by the USGS landslide data. All areas are also of low landslide susceptibility. Since no areas of high incidence were identified, the moderate incidence level was used to identify different areas of concern for the analysis below.

TABLE C.41: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Archer Lodge	0	0	$0
Benson	0	0	$0
Clayton	0	0	$0
Four Oaks	0	0	$0
Kenly	0	0	$0
Micro	0	0	$0
Pine Level	0	0	$0
Princeton	0	0	$0
Selma	0	0	$0
Smithfield	0	0	$0
Wilson's Mills	0	0	$0

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Unincorporated Area	0	0	$0
JOHNSTON COUNTY TOTAL	**0**	**0**	**$0**

Source: U.S. Geological Survey

Social Vulnerability
Given low susceptibility across the northwestern portion of the county, it is assumed that the total population is at low risk.

Critical Facilities
All critical facilities are located in a low susceptibility area. All facilities in Johnston County are also located in a low incidence area. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a landslide has low potential to impact the existing and future buildings, facilities, and populations in Johnston County, though some areas may be at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Johnston County is susceptible to flood events. A total of 34 flood events have been reported by the National Climatic Data Center resulting in nearly $46,000 in damages. Therefore, it is difficult to calculate a reliable annualized loss figure. On an annualized level, these damages amount to $2,293.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table C.42** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE C.42: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Archer Lodge	42	2	$3,039,260	0	0	$0
Benson	4	1	$51,270	0	0	$0
Clayton	213	20	$58,841,010	68	34	$10,496,010
Four Oaks	29	3	$1,501,390	23	4	$2,645,850
Kenly	0	0	$0	0	0	$0

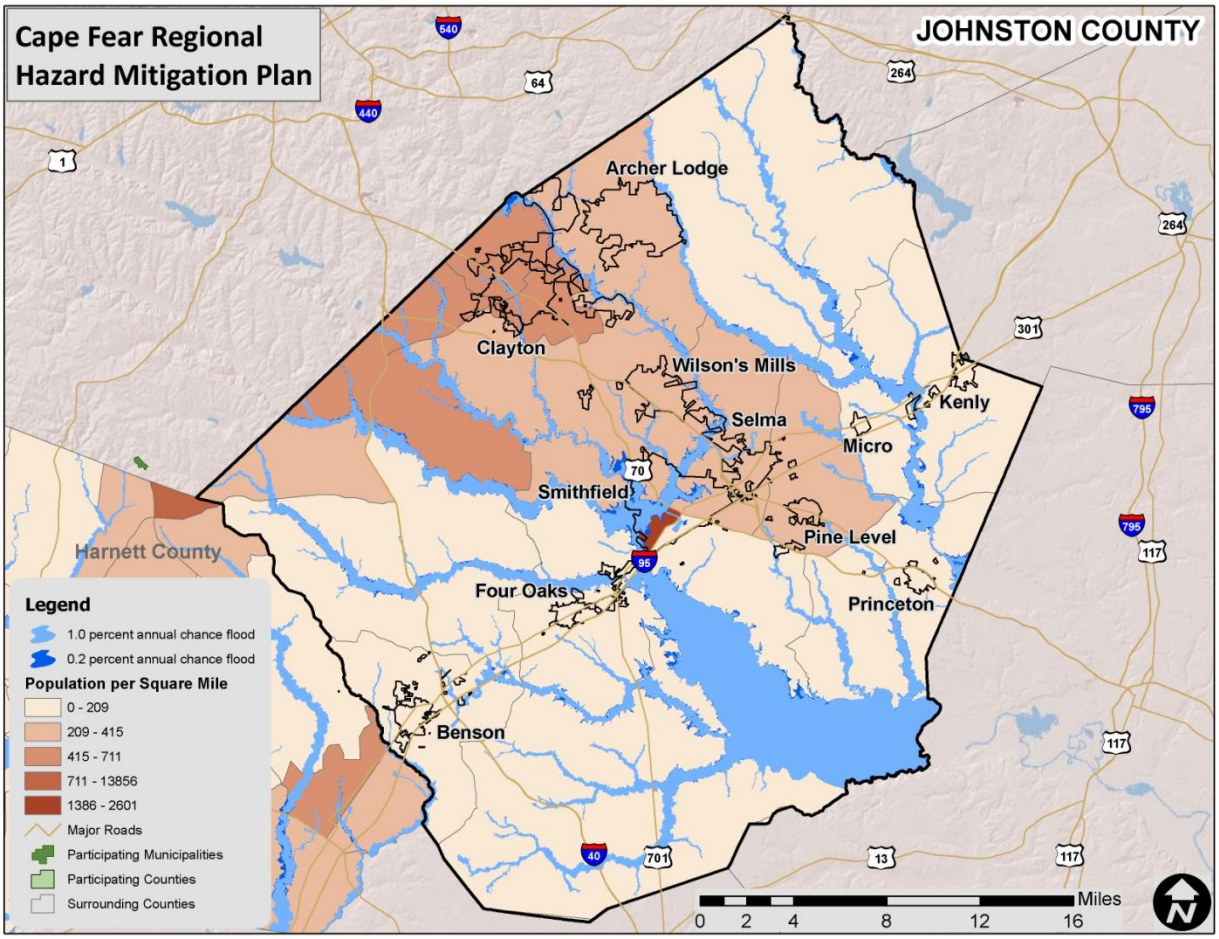
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Micro	1	0	$0	0	0	$0
Pine Level	1	0	$31,870	0	0	$0
Princeton	1	0	$120,110	0	0	$0
Selma	23	2	$1,070,130	0	0	$0
Smithfield	609	287	$105,484,330	272	178	$34,648,500
Wilson's Mills	14	1	$536,410	0	0	$0
Unincorporated Area	6,449	604	$450,308,610	422	237	$40,634,180
JOHNSTON COUNTY TOTAL	**7,386**	**920**	**$620,984,390**	**785**	**453**	**$88,424,540**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure C.26** is presented to gain a better understanding of at risk population.

FIGURE C.26 : POPULATION DENSITY NEAR FLOODPLAINS IN JOHNSTON COUNTY



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

In Johnston County there are five facilities located in the 1.0 percent annual chance floodplain including two adult care facilities, two town-owned buildings, and a school. There are also two facilities located in the 0.2 percent annual chance floodplain: Smithfield Operation Center and Meadowview Assisted Living Center. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Johnston County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

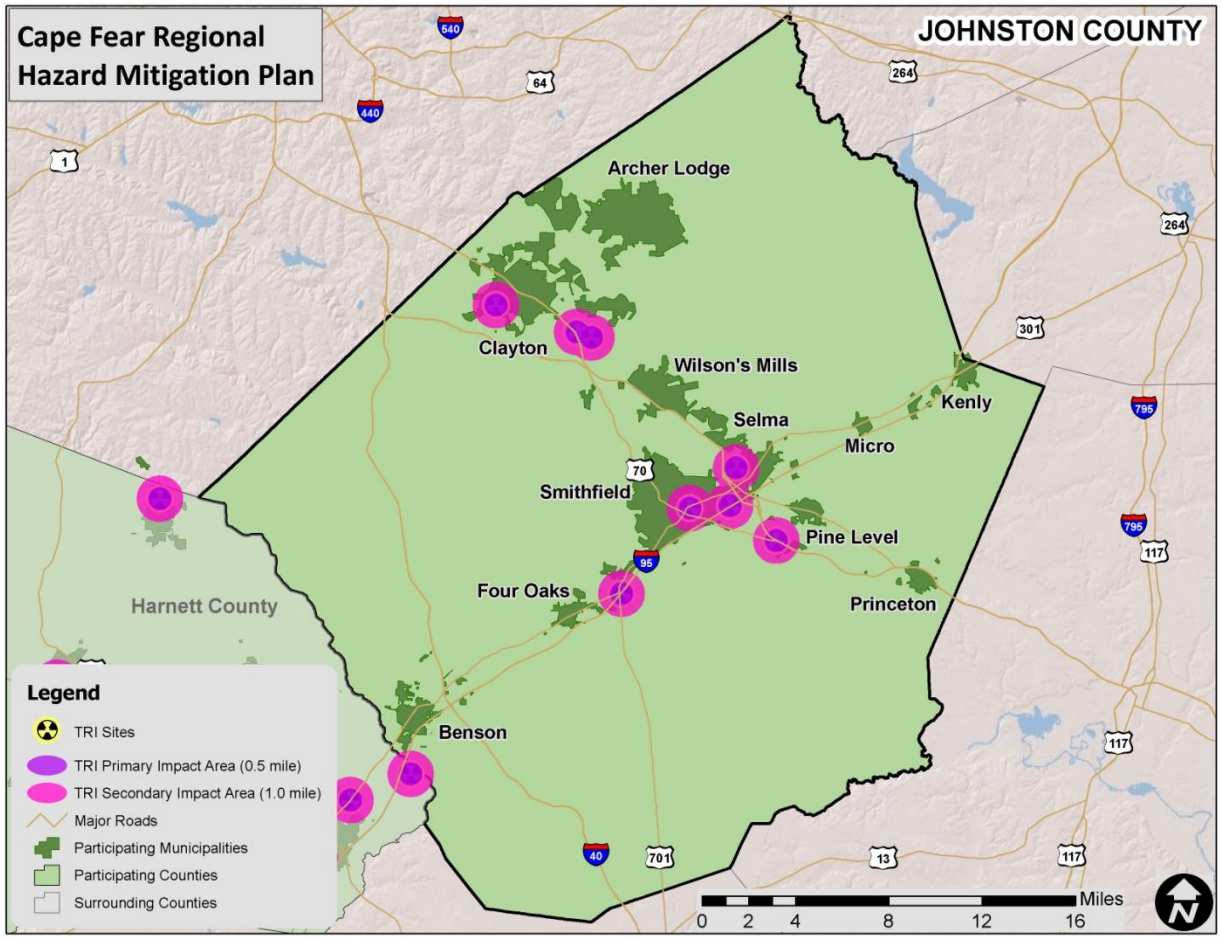
Historical evidence indicates that Johnston County is susceptible to hazardous materials events. A total of 76 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration resulting in approximately $23,000 in property damages, 2 fatalities, and 2 injuries. On an annualized level, these damages amount to $858 for Johnston County.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[22] In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Johnston County, along with buffers, were used for analysis as shown in **Figure C.27.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure C.28** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table C.43** (fixed sites), **Table C.44** (mobile road sites) and **Table C.45** (mobile railroad sites).[23]

[22] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

FIGURE C.27 : TRI SITES WITH BUFFERS IN JOHNSTON COUNTY



Source: Environmental Protection Agency

TABLE C.43: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Archer Lodge	0	0	$0	0	0	$0
Benson	0	0	$0	0	0	$0
Clayton	676	455	$89,812,190	2165	1492	$252,085,700
Four Oaks	47	47	$6,134,280	107	89	$13,623,180
Kenly	0	0	$0	0	0	$0
Micro	0	0	$0	0	0	$0
Pine Level	1	0	$0	33	82	$2,901,220
Princeton	0	0	$0	0	0	$0
Selma	223	205	$23,799,580	1,476	1,361	$138,515,920
Smithfield	738	642	$155,396,310	2,284	1,881	$471,013,961
Wilson's Mills	0	0	$0	0	0	$0
Unincorporated Area	494	474	$191,325,140	1,856	1,648	$361,551,130
JOHNSTON COUNTY TOTAL	**2,179**	**1,823**	**$466,467,500**	**7,921**	**6,553**	**$1,239,691,111**

FIGURE C.28 : MOBILE HAZMAT BUFFERS IN JOHNSTON COUNTY

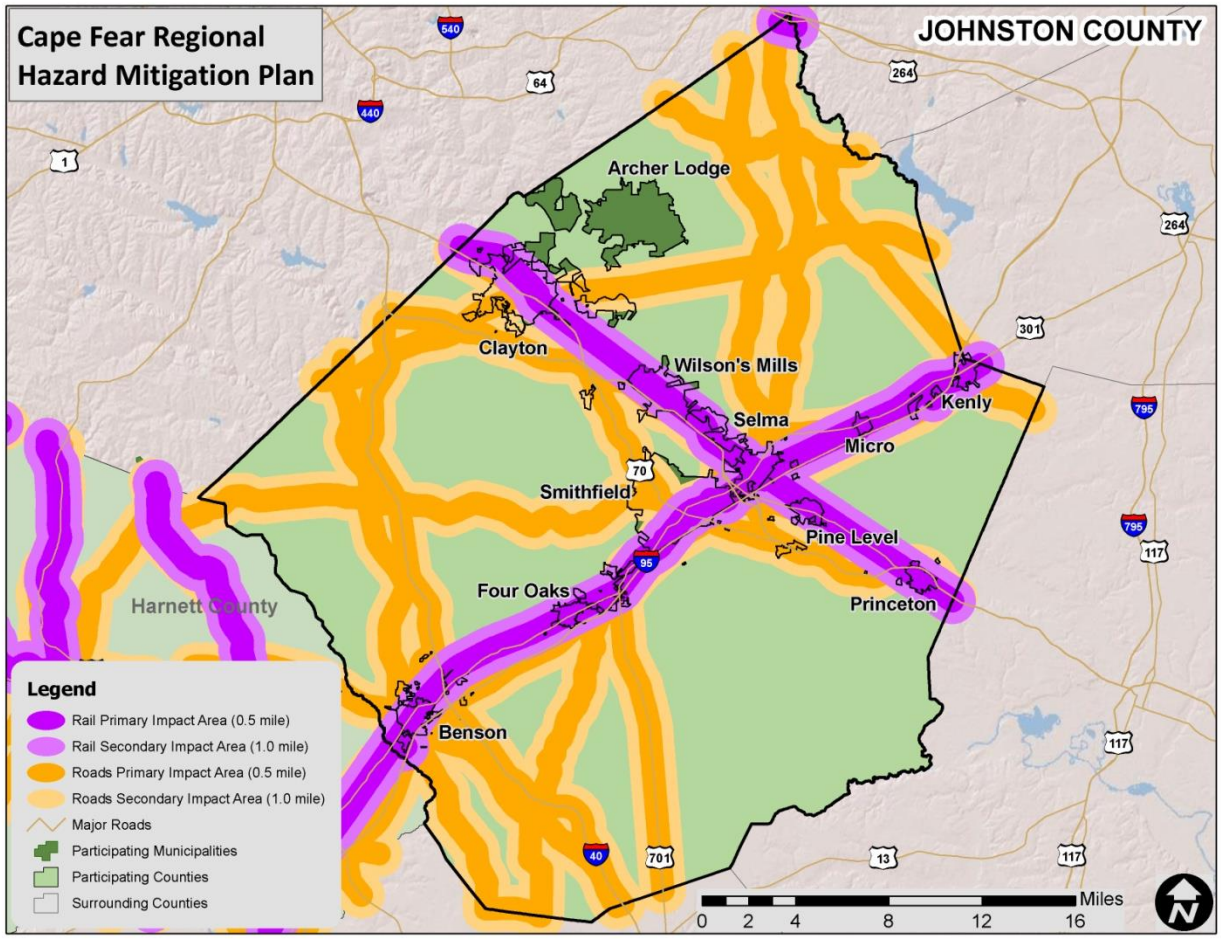


TABLE C.44: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Archer Lodge	0	0	$0	20	13	$1,164,490
Benson	1,712	1458	$178,956,673	1,712	1,458	$178,956,673
Clayton	3,534	2,712	$505,484,383	6,044	4,213	$817,554,253
Four Oaks	977	832	$85,536,644	1,131	915	$92,646,954
Kenly	741	742	$48,529,791	741	750	$48,529,791
Micro	244	254	$11,897,567	244	256	$11,897,567
Pine Level	754	808	$68,553,540	795	820	$70,814,330
Princeton	436	394	$67,521,100	707	628	$83,358,730
Selma	2,006	2,099	$186,057,540	2,311	2,506	$205,382,510
Smithfield	4,568	4,125	$704,429,091	5,208	4,763	$814,517,971
Wilson's Mills	434	377	$44,864,030	890	792	$70,463,670

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	26,954	23,640	$2,487,194,673	41,398	37,307	$3,609,118,983
JOHNSTON COUNTY TOTAL	**42,360**	**37,441**	**$4,389,025,032**	**61,201**	**54,421**	**$6,004,405,922**

TABLE C.45: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Archer Lodge	0	0	$0	0	0	$0
Benson	1,223	1,117	$123,465,933	1,628	1,382	$169,048,163
Clayton	2,353	1,840	$289,210,633	3,851	2,462	$492,544,973
Four Oaks	1,014	854	$88,689,664	1,131	915	$92,646,954
Kenly	711	692	$46,486,171	741	750	$48,529,791
Micro	239	242	$11,694,027	244	256	$11,897,567
Pine Level	618	644	$56,764,240	756	737	$67,194,450
Princeton	696	618	$80,436,730	707	626	$83,358,730
Selma	2,087	2,163	$178,150,020	2,311	2,506	$205,382,510
Smithfield	3,092	2,734	$528,934,641	4,055	3,631	$683,811,301
Wilson's Mills	792	689	$58,194,890	997	836	$73,824,230
Unincorporated Area	3,808	3,305	$488,341,260	7,616	6,940	$776,212,680
JOHNSTON COUNTY TOTAL	**16,633**	**14,898**	**$1,950,368,209**	**24,037**	**21,041**	**$2,704,451,349**

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 44 Johnston County facilities located in a HAZMAT risk zone. The primary impact zone includes 11 facilities, 1 medical care facility, 1 school, and 9 others. The remaining 33 at-risk critical facilities are in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Johnston County revealed that there are 158 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 119 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes 134 critical facilities. The remaining at-risk critical facilities are located in the secondary road buffer area. The primary railroad buffer area includes 97 critical facilities. The remaining at-risk critical facilities are located in the secondary railroad buffer. Although this is a

worst case scenario model, it indicates that many of the critical facilities in Johnston County are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Johnston County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

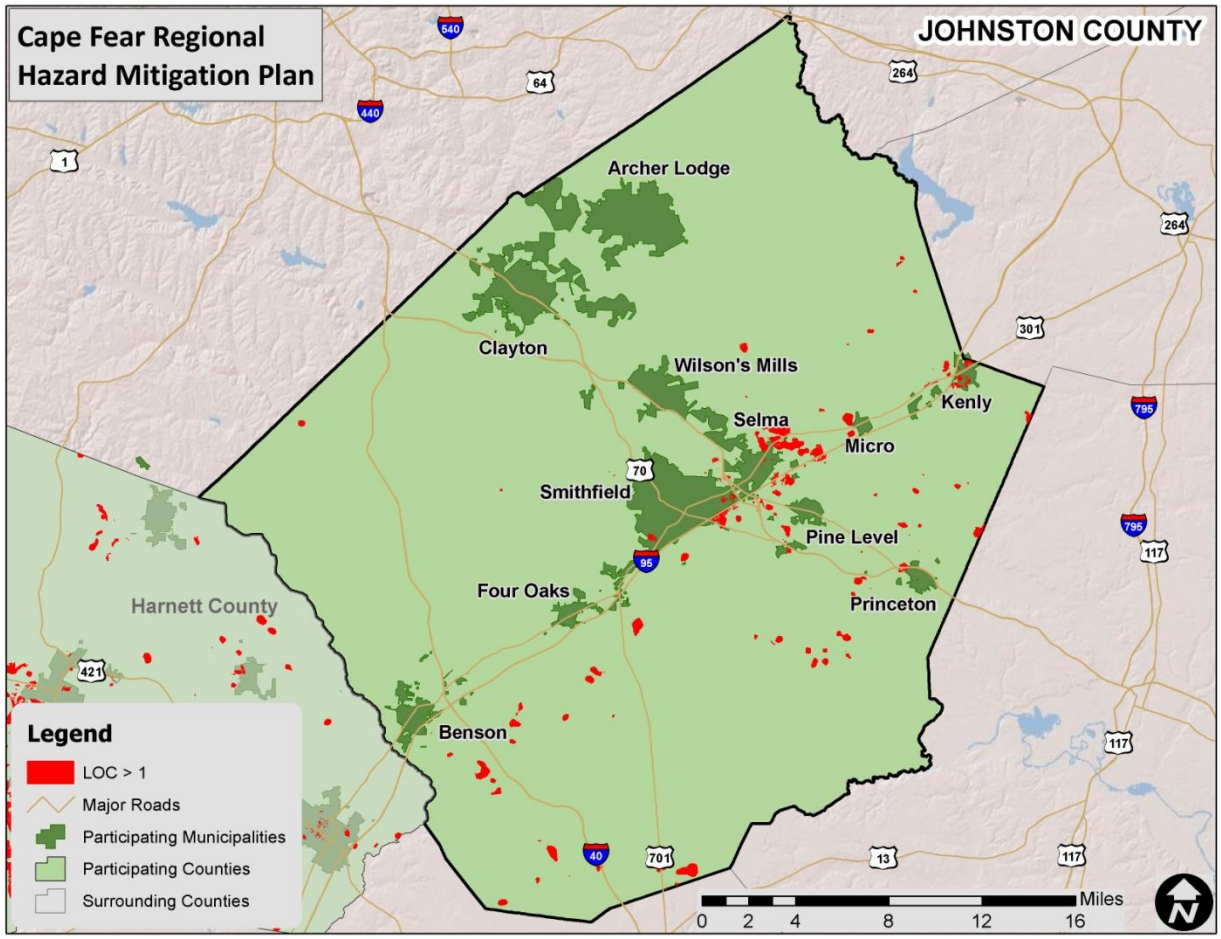
Wildfire

Although historical evidence indicates that Johnston County is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure C.29**, **Figure C.30**, **Figure C.31**, **Figure C.32**, **Figure C.33**, **Figure C.34**, **Figure C.35**, **Figure C.36**, **Figure C.37**, **Figure C.38**, **Figure C.39**, and **Figure C.40** show the Level of Concern data. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The county contains some lands where the value falls into the at-risk category, and though it has somewhat less land labeled as at-risk compared to other regions of North Carolina, the level of concern in those areas that are considered at-risk is somewhat higher than other areas of the state. Since all of this land area is on the lower fifth of the overall LOC scale, there is likely considerably less risk in the county than in other areas of the country.

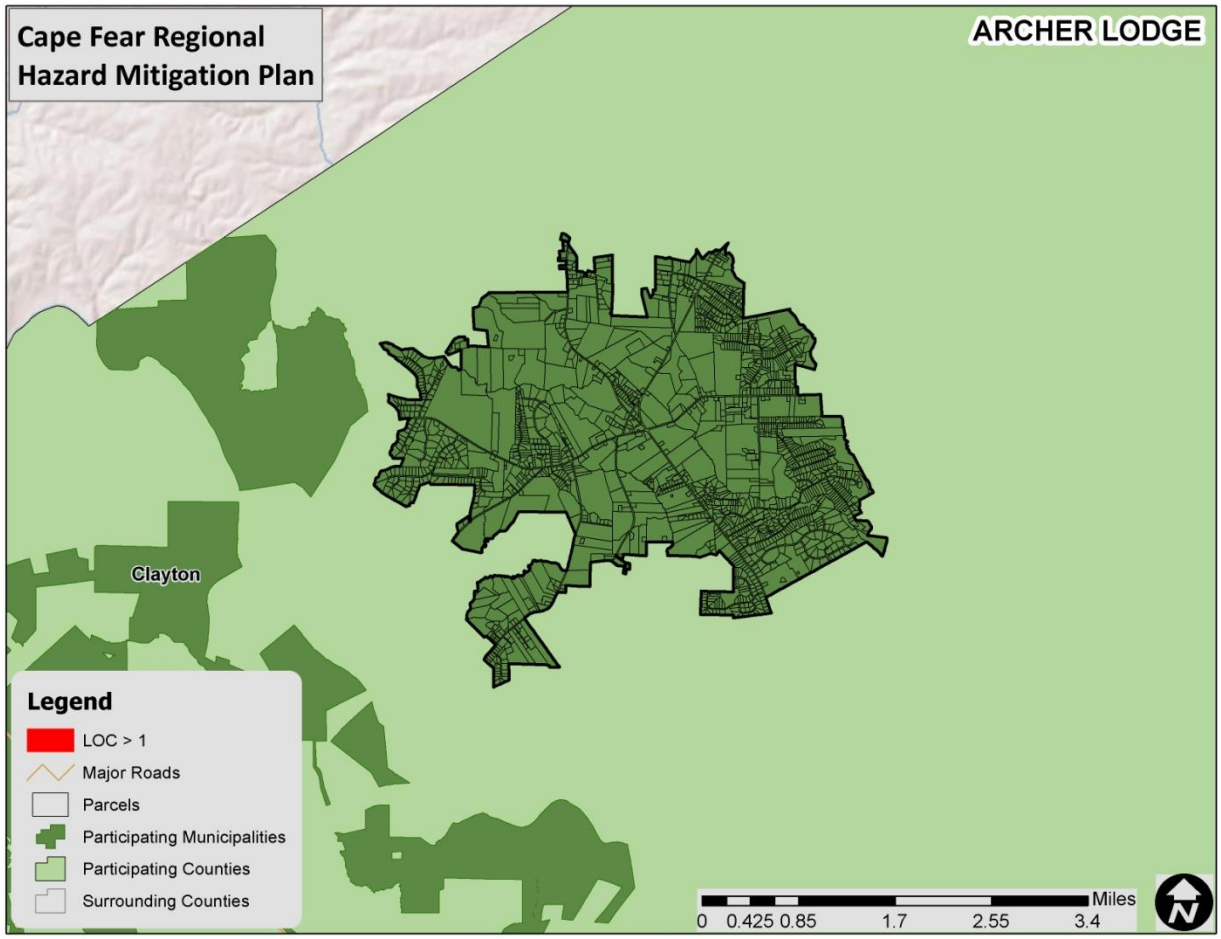
Table C.46 shows the results of the analysis.

FIGURE C.29: WILDFIRE RISK AREAS IN JOHNSTON COUNTY



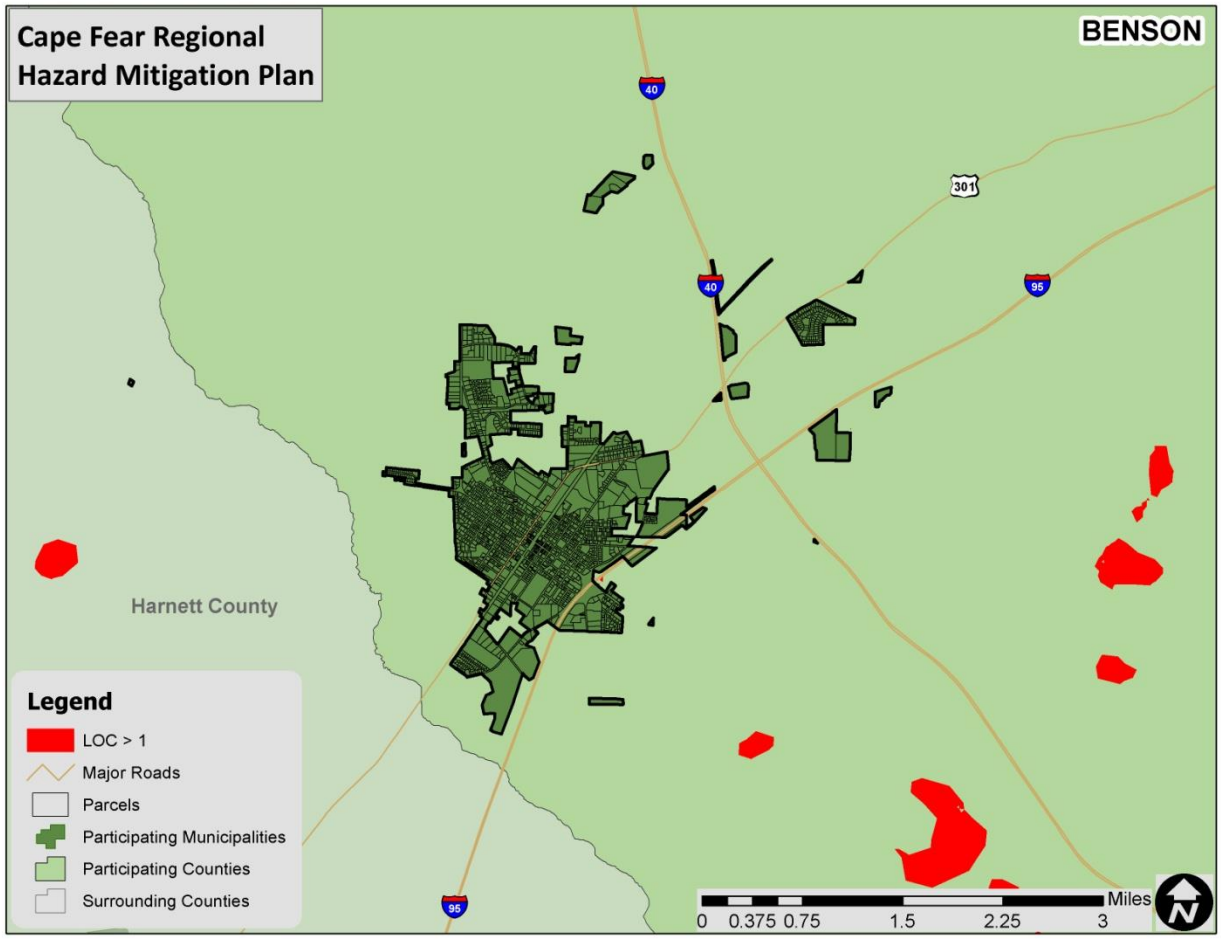
Source: Southern Wildfire Risk Assessment Data

FIGURE C.30: WILDFIRE RISK AREAS IN ARCHER LODGE



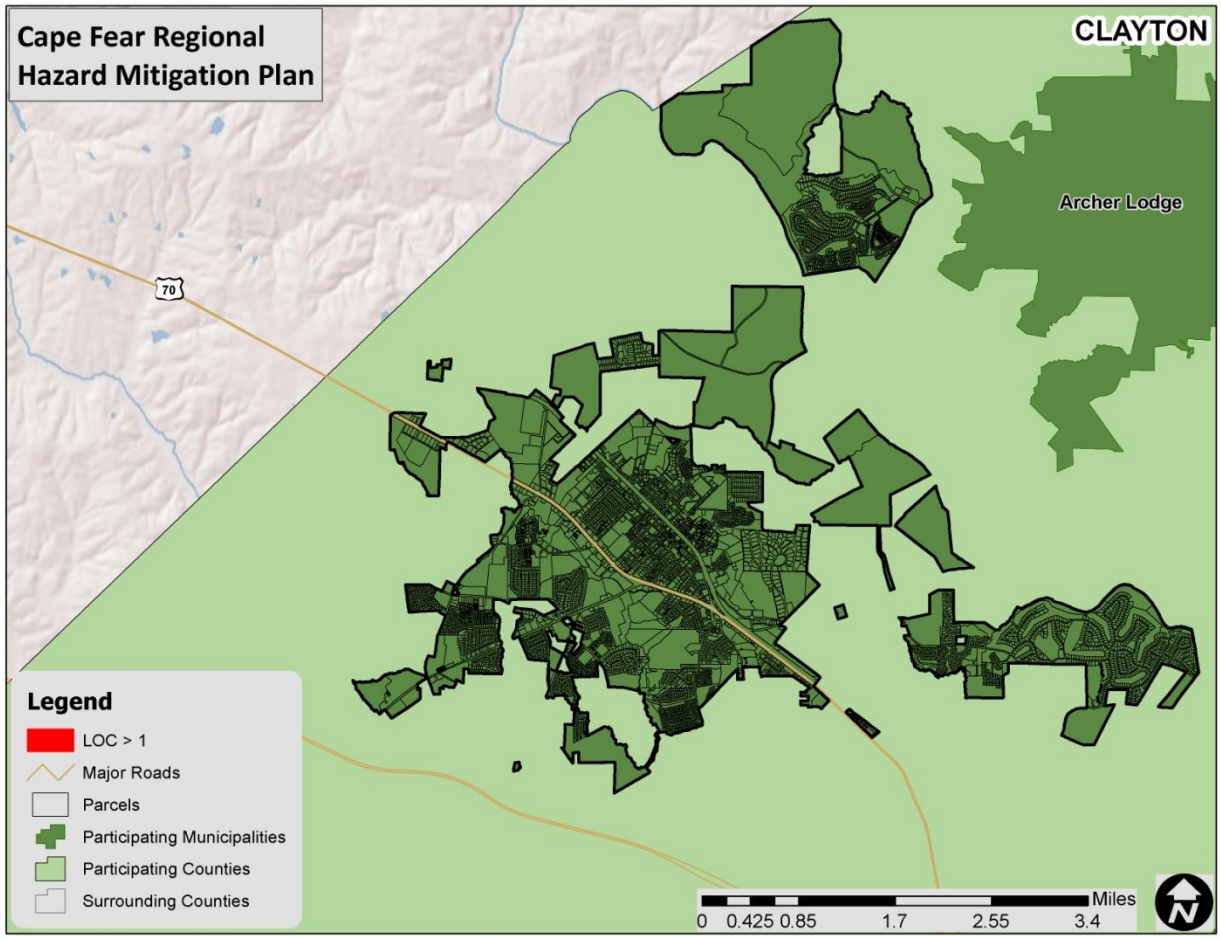
Source: Southern Wildfire Risk Assessment Data

FIGURE C.31: WILDFIRE RISK AREAS IN BENSON



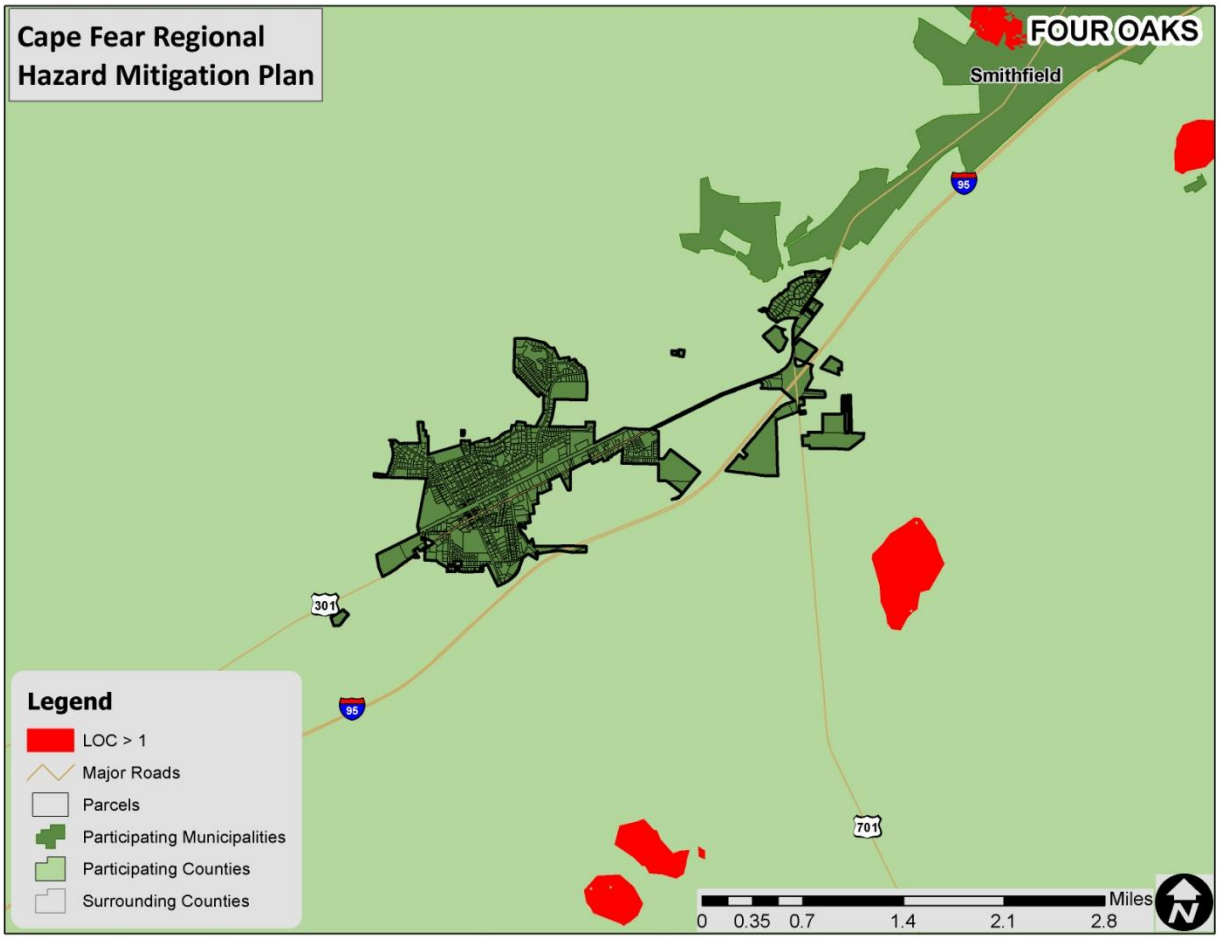
Source: Southern Wildfire Risk Assessment Data

FIGURE C.32: WILDFIRE RISK AREAS IN CLAYTON



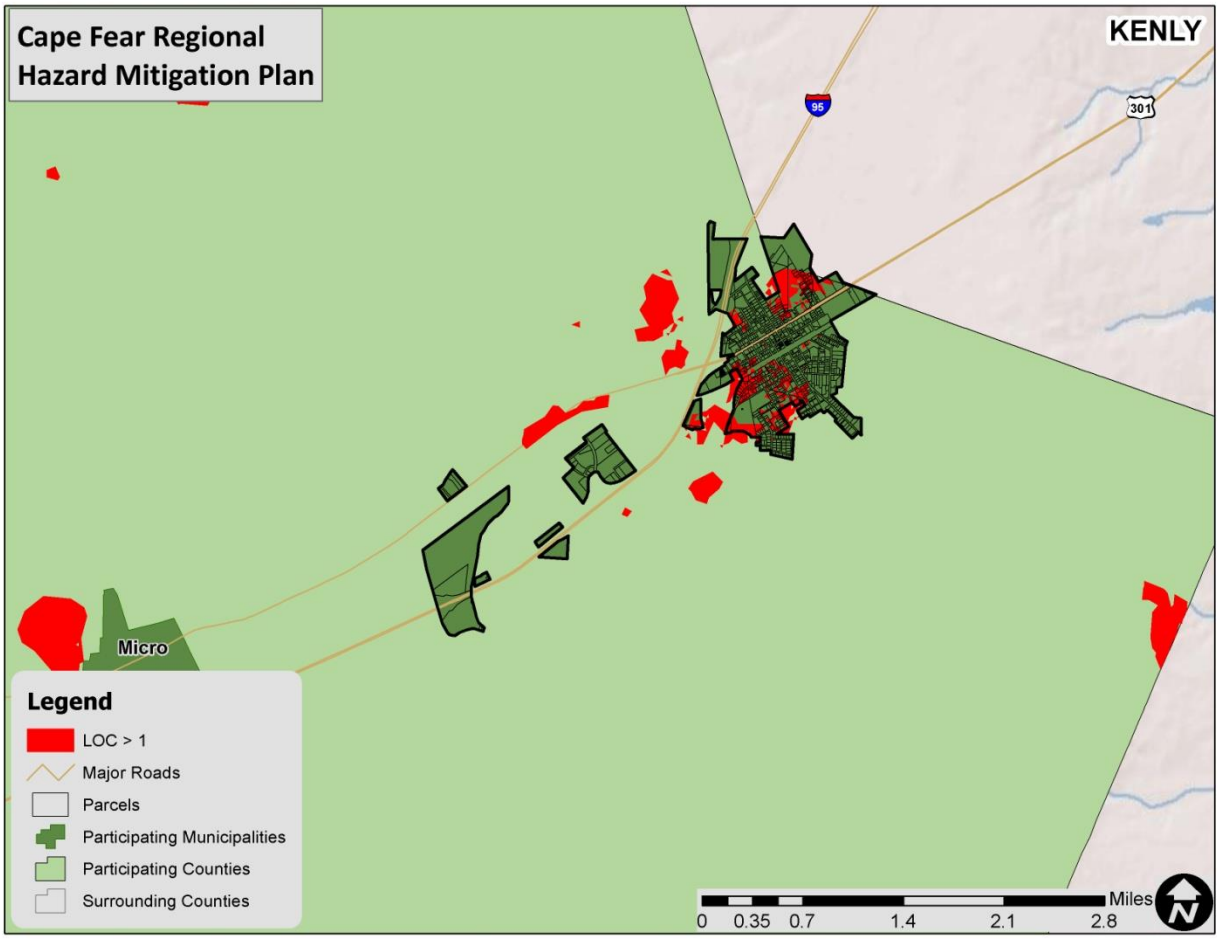
Source: Southern Wildfire Risk Assessment Data

FIGURE C.33: WILDFIRE RISK AREAS IN FOUR OAKS



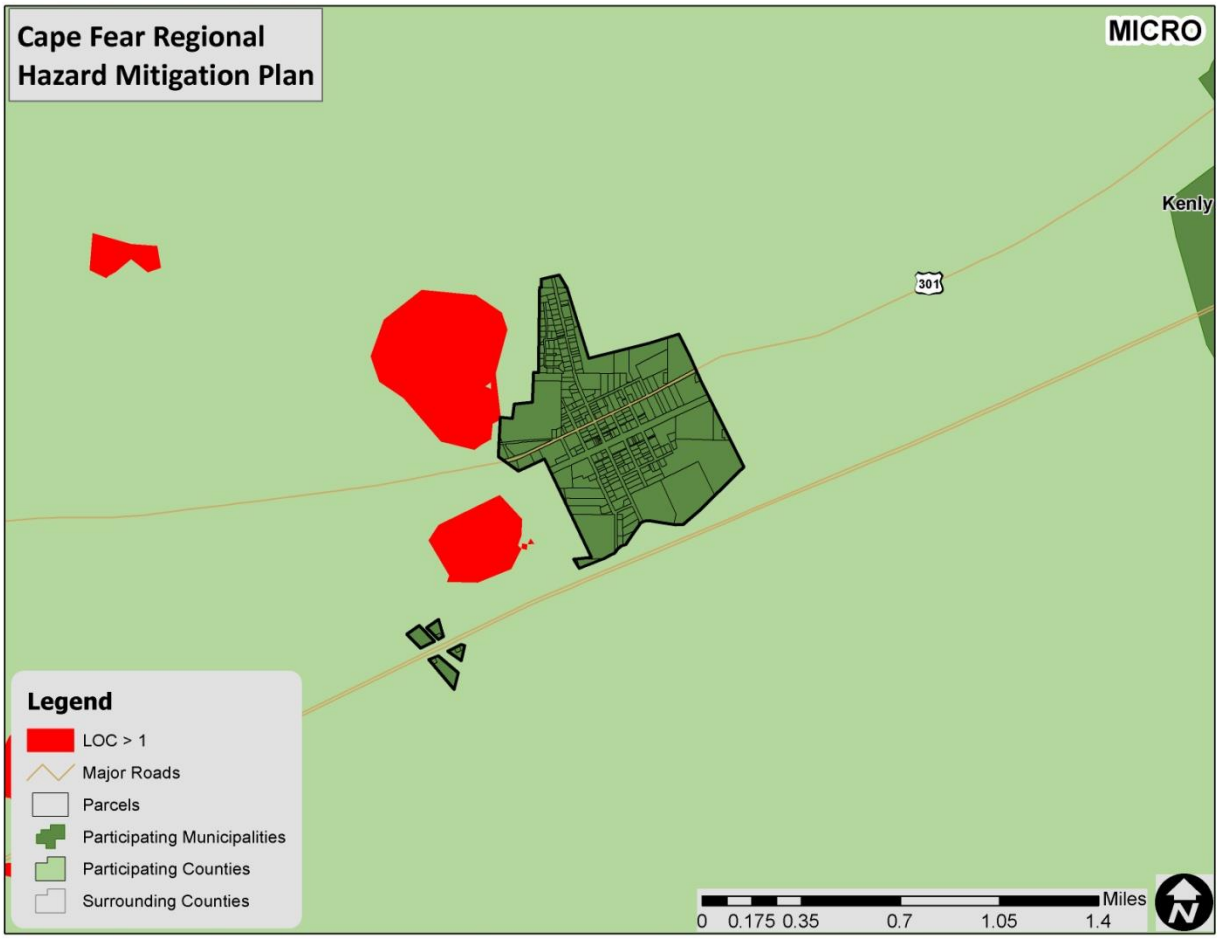
Source: Southern Wildfire Risk Assessment Data

FIGURE C.34: WILDFIRE RISK AREAS IN KENLY



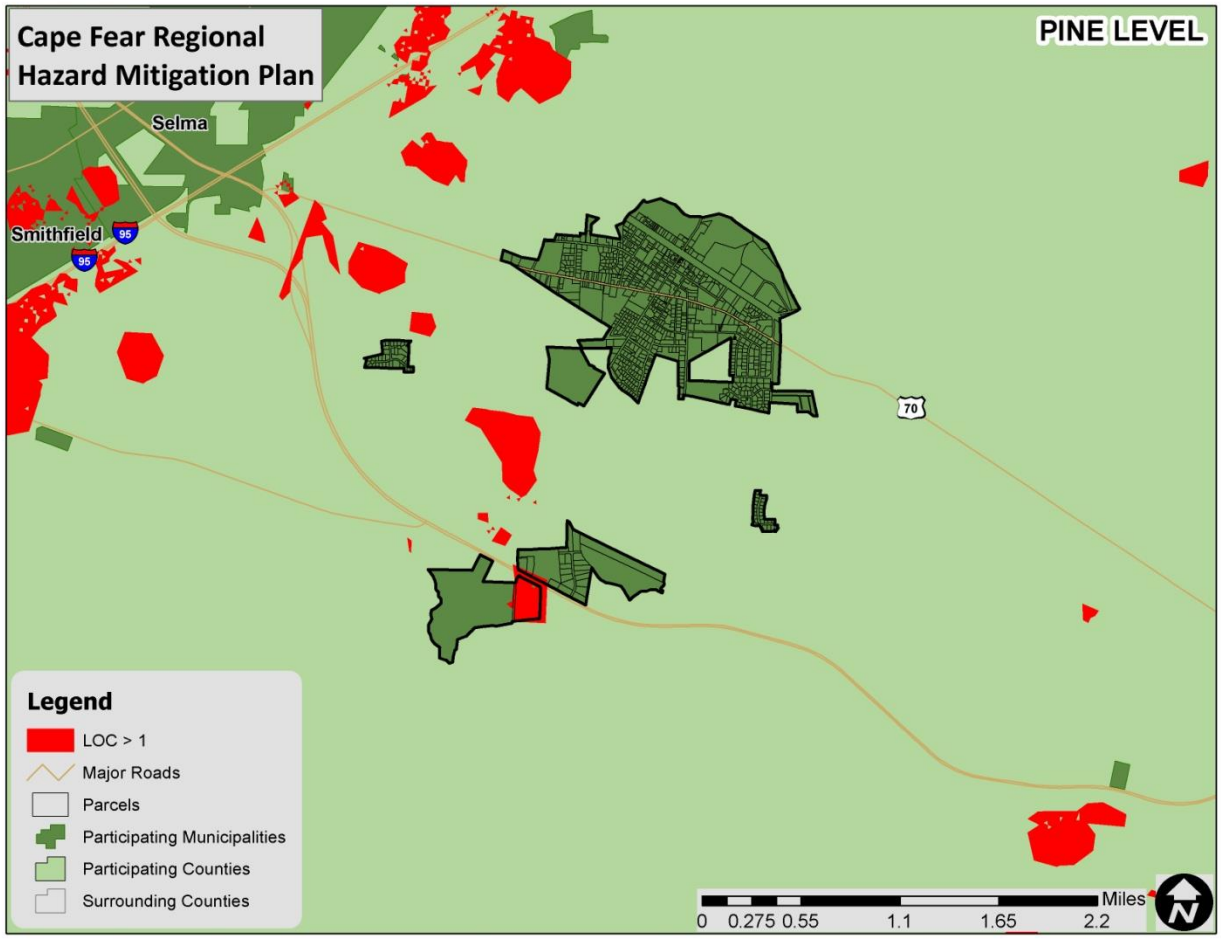
Source: Southern Wildfire Risk Assessment Data

FIGURE C.35: WILDFIRE RISK AREAS IN MICRO



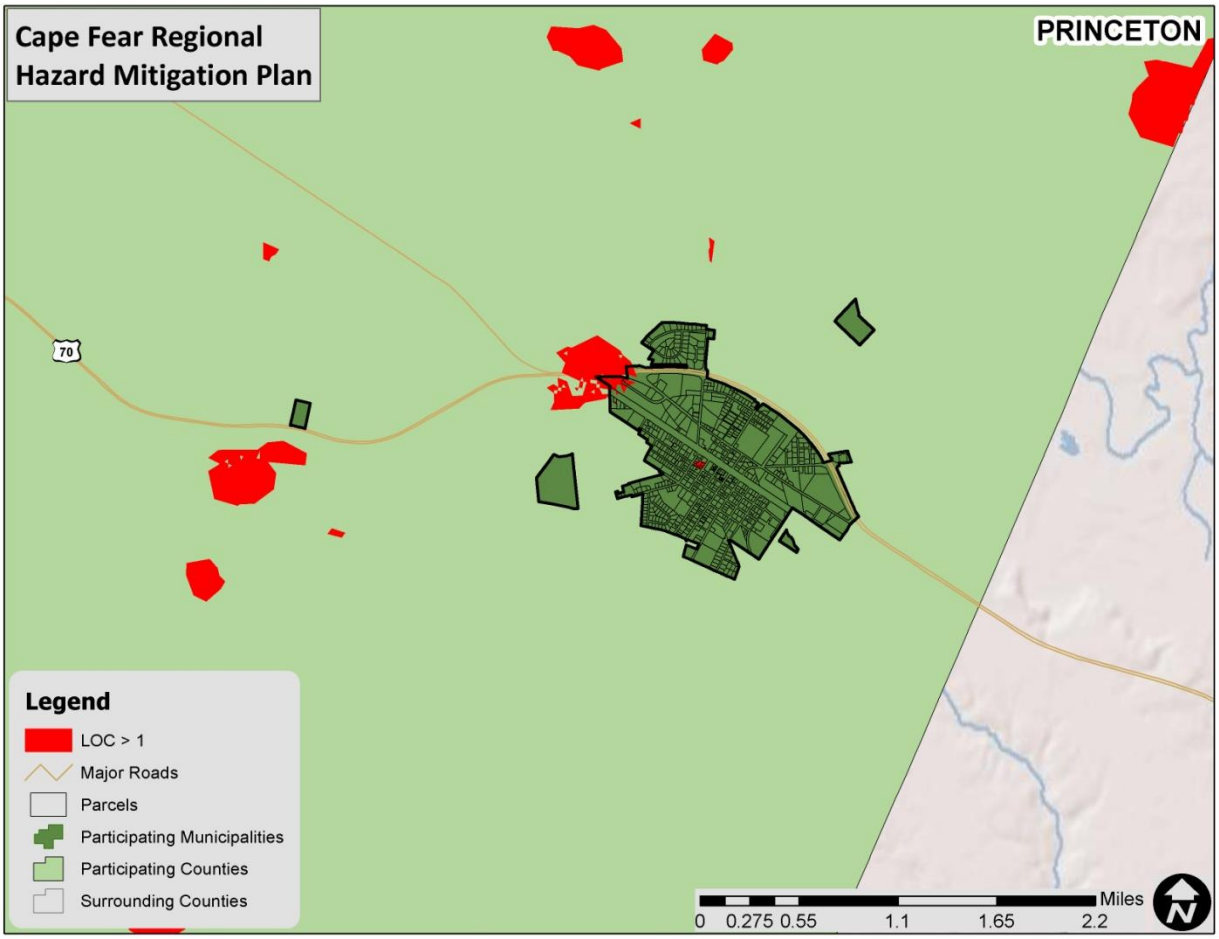
Source: Southern Wildfire Risk Assessment Data

FIGURE C.36: WILDFIRE RISK AREAS IN PINE LEVEL



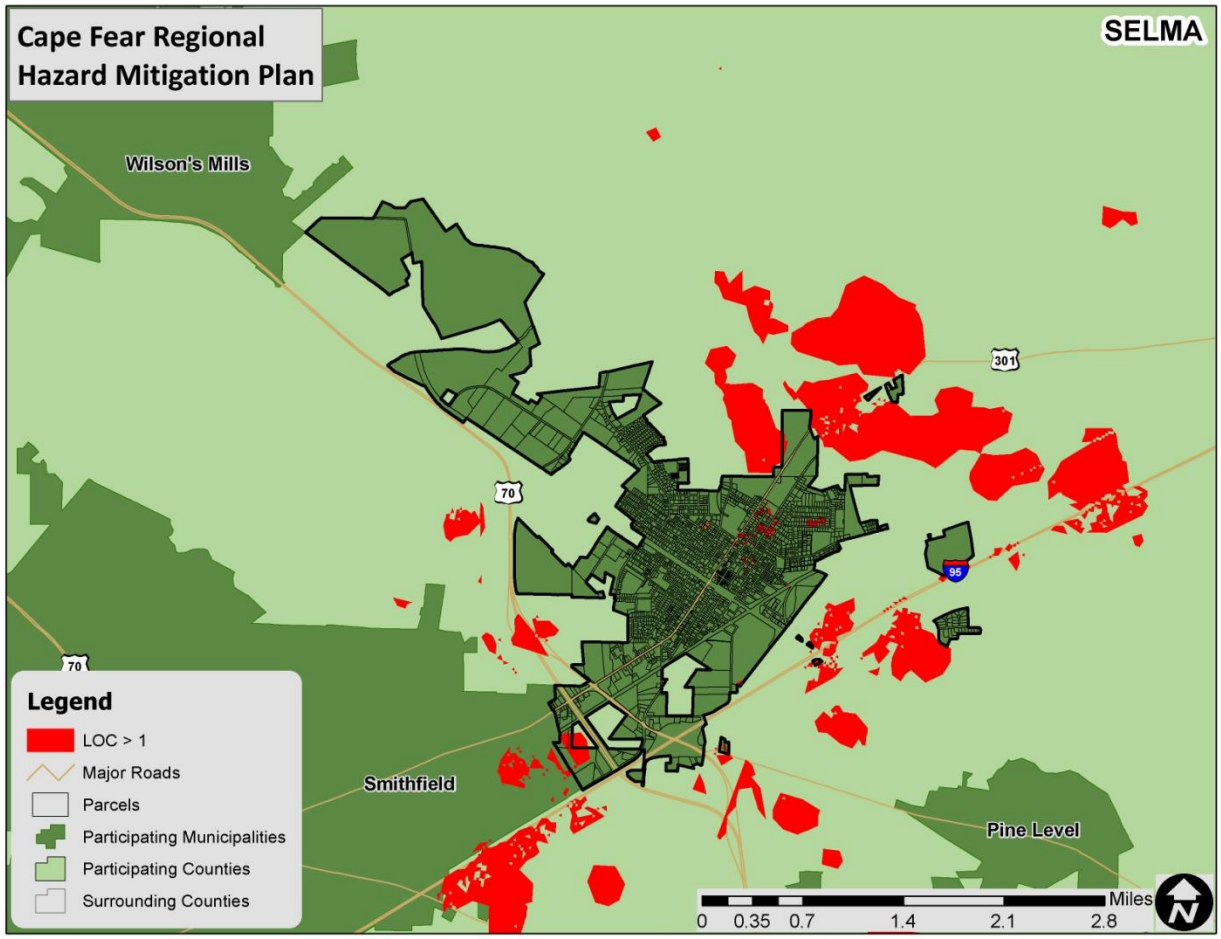
Source: Southern Wildfire Risk Assessment Data

FIGURE C.37: WILDFIRE RISK AREAS IN PRINCETON



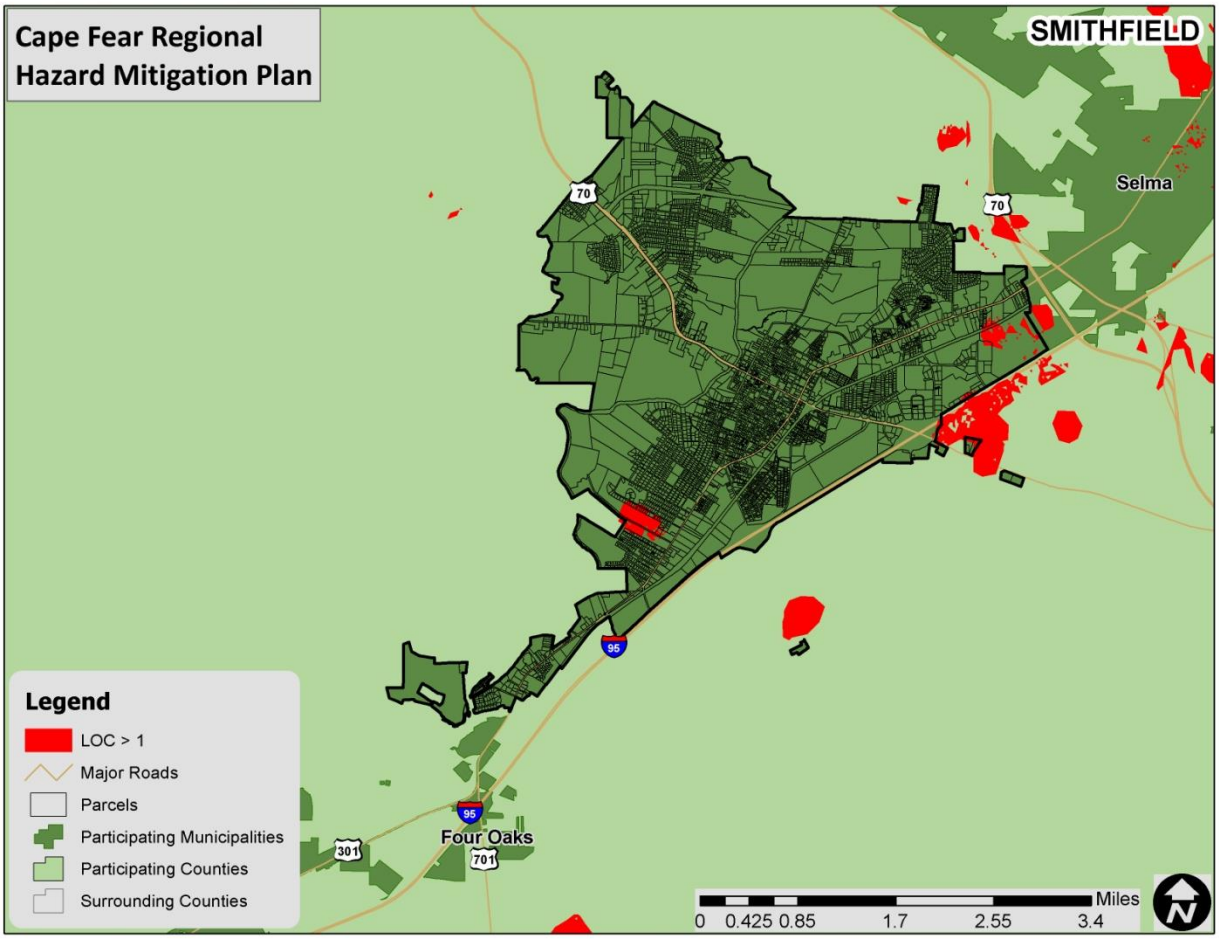
Source: Southern Wildfire Risk Assessment Data

FIGURE C.38: WILDFIRE RISK AREAS IN SELMA



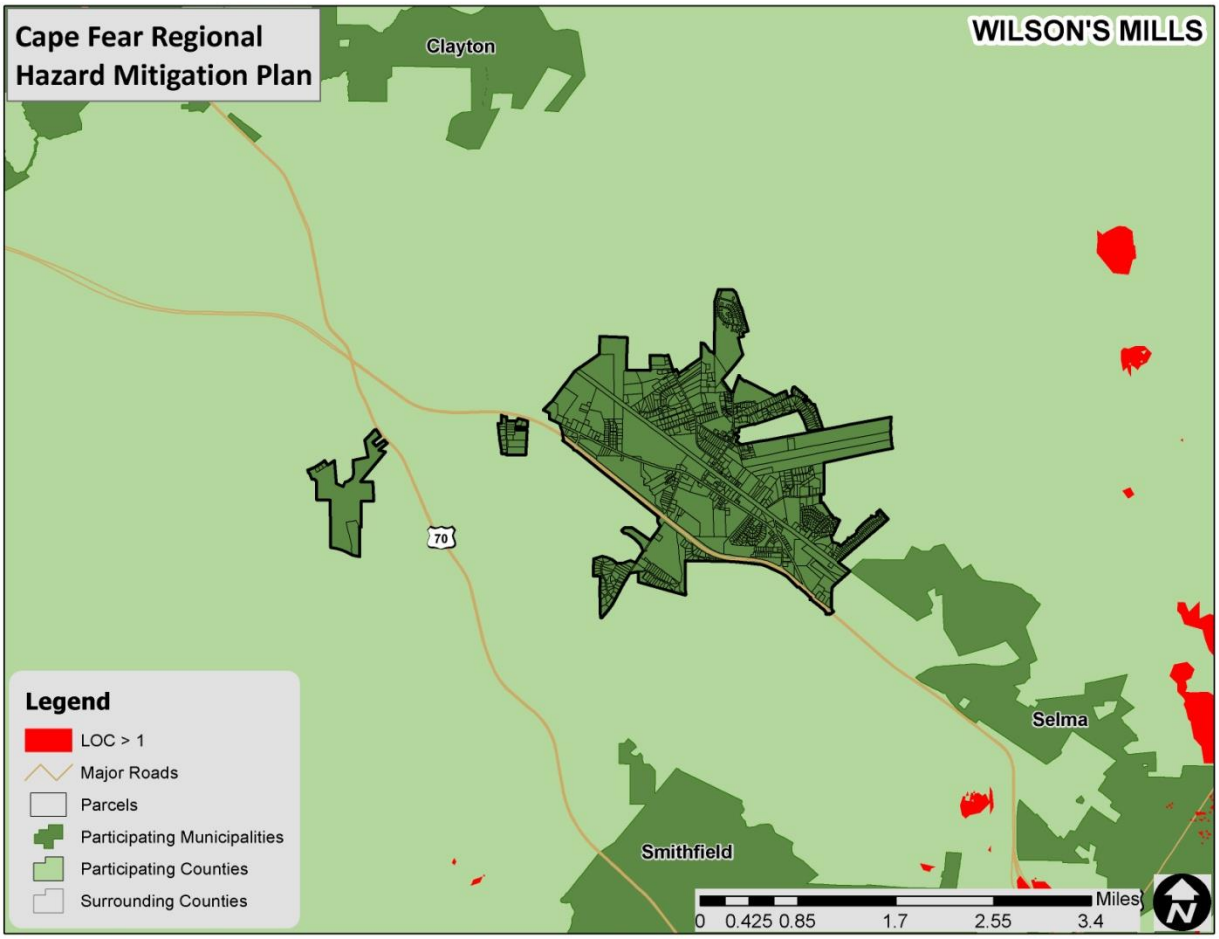
Source: Southern Wildfire Risk Assessment Data

FIGURE C.39: WILDFIRE RISK AREAS IN SMITHFIELD



Source: Southern Wildfire Risk Assessment Data

FIGURE C.40: WILDFIRE RISK AREAS IN WILSON'S MILLS



Source: Southern Wildfire Risk Assessment Data

TABLE C.46: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Archer Lodge	0	0	$0
Benson	0	0	$0
Clayton	0	0	$0
Four Oaks	1	0	$0
Kenly	264	142	$14,562,830
Micro	6	0	$7,600
Pine Level	13	13	$1,340,190
Princeton	15	5	$471,680
Selma	146	73	$48,572,760
Smithfield	70	36	$42,369,820
Wilson's Mills	0	0	$0

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Unincorporated Area	762	301	$31,356,370
JOHNSTON COUNTY TOTAL	**1,277**	**570**	**$138,681,250**

Looking at jurisdictional level, a few areas scattered across the unincorporated portion of the county face the highest level of concern areas. However, several municipalities also have some areas where the level of concern is above 1.

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in wildfire areas of concern. It should be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Johnston County.

Nuclear Accident

The location of Shearon Harris Nuclear Station west of Johnston County demonstrates that the county is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. All of Johnston County is located within one of the risk zones. **Table C.47** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE C.47: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Archer Lodge	0	0	$0	1,750	1,595	$170,585,060
Benson	0	0	$0	1,712	1,458	$178,956,673
Clayton	0	0	$0	7,504	4,762	$1,031,714,203
Four Oaks	0	0	$0	1,131	915	$92,646,954
Kenly	0	0	$0	741	750	$48,529,791
Micro	0	0	$0	244	256	$11,897,567
Pine Level	0	0	$0	795	820	$70,814,330
Princeton	0	0	$0	707	628	$83,358,730
Selma	0	0	$0	2,311	2,506	$205,382,510
Smithfield	0	0	$0	5,236	4,798	$815,559,431
Wilson's Mills	0	0	$0	1,093	895	$82,053,740
Unincorporated Area	0	0	$0	68,495	61,125	$5,816,517,259
JOHNSTON COUNTY TOTAL	**0**	**0**	**$0**	**91,719**	**80,508**	**$8,608,016,248**

Source: International Atomic Energy Agency

Social Vulnerability

Since all areas of the county are within the 50-mile buffer area, the total population is considered to be at risk to a nuclear accident.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in the 10-mile nuclear buffer area in Johnston County. However, all critical facilities in the county are located within the 50-mile nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table C.49** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in Johnston County. All structures in the county are at some risk given that they are all located within the 50-mile buffer area.

Conclusions on Hazard Vulnerability

Table C.48 presents a summary of annualized loss for each hazard in Johnston County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

[24] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[25] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

TABLE C.48: ANNUALIZED LOSS FOR JOHNSTON COUNTY

Event	Johnston County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	$70,609
Hurricane & Tropical Storm	$2,339,000
Lightning	$40,508
Severe Thunderstorm / High Wind	$26,524
Tornado	$4,492,630
Winter Storm & Freeze	$40,624
Geologic Hazards	
Earthquake	$20,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$2,293
Other Hazards	
HAZMAT Incident	$858
Wildfire	Negligible
Nuclear Accident	Negligible
Terror Threat	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme temperature, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table C.49** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE C.49: AT-RISK CRITICAL FACILITIES IN JOHNSTON COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
JOHNSTON COUNTY																							
Bentonville Fire Department	Fire Station	X	X	X	X	X	X	X	X	X													X
Cleveland Fire Department Inc	Fire Station	X	X	X	X	X	X	X	X	X								X					X
Elevation Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
50-210 Community Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
50-210 Community Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X													X
Wilson Mills Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X													X
Corinth-Holder Vol Fire Dept	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Autumn Care #1	Other	X	X	X	X	X	X	X	X	X								X					X
Autumn Wind Rest Home & Retirem	Other	X	X	X	X	X	X	X	X	X							X	X					X
Mclamb's Rest Home #1	Other	X	X	X	X	X	X	X	X	X							X	X					X
Oasis Of Four Oaks Rest Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Progressive Care	Other	X	X	X	X	X	X	X	X	X													X
Hester's Family Care	Other	X	X	X	X	X	X	X	X	X													X
Autumn Care #2	Other	X	X	X	X	X	X	X	X	X								X					X
Autumn Care #3	Other	X	X	X	X	X	X	X	X	X								X					X
Mclamb's Rest Home #2	Other	X	X	X	X	X	X	X	X	X							X	X					X
Landfill	Other	X	X	X	X	X	X	X	X	X							X	X					X
Johnston County Airport Authority	Other	X	X	X	X	X	X	X	X	X								X					X
Johnston County Livestock Arena	Other	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER									
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Johnston County Garage	Other	X	X	X	X	X	X	X	X	X								X					X
Johnston County Landfill	Other	X	X	X	X	X	X	X	X	X								X					X
North Johnston High	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Meadow Elementary	School	X	X	X	X	X	X	X	X	X							X	X					X
Glendale-Kenly Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
South Johnston High	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Mcgee's Crossroads Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
East Clayton Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Cleveland Elementary	School	X	X	X	X	X	X	X	X	X													X
Cleveland Middle	School	X	X	X	X	X	X	X	X	X													X
Corinth-Holders School	School	X	X	X	X	X	X	X	X	X							X	X					X
Polenta Elementary	School	X	X	X	X	X	X	X	X	X													X
Mcgees Crossroads Middle	School	X	X	X	X	X	X	X	X	X							X	X					X
River Dell Elem	School	X	X	X	X	X	X	X	X	X								X					X
West Johnston High	School	X	X	X	X	X	X	X	X	X								X					X
West Smithfield Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Dixon Road Elem	School	X	X	X	X	X	X	X	X	X								X					X
West View Elem	School	X	X	X	X	X	X	X	X	X							X	X					X
Corinth Holders High	School	X	X	X	X	X	X	X	X	X													X
Cleveland High	School	X	X	X	X	X	X	X	X	X													X
Archer Lodge Town Hall	Other	X	X	X	X	X	X	X	X	X													X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Archer Lodge Middle	School	X	X	X	X	X	X	X	X	X													X
Oasis Of Benson Rest Home(1 - 6	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Liberty Commons	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Mary Duncan Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Benson Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Benson Elementary	School	X	X	X	X	X	X	X	X	X							X	X					X
Benson Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Johnston Health Clayton	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X					X
Brian Center	Other	X	X	X	X	X	X	X	X	X						X	X	X					X
Front Street Family Care	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Diversicare AL Of Clayton	Other	X	X	X	X	X	X	X	X	X						X	X	X					X
Hocutt-Ellington Memorial Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton Operations Center	Other	X	X	X	X	X	X	X	X	X					X	X	X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Town Of Clayton Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Clayton High	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
West Clayton Elem	School	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Cooper Elementary	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Riverwood Elementary	School	X	X	X	X	X	X	X	X	X													X
Riverwood Middle	School	X	X	X	X	X	X	X	X	X													X
Clayton Middle	School	X	X	X	X	X	X	X	X	X					X	X	X	X					X
Powhatan Elem	School	X	X	X	X	X	X	X	X	X													X
Four Oaks Rescue Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Johnston County Group Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Jame Bryan Creech Public Library	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Smithfield Post Office 2	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Four Oaks Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Four Oaks Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Four Oaks Elementary	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Four Oaks Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Volunteer Fire Depart	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Village Association	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
College Court Apartments	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Kenly Maintenance/Storage Facility	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Kenly Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Volunteer Fire Dept Inc	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Hilmont Village	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Public Works Department	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro Town Dump	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
North Johnston Middle	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pine Level Public Works	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Town Of Pine Level Police	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Micro-Pine Level Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Volunteer Fire	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Senior Center	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Princeton Public Library	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Princeton Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Maintenance Building	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Princeton Parking Garage	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Ms_Hs	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Princeton Elem	School	X	X	X	X	X	X	X	X	X								X		X			X
Selma Public Library	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Post Office	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Housing Authority	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Selma Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Selma Public Works	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Town Of Selma Police	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Selma Middle School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Selma Elementary	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
County Of Johnston Police	Eoc	X	X	X	X	X	X	X	X	X						X	X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Johnston Medical Center	Medical Care Facility	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Diversicare AL Of Smithfield Wes	Other	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X
Classic Care #101	Other	X	X	X	X	X	X	X	X	X							X	X					X
Britthaven	Other	X	X	X	X	X	X	X	X	X								X					X
Smithfield Manor Inc.	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Council On Aging	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Meadowview Assisted Living Cente	Other	X	X	X	X	X	X	X	X	X				X			X	X					X
Carolina House Of Smithfield	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Pine Knoll Manor #2	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pine Knoll Manor #1	Other	X	X	X	X	X	X	X	X	X							X	X					X
Greenwood Group Home	Other	X	X	X	X	X	X	X	X	X			X				X	X					X
Laurel Woods Group Home	Other	X	X	X	X	X	X	X	X	X								X					X
Rha Group Home	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Public Library Of Johnston County And Smithfield	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
The Heritage Center	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Smithfield Post Office	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Housing Authority	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Smithfield Town Hall	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Johnston County Court House	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Happ	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Human Resources	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Maintenance	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Johnston County Land Use Center	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Johnston County Agricultural Building	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Johnston County Division Of Social Services	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Johnston County Health Center	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Town Of Smithfield Maintenance	Other	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X
Johnston County Animal Shelter	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Smithfield Operation Center	Other	X	X	X	X	X	X	X	X	X				X		X	X	X		X			X
Johnston Memorial Hospital	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Smithfield Parks & Rec	Other	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Town Of Smithfield Police	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Smithfield-Selma High	School	X	X	X	X	X	X	X	X	X								X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER									
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Smithfield Middle	School	X	X	X	X	X	X	X	X	X													X
South Campus Cmty	School	X	X	X	X	X	X	X	X	X			X			X	X	X		X			X
South Smithfield Elem	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Neuse Charter School	School	X	X	X	X	X	X	X	X	X								X		X			X
Board Of Education	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Operations	School	X	X	X	X	X	X	X	X	X						X	X	X		X			X
Jo Co Middle College High	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Jo Co Early Academy	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Wilson Mills Fire Department	Fire Station	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilsons Mill Post Office	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilson's Mills Town Hall	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Town Of Wilson's Mills Police	Police Station	X	X	X	X	X	X	X	X	X								X	X	X			X
Wilson's Mills Elem	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X

C.4 JOHNSTON COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Johnston County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

C.4.1 Planning and Regulatory Capability

Table C.50 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Johnston County. 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE C.50: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
JOHNSTON COUNTY	✓	✓		✓	✓			✓	✓			✓	*		✓	✓	✓			✓	✓	✓	
Archer Lodge		*		*				✓							✓	✓	✓			✓	✓	✓	
Benson	✓	✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Clayton	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Four Oaks	✓			*				✓				✓			✓	✓	✓			✓	✓	✓	
Kenly	✓	✓		*				✓							✓	✓				✓	✓	✓	
Micro	✓			*	✓			✓							✓	✓	✓			✓	✓		
Pine Level	✓	✓		*				✓							✓	✓	✓			✓	✓	✓	
Princeton	✓	✓		*	*			✓							✓	✓	✓			✓	✓	✓	

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
Selma	✓	✓		*				✓				✓			✓	✓	✓	✓		✓	✓	✓	
Smithfield	✓	✓		*	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Wilson's Mills	✓	✓		*	✓			✓				✓			✓	✓	✓			✓	✓		

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Johnston County has previously adopted a hazard mitigation plan. All of the participating municipalities were also included in this plan except the Town of Archer Lodge, which was not incorporated until November 2009.

Emergency Operations Plan
Johnston County maintains an emergency operations plan through its Emergency Management Department. This plan has been adopted by each of the municipalities within the county.

Continuity of Operations Plan
Johnston County has developed a continuity of operations plan.

General Planning

Comprehensive Land Use Plan
Johnston County has adopted a comprehensive plan. Each of the participating municipalities has also adopted a land use or comprehensive plan except the Towns of Archer Lodge, Four Oaks, and Micro, and the Town of Archer Lodge is currently in the process of developing a comprehensive land use plan.

Capital Improvements Plan
Johnston County maintains a tax-supported capital improvement plan. The Towns of Benson, Clayton, Four Oaks, Selma, Smithfield, and Wilson's Mills also have capital improvement plans in place.

Zoning Ordinance
Johnston County and all of its municipalities have adopted zoning ordinances. The Towns of Benson, Clayton, Selma, and Smithfield include zoning regulations as part of their local unified development ordinance.

Subdivision Ordinance
Johnston County and all of its municipalities except the Town of Kenly have adopted subdivision regulations. Again, the Towns of Benson, Clayton, Selma, and Smithfield include subdivision regulations as part of their local unified development ordinance.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Johnston County Building Inspections provides building code enforcement to the unincorporated county as well as the following municipalities: Archer Lodge, Kenly, Micro, Pine Level, Smithfield, and Wilson's Mills. The remaining municipalities administer their own building code enforcement.

Floodplain Management

Table C.51 provides NFIP policy and claim information for each participating jurisdiction in Johnston County.

TABLE C.51: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
JOHNSTON COUNTY†	09/30/83	07/07/14	249	$52,636,900	29	$680,206
Archer Lodge	05/06/14	12/02/05	0	$0	0	$0
Benson	09/13/00	01/05/07	5	$1,480,000	0	$0
Clayton	04/01/82	01/05/07	42	$12,495,900	2	$1,498
Four Oaks	09/24/02	01/05/07	3	$674,200	0	$0
Kenly	04/12/01	01/05/07	3	$840,000	0	$0
Micro*	--	--	--	--	--	--
Pine Level	06/22/05	01/05/07	5	$1,400,000	0	$0
Princeton	02/14/97	01/05/07	2	$252,000	0	$0
Selma	10/20/00	01/05/07	6	$1,470,000	0	$0
Smithfield	04/01/82	01/05/07	104	$19,672,500	48	$1,596,593
Wilson's Mills*	--	--	--	--	--	--

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Johnston County and all of its municipalities except Micro and Wilson's Mills participate in the NFIP and have adopted flood damage prevention regulations. Although Micro and Wilson's Mills do not currently participate in the NFIP, they have both adopted flood damage prevention ordinances.

Open Space Management Plan
Johnston County is currently developing a county-wide parks and recreation master plan. The Towns of Benson and Clayton already have municipal parks and recreation plans in place. Johnston County, Clayton, and Smithfield have also developed a master plan for the county's portion of the Mountains-to-Sea Trail.

Stormwater Management Plan
Although Johnston County and its municipalities do not have stormwater management plans in place, the county, Clayton, Micro, Smithfield, and Wilson's Mills have adopted stormwater management regulations through various local ordinances. Additionally, the Town of Princeton has a study in progress that will lead to the development of a stormwater management plan.

C.4.2 Administrative and Technical Capability

Table C.52 provides a summary of the capability assessment results for Johnston County 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 C.52: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
JOHNSTON COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	
Archer Lodge	✓	✓		✓	✓		✓			
Benson	✓	✓		✓	✓		✓	✓		
Clayton	✓	✓		✓	✓		✓	✓	✓	

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
Four Oaks	✓	✓		✓	✓		✓			
Kenly		✓		✓	✓		✓	✓		
Micro		✓		✓			✓	✓		
Pine Level		✓		✓	✓		✓	✓		
Princeton		✓		✓	✓		✓	✓		
Selma	✓	✓		✓	✓		✓			
Smithfield	✓	✓		✓	✓		✓	✓	✓	
Wilson's Mills	✓	✓		✓	✓		✓	✓		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

C.4.3 Fiscal Capability

Table C.53 provides a summary of the results for Johnston County 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) according to the previous county hazard mitigation plan.

TABLE C.53: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.
JOHNSTON COUNTY	✓	✓	✓						✓	✓
Archer Lodge			✓						✓	✓
Benson	✓	✓	✓						✓	✓
Clayton	✓	✓	✓						✓	✓
Four Oaks	✓		✓						✓	✓
Kenly		✓	✓						✓	✓
Micro			✓						✓	✓
Pine Level		✓	✓						✓	✓
Princeton			✓						✓	✓
Selma	✓	✓	✓						✓	✓
Smithfield	✓	✓	✓						✓	✓
Wilson's Mills	✓	✓	✓						✓	✓

C.4.4 Political Capability

The previous hazard mitigation plan indicates that the general populace and governing officials in Johnston County are open to mitigation efforts. Following the devastation that Hurricanes Fran and Floyd inflicted on Johnston County, and following several severe ice events in the last few years, the citizens and leaders of Johnston County are aware of the widespread damage that can be done by a natural event. Analyzing how mitigation can be inserted into everyday decision making as a routine course may help to depoliticize the issue. Public education and awareness campaigns about the economic efficiency and social utility of mitigation measures can help foster its general acceptance by citizens, and, in turn, by politicians.

C.4.5 Conclusions on Local Capability

Table C.54 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 28.3, which falls into the moderate capability ranking.

TABLE C.54: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
JOHNSTON COUNTY	43	High
Archer Lodge	21	Moderate
Benson	33	Moderate
Clayton	36	Moderate
Four Oaks	25	Moderate
Kenly	24	Moderate
Micro	16	Limited
Pine Level	24	Moderate
Princeton	25	Moderate
Selma	30	Moderate
Smithfield	34	Moderate
Wilson's Mills	28	Moderate

C.5 JOHNSTON COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Johnston County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

C.5.1 Mitigation Goals

Johnston County developed six mitigation goals in coordination with the other participating Cape Fear Region jurisdictions. The regional mitigation goals are presented in **Table C.55**.

TABLE C.55: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

C.5.2 Mitigation Action Plan

The mitigation actions proposed by Johnston County, the Town of Archer Lodge, the Town of Benson, the Town of Clayton, the Town of Four Oaks, the Town of Kenly, the Town of Micro, the Town of Pine Level, the Town of Princeton, the Town of Selma, the Town of Smithfield, and the Town of Wilson's Mills are listed in the following individual Mitigation Action Plans.

Johnston County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Johnston County will apply to reduce their NFIP-CRS (Community Rating System) score.	Flood, Hurricane, Thunderstorm	Moderate	Emergency Services Coordinator, Environmental Protection Administrator	In house staff	2019	Although the county has not reduced its CRS score in the past 5 years, it will continue to work to develop a floodplain management program that will earn points through the CRS program.
P-2	Conduct a county dam safety inventory. People downstream of hazardous dams would be notified. Owners would be notified of ways to reduce the risk of their dams.	Dam Failure	Low	Public Utilities Director	In house staff	Deleted	This action was deleted because there is not sufficient staff time or resources to complete the action.
P-3	Develop a Johnston County Burning Ordinance	Wildfire	Low	Fire Marshal	In house staff	Deleted	This action was deleted because there is not sufficient staff time or resources to complete the action.
Property Protection							
PP-1	Relocation of 4 server boxes located in the basement of the Johnston County courthouse and/or increase from one to multiple servers at the Johnston County Health Department to increase redundancy.	Flood, Hurricane, Thunderstorm	High	Technology Services Director	Grants, General Fund budget	2018	The county has not completely mitigated the redundancy issues with its server boxes even though some steps have been taken to reduce the risk. Therefore, the county will continue to work to increase redundancy in its server systems.
PP-2	Replace generator at Pine Level wastewater pump station.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	July 2015	The generator a Pine Level wastewater pump station has not been replaced, but this is still a priority and the county will work to replace it in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Complete rehabilitation work on three gravity sewer outfalls to reduce system infiltration.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	Deleted	Delete, same as SP-2
Structural Projects							
SP-1	Improve County water system to provide hydrant coverage to 85 percent of County Fire Districts.	Fire	High	Emergency Services Director	In house staff	2019	The county has made some improvements to the water system, but 85 percent coverage has not been achieved so this action will continue to be pursued going forward.
SP-2	Complete rehabilitation work on three gravity sewer outfalls to reduce system infiltration.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	General Fund Budget	December 2015	Rehabilitation work on the gravity sewer outfalls has begun but it is not complete. The county intends to continue to work to reduce infiltration and will aim to have the project done by late 2015.
SP-3	Replace bridge No. 40 located on US 70 Business (Market St.) over Neuse River.	Flood	High	Emergency Services Director	In house staff	Completed	DOT has completed work on this project as a new bridge was constructed and opened on April 24, 2013
Emergency Services							
ES-1	The Johnston County Continuity of Operations Plan (COOP) will be upgraded.	All	Moderate	Emergency Services Director	NCEM grant	2015	The county upgraded the COOP in 2012, but another upgrade is required and the budget for FY15 includes funds for COOP update.
ES-2	Provide auxiliary heating and cooling capability and generator connections to shelter sites at North Johnston Middle School, West Johnston High School, and First Baptist Church Smithfield.	All	Moderate	Emergency Services Director, Johnston County School System	Public/private partnership, industry donations, lease units, assistance groups (i.e. Red Cross)	2018	These shelter sites do not have generator capability so this will need to be addressed in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish a site for supporting an NCOEMS Medical Support Shelter. (CapRac).	All	High	Emergency Services Department	In house staff	2016	A site for supporting an NCOEMS Medical Support Shelter has not been established, so this will need to be established going forward.
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The county will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-2	Update and maintain educational information and links on County website for the public to access in order to stay informed.	All	Low	Emergency Services Department	In house staff	2015, Annual review and update	The county website includes information on hazards and mitigation for the public. The website will need to be reviewed and updated to include the most recent data on hazards.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The county will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
Previously Completed Mitigation Actions							
	Johnston County adopted Sedimentation and Erosion Control Ordinance.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	Grants, General Fund budget	Completed 2013	
	Establish a system and plan for identifying and sheltering special needs populations within Johnston County.	All	High	Emergency Services Department	In house staff	Completed 2013	

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Develop a system and plan for points of distribution throughout Johnston County for the dissemination of essential commodities to citizens during a disaster.	All	High	Emergency Services Department	In house staff	Complete 2012	

Town of Archer Lodge Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Work with county to improve water system to provide hydrant coverage to 85 percent of County Fire Districts.	Fire	High	Emergency Services Director	In house staff	2019	New action
Emergency Services							
ES-1	Work with Johnston County to upgrade Continuity of Operations Plan (COOP).	All	Moderate	Emergency Services Director	NCEM grant	2015	New action
Public Education and Awareness							
PEA-1	Update and maintain educational information and links on County website for the public to access in order to stay informed on natural hazard risk and mitigation techniques.	All	Low	Town Administration	In house staff	2015, Annual review and update	New action
PEA-2	Make available to public any brochures/materials that may be available from the county, state, or federal level that outline homeowner mitigation techniques.	All	Low	Town Administration	In house staff	2016	New action

Town of Benson Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Propose a stormwater drainage study.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Planning, Public Works	Local, Federal/State Grants	Completed	Drainage study was proposed in July 2011, so this action is complete. See PP-1 for continuation.
P-2	Maintain list of residents with special needs.	All	High	Administration	Local	2015, Annual review and update	The town has developed a preliminary list of residents with special needs, but this list will need to be updated and reviewed each year.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Electric Department, Public Works Department	Local	2015, Annually	Tree trimming is carried out at least annually and will need to continue to be taken care of each year. Rights of way for sewer and water are maintained as well.
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	A list of contractors has been developed to help in case of an emergency, but this list will need to be updated annually.
Property Protection							
PP-1	Conduct smoke testing and camera system of existing sewer lines.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
PP-2	Conduct a comprehensive drainage study.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
PP-3	Replace three existing pump stations.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-4	On pump stations, raise all controls above Base Flood Elevation. Lift Station needs to be 2ft higher.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2018	New action
Structural Projects							
SP-1	Continue upgrades of sanitary sewer system.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Wastewater Treatment, Public Works	Operating Budget, Federal/State Grants	2019	Some upgrades to the sanitary sewer system have been implemented, but overall the system requires more work so this action will remain in the plan.
Emergency Services							
ES-1	Enter into agreement with Johnston County to use current county notification system.	All	Low	Administration	Local	Completed	The town has entered into an agreement with Johnston County to use the county notification system. This action will be removed as a capability during the next update.
Public Education and Awareness							
PEA-1	Maintain and update the Town of Benson website.	All	Low	Administration	Local	2015, Annual review and update	The town website includes information on hazards and mitigation for the public. The website will need to be reviewed and updated to include the most recent data on hazards.
PEA-2	Educate public of potential natural disasters.	All	High	Administration	Local	2015, Annual review and update	The town works to educate the public on natural disasters in a number of ways, both through electronic and paper media. The town will continue to do this going forward and will be working to update its materials.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-3	Information regarding fire prevention and safe burning practices will be distributed to the public.	Wildfire	Moderate	Fire Department	Local	2015, Annual review and update	The town has informed the public of fire prevention techniques and safe burning practices and will continue to develop and distribute fire prevention information to the public, both through electronic and paper media.

Town of Clayton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Town of Clayton public power tree trimming program.	Thunderstorm, Lightning, Severe Winter Storm, Hurricane, Tornado	High	Electric System Director	Town electric fund	2015, Annually – July through September	In process and scheduled for completion in September 2014, after which the town will continue to implement on an annual basis.
P-2	Develop a Johnston County burning ordinance.	Wildfire	Low	Fire Marshall, Zoning Enforcement	In house staff	Deleted	Deleted, this action was deemed not applicable to the Town of Clayton.
P-3	Conduct a community risk assessment.	Hazardous Materials	Moderate	Fire Department	Local	2015, Annually	New action
P-4	Develop comprehensive plan.	All	High	Planning Department	Town Budget	August 2015	New action
Property Protection							
PP-1	Auxiliary power for Town of Clayton sewer lift stations.	All	High	Public Works Director	Town water/sewer fund budget	July 2016	Purchased two additional back up pumps to supplement 3 existing generators (5 total). All new facilities require back-up equipment.
PP-2	Town of Clayton public power electric system upgrade and relocation of overhead power lines. Convert 1\0 ACSR conductor to 477 AL conductor.	All	High	Electric System Director	Town electric fund	June 2015	Initial upgrade complete. Additional conversion of 1/0 ACSR conductor will take place by 2015.
PP-3	Add North Side Substation.	All	High	Electric Department	Town electric fund/bond money	2018	New action
Emergency Services							
ES-1	The Johnston County Continuity of Operations Plan (COOP) will be upgraded.	All	Moderate	Emergency Services Director	NCEM grant	2015	The county upgraded the COOP, but another upgrade is required and the budget for FY15 includes funds for COOP update.
ES-2	Conduct Annual EOC training.	All	Low	Fire Department	Town Budget	2015, Annually	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Develop Firewise Community Program.	Wildfire	Moderate	Fire Department	NC Forestry Service/ USFA	2015	New action
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.

Town of Four Oaks Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Develop a stormwater ordinance for the Town of Four Oaks.	Flood, Hurricane, Thunderstorm	High	Town Engineer, Zoning Administrator	In house staff, contracted town engineer	Completed	The town has developed a stormwater ordinance that is in place. This action will be removed as a capability at the next update.
P-2	Develop a burning ordinance for the Town of Four Oaks.	Wildfire	Low	Zoning Administrator, Fire Chief	In house staff	Completed	The town has developed a burning ordinance that is in place. This action will be removed as a capability at the next update.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Public Works/ Duke Energy	Local	2015, Annually	New action
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	New action
P-5	Digitize copies of town ordinances, polices, and procedures.	All	High	Administration and Town Council	Local, Grants	December 2015	New action
Property Protection							
PP-1	Town of Four Oaks public power electric system upgrade and relocation of overhead power lines.	All	High	Public Works	Federal or state grant	December 2018	New action
PP-2	Assess sewer lines due to infiltration issues. Need to address five to six manholes per year.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action
PP-3	Clean street grates before heavy rains and in large drain tiles to accommodate water.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action
PP-4	Install drainage pipe to relieve storm runoff and clean culvert areas.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/state grants	December 2018	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Maintain a system for identifying special needs citizens in the town.	All	High	Police Department, Administration	Local	June 2015	New action
Public Education and Awareness							
PEA-1	Maintain town's website to include links to ReadyNC.org and FEMA-www.DHS.gov/ready.	All	Moderate	Administration	Local	June 2015	New action

Town of Kenly Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Digitize copies of town ordinances, polices, and procedures.	All	High	Town Manager	Grants	Completed June 2014	The town has digitized copies of all town ordinances, policies, and procedures. Town ordinances are now online and available for public access.
P-2	Develop a Town of Kenly burning ordinance.	Wildfire	Low	Town Manager, Fire Chief	Town Staff	Deleted	The town has elected not to institute a burning ordinance.
P-3	Develop ordinance to penalize intentional or malicious damage to canal and drainage system.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, Town Council	Town Manager, Town Council	January 2016	The town is working to develop an ordinance to penalize intentional damage to the canal and drainage system and will aim to have it in place by 2016.
P-4	Clean out and improve drainage pipe located on CSX Railroad right-of-way.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, CSX Officials	CSX Transportation	January 2016	The town is working with the railroad to clean out and improve the drainage pie that is located in the railroad right of way.
P-5	Remove beaver dam and trap beavers on east side of town to improve drainage and prevent flooding of low lying areas and streets.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	Local Budget, Grants	January 2016	The town is has been working to develop a system to reduce beaver dams and trap beavers so that it will not experience drainage problems. This project is still a work in progress.
P-6	Conduct study of drainage system to look for ways to improve drainage in southwest part of Town.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager, Engineering Firm	Local Budget	December 2014	Project in work. Engineering firm currently conducting the study of the system in this area.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Conduct smoke test and sewer system audit to study excess water that flows into sewer pipes from groundwater and storm water infiltration and inflow.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	Grants	January 2016	The town conducts smoke and sewer system tests/audits to study the excess water that flows into the sewer system through I&I. More evaluation is necessary and continual monitoring will be needed.
P-8	Create a process and infrastructure to backup documents and records on town computers.	All	High	Town Manager Town Staff	Local Budget	December 2015	The town is working to develop a process for backing up all documents and records on the town's computer system.
Property Protection							
PP-1	Provide for a secondary means of power at sewer lift stations without this capability.	Flood, Hurricane, Thunderstorm	Moderate	Town Manager, Town Council	Grants	January 2016	All lift stations have been retrofitted for a secondary power source except this station on Bay Valley Road. The upgrades to the other stations were completed in September 2014.
Structural Projects							
SP-1	Provide a secondary means to connect the Town of Kenly water system to the Princeton-Kenly Water District.	Drought	High	Town Manager, Johnston County Director of Public Utilities	Grants	Completed	**Completed approximately 5 years ago. The Town of Kenly also has connected to the Wilson County water system at the intersection of NC Highway 581 and Saint Mary's Church Road to provide another emergency connection.**

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Improve drainage ditches and canal system in Town and other areas located in the ETJ.	Flood, Hurricane, Thunderstorm, Tornado	High	Town of Kenly, Johnston County, Wilson County	Grants	January 2020	The town has worked to improve its drainage ditches and canals in areas outside the city limits, but additional work needs to be carried out to ensure water flows out properly and doesn't cause flooding.
SP-3	Water/Sewer Main Project – Upgrade and loop water mains to improve water for domestic consumption and fire protection, upgrade sewer lines to prevent infiltration of storm water into sewer system.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Manager	CDBG Grant	Complete May 2015	**Project in work.** This project is currently underway and funded through a Community Development Block Grant
SP-4	Install water main valves to grid town system in a manner to eliminate the disruption of water to the entire town during failures in the system.	Drought, Fire, Extreme Heat	High	Town Manager	Local Budget	December 2014	Project is currently underway and scheduled for completion by December 2014.
Emergency Services							
ES-1	Develop a Continuity of Operations Plan (COOP) for the Town of Kenly.	All	High	Town Council, Town Government	Grants	Complete 2020	The town has not developed a Continuity of Operations plan, but it coordinates with Johnston County and is working to develop its own COOP.
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Analyst, Emergency Services Department	Local Budget	2015, Annually	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Conduct a dam/hog lagoon safety inventory. People downstream of hazardous dams/hog lagoons would be notified. Owners would be notified of ways to reduce the risk of their dams/lagoons.	Dam Failure	Low	Public Utilities Director for Johnston County	Local Budget	2015, Annually	The town will notify citizens that are downstream of dams and hog lagoons that there are potential safety issues and will ensure that this notification takes place each year at least.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Johnston County Planning and Inspections	Local Budget	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-4	Provide education materials on preparedness/mitigation measures and display at the Town Hall, Town Library, and Town Website.	All	Moderate	Town Staff	Local Budget	December 2015	The town will develop and provide education materials on mitigation to citizens at both public locations and via the town's website.

Town of Micro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt the NFIP.	Flood, Hurricane, Thunderstorm	High	Town Board	Local budget	Completed	The town is a participating member of the NFIP. This action will be removed as a capability at the next update.
P-2	Improve drainage in Micro.	Flood, Hurricane, Thunderstorm	High	Town Board	Local budget, grants	2019	The town is working to improve drainage throughout the town in many ways, but there are still several projects that need to be completed to improve drainage further.
P-3	Develop a Johnston County burning ordinance.	Wildfire	Low	Fire Marshall, Zoning Enforcement	In house staff	Completed	The county has developed a burning ordinance that is in place. This action will be removed as a capability at the next update.
P-4	Create a process and infrastructure to backup documents, forms, and utility records on town computers.	All	High	Town Staff	Local Budget	December 2015	New action
Property Protection							
PP-1	Provide for a secondary means of power for wells and sewer lift stations through the installation of appropriate electrical connections and purchase of 40 KW generator.	All	High	Town Board	Grants	January 2016	New action
Structural Projects							
SP-1	Upsize culvert located on CSX Railroad right-of-way to handle storm water drainage from the new North Johnston Middle School.	Flood, Hurricane, Thunderstorm, Tornado	High	Town Board, CSX Railroad	CSX Railroad	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Provide a means to connect the Town of Micro water distribution system to the Johnston County water system on US Highway 301 near North Johnston High School.	Drought, Wildfire, Extreme Heat	High	Town Board, Johnston County	Grants	January 2020	New action
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual update and review	The town currently has an up to date repetitive loss list and it will annually work to update that list and attempt to encourage property owners to take action to mitigate.
PEA-2	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-3	Provide education materials on preparedness/mitigation measures and display at the Town Hall, and Town Website.	All	Moderate	Town Staff	Local Budget	December 2015	New action

Town of Pine Level Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt a flood ordinance that is more restrictive on construction within a 100 year flood zone.	Flood, Hurricane, Thunderstorm	High	Zoning Administrator, Board of Commissioners	In house staff	Completed	The town has adopted an ordinance that is more restrictive on construction within the 100 year flood zone. This action will be removed from the next update as a capability.
P-2	Incorporate inspection and management of hazardous trees into the Town's systematic inspection process of public facilities and utilities.	All	High	Zoning Administrator	Town	2015, Annual review and update	The town has incorporated the evaluation of hazardous trees into its inspection process, but this process will need to be reviewed and updated annually so this action will remain in the plan.
Property Protection							
PP-1	Develop a systematic inspection process of the Town's public facilities and utilities to prevent or minimize potential damage.	All	High	Director of Public Works	Town	2015, Annual review and update	The town has developed a systematic inspection process for its public utilities, but this process will need to be carried out, reviewed, and updated on at least an annual basis, so it will remain in the plan.
PP-2	Improve drainage in Southern part of town based on a Comprehensive drainage study performed in 2011.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2020	New action
Structural Projects							
SP-1	Upgrade lift station located on the East Side due to its location being in a low point in the flood plain.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Public Works	Federal/State Grants	December 2020	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Increase public awareness of risk and mitigation measures available through a series of informative news articles.	All	Low	Zoning Administrator, Town Clerk	Town	2015, Annually	In the past, the town has developed and published articles on risks and mitigation for its citizens, but the town is planning to continue this process by developing these articles at least annually.
PEA-2	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-3	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.

Town of Princeton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Maintain Moccasin Creek and right away from erosion.	Flood, Hurricane, Tornado, Thunderstorm	Moderate	Public Works	Operating Budget	2019	New action
P-2	Maintain right of way for water and sewer lines.	Hurricane, Tornado, Thunderstorm, Winter Storm and Freze	High	Public Works	Operating Budget	2015, Annual review	New action
P-3	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annual review and update	New action
P-4	Maintain town ordinances, policies, and procedures for the Town of Princeton on their website.	All	High	Administration	In house staff, grants	June 2015	New action
Property Protection							
PP-1	Conduct annual smoke testing of existing sewer lines. 10% of lines to be tested annually.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State grants	December 2018	New action
Structural Projects							
SP-1	Upgrade existing manual bar screen with an automatic bar screen at Wastewater Treatment Facility.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Federal/State grants	December 2018	New action
SP-2	Upgrade grit removal system at Wastewater Treatment Plan.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating budget, Federal/State grants	December 2018	New action
Emergency Services							
ES-1	Maintain a system at Town Hall for identifying towns' special needs citizens within the Princeton area.	All	High	Police Department, Administration	Local	June 2015	New action
ES-2	Install stationary 75kw generator for Town Hall.	All	High	Public Works	Federal/State grants	June 2016	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-2	Educate public on potential natural disasters by maintaining town's website to include links to ReadyNC.org and FEMA – www.dhs.gov/ready.	All	Moderate	Town Administration	Operating Budget	June 2015	New action
Previously Completed Mitigation Actions							
	Install auxiliary power generators at all sewage lift stations.	All	High	Water and Sewer Commission, Mayor	Grants, local funds		Completed. June, 2006.

Town of Selma Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Update Town Development Code with latest hazard mitigation measures; revise floodplain and stormwater regulations.	All	High	Planning and Inspections	Local	2019	The town development code was previously updated with the latest hazard mitigation measures, as were floodplain and stormwater regulations. However, these will need to be updated again in the next several years.
P-2	Incorporate latest NC Building Code regulations.	All	Moderate	Planning and Inspections, Administration	Local	Completed	The latest NC Building Code has been incorporated into town regulations. This action will be removed from the next update as a capability.
P-3	Provide Cloud access for government software and date.	All	High	Administration	Local	2019	New action
P-4	Develop a fuel back up plan.	All	High	Public works, Fire	Local	2019	New action
P-5	Maintain a list of contractors to assist in town emergency recovery.	All	High	Public Works	Local	2019	New action
P-6	Improve Storm water drainage.	All	High	Public Works	Local	2019	New action
P-7	Complete storm water GIS mapping project.	All	High	Public Works	Local	2019	New action
P-8	Complete sewer inspection to eliminate INI.	Flooding	High	Public Works	Local	2019	New action
Property Protection							
PP-1	Install emergency power back up to all critical facilities.	All	High	Administration	Local	2019	New action
Natural Resource Protection							
NRP-1	Install emergency power back up to critical wells and lift stations.	All	High	Administration	Local	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Incorporate an EOC into the Town Hall.	Natural disaster	Moderate	Administration	Local	2019	New action
SP-2	Improve drainage ditches and canal system in areas outside of the incorporated area.	Flooding	High	Public works	Local	2019	New action
Emergency Services							
ES-1	Increase the Town's emergency service measures that would minimize the impact of a natural hazard event on people and property immediately prior to, during, or in response to a natural hazard event.	All	High	Fire, Police	Local	Deleted	Deleted, this action was further specified and divided into multiple actions ES-2 through ES-7
ES-2	Increase staff of the Fire Department to meet NFPA 1710.	All	High	Fire	Local	2019	New action
ES-3	Develop the Fire Department Training room into an EOC by adding data, and phone lines.	Natural Disaster	Moderate	Fire, Police	Local	2019	New action
ES-4	Develop a list of special needs citizens in need of assistance during a disaster.	All	High	Fire, Police	Local	2019	New action
ES-5	Develop and exercise the towns emergency plan annually with all departments.	All	High	Fire	Local	2019	New action
ES-6	Develop a shelter plan for the Town.	All	High	Fire, Police	Local	2019	New action
ES-7	Purchase a mobile Command Center.	All	Moderate	Police	Local	2019	New action
Public Education and Awareness							
PEA-1	Advertise and promote the availability of flood insurance to town residents and property owners by including such information in the Town's water billing at least once a year.	Flood	Moderate	Planning and Inspections, Administration	Local	2015, Annually	The town works to advertise the availability of flood insurance at least annually via water bills. The town will continue to advertise and encourage homeowners to purchase flood insurance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Collect education materials on preparedness/mitigation measures and display at both the Town Hall and Town Library.	All	Moderate	Planning and Inspections, Administration	Local	2015, Annually	The town has developed a number of materials to display at the Town Hall and in the Town Library. However, this material will need to be reviewed and updated as it may be out of date.

Town of Smithfield Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Complete storm water GIS mapping project, with elevations showing where deficiencies exist in the storm water system.	Flood, Hurricane, Thunderstorm	High	Director of Public Works	General fund budget	June 2016	This project is still around75 percent complete. Scheduled for completion by FY 2015 due to budget cuts.
P-2	Johnston County will apply to reduce their NFIP-CRS (Community Rating System) score.	Flood, Hurricane, Thunderstorm	Moderate	Emergency Services Coordinator, Environmental Protection Administrator	In house staff	Deleted	Deleted, this is a Johnston County action
Property Protection							
PP-1	Install generators to at least two, possibly three, critical sewer lift stations within the Town of Smithfield.	Flood, Hurricane, Thunderstorm, Ice Storm, Tornado	High	Director of Public Works	Annual budget (appropriations from utility fund)	2019	This project is a work in progress as the town is still trying to install generators to support critical sewer lift stations.
Structural Projects							
SP-1	Complete the Spring Branch Wetlands Restoration Project in order to improve the quality of stormwater runoff before it enters the Neuse River.	Flood, Hurricane, Thunderstorm	Moderate	Public Works Director	Local Funding, Grants	2019	This project is complete, but the town is still working to improve the quality of stormwater runoff before it enters the Neuse River.
SP-2	Eliminate Lift Station #3 and convert to a gravity sewer line.	Flood, Hurricane, Thunderstorm	High	Public Works Director	Local Funding, Utility Fund Budget	July, 2016	The town has been working on the conversion to a gravity sewer line. This is scheduled for completion in current budget year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	On an annual basis, the FEMA repetitive loss property list will be obtained from NCEM. At that time, letters will be sent to the owners of the repetitive loss structures to notify them of their status and to offer information on programs that could help.	Flood, Hurricane, Thunderstorm	Moderate	GIS Application Analyst, Emergency Services Coordinator	In house staff	2015, Annual review and update	The town will annually update its repetitive loss list and, will continue to attempt the property owners to institute mitigation.
PEA-2	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
Previously Completed Mitigation Actions							
	The development of a Continuity of Operations Plan (COOP) for the Town of Smithfield.	All	High	Emergency Services Director, Town Manager	Grant		Completed. In spring 2006 and updates ongoing. An NCEM grant was secured for $26,000.
	Adopt a new flood ordinance that is more restrictive on construction within a 100-year flood zone.	Flood, Hurricane, Thunderstorm	High	Director of Public Works, Director of Planning and Zoning	FEMA, in house staff		Completed. December of 2008. The IEMC retreat is paid for by FEMA. In-house staff will do all of the work done on the flood ordinances.
	Rehabilitate and protect Sewer Lift Station #2 raising all controls above Base Flood Elevation. Eliminate Lift Station #3 and convert to a gravity sewer line.	Flood, Hurricane, Thunderstorm	High	Public Utilities Director	Loans, grants, utility fund budget		Completed. December 2005.
	Complete the Spring Branch Wetlands Restoration Project in order to improve the quality of stormwater runoff before it enters the Neuse River.	Flood, Hurricane, Thunderstorm	Moderate	Public Works Director	Clean Water Management Trust Fund Grant, local funding		Completed. June 30, 2007.

Town of Wilson's Mills Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Adopt NFIP.	Flood, Hurricane, Thunderstorm	High	Town staff	Local budget	2016	The town has not adopted the NFIP and will work to do this going forward.
P-2	Improve drainage in Wilson's Mills.	Flood, Hurricane, Thunderstorm	Moderate	Town staff	Grants, local budget	2019	Although some steps have been taken to improve drainage in the town, there are still some outstanding projects so this action will remain in the plan.
P-3	Maintain all utility right-of-ways by trimming trees around power lines and maintain right-of-way of water/sewer lines.	All	High	Public Works/ Duke Energy	Local	2015, Annually	New action
P-4	Maintain a list of contractors to assist town in emergencies.	All	Moderate	Administration	Local	2015, Annually	New action
P-5	Digitize copies of town ordinances, polices, and procedures.	All	High	Administration and Town Council	Local, Grants	December 2015	New action
Property Protection							
PP-1	Work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County & Town limits in particular. The goal of this effort will be to provide the pertinent agencies with better information regarding river water levels.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2019	New action
PP-2	Subsequent to the establishment of additional stream gauges as noted above, a working group including all individuals charged with floodplain and dam management within the County.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	December 2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Install generators to sewer pumps if possible.	Flood, Hurricane, Tornado, Thunderstorm	High	Public Works	Operating Budget, Federal/State Grants	2019	New action
Natural Resource Protection							
NRP-1	Continue the possibility of accepting dedication of open space within all new major subdivisions, especially when environmentally sensitive areas are present.	Flood, Hurricane, Thunderstorm, Tornado	High	Planning	Local	2019	New action
NRP-2	Continue ensuring that new developments have adequate hydrants per the Town development ordinances.	Flood, Hurricane, Tornado, Thunderstorm	High	Planning	Local	2019	New action
Emergency Services							
ES-1	Maintain a system for identifying special needs citizens in the town.	All	High	Police Department, Administration	Local	June 2015	New action
ES-2	Establishment of additional Community Emergency Response Teams (CERT). This effort will so address the ongoing training and support of the eleven teams currently operating within the County.	All	Moderate	Administration/ Police	Local	2016	New action
ES-3	Utilize the Town's Blackboard Connect system to notify Town residents and business owners regarding natural and man-made hazard events. Town residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Administration	Local	2015	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and print a brochure outlining wind proofing methods above and beyond Code. This will be offered in the Inspections Department receptionist area.	Hurricane, Thunderstorm, Tornado	Low	Steven Finn (Planning and Inspections Director)	In house staff	June 2015	The town will work to develop a brochure concerning wind proofing methods and will offer help from the Inspections Department.
PEA-2	Maintain town's website to include links to ReadyNC.org and FEMA – www. Dhs.gov/ready.	All	Moderate	Administration	In house	June 2015	New action
PEA-3	Conduct research activities aimed at education business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	Moderate	Planning	Local	2015, After disaster events	New action
PEA-4	Advertise and promote the availability of flood insurance to town residents and property owners by including such information on the Town website as well as through a Blackboard Connect message.	All	Moderate	Planning	Local	2015, Annual review and update	New action
PEA-5	Information regarding fire prevention and safe burning practices will be available the Town Hall & published on the town website.	All	Moderate	Administration/ Planning	Local	2015, Annual review and update	New action

Annex D
Lee County

This annex includes jurisdiction-specific information for Lee County and its participating municipalities. It consists of the following five subsections:

- D.1 Lee County Community Profile
- D.2 Lee County Risk Assessment
- D.3 Lee County Vulnerability Assessment
- D.4 Lee County Capability Assessment
- D.5 Lee County Mitigation Strategy

D.1 LEE COUNTY COMMUNITY PROFILE

D.1.1 Geography and the Environment

Lee County is located at the geographic center of North Carolina just a short drive southwest of Raleigh, the state's capital. It comprises two municipalities, the Town of Broadway and City of Sanford, as well as many small communities. An orientation map is provided as **Figure D.1**.

The prevailing landscape of Lee County consists of gently rolling hills characteristic of the Piedmont region. The Cape Fear River, along the county's northeastern border; Deep River, along the county's northwestern border; Upper Little River, and Trace Lake are the major water bodies in the county. The total area of the county is 259 square miles, 4 square miles of which is water area.

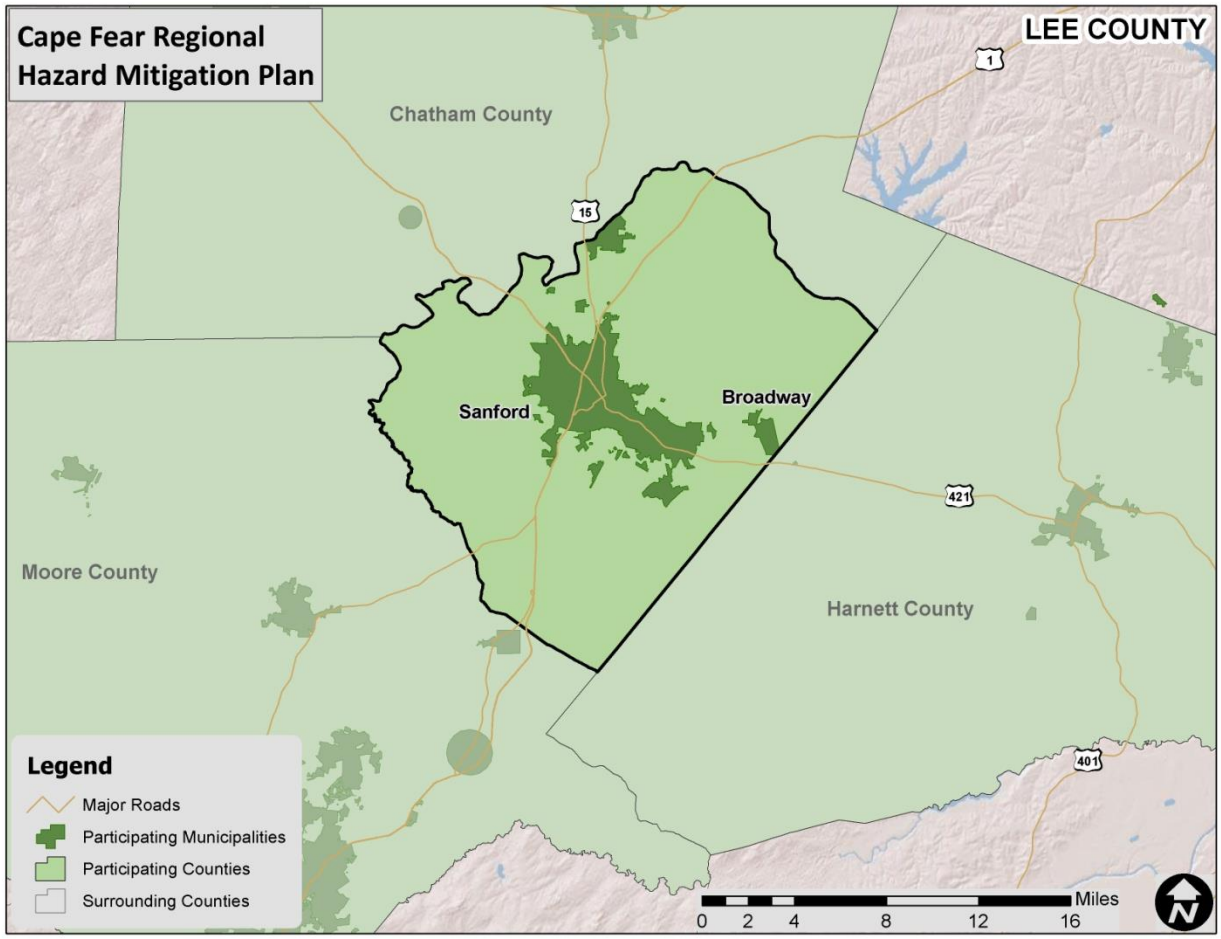
From December to February, the average high temperature is in the lower to upper 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter. Snow and sleet is usually light and occurs on average once or twice per year.

During the spring months, the days are warm and the nights are cool. Average high temperatures increase from the mid 60s in March to the low 80s in May. There is a similar increase in average low temperatures, which start in the upper 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring.

The summer is characterized by warm temperatures and rather high humidity. Average high temperatures range from the upper 80s to lower 90s and low temperatures average in the lower to upper 60s. Summer precipitation is normally the greatest, but also the most variable, and thunderstorms are common events.

Autumn is typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the low to mid 80s in September and fall to the mid 60s by November. Average lows also drop significantly from about 60°F to the high 30s from September to November. Autumn is the driest season.

FIGURE D.1: LEE COUNTY ORIENTATION MAP



D.1.2 Population and Demographics

According to the 2010 Census, Lee County has a population of 57,866 people. The county has seen 18 percent growth between 2000 and 2010, and the average population density is 227 people per square mile. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for the county and participating municipalities are presented in **Table D.1**.

TABLE D.1: POPULATION COUNTS FOR LEE COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Lee County	**41,374**	**49,040**	**57,866**	**18.0%**
Town of Broadway	973	1,015	1,229	21.1%
City of Sanford	14,475	23,220	28,094	21.0%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Lee County is 37.4 years. The racial characteristics of the county are presented in **Table D.2**. Whites make up the majority of the population in the county, accounting for around 67 percent of the population.

TABLE D.2: DEMOGRAPHICS OF LEE COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Lee County	**66.9%**	**20.0%**	**0.7%**	**0.8%**	**0.0%**	**9.1%**	**2.4%**	**18.3%**
Town of Broadway	78.8%	10.2%	1.4%	1.1%	0.1%	6.7%	1.7%	9.9%
City of Sanford	55.2%	27.6%	0.8%	1.1%	0.0%	12.4%	2.8%	25.6%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

D.1.3 Housing

According to the 2010 U.S. Census, there are 24,136 housing units in Lee County, the majority of which are single family homes or mobile homes. Housing information for the county and towns is presented in **Table D.3**. As shown in the table, the county and towns all have a very low percentage of seasonal units.

TABLE D.3: HOUSING CHARACTERISTICS OF LEE COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Lee County	**19,909**	**24,136**	**0.6%**	**$127,800**
Town of Broadway	419	538	0.6%	$151,100
City of Sanford	9,223	11,411	0.2%	$131,800

Source: United States Census Bureau

D.1.4 Infrastructure

Transportation

There are several major highways that cross Lee County. US Route 1 is the major north-south thoroughfare which connects Lee County to Chatham County, Wake County, and the Triangle. US-87 also links the southeastern side of Lee County north to Chatham County. US-421 is the major east-west thoroughfare which runs from the Lee County and Harnett County to Chatham County linking the region to the Triad.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to Lee County. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 45 miles from Sanford. An additional relief airport, Raleigh Exec, is also located a few miles northeast of Sanford and provides additional capacity to the RDU airport.

Utilities

Electrical power in Lee County is provided by one public utility and one electricity cooperative. Duke Energy Progress serves major portions of the county while Central Electric Membership Corporation serves rural customers in across the county.

Water and sewer service is provided by the City of Sanford and the Town of Broadway within their respective jurisdictions. The City of Sanford also provides also provides water servicse to all of Lee County with the exception of Carolina Trace and Quail Ridge. Therefore, some parts of the county require the use of wells and septic systems.

Community Facilities

There are a number of buildings and community facilities located throughout Lee County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 10 fire stations, 3 police stations, and 25 public schools located within the county.

There is one medical care facility located in Lee County. This facility, Central Carolina Hospital, is a 137-bed acute care hospital located in Sanford.

In addition to San Lee Park and Carolina Trace Country Club, the county contains numerous local parks and recreation areas. These facilities offer recreational opportunities to area residents and many visitors each year.

D.1.5 Land Use

Lee County is experiencing growth and development due to its proximity to the major metropolitan areas in the Triangle and Triad. There are several incorporated municipalities located throughout the county which make up most of the county's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with some agricultural and recreational uses in the more rural areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

D.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Chatham County had an average annual employment of 23,626 workers and an average unemployment rate of 11.6 percent (compared to 8.0 percent for the state). In 2012, the Manufacturing industry was the largest employment sector by fare with 33.3 percent of the county's workforce. The other leading industries were Retail Trade (11.8%); Health Care and Social Assistance (11.8%); and Educational Services (8.3%). The American Community Survey (ACS) found the average annual median household income in Chatham County was $45,284 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

D.2 LEE COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Lee County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

D.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, Lee County has had drought occurrences in each of the last fourteen years (2000-2013). **Table D.4** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE D.4: HISTORICAL DROUGHT OCCURRENCES IN LEE COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Lee County
2000	MODERATE
2001	**EXTREME**
2002	**EXCEPTIONAL**
2003	ABNORMAL
2004	ABNORMAL
2005	SEVERE
2006	SEVERE
2007	**EXCEPTIONAL**
2008	**EXCEPTIONAL**
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE

Source: North Carolina Drought Monitor

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Lee County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

D.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Lee County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Lee County. One event was reported:

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1972. The recorded maximum for Lee County can be found below in **Table D.5**.

TABLE D.5: HIGHEST RECORDED TEMPERATURE IN LEE COUNTY

Location	Date	Temperature (F)
Sanford 8 NE	8/18/1988	107
LEE COUNTY MAXIMUM	**--**	**107**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the county. The most centralized location is Sanford. **Table D.6** shows the average maximum temperatures from 1971 to 2000 at the Sanford 8 NE observation station which can be used as a general comparison for the county.

TABLE D.6: AVERAGE MAXIMUM TEMPERATURE IN SANFORD 8 NE, LEE COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	52.4	57.3	65.9	75.3	81.8	87.8	91.0	88.9	83.8	74.1	64.2	55.2

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Lee County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county.

D.2.3 Hailstorm

Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Lee County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

Historical Occurrences

According to the National Climatic Data Center, 47 recorded hailstorm events have affected Lee County since 1956.[1] **Table D.7** is a summary of the hail events in Lee County. **Table D.8** provides detailed information about each event that occurred in the county. In all, hail occurrences did not result in any recorded monetary property damages. Hail ranged in diameter from 0.75 inches to 2.0 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE D.7: SUMMARY OF HAIL OCCURRENCES IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	7	0/0	$0
Sanford	16	0/0	$0
Unincorporated Area	24	0/0	$0
LEE COUNTY TOTAL	**47**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE D.8: HISTORICAL HAIL OCCURRENCES IN LEE COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Broadway				
BROADWAY	6/24/1996	1.00 in.	0/0	$0
BROADWAY	6/2/1997	1.50 in.	0/0	$0
BROADWAY	5/26/1998	0.88 in.	0/0	$0
BROADWAY	6/2/1998	0.88 in.	0/0	$0
BROADWAY	4/1/2001	0.75 in.	0/0	$0
BROADWAY	5/14/2006	1.00 in.	0/0	$0
BROADWAY	4/20/2008	1.75 in.	0/0	$0
Sanford				
Sanford	4/26/1993	1.75 in.	0/0	$0
Sanford	5/19/1993	0.75 in.	0/0	$0
SANFORD	4/3/1998	0.75 in.	0/0	$0
SANFORD	5/23/1998	0.75 in.	0/0	$0
SANFORD	6/13/1998	0.75 in.	0/0	$0
SANFORD	4/17/2000	0.75 in.	0/0	$0
SANFORD	6/14/2000	0.88 in.	0/0	$0
SANFORD	6/1/2001	1.00 in.	0/0	$0
SANFORD	3/31/2002	1.75 in.	0/0	$0
SANFORD	5/31/2003	0.88 in.	0/0	$0
SANFORD	1/11/2006	1.00 in.	0/0	$0
SANFORD	6/5/2006	0.75 in.	0/0	$0
SANFORD	4/20/2008	0.75 in.	0/0	$0
SANFORD	5/9/2008	1.75 in.	0/0	$0

[1] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected Lee County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

	Date	Magnitude	Deaths / Injuries	Property Damage*
SANFORD	5/9/2008	1.75 in.	0/0	$0
SANFORD	7/27/2008	1.00 in.	0/0	$0
Unincorporated Area				
Lee County	6/1/1956	2.00 in.	0/0	$0
Lee County	3/24/1985	0.75 in.	0/0	$0
Lee County	3/24/1985	1.00 in.	0/0	$0
Lee County	2/19/1986	1.00 in.	0/0	$0
Lee County	4/26/1986	0.75 in.	0/0	$0
Lee County	8/21/1987	1.00 in.	0/0	$0
Lee County	6/9/1988	1.75 in.	0/0	$0
Lee County	7/1/1990	0.75 in.	0/0	$0
Lee County	6/19/1992	0.75 in.	0/0	$0
CAPE FEAR	5/24/1996	1.00 in.	0/0	$0
LEMON SPRINGS	6/2/1997	0.75 in.	0/0	$0
TRAMWAY	6/26/2000	0.75 in.	0/0	$0
TRAMWAY	4/26/2003	0.75 in.	0/0	$0
CUMNOCK	7/28/2005	1.75 in.	0/0	$0
LEMON SPGS	7/28/2005	0.88 in.	0/0	$0
TRAMWAY	5/18/2006	0.75 in.	0/0	$0
LEMON SPGS	7/27/2007	0.75 in.	0/0	$0
NORTHVIEW	5/9/2008	1.75 in.	0/0	$0
CUMNOCK	5/20/2008	0.88 in.	0/0	$0
CUMNOCK	5/20/2008	0.88 in.	0/0	$0
TRAMWAY	7/27/2009	0.88 in.	0/0	$0
LEMON SPGS	8/5/2009	1.25 in.	0/0	$0
ROSSER	6/21/2011	1.00 in.	0/0	$0
SWANN	8/21/2011	1.00 in.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Lee County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

D.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

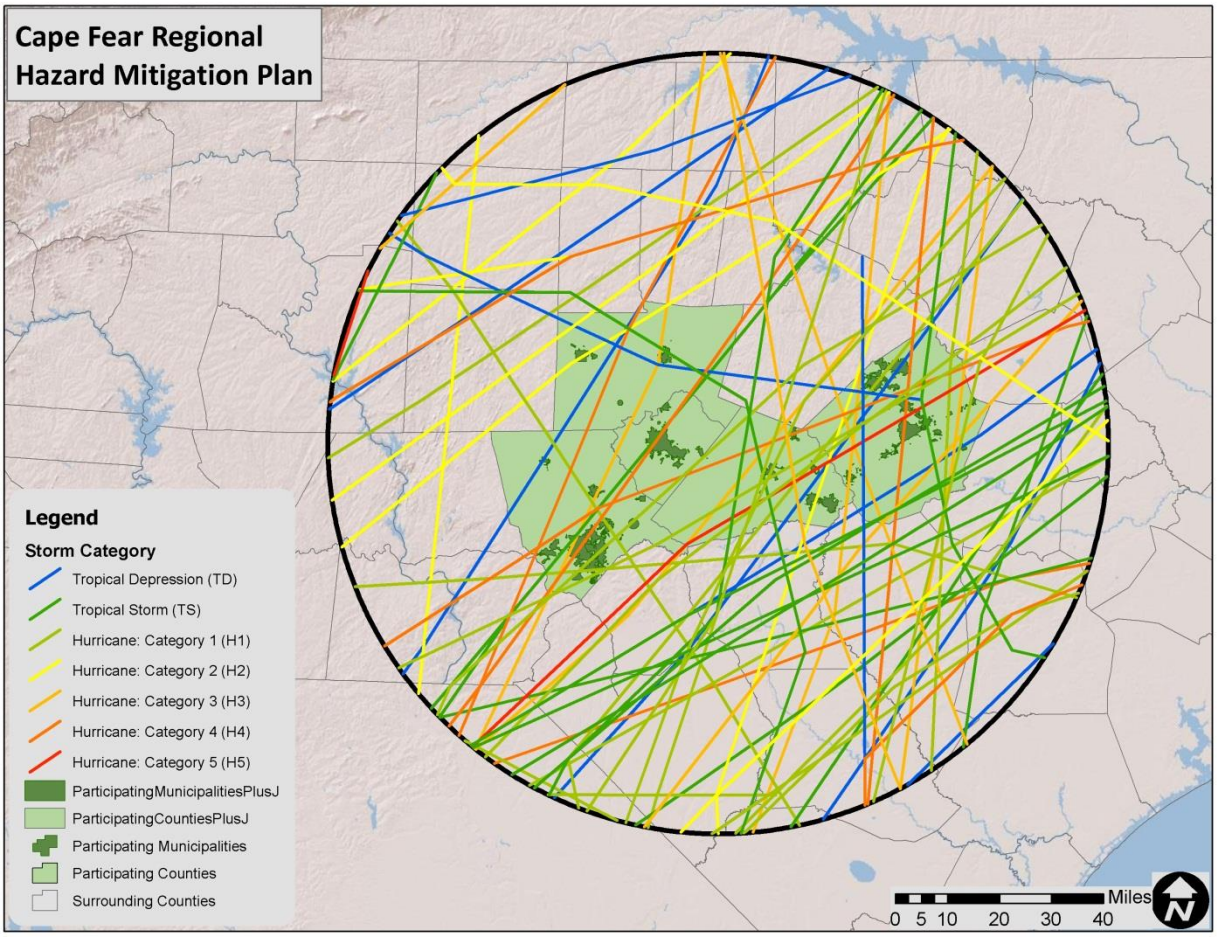
Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Lee County. The entire county is equally susceptible to hurricane and tropical storms.

Historical Occurrences

According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[2] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

Of the recorded storm events, 6 have traversed directly through Lee County as shown in **Figure D.2**. **Table D.9** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cape Fear Region) and Maximum Category of the storm based on the Saffir-Simpson Scale for each event.

FIGURE D.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

TABLE D.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center has reported four events associated with a hurricane or tropical storm in Lee County since 1996. These storms are listed in **Table D.10** and are generally representative of storms with the greatest impact on the county over that time period.

TABLE D.10: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN LEE COUNTY

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$645,322,144

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that two disaster declarations were made in 1996 (Hurricane Fran) and 1999 (Hurricane Floyd) for the county.[3]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in Lee County as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Tropical Storm Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

Probability of Future Occurrences
Given the inland location of the county, Lee County is less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the county's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historic evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. When the county is impacted, the damage could be significant, threatening lives and property throughout the planning area.

D.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Lee County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been two recorded lightning events in Lee County since 2005, as listed in summary **Table D.11**.[4] These events resulted in almost $141,000 (2013 dollars) in damages. A complete listing of those events can be found in **Table D.12**. Many of the

[3] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[4] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in Lee County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE D.11: SUMMARY OF LIGHTNING OCCURRENCES IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	0	0/0	$0
Sanford	1	0/0	$119,178
Unincorporated Area	1	0/0	$21,390
LEE COUNTY TOTAL	**2**	**0/0**	**$140,568**

Source: National Climatic Data Center

TABLE D.12: HISTORIC LIGHTNING OCCURRENCES IN LEE COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Broadway				
None Reported	--	--	--	--
Sanford				
Sanford	7/17/05	0/0	$119,178	Lightning struck a home in Sanford as storms passed just north of town. The lightning strike initiated a fire in the crawl space which consumed the home. No one was in the house at the time of the fire.
Unincorporated Area				
Northview	6/29/10	0/0	$21,390	Lightning struck a barn outside of Sanford, NC. The barn was declared a total loss as result of the fire.

*Property Damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Lee County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Lee County is located in an area of the country that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

D.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most

common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Lee County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Lee County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms were at least partially responsible for one disaster declaration in Lee County in 2011.[5] According to NCDC, there have been 86 reported thunderstorm wind and high wind events since 1963 in Lee County.[6] These events caused just over $364,000 (2013 dollars) in damages. There were also reports of one injury. **Table D.13** summarizes this information. **Table D.14** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.[7]

TABLE D.13: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	7	0/0	$0
Sanford	27	0/0	$313,413
Unincorporated Area	52	0/1	$50,643
LEE COUNTY TOTAL	**86**	**0/1**	**$364,056**

Source: National Climatic Data Center

TABLE D.14: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN LEE COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Broadway					
BROADWAY	6/24/1996	TSTM WIND	0 kts.	0/0	$0
BROADWAY	8/14/1999	TSTM WIND	0 kts.	0/0	$0
BROADWAY	7/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BROADWAY	7/31/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
BROADWAY	7/13/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
BROADWAY	6/21/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
BROADWAY	6/27/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
Sanford					
Sanford	11/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$0
SANFORD	5/7/1998	TSTM WIND	58 kts.	0/0	$0
SANFORD	6/2/1998	TSTM WIND	50 kts.	0/0	$0
SANFORD	6/3/1998	TSTM WIND	50 kts.	0/0	$0
SANFORD	7/22/1998	TSTM WIND	50 kts.	0/0	$307,252
SANFORD	3/26/2000	TSTM WIND	50 kts.	0/0	$0

[5] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[6] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional thunderstorm events have occurred in Lee County. As additional local data becomes available, this hazard profile will be amended.
[7] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
SANFORD	6/1/2001	TSTM WIND	70 kts.	0/0	$0
SANFORD	5/13/2002	TSTM WIND	50 kts.	0/0	$0
SANFORD	3/8/2005	TSTM WIND	50 kts.	0/0	$0
SANFORD	7/7/2005	TSTM WIND	50 kts.	0/0	$0
SANFORD	4/3/2006	TSTM WIND	50 kts.	0/0	$0
SANFORD	5/14/2006	TSTM WIND	50 kts.	0/0	$0
SANFORD	5/14/2006	TSTM WIND	50 kts.	0/0	$0
SANFORD	11/16/2006	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	6/27/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	7/27/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$1,087
SANFORD	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	8/22/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	6/18/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD	8/8/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
Unincorporated Area					
Lee County	6/20/1963	TSTM WIND	0 kts.	0/0	$0
Lee County	5/28/1964	TSTM WIND	51 kts.	0/0	$0
Lee County	6/20/1969	TSTM WIND	0 kts.	0/0	$0
Lee County	5/28/1973	TSTM WIND	0 kts.	0/0	$0
Lee County	6/16/1974	TSTM WIND	0 kts.	0/0	$0
Lee County	5/13/1978	TSTM WIND	0 kts.	0/0	$0
Lee County	3/20/1984	TSTM WIND	0 kts.	0/0	$0
Lee County	7/6/1984	TSTM WIND	0 kts.	0/0	$0
Lee County	7/17/1984	TSTM WIND	0 kts.	0/0	$0
Lee County	7/1/1986	TSTM WIND	0 kts.	0/0	$0
Lee County	7/26/1986	TSTM WIND	0 kts.	0/0	$0
Lee County	8/29/1987	TSTM WIND	0 kts.	0/0	$0
Lee County	5/24/1988	TSTM WIND	0 kts.	0/0	$0
Lee County	6/9/1988	TSTM WIND	0 kts.	0/0	$0
Lee County	6/26/1988	TSTM WIND	0 kts.	0/0	$0
Lee County	7/28/1988	TSTM WIND	0 kts.	0/0	$0
Lee County	2/21/1989	TSTM WIND	0 kts.	0/0	$0
Lee County	5/5/1989	TSTM WIND	0 kts.	0/0	$0
Lee County	6/16/1989	TSTM WIND	0 kts.	0/0	$0
Lee County	7/12/1989	TSTM WIND	0 kts.	0/0	$0
Lee County	5/2/1990	TSTM WIND	0 kts.	0/1	$0
Lee County	3/29/1991	TSTM WIND	0 kts.	0/0	$0
Lee County	3/19/1992	TSTM WIND	0 kts.	0/0	$0
Nr Sanford	3/8/1995	THUNDERSTORM WINDS	0 kts.	0/0	$4,587

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
COUNTYWIDE	1/19/1996	TSTM WIND	0 kts.	0/0	$0
CAPE FEAR	5/24/1996	TSTM WIND	0 kts.	0/0	$0
Lee County	2/16/1998	HIGH WIND	52 kts.	0/0	$0
TRAMWAY	11/11/2002	TSTM WIND	50 kts.	0/0	$0
Lee County	3/7/2004	HIGH WIND	65 kts.	0/0	$6,446
ROSSER	7/11/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
TRAMWAY	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
LEMON SPGS	8/7/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
COLON	8/10/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
ROSSER	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
CUMNOCK	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
CUMNOCK	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
COLON	7/17/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
LEMON SPGS	6/10/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
LEMON SPGS	6/10/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SWANN	6/10/2011	THUNDERSTORM WIND	50 kts.	0/0	$25,908
TRAMWAY	6/18/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD MUNI ARPT	6/21/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
OSGOOD	6/27/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
TRAMWAY	6/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SANFORD MUNI ARPT	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SWANN	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
NORTHVIEW	7/24/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
COLON	6/22/2012	THUNDERSTORM WIND	50 kts.	0/0	$3,045
SANFORD MUNI ARPT	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
JONESBORO	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$10,150
JONESBORO	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$508
LEMON SPGS	8/17/2012	THUNDERSTORM WIND	50 kts.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

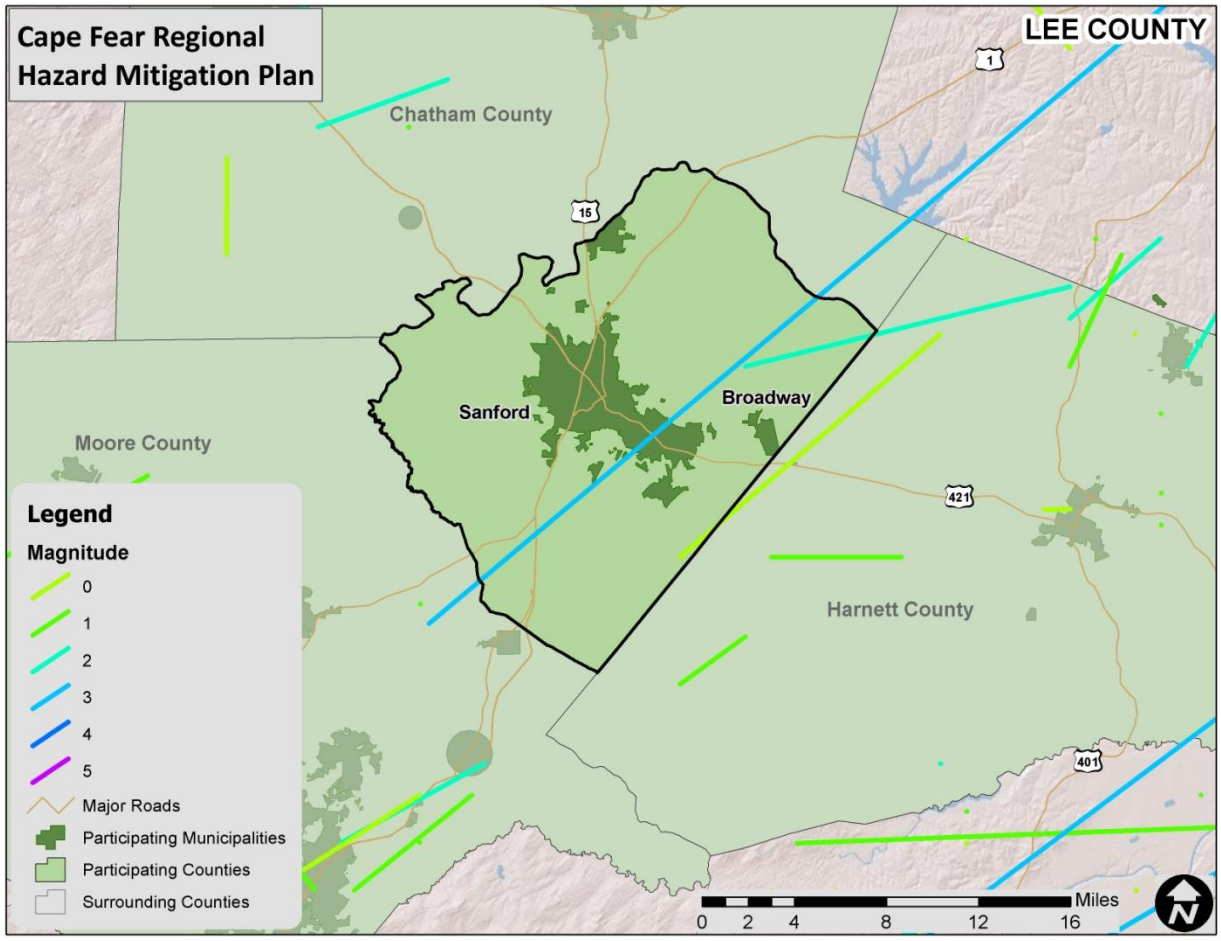
D.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Lee County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Lee County is uniformly exposed to this hazard. With that in mind, Figure **D.3** shows tornado track data for many of the major tornado events that have impacted the county.

While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE D.3: HISTORICAL TORNADO TRACKS IN LEE COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes were at least partially responsible for one disaster declaration in Lee County in 2011.[8] According to the National Climatic Data Center, there have been a total of four recorded tornado events in the Lee County since 1956 (**Table D.15**), resulting in almost $59.3 million (2013 dollars) in property damages.[9] In addition, 2 fatalities and 36 injuries were reported (**Table D.16**). The magnitude of these tornadoes ranges from F0 to F3 in intensity, although an F4 or F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 57 years.

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[9] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in Lee County. As additional local data becomes available, this hazard profile will be amended.

TABLE D.15: SUMMARY OF TORNADO OCCURRENCES IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	1	0/0	$0
Sanford	0	0/0	$0
Unincorporated Area	3	2/36	$59,284,498
LEE COUNTY TOTAL	**4**	**2/36**	**$59,284,498**

Source: National Climatic Data Center

TABLE D.16: HISTORICAL TORNADO IMPACTS IN LEE COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Broadway					
BROADWAY	5/14/2006	F1	0/0	$0	STORM SURVEY FOUND WIDESPREAD TREE DAMAGE BEGINNING AT INTERSECTION OF DALRMPLE AND SALEM CHURCH ROAD...CONTINUE NE THROUGH A HEAVILY WOODED AREA...LIFTING JUST BEFORE COPELAND ROAD. THERE WAS ONLY MINOR STRUCTURAL DAMAGE.
Sanford					
None Reported	--	--	--	--	--
Unincorporated Area					
Lee County	4/6/1956	F2	0/0	$214,543	
WHITE HILL	9/8/2004	F0	0/0	$0	A tornado touched down along South Plank Road on the Moore/Lee County Line, damaging the roof on a home.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
WHITE HILL	4/16/2011	F3	2/36	$59,069,955	The tornado exited Moore County and proceeded to strengthen to an EF1 as it moved into Lee County along Wildlife Road. The tornado blew a single wide trailer off its foundation, while also damaging the home next door. The tornado continued to intensify to EF3 intensity along Lemon Springs Road striking the St. Andrews Subdivision. One fatality occurred when a tree fell onto a vehicle along Lemon Springs Road, crushing the driver. Numerous homes were completely destroyed and several two story homes had their upper floors removed. Wind speeds were estimated at 140 mph with a path length of over one quarter mile. Additional homes were blown off their foundations on Cemetery Drive. The tornado continued to produce major damage as it moved east along Cameron drive. The upper floor was blown off of two apartment buildings. The tornado then entered an industrial complex along Industrial Drive, where multiple steel constructed retail buildings were destroyed, in addition to 3 large warehouses at the static control facility. Winds In this area likely exceeded 160 mph. The tornado then destroyed the Tractor Supply Company, Big Lots and the Lowes Home Improvement Store along highway 421. Winds in this area were estimated around 140 mph. Two homes were blown off their foundations along Rice Road, north of NC Highway 42. Another fatality occurred along Poplar Spring Church Road when a mobile home was lifted off the ground and then thrown into the woods and destroyed. In total, 457 homes were damaged with 116 homes being destroyed. Seventeen businesses were damaged as well. The tornado continued northeast along Avent Ferry Road, crossing into Chatham County, just east of Harris Lake.

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Lee County experience a direct tornado strike. The probability of future tornado occurrences affecting Lee County is likely (10 to 100 percent annual probability).

D.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States 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. Lee County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in four disaster declarations in Lee County. This includes severe ice storms in 1968 and 2002, the Blizzard of 1996, and a severe winter storm in 2000.[10] According to the National Climatic Data Center, there have been a total of 23 recorded winter storm events in Lee County since 1993 (**Table D.17**).[11] These events resulted in almost $807,000 (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table D.18**.

TABLE D.17: SUMMARY OF WINTER STORM EVENTS IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lee County	23	0/0	$806,869

Source: National Climatic Data Center

TABLE D.18: HISTORICAL WINTER STORM IMPACTS IN LEE COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Broadway				
None Reported	--	--	--	--
Sanford				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	3/12/1993	WINTER STORM	2/10†	$806,869
LEE COUNTY	1/6/1996	ICE STORM	0/0	$0

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[11] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional winter storm conditions have affected Lee County.
[12] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
LEE COUNTY	1/11/1996	ICE STORM	0/0	$0
LEE COUNTY	2/2/1996	ICE STORM	0/0	$0
LEE COUNTY	2/16/1996	HEAVY SNOW	0/0	$0
LEE COUNTY	1/19/1998	HEAVY SNOW	0/0	$0
LEE COUNTY	12/23/1998	ICE STORM	0/0	$0
LEE COUNTY	1/18/2000	WINTER STORM	0/0	$0
LEE COUNTY	1/20/2000	WINTER STORM	0/0	$0
LEE COUNTY	1/22/2000	WINTER STORM	0/0	$0
LEE COUNTY	1/24/2000	WINTER STORM	0/0	$0
LEE COUNTY	1/28/2000	WINTER STORM	0/0	$0
LEE COUNTY	11/19/2000	HEAVY SNOW	0/0	$0
LEE COUNTY	1/3/2002	WINTER STORM	0/0	$0
LEE COUNTY	12/4/2002	WINTER STORM	0/0	$0
LEE COUNTY	2/16/2003	WINTER STORM	0/0	$0
LEE COUNTY	1/26/2004	WINTER STORM	0/0	$0
LEE COUNTY	2/26/2004	WINTER STORM	0/0	$0
LEE COUNTY	12/26/2004	WINTER STORM	0/0	$0
LEE COUNTY	1/17/2008	WINTER WEATHER	0/0	$0
LEE COUNTY	1/19/2008	WINTER WEATHER	0/0	$0
LEE COUNTY	1/19/2008	WINTER STORM	0/0	$0
LEE COUNTY	1/29/2010	WINTER STORM	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
†Deaths/injuries were not reported at the county level; potentially outside of the county.
Source: National Climatic Data Center

There have been several severe winter weather events in Lee County. The text below describes two of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

Probability of Future Occurrences

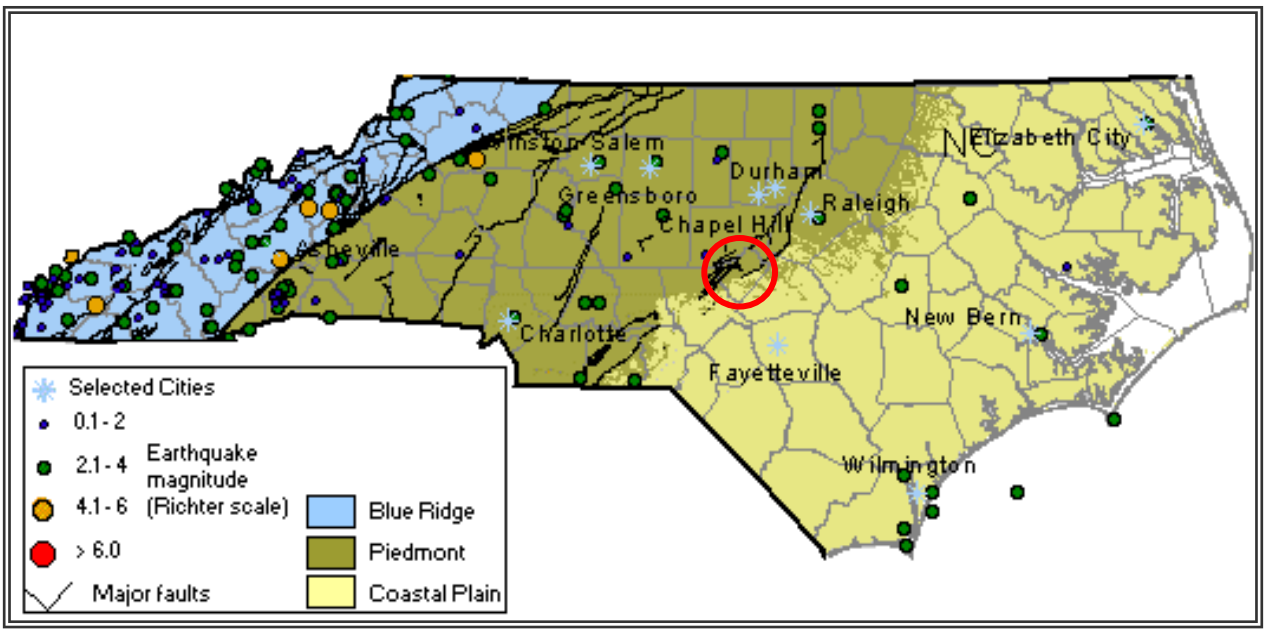
Winter storm events will remain a regular occurrence in Lee County. According to historical information, Lee County generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

D.2.9 Earthquake

Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure D.4** is a map showing geological and seismic information for North Carolina.

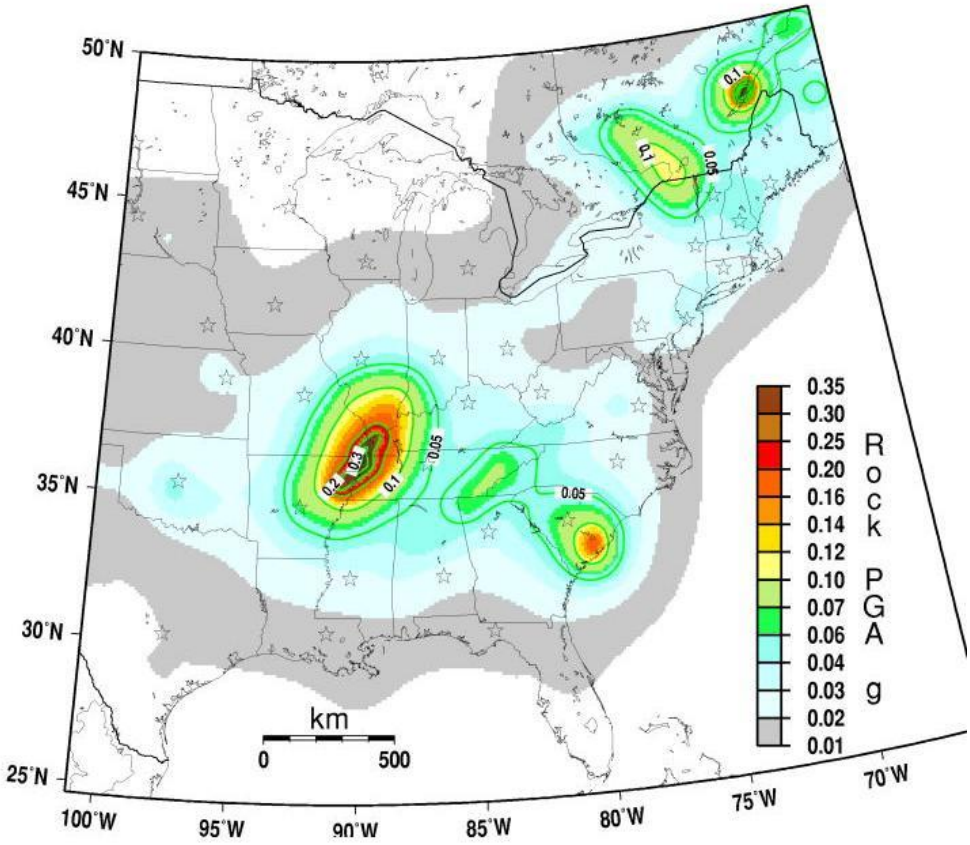
FIGURE D.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure D.5 shows the intensity level associated with Lee County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Lee County lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the county exists within an area of low to moderate seismic risk.

FIGURE D.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: United States Geological Survey, 2008

Historical Occurrences

At least one earthquake is known to have affected Lee County since 1886. It measured a V on the Modified Mercalli Intensity (MMI) scale. **Table D.19** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table D.20** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE D.19: SUMMARY OF SEISMIC ACTIVITY IN LEE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Broadway	0	--	--
Sanford	0	--	--
Unincorporated Area	1	V	< 4.8
LEE COUNTY TOTAL	**1**	**V**	**< 4.8**

Source: National Geophysical Data Center

[13] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

TABLE D.20: SIGNIFICANT SEISMIC EVENTS IN LEE COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Broadway				
None Reported	--	--	--	--
Sanford				
None Reported	--	--	--	--
Unincorporated Area				
Jonesboro	9/1/1886	295.0 km	--	V

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Lee County is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 percent (unlikely).

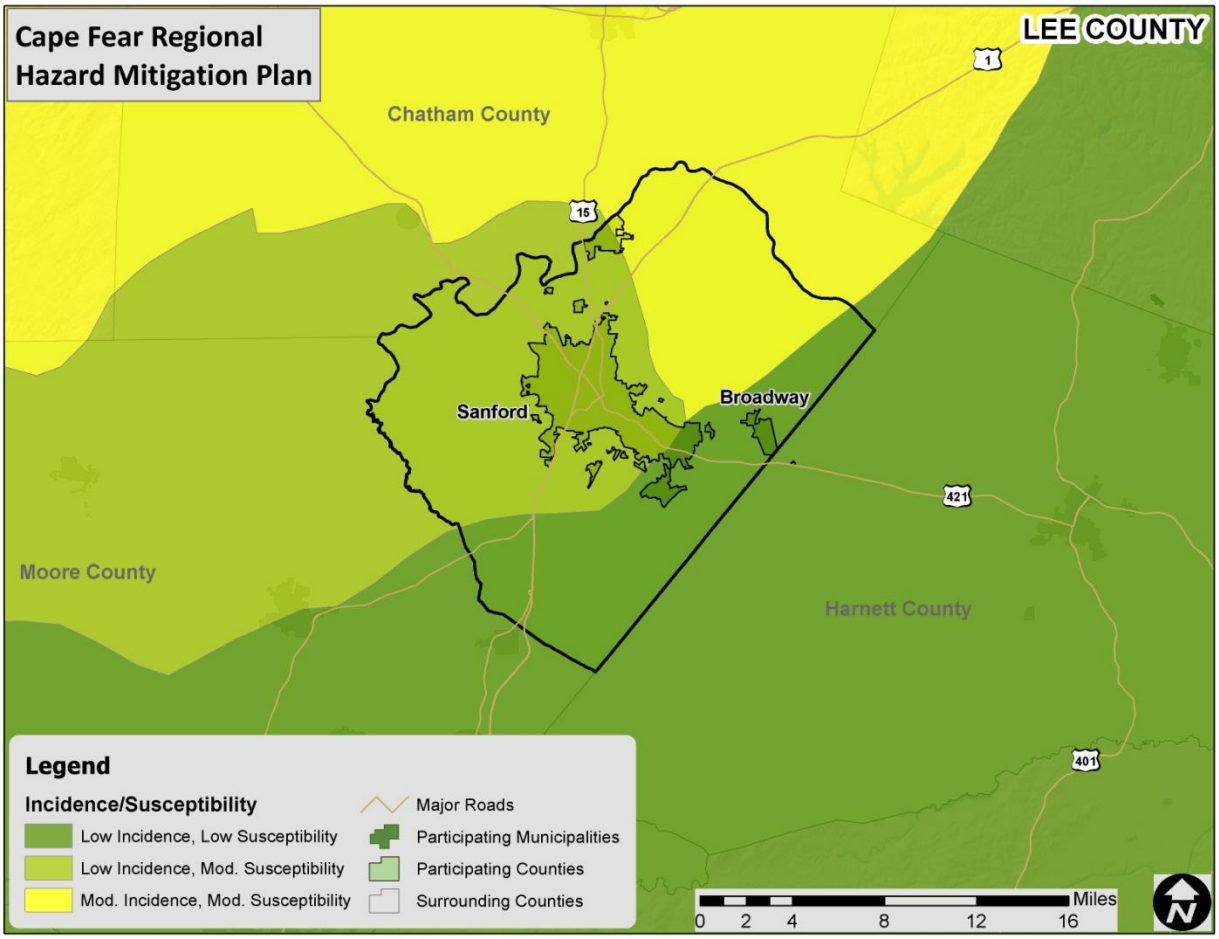
D.2.10 Landslide

Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout Lee County.

According to **Figure D.6** below, the northeast corner of the county has moderate landslide activity. The remaining portion of the county, along the east and west county boundaries, has a low incidence occurrence rate. There is moderate susceptibility throughout the majority county.

FIGURE D.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF LEE COUNTY

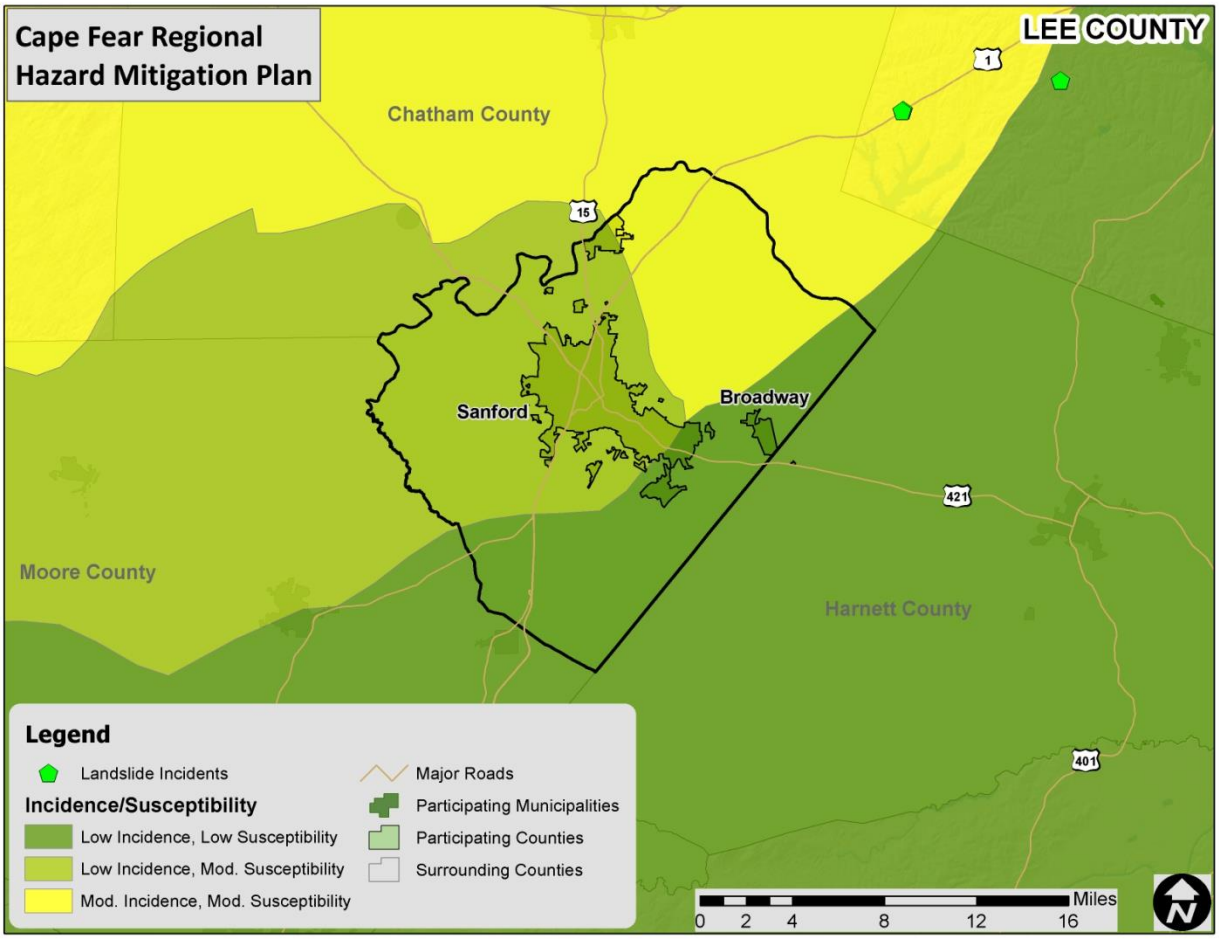


Source: United States Geological Survey

Historical Occurrences

Some areas of Lee County are moderately susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the county, it should be noted that the North Carolina Geological Survey emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The locations of landslide events that occurred nearby the county are presented in **Figure D.7**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE D.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN LEE COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Lee County have greater risk than others given factors such as steepness on slope and modification of slopes.

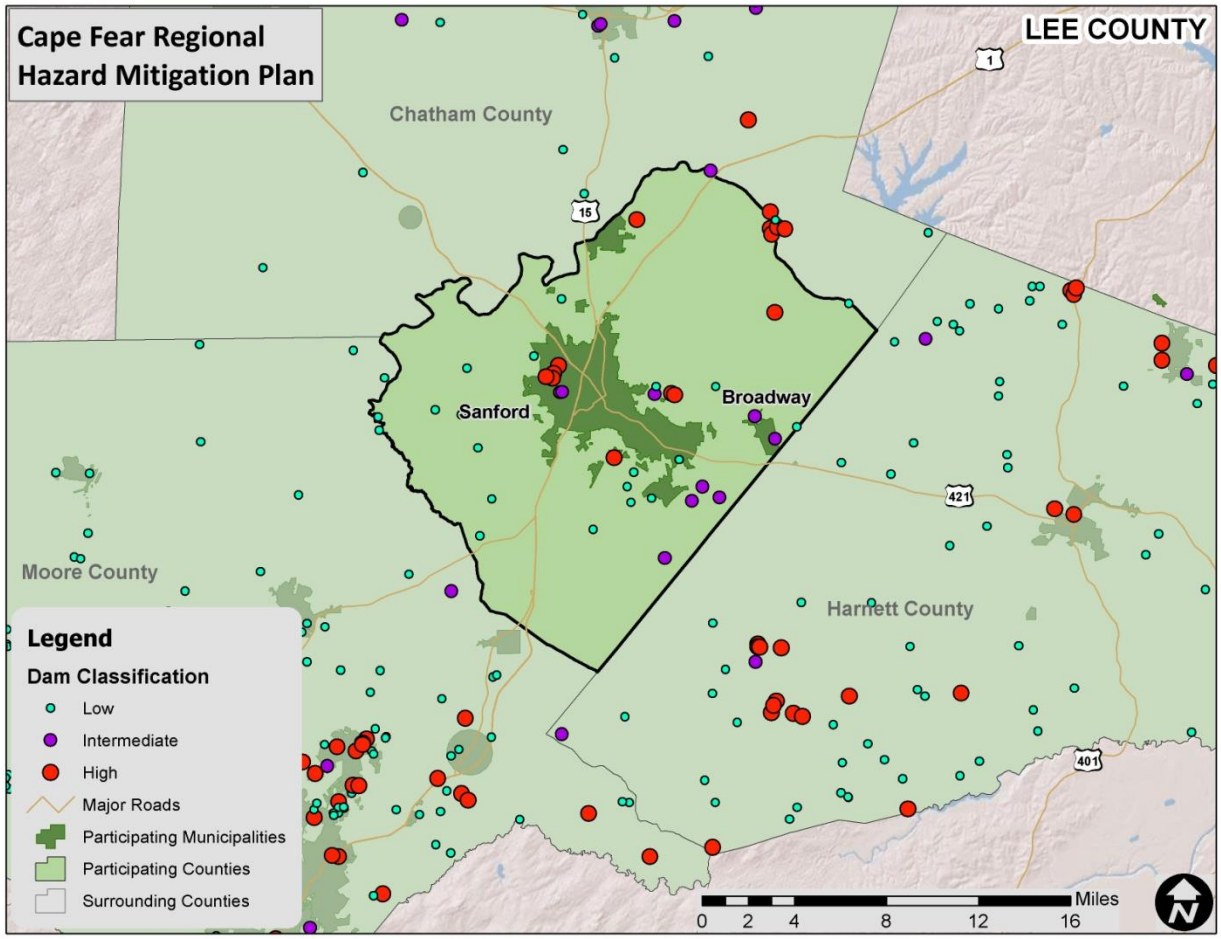
D.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 36 dams in Lee County.[14] **Figure D.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, nine are classified as high hazard potential. These high hazard dams are listed in **Table D.21**.

[14] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE D.8: LEE COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

TABLE D.21: LEE COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Lee County				
San-Lee Park Dam	High	7.0	95	Local Gov
Holiday Lake Dam Lower	High	0.0	104	Private
Holiday Lake Dam Upper	High		200	Private
New Johnson Pond Dam	High	4.1	79	
Sanford Raw Water Reservoir	High	15.0	234	Local Gov
Ashmore Lake Dam	High	0.0	57	
San-Lee Park Upper Dam	High	6.5	46	Local Gov
Cedar Lake Dam	High		22	
Hall Pond Dam	High	3.0	18	Private

Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been no dam breaches reported in Lee County. However, several breach scenarios in the county could be catastrophic.

The information below identifies additional historical information reported in the previous county hazard mitigation plan.

Lee County

No information on past dam failure events in the county was provided.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

D.2.12 Erosion

Location and Spatial Extent

Erosion in Lee County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Lee County soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the county, particularly along the banks of rivers and streams, but it is not an extreme threat. No areas of concern were reported by the planning team.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Lee County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Little information could be found beyond the hazard mitigation plan; however, there was no recorded history of significant erosion events and it was found to be a hazard with a low potential impact.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Lee County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent).

D.2.13 Flood

Location and Spatial Extent

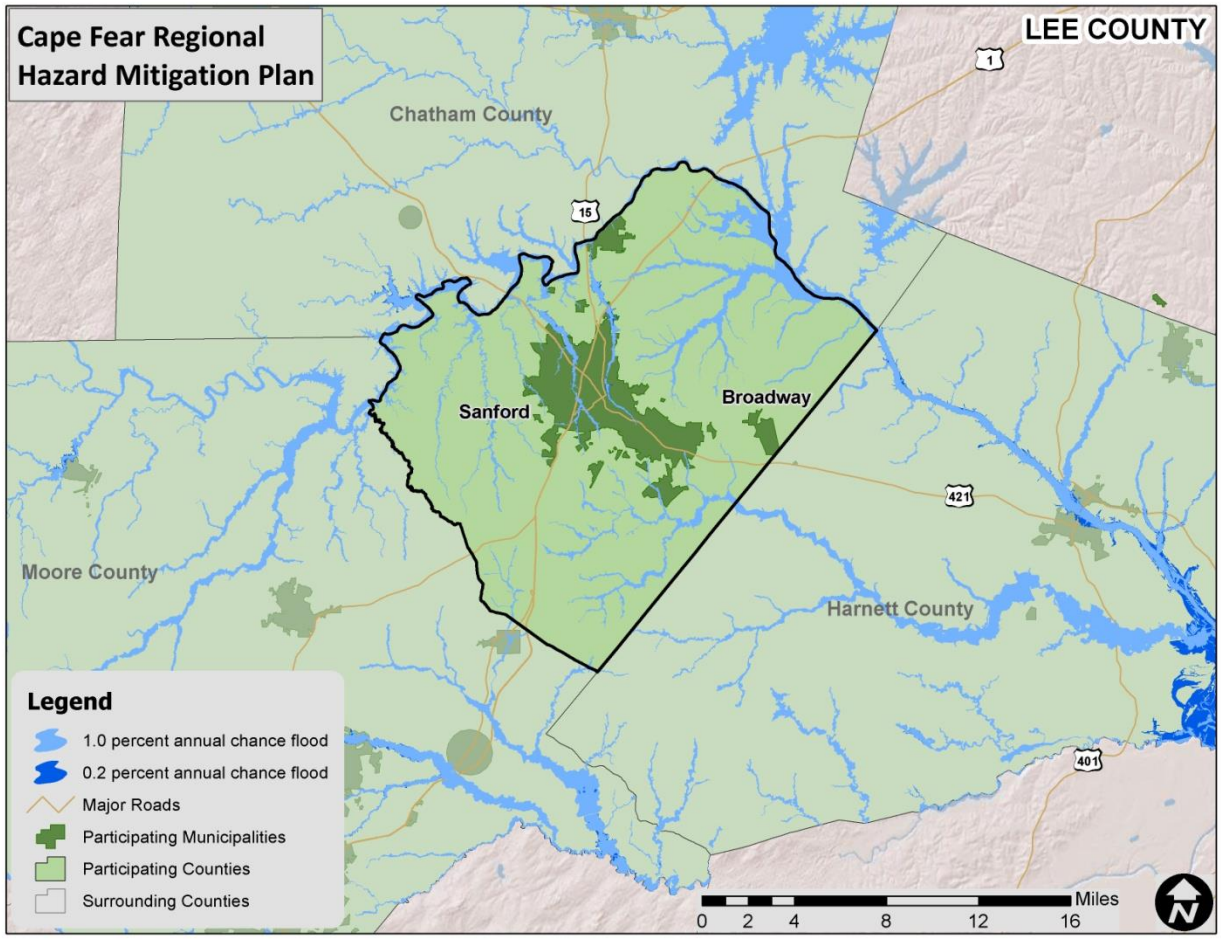
There are areas in Lee County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[15] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 259 square miles that make up Lee County, there are 24.5 square miles of land in

[15] The county-level DFIRM data used for Lee County were updated in 2009.

zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.3 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

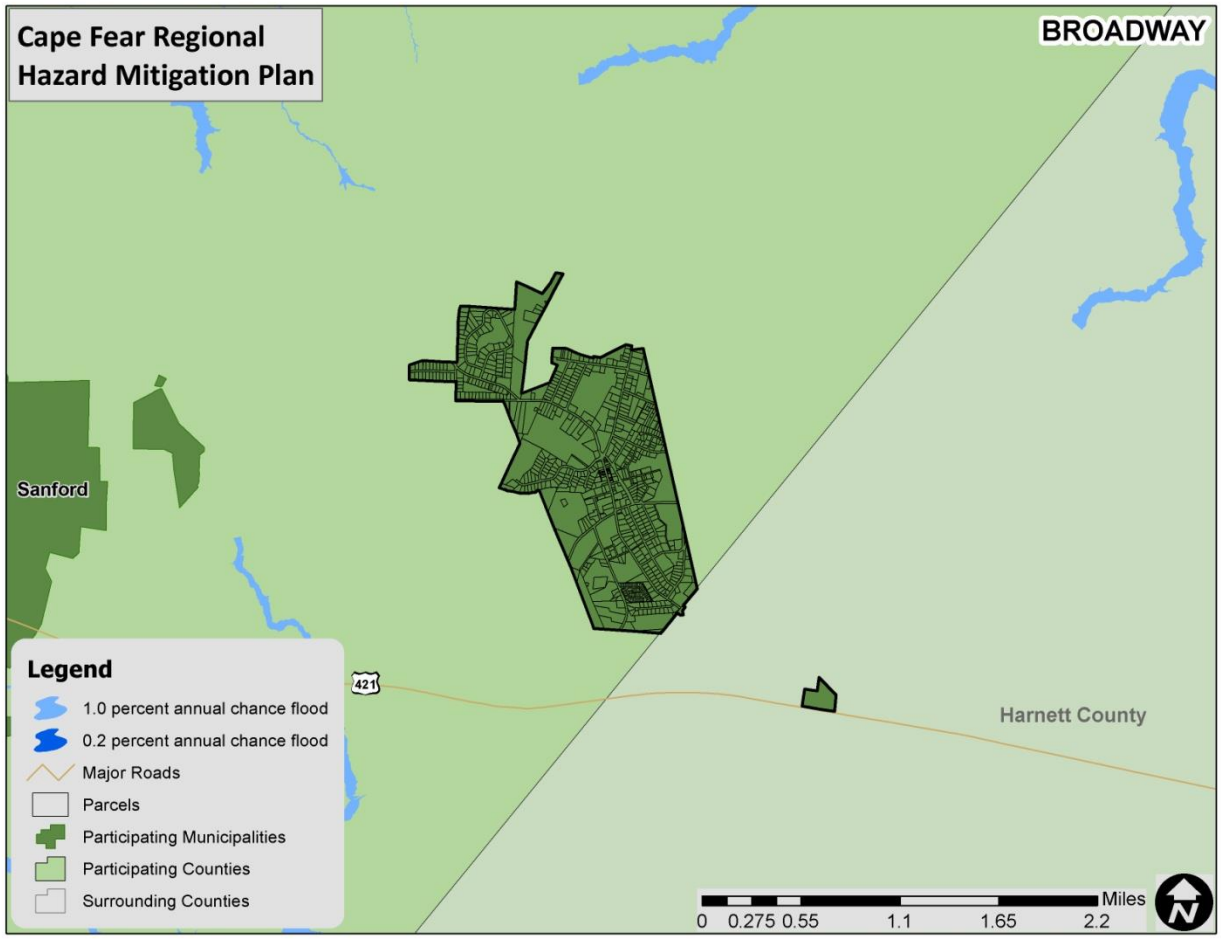
These flood zone values account for 9.6 percent of the total land area in Lee County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure D.9**, **Figure D.10**, and **Figure D.11** illustrate the location and extent of currently mapped special flood hazard areas for Lee County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE D.9: SPECIAL FLOOD HAZARD AREAS IN LEE COUNTY



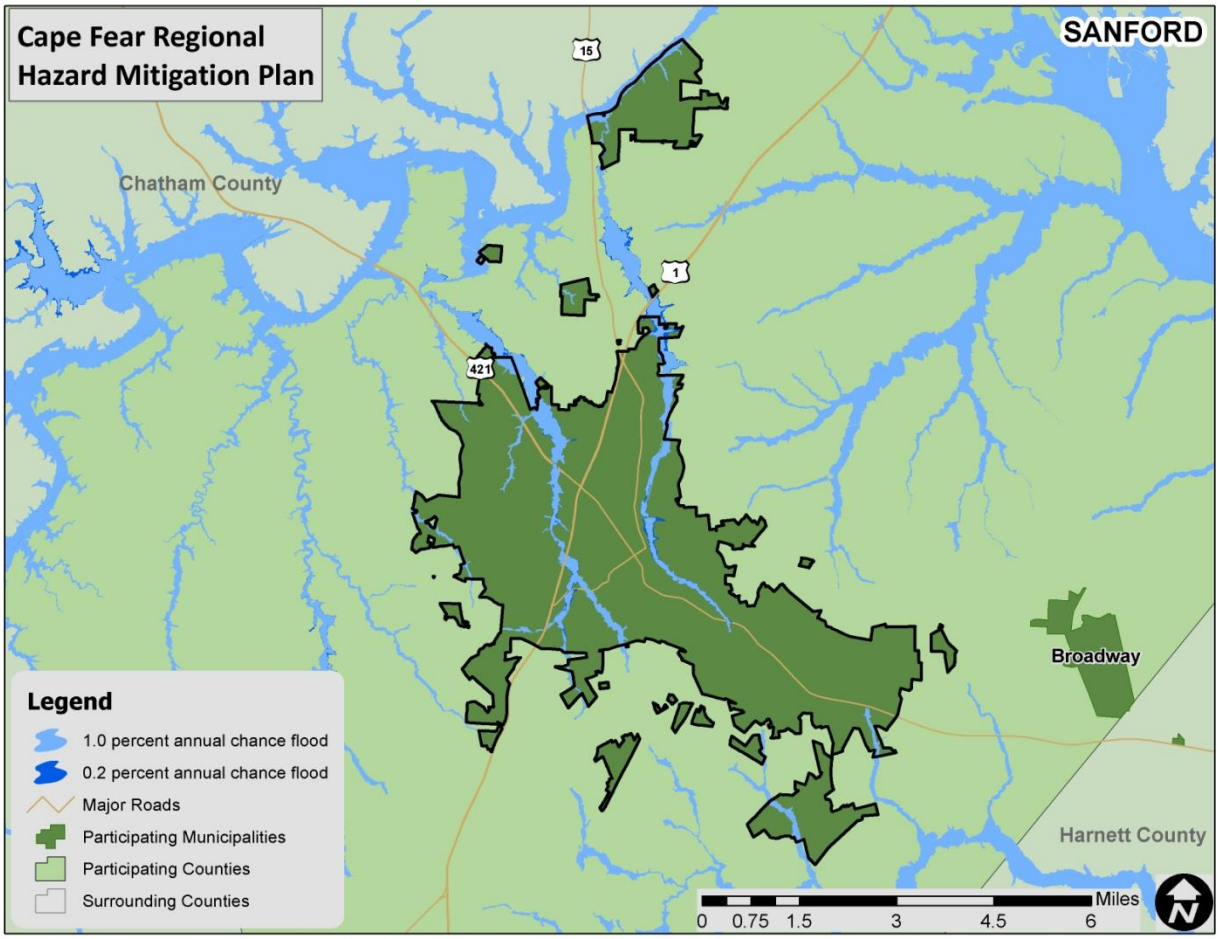
Source: Federal Emergency Management Agency

FIGURE D.10: SPECIAL FLOOD HAZARD AREAS IN BROADWAY



Source: Federal Emergency Management Agency

FIGURE D.11: SPECIAL FLOOD HAZARD AREAS IN SANFORD



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding was at least partially responsible for one disaster declaration in Lee County in 2011.[16] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 19 events in Lee County since 1993.[17] A summary of these events is presented in **Table D.22**. These events did not result in any recorded monetary property damages in the county; however, there was one injury reported.[18] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table D.23**.

[16]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[17] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[18] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

TABLE D.22: SUMMARY OF FLOOD OCCURRENCES IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	0	0/0	$0
Sanford	7	0/0	$0
Unincorporated Area	12	0/1	$0
LEE COUNTY TOTAL	**19**	**0/1**	**$0**

Source: National Climatic Data Center

TABLE D.23: HISTORICAL FLOOD EVENTS IN LEE COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Broadway				
None Reported	--	--	--	--
Sanford				
Sanford	8/27/1995	FLASH FLOOD	0/0	$0
SANFORD	6/1/2001	FLASH FLOOD	0/0	$0
SANFORD	6/13/2001	FLASH FLOOD	0/0	$0
SANFORD	8/8/2003	FLASH FLOOD	0/0	$0
SANFORD	6/4/2004	FLASH FLOOD	0/0	$0
SANFORD	8/27/2008	FLASH FLOOD	0/0	$0
SANFORD	9/6/2008	FLASH FLOOD	0/0	$0
Unincorporated Area				
Lee County	3/23/1993	FLASH FLOODS	0/0	$0
Cleveland	8/27/1995	FLASH FLOODING	0/1	$0
NRN PART	9/10/1996	FLASH FLOOD	0/0	$0
COUNTYWIDE	7/23/1997	FLASH FLOOD	0/0	$0
COUNTYWIDE	7/24/1997	FLASH FLOOD	0/0	$0
Lee County	1/27/1998	FLOOD	0/0	$0
Lee County	2/4/1998	FLOOD	0/0	$0
COUNTYWIDE	9/16/1999	FLASH FLOOD	0/0	$0
NORTH PORTION	7/4/2001	FLASH FLOOD	0/0	$0
Lee County	4/10/2003	FLOOD	0/0	$0
COUNTYWIDE	6/14/2006	FLASH FLOOD	0/0	$0
OSGOOD	7/27/2010	FLASH FLOOD	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been 14 flood losses reported in Lee County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $172,000 in claims payments. A summary of these figures for the county is provided in **Table D.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Lee County were either uninsured, denied claims payment, or not reported.

TABLE D.24: SUMMARY OF INSURED FLOOD LOSSES IN LEE COUNTY

Location	Flood Losses	Claims Payments
Broadway	0	$0
Sanford	7	$60,597
Unincorporated Area	7	$111,156
LEE COUNTY TOTAL	**14**	**$171,753**

Source: Federal Emergency Management Agency, National Flood Insurance Program

Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

As of July 2013, there are no non-mitigated repetitive loss properties located in Lee County. **Table D.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Lee County.

TABLE D.25: REPETITIVE LOSS PROPERTIES IN LEE COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Broadway	0	--	0	$0	$0	$0	$0
Sanford	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
LEE COUNTY TOTAL	**0**		**0**	**$0**	**$0**	**$0**	**$0**

Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Lee County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

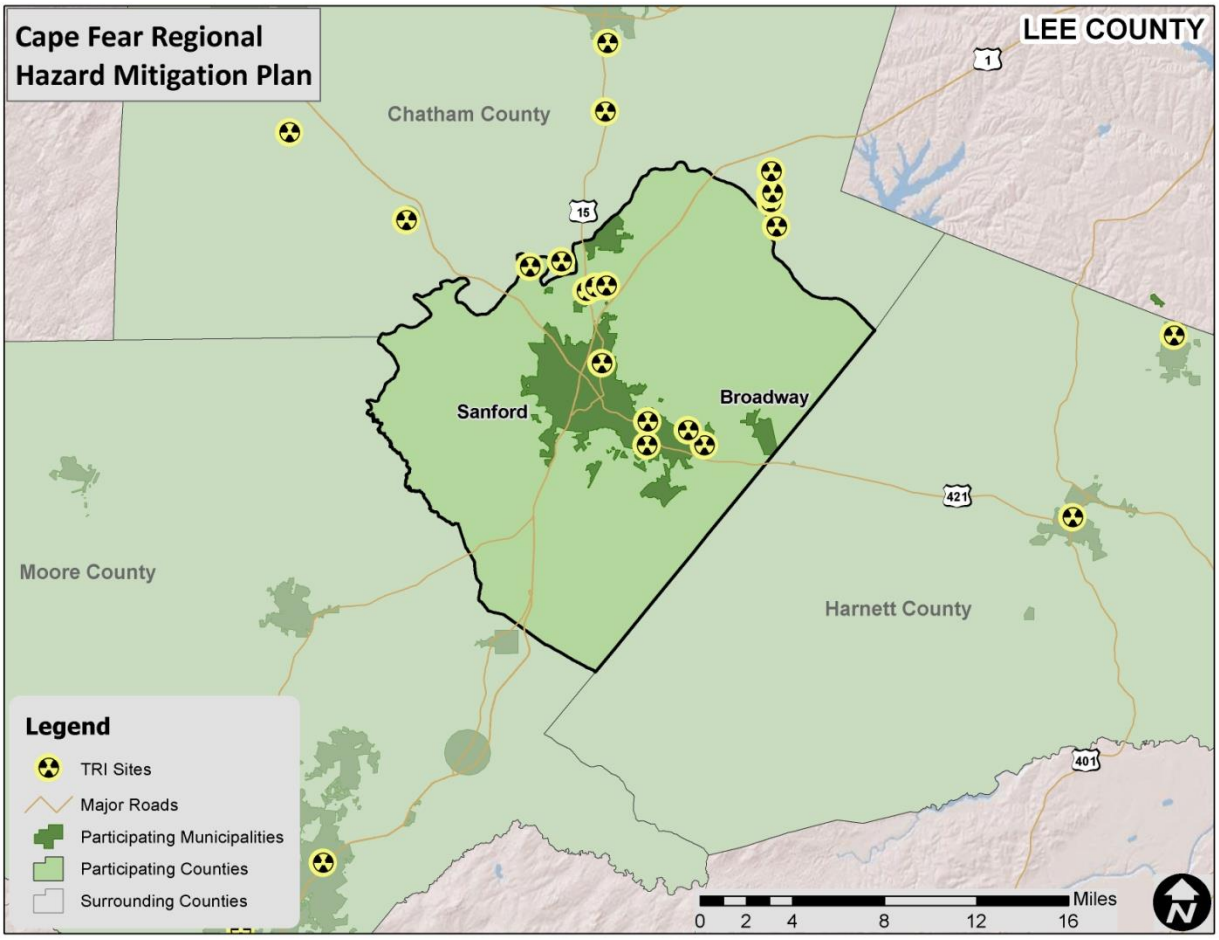
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Sanford has more floodplain and thus a higher risk of flood than Broadway. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

D.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Lee County has nine TRI sites. These sites are shown in **Figure D.12.**

FIGURE D.12: TOXIC RELEASE INVENTORY (TRI) SITES IN LEE COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 32 recorded HAZMAT incidents in Lee County since 1971 (**Table D.26**). These events resulted in almost $1,700 (2013 dollars) in property damage as well as one injury. **Table D.27** presents detailed information on historic HAZMAT incidents in Lee County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE D.26: SUMMARY OF HAZMAT INCIDENTS IN LEE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Broadway	1	0/0	$0
Sanford	30	0/1	$1,661
Unincorporated Area	1	0/0	$0

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
LEE COUNTY TOTAL	**32**	**0/1**	**$1,661**

Source: United StatesDepartment of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE D.27: HAZMAT INCIDENTS IN LEE COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Broadway							
E-2012090130	8/31/2012	BROADWAY	Highway	No	0/0	$0	20 LGA
Sanford							
I-1971090001	8/21/1971	SANFORD	Highway	Yes	0/0	$0	150 LGA
I-1975060282	5/29/1975	SANFORD	Highway	No	0/0	$0	0
I-1975070514	6/25/1975	SANFORD	Highway	No	0/0	$0	0
I-1975080748	8/14/1975	SANFORD	Highway	No	0/0	$0	0
I-1979100113	9/28/1979	SANFORD	Highway	No	0/0	$0	0
I-1980030047	2/13/1980	SANFORD	Highway	No	0/0	$0	20 LGA
I-1981020481	1/12/1981	SANFORD	Highway	No	0/0	$0	55 LGA
I-1981060327	6/2/1981	SANFORD	Highway	No	0/0	$0	18 LGA
I-1981060753	6/11/1981	SANFORD	Highway	Yes	0/0	$0	3,000 LGA
I-1982080204	7/25/1982	SANFORD	Highway	No	0/0	$0	0
I-1982080268	8/6/1982	SANFORD	Highway	No	0/0	$0	5 LGA
I-1982090285	8/10/1982	SANFORD	Highway	No	0/0	$0	35 LGA
I-1986090575	9/10/1986	SANFORD	Highway	No	0/1	$0	0.5 LGA
I-1986100403	10/7/1986	SANFORD	Highway	No	0/0	$0	1 LGA
I-1990070730	7/3/1990	SANFORD	Highway	No	0/0	$0	25 LGA
I-1991090864	9/18/1991	SANFORD	Highway	No	0/0	$0	3 LGA
I-1992090291	8/24/1992	SANFORD	Highway	No	0/0	$0	1 LGA
I-1992090749	9/7/1992	SANFORD	Highway	No	0/0	$1,661	15 LGA
I-1994020247	1/21/1994	SANFORD	Highway	No	0/0	$0	50 LGA
I-1995030730	2/20/1995	SANFORD	Highway	No	0/0	$0	55 LGA
I-1995101405	6/22/1995	SANFORD	Highway	No	0/0	$0	0.125 LGA
I-1996100353	9/8/1996	SANFORD	Highway	No	0/0	$0	5,383.2935GCF
I-1998071397	5/19/1998	SANFORD	Highway	No	0/0	$0	2 LGA
I-2003010511	12/23/2002	SANFORD	Highway	No	0/0	$0	5 LGA
I-2003030519	2/21/2003	SANFORD	Highway	No	0/0	$0	0.5 LGA
I-2003041327	4/4/2003	SANFORD	Highway	No	0/0	$0	1 SLB
I-2003041127	4/18/2003	SANFORD	Highway	No	0/0	$0	1 LGA
E-2006120085	11/8/2006	SANFORD	Highway	No	0/0	$0	0.25 LGA
E-2007030265	2/21/2007	SANFORD	Highway	No	0/0	$0	7 LGA
I-2009100095	8/24/2009	SANFORD	Highway	No	0/0	$0	28 LGA
Unincorporated Area							
I-1998030548	8/21/1971	ZEBULON	Highway	No	0/0	$0	2 LGA

*Property damage is reported in 2013 dollars.

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of nine toxic release inventory sites in Lee County and several roadway incidents, it is likely that a hazardous material incident may occur in the county (between 10 and 100 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

D.2.15 Wildfire

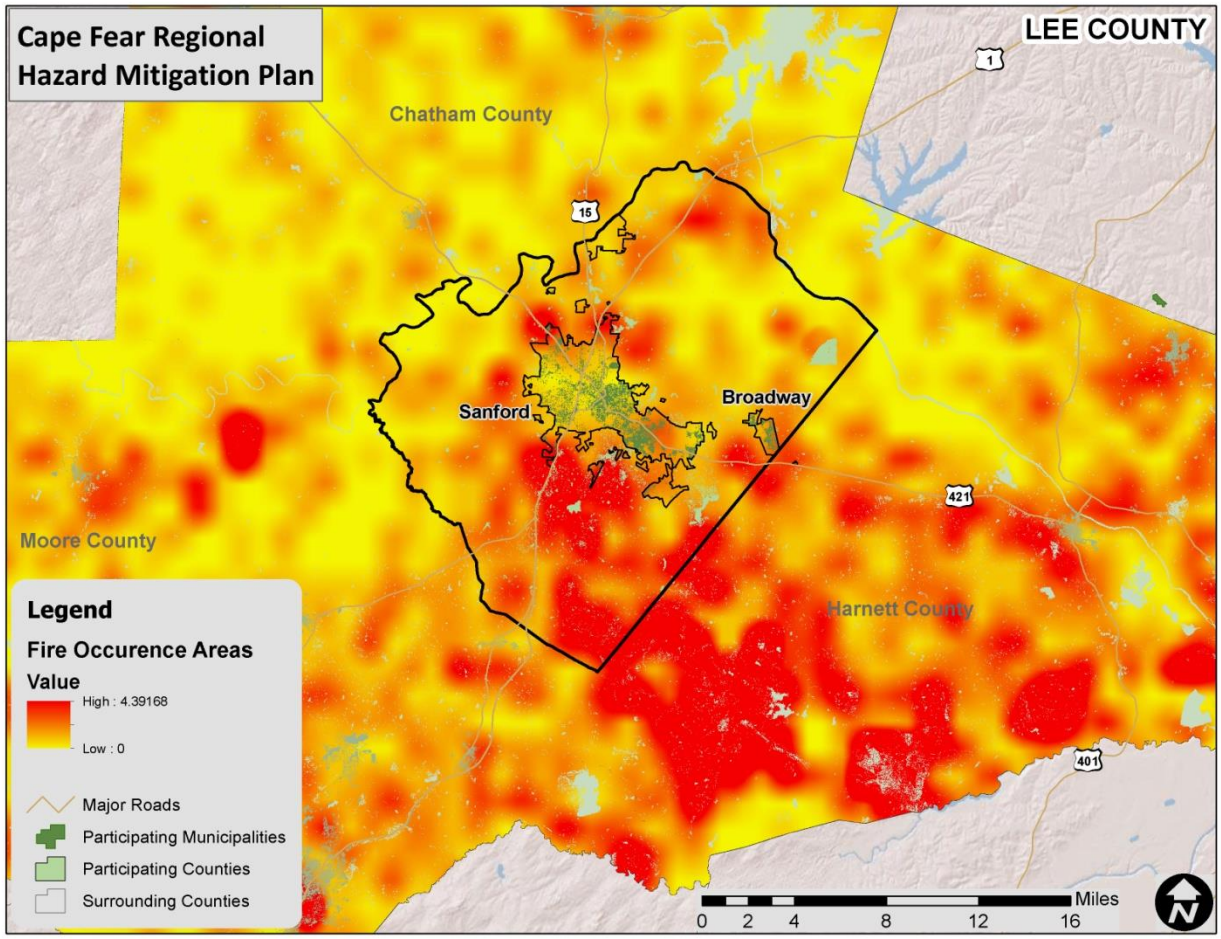
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic location.

Historical Occurrences

Figure D.13 shows the Fire Occurrence Areas (FOA) in Lee County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE D.13: HISTORIC WILDFIRE EVENTS IN LEE COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Lee County experienced an average of 67 wildfires annually which burn an average of 74 acres per year. The data indicates that most of these fires are small, averaging one acre per fire. **Table D.28** lists the number of reported wildfire occurrences in the county between the years 2003 and 2012.

TABLE D.28: HISTORICAL WILDFIRE OCCURRENCES IN LEE COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Lee County										
Number of Fires	44	60	73	53	96	44	55	74	106	62
Number of Acres	40.6	50.2	130.1	43.7	75.8	55.8	55.1	112.0	96.2	83.6

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Lee County. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due

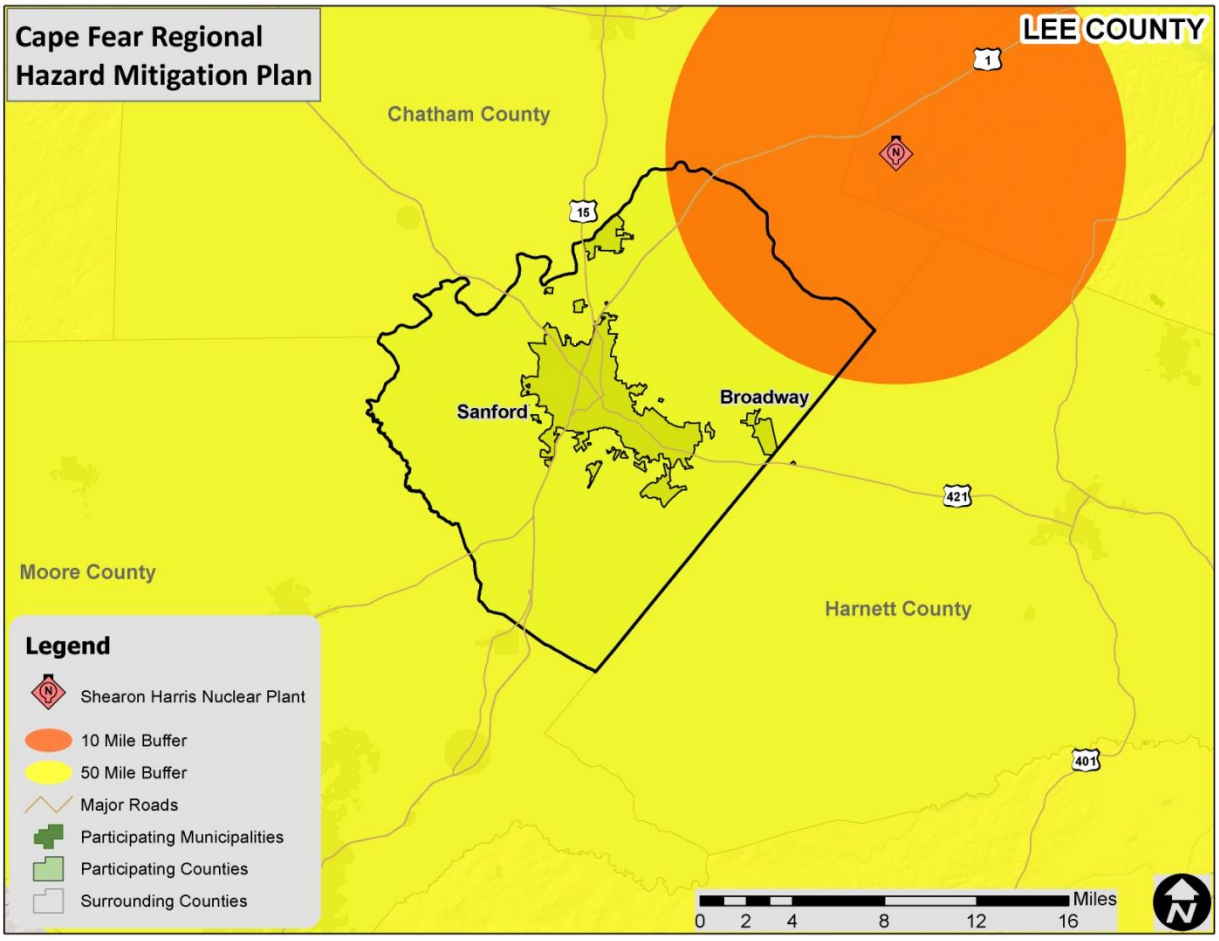
local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Lee County for future wildfire events is likely (10 to 100 percent annual probability).

D.2.16 Nuclear Accident

Location and Spatial Extent

The entire region is at risk to a nuclear incident. However, areas in the northeastern corner of the county are more susceptible due to their proximity to the Shearon Harris Nuclear Station. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure D.14**). All areas of the county that are not located within the 10 mile radius are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

FIGURE D. 14: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES IN LEE COUNTY



Source: International Atomic Energy Agency

Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986. There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.[19]

Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

[19] More information on Shearon Harris Emergency Declaration events can be found in Section 5: *Hazard Profiles*.

D.2.17 Terror Threat

Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table D.29** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE D.29 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

Although all critical facilities (see Section D.3.3) are at a heightened level of risk in Lee County, there are several that have been identified as the likely primary targets. These critical facilities include the Lee County Emergency Operations Center and Central Carolina Hospital.

Historical Occurrences

Although there have been no major terror events in Lee County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

Probability of Future Occurrences

Lee County has no recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

D.2.18 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table D.30 describes the extent of each natural hazard identified for Lee County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE D.30: EXTENT OF LEE COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Lee County has received this ranking three times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Lee County is 107 degrees Fahrenheit (reported on August 18, 1988).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Lee County was 2.0 inches (reported on June 1, 1956). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Lee County was an Unnamed 1896 Storm which reached a maximum wind speed of 62 knots in the county.
Lightning	According to the Vaisala flash density map (Figure 5.5), Lee County is located in an area that experiences 3 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.
Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 50-year history from the National Climatic Data Center, the strongest recorded wind event in Lee County was reported on June 1, 2001 at 70 knots (approximately 81 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F3 (reported on April 16, 2011).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Lee County was 10.5 inches on February 18, 1979. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from Lee County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (reported on September 1, 1886). The epicenter of this earthquake was located 295.0 km away.

Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is low across the majority of Lee County. However, there is moderate incidence in the northeast corner of the county. There is also moderate susceptibility throughout the most of the county.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 36 dams in Lee County, 9 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Lee County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 9.6 percent of the total land area in Lee County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at the Deep River at Moncure in 1945. Water reached a discharge of 80,300 cubic feet per second and the stream gage height was recorded at 17.20 feet. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 5,383 GCF released on the highway on September 8, 1996. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. The greatest number of fires to occur in Lee County in any year was 106 in 2011. The greatest number of acres to burn in the county in a single year occurred in 2005 when 130.1 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Nuclear Accident	Although there is no history of a nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in Lee County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Lee County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.20.2.

Table D.31 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE D.31: SUMMARY OF PRI RESULTS FOR LEE COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm/High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	**1.8**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Limited	Small	6 to 12 hours	Less than 1 week	**2.8**
Other Hazards						
Hazardous Materials Incident	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Wildfire	Likely	Minor	Small	Less than 6 hours	Less than 1 week	**2.3**
Nuclear Accident	Unlikely	Critical	Small	6 to 12 hours	Less than 1 week	**2.2**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

D.2.19 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Lee County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table D.32**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Lee County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section D.3. It should be noted that

although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE D.32: CONCLUSIONS ON HAZARD RISK FOR LEE COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Hurricane and Tropical Storm Flood Tornado Hailstorm Drought Winter Storm and Freeze
MODERATE RISK	Hazardous Material Incident Extreme Heat Wildfire Lightning
LOW RISK	Terror Threat Nuclear Accident Dam and Levee Failure Landslide Erosion Earthquake

D.3 LEE COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Lee County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

D.3.1 Asset Inventory

Table D.33 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Lee County and its participating jurisdictions (study area of vulnerability assessment).[20]

[20] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE D.33: IMPROVED PROPERTY IN LEE COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[21]
Broadway	700	$82,776,760	844	$68,903,880
Sanford	11,665	$1,904,810,000	13,980	$1,439,592,100
Unincorporated Area	19,182	$2,483,212,600	28,806	$1,608,803,600
LEE COUNTY TOTAL	**31,547**	**$4,470,799,360**	**43,630**	**$3,117,299,580**

Table D.34 lists the fire stations, police stations, EMS/rescue stations, emergency operations centers (EOCs), medical care facilities, schools and other critical facilities located in Lee County. Local governments at the county level provided a majority of the data for this analysis; however, gaps in the data were filled using Hazus 2.1 to obtain the location of some critical facilities for which spatial data was not available. In addition, **Figure D.15** shows the locations of essential facilities in Lee County. **Table D.49**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county and Hazus 2.1.

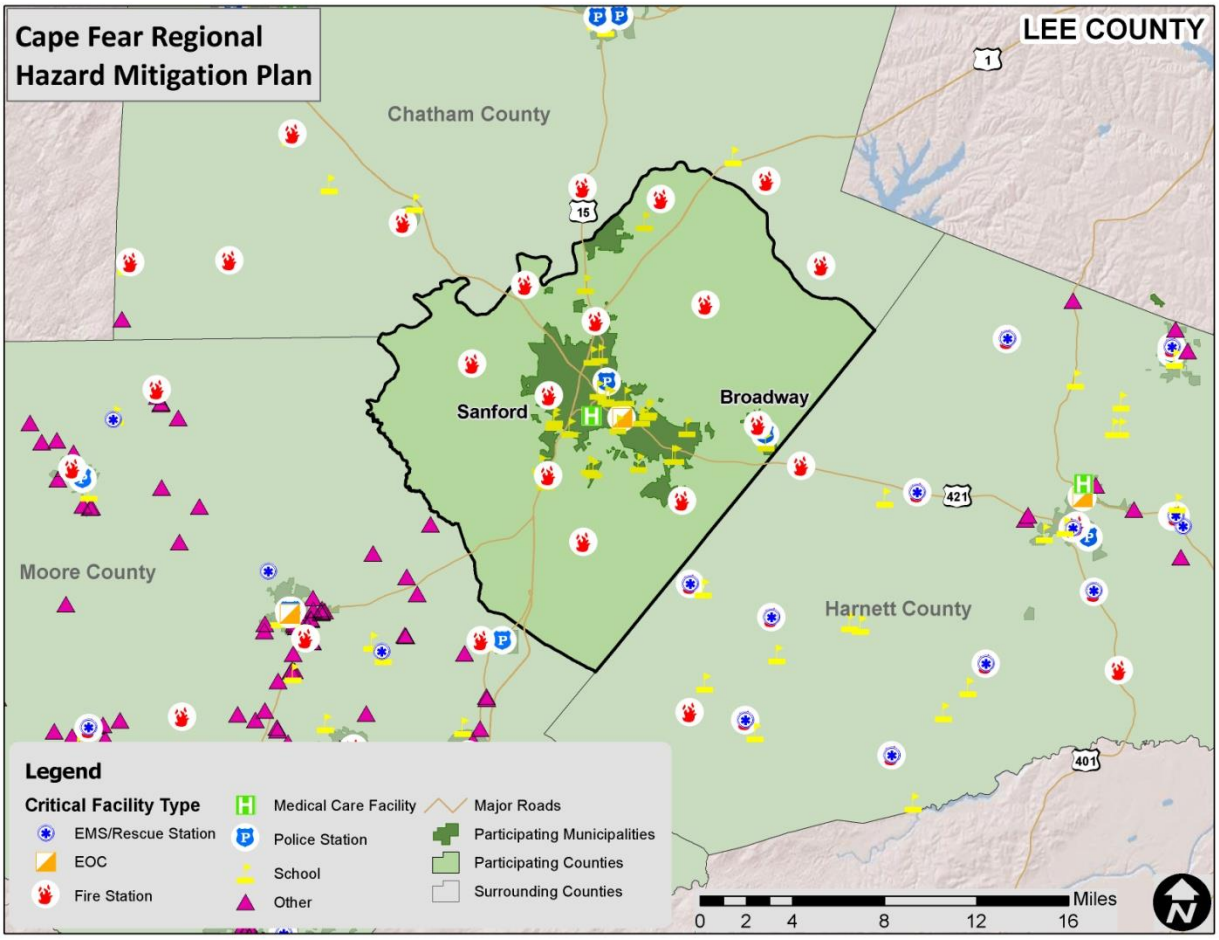
TABLE D.34: CRITICAL FACILITY INVENTORY IN LEE COUNTY

Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Broadway	1	1	0	0	0	1	0
Sanford	1	2	0	1	1	17	0
Unincorporated Area	8	0	0	0	0	7	0
LEE COUNTY TOTAL	**10**	**3**	**0**	**1**	**1**	**25**	**0**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.
Source: Local Government; Hazus-MH

[21] Building value for each county is based on the number of parcels with an improved building value greater than zero.

FIGURE D.15: CRITICAL FACILITY LOCATIONS IN LEE COUNTY



Source: Local Governments; Hazus-MH 2.1

D.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Lee County that are potentially at risk to these hazards.

Table D.35 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Lee County according to Census data is 57,866 persons. Additional population estimates are presented above in Section D.1.

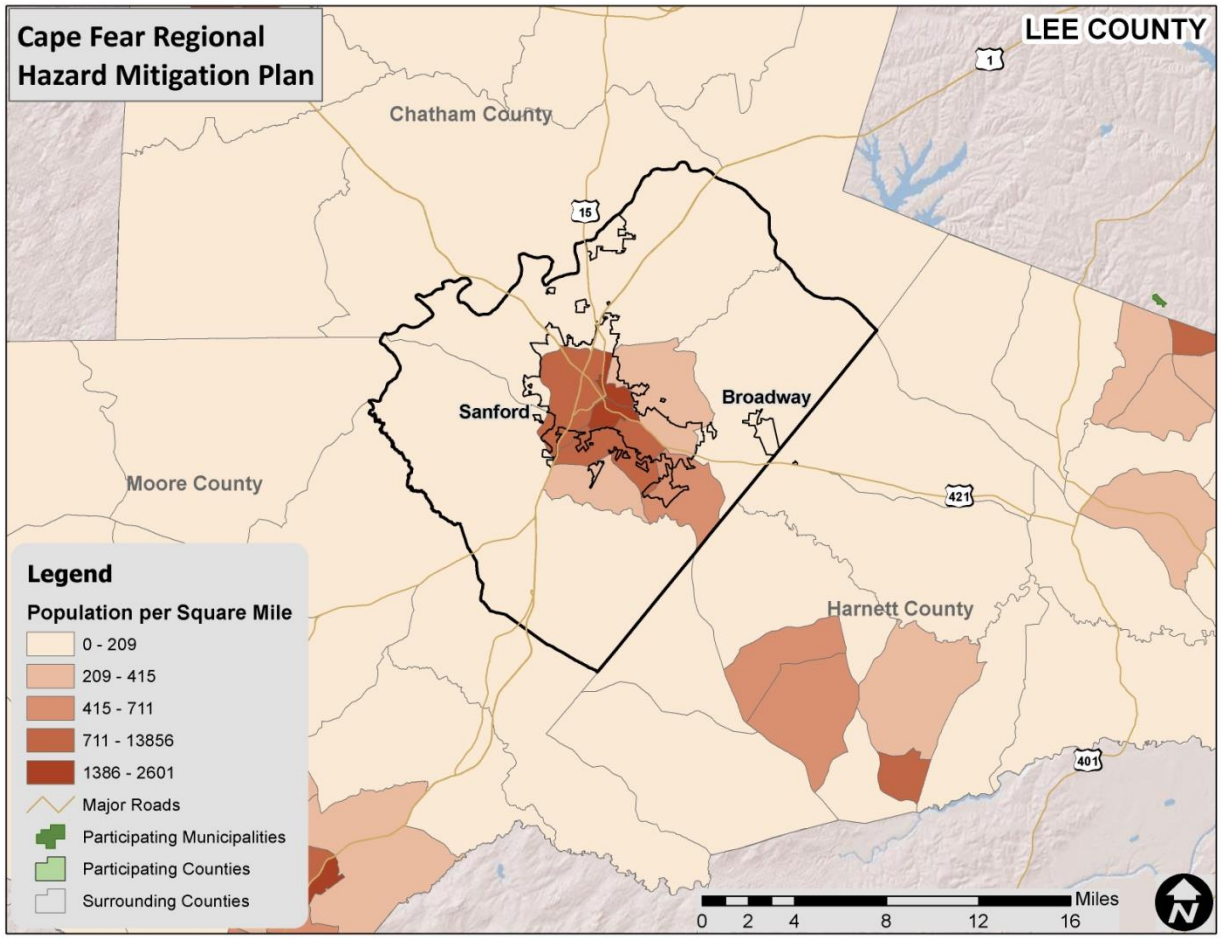
TABLE D.35: TOTAL POPULATION IN LEE COUNTY

Jurisdiction	2010 Census Population
Lee County	**57,866**
Town of Broadway	1,229
City of Sanford	28,094

Source: United States Census 2010

In addition, **Figure D.16** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE D.16: POPULATION DENSITY IN LEE COUNTY



Source: United States Census Bureau, 2010

D.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans was approved (in 2012), Lee County has experienced some growth and development. **Table D.36** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE D.36: BUILDING COUNTS FOR LEE COUNTY

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Broadway	542	0	0.0%
Sanford	11,398	34	0.3%

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Unincorporated Area	12,130	17	0.1%
LEE COUNTY TOTAL	**24,070**	**51**	**0.2%**

Source: United States Census Bureau

Table D.37 shows population growth estimates for the county from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE D.37: POPULATION GROWTH FOR LEE COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Broadway	1,230	1,244	1,266	1,279	4.0%
Sanford	28,170	28,570	29,084	29,470	4.6%
Unincorporated Area	28,504	28,754	29,229	29,517	3.6%
LEE COUNTY TOTAL	**57,904**	**58,568**	**59,579**	**60,266**	**4.1%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the county since 2010. Therefore, development and population growth have not impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been little change in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, primary and secondary TRI site buffers, or Shearon Harris Nuclear Station's 10-mile buffer.

D.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Lee County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total county exposure, and thus risk, was presented in **Table D.33**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table D.48.**

The hazards presented in this section include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

Hurricane and Tropical Storm

Historical evidence indicates that Lee County has a significant risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section D.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table D.38.** Only losses to buildings, contents, and inventory are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE D.38: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Lee County	$674,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table D.39.**

TABLE D.39: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Broadway	76.1	85.8	104.1	110.7
Sanford	74.6	84.4	102.9	110.5
Unincorporated Area	76.1	85.8	104.1	110.7
MAXIMUM WIND SPEED REPORTED	**76.1**	**85.8**	**104.1**	**110.7**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Lee County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Lee County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Lee County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building

counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table D.40** summarizes the findings.

TABLE D.40: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Lee County	$15,000

Source: Hazus-MH 2.1

Social Vulnerability

It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table D.49**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Lee County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Lee County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section D.2.10), county level tax parcel data, and GIS analysis. **Table D.41** presents the potential at-risk property where available. A portion of Lee County is identified as a moderate incidence area by the USGS landslide data. The majority of the county is also of moderate landslide susceptibility. Since no areas of high incidence were identified, the moderate incidence level was used to identify different areas of concern for the analysis below.

TABLE D.41: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Broadway	1	0	$0
Sanford	0	0	$0
Unincorporated Area	2,766	4,816	$177,921,000
LEE COUNTY TOTAL	**2,767**	**4,816**	**$177,921,000**

Source: United States Geological Survey

Social Vulnerability
Given moderate susceptibility across the northwestern portion of the county, it is assumed that the population in this area is at risk.

Critical Facilities
The majority of critical facilities are located in a moderate susceptibility area. There are 3 facilities in Lee County located in the moderate incidence area (moderate susceptibility), including 2 fire stations and 1 school. The remaining 37 critical facilities are located in the low landslide incidence area (moderate or low susceptibility). A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a landslide has the potential to impact many existing and future buildings, facilities, and populations in Lee County, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Although historical evidence indicates that Lee County is susceptible to flood events, there are no reports of property damage according to the National Climatic Data Center. Therefore, it is difficult to calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Lee County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table D.42** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

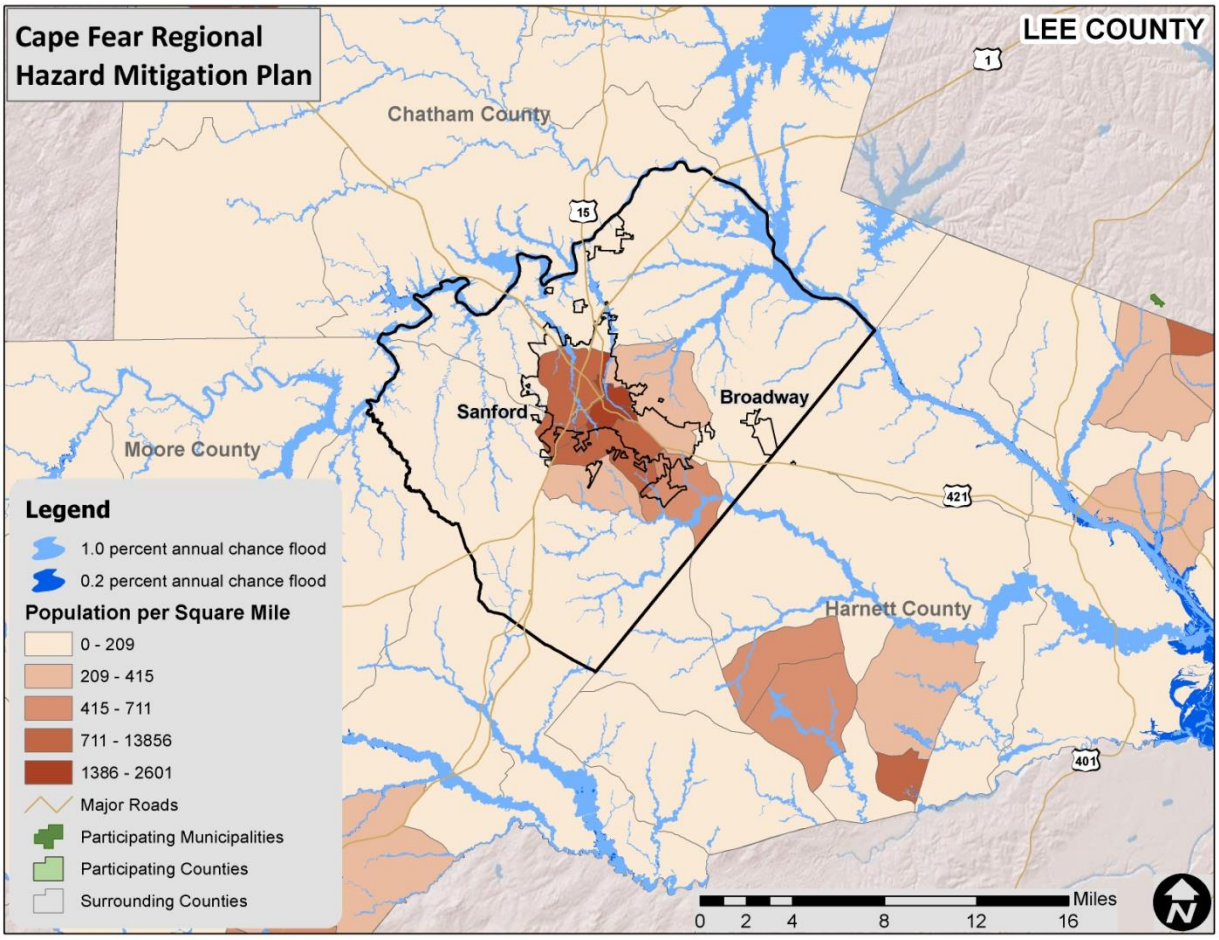
TABLE D.42: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Broadway	0	0	$0	0	0	$0
Sanford	627	197	$137,463,600	67	59	$9,426,300
Unincorporated Area	2,192	335	$298,342,400	15	21	$3,734,600
LEE COUNTY TOTAL	**2,819**	**532**	**$435,806,000**	**82**	**80**	**$13,160,900**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability
Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure D.17** is presented to gain a better understanding of at risk population.

FIGURE D.17 : POPULATION DENSITY NEAR FLOODPLAINS IN LEE COUNTY



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are a no critical facilities located in the Lee County 1.0-percent annual chance floodplain or 0.2-percent annual chance floodplain based on FEMA DFIRM boundaries and GIS analysis. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Lee County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

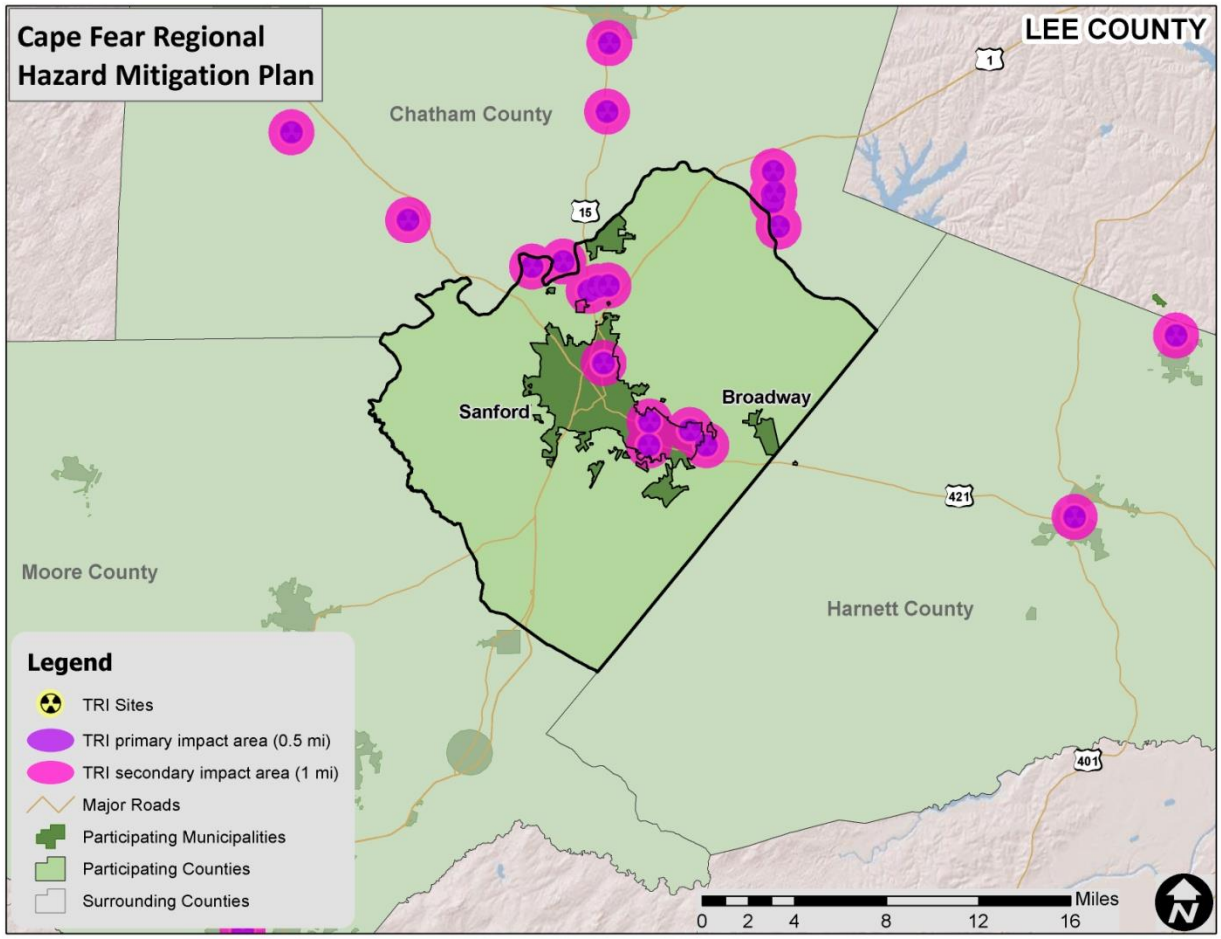
Historical evidence indicates that Lee County is susceptible to hazardous materials events. A total of 32 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration resulting in approximately $2,000 in property damages and 1 injury. On an annualized level, these damages amount to $40 for Lee County.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[22] In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Lee County, along with buffers, were used for analysis as shown in **Figure D.18.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure D.19** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table D.43** (fixed sites), **Table D.44** (mobile road sites) and **Table D.45** (mobile railroad sites).[23]

[22] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

FIGURE D.18 : TRI SITES WITH BUFFERS IN LEE COUNTY



Source: Environmental Protection Agency

TABLE D.43: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Broadway	0	0	$0	0	0	$0
Sanford	1,169	1,586	$241,133,700	2,972	4,079	$455,745,500
Unincorporated Area	321	506	$194,486,300	1,248	1,846	$258,235,100
LEE COUNTY TOTAL	**1,490**	**2,092**	**$435,620,000**	**4,220**	**5,925**	**$713,980,600**

FIGURE D.19 : MOBILE HAZMAT BUFFERS IN LEE COUNTY

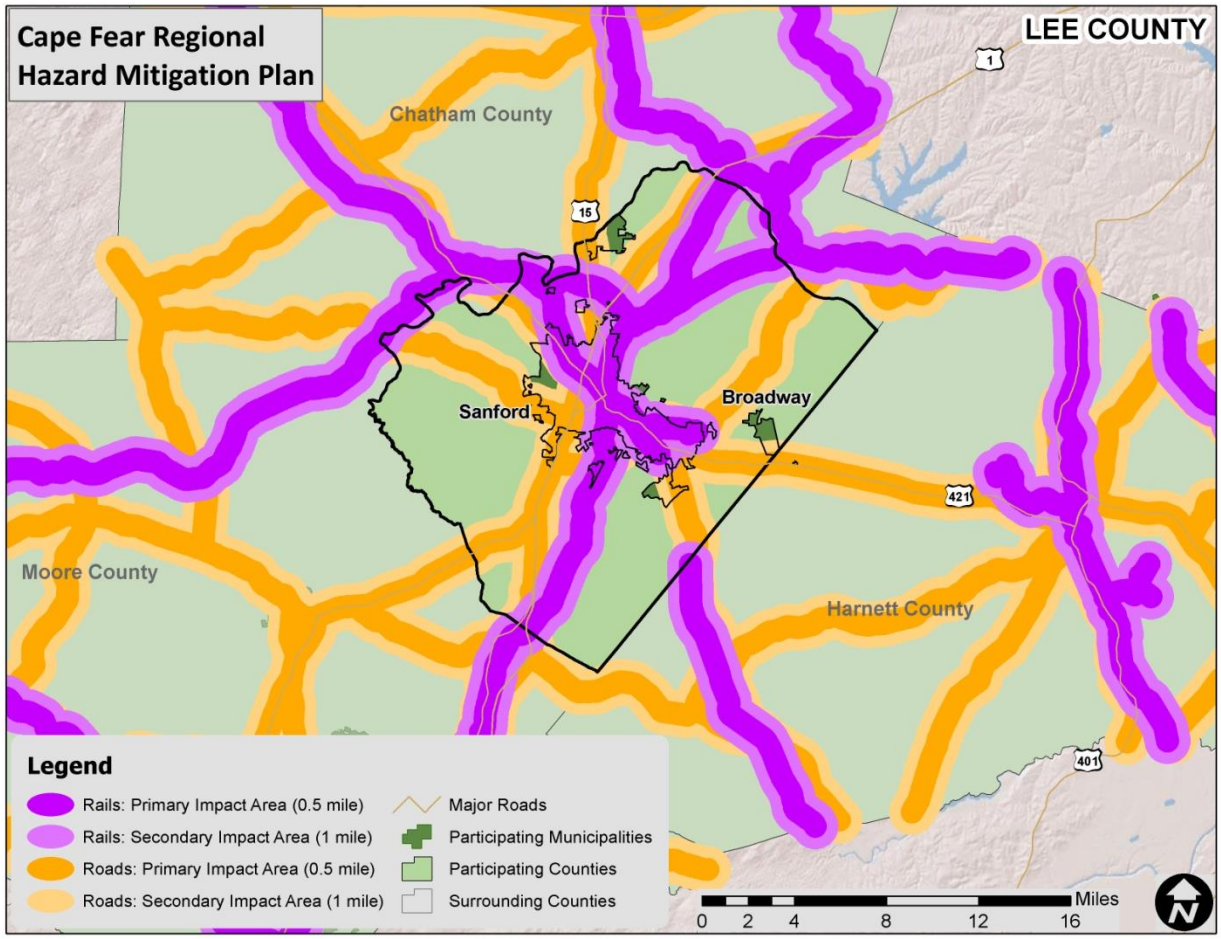


TABLE D.44: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Broadway	31	32	$1,391,180	223	269	$30,926,980
Sanford	8,139	9,662	$1,079,629,200	10,852	12,937	$1,353,784,100
Unincorporated Area	6,117	8,198	$668,739,800	10,847	14,630	$1,078,725,300
LEE COUNTY TOTAL	**14,287**	**17,892**	**$1,749,760,180**	**21,922**	**27,836**	**$2,463,436,380**

TABLE D.45: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Broadway	0	0	$0	0	0	$0

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Sanford	2,827	7,288	$756,695,900	8,791	10,557	$1,057,791,600
Unincorporated Area	6,101	4,201	$429,119,500	5,228	8,193	$582,599,000
LEE COUNTY TOTAL	**8,928**	**11,489**	**$1,185,815,400**	**14,019**	**18,750**	**$1,640,390,600**

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 10 Lee County facilities located in a HAZMAT risk zone. The primary impact zone includes 5 facilities, all school. The remaining 5 at-risk critical facilities are in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Lee County revealed that there are 32 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 25 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes the following critical facilities: 1 EOC, 4 fire stations, 1 medical care facility, 2 police stations, and 18 schools. The remaining 6 at-risk critical facilities are located in the secondary road buffer area. The primary railroad buffer area includes the following critical facilities: 1 EOC, 6 fire stations, 1 medical care facility, 2 police stations, and 19 schools. The remaining 4 at-risk critical facilities are located in the secondary railroad buffer. Although this is a worst case scenario model, it indicates that many of the critical facilities in Lee County are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Lee County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

Wildfire

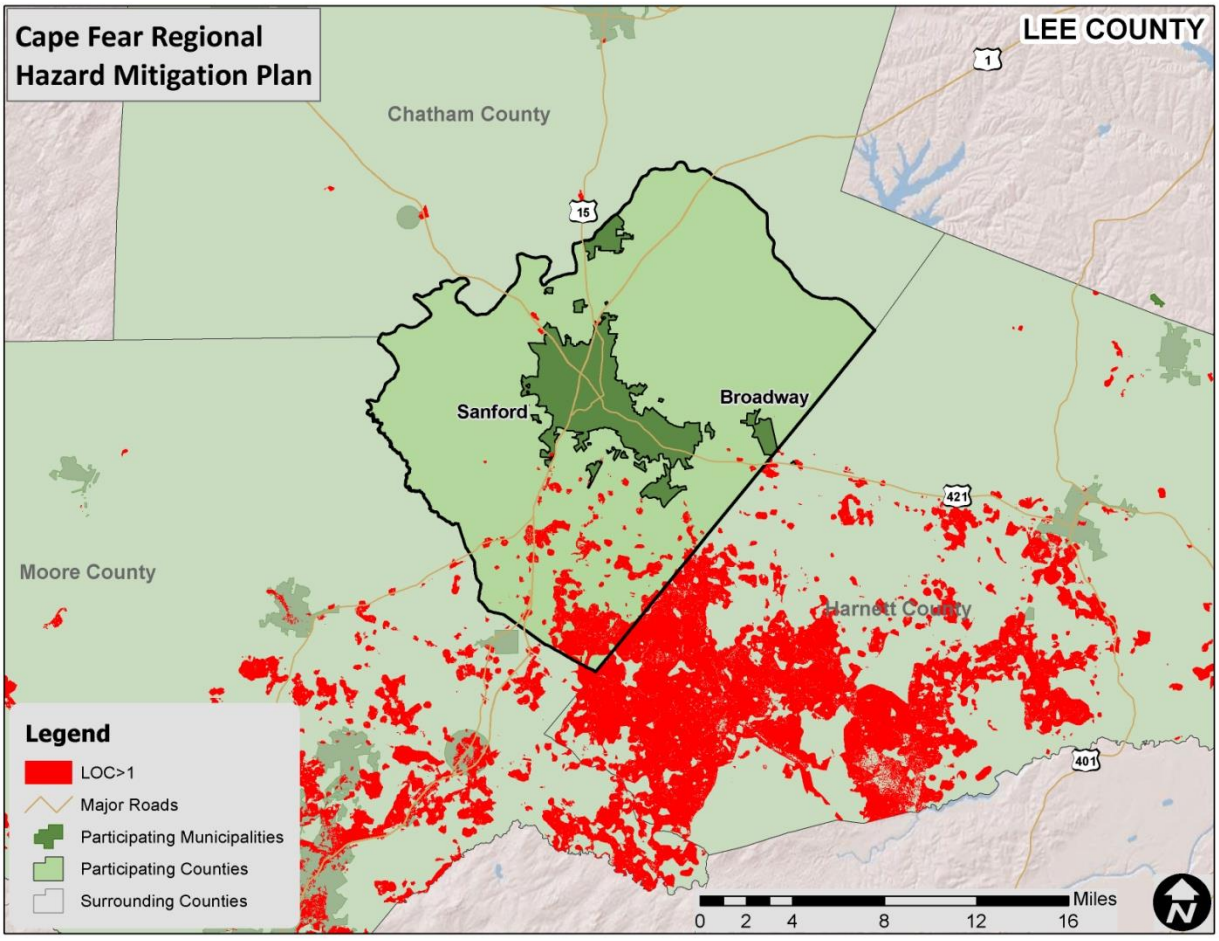
Although historical evidence indicates that Lee County is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were

intersected with critical facility locations. **Figure D.20**, **Figure D.21**, and **Figure D.22** show the Level of Concern data. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The county contains some lands where the value falls into the at-risk category, and though it has somewhat less land labeled as at-risk compared to other regions of North Carolina, the level of concern in those areas that are considered at-risk is somewhat higher than other areas of the state. Since all of this land area is on the lower fifth of the overall LOC scale, there is likely considerably less risk in the county than in other areas of the country.

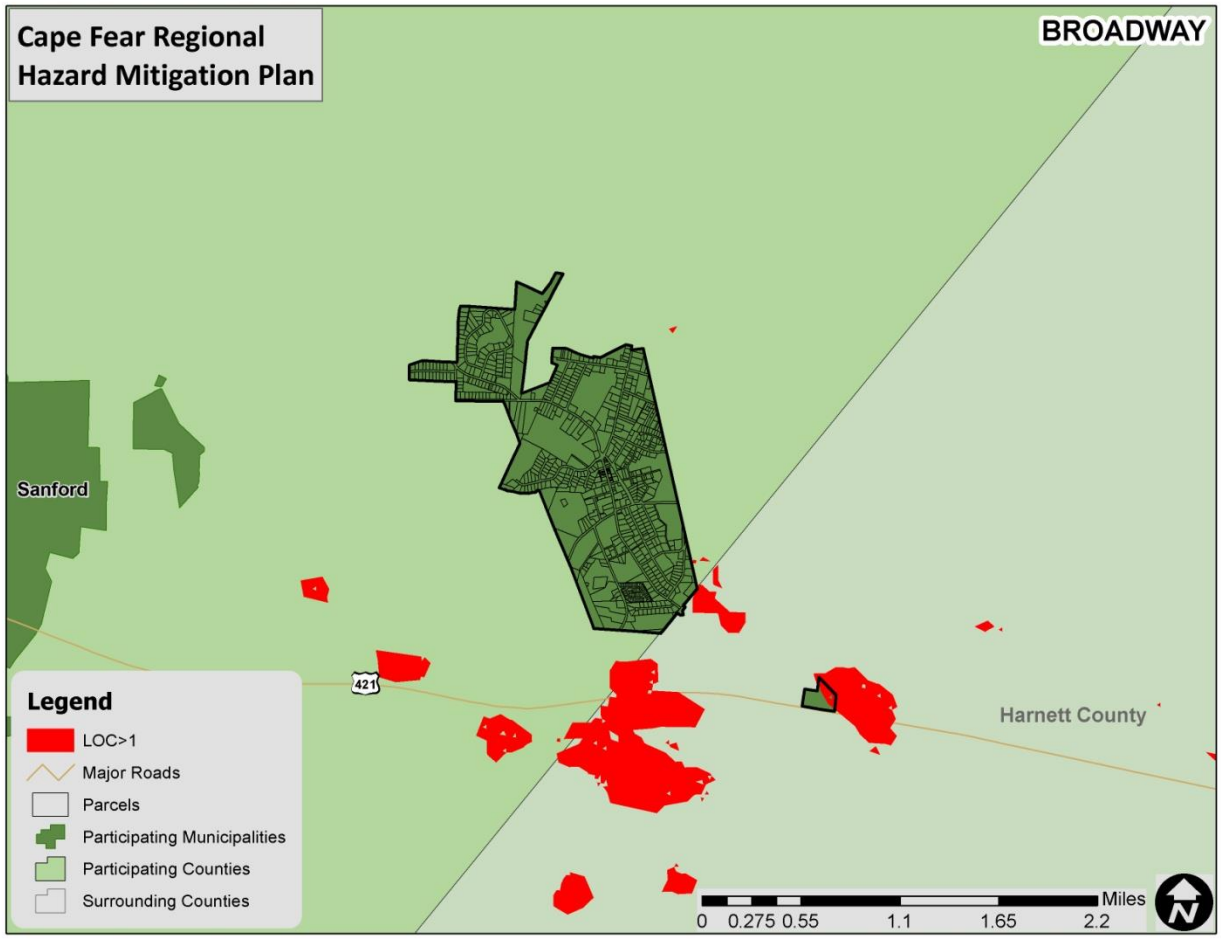
Table D.46 shows the results of the analysis.

FIGURE D.20: WILDFIRE RISK AREAS IN LEE COUNTY



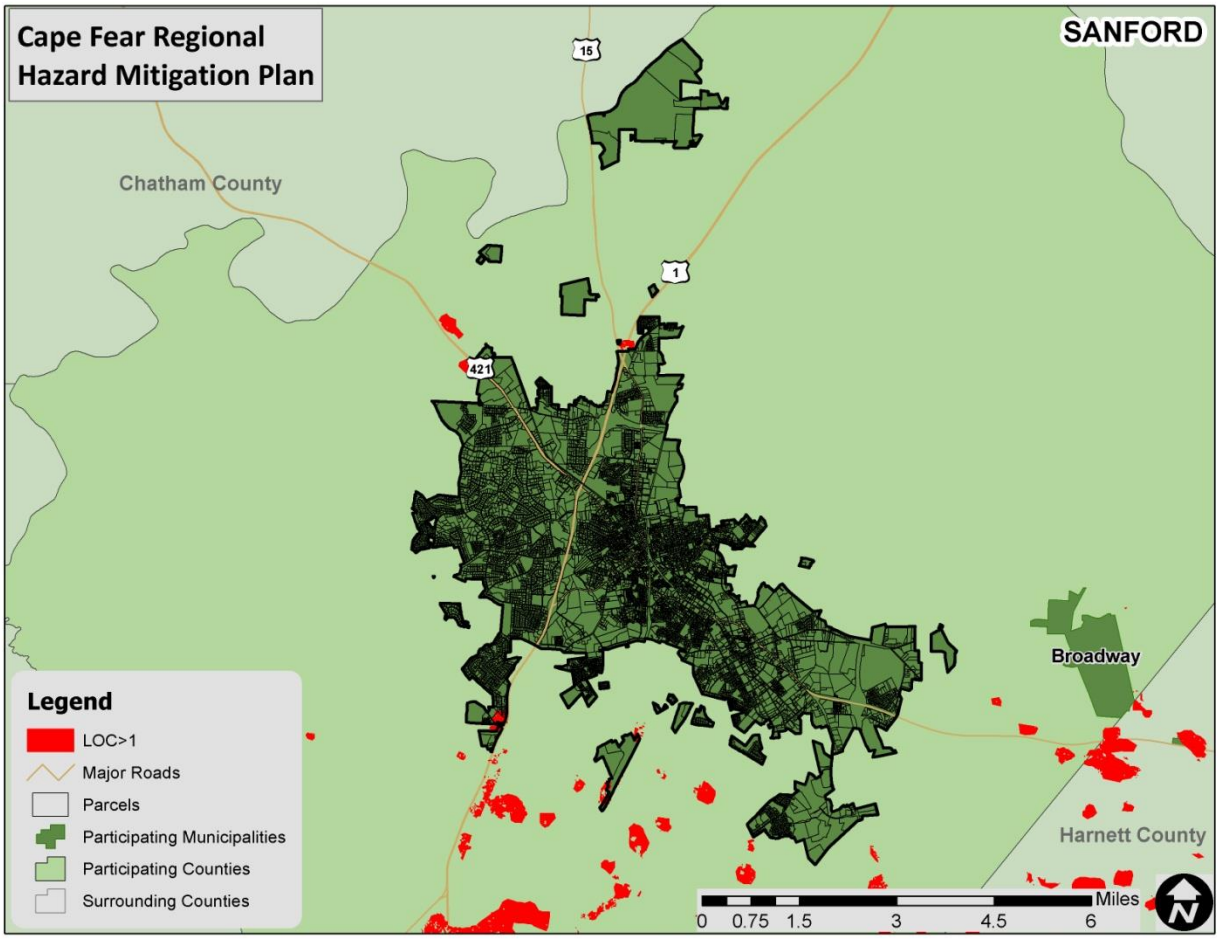
Source: Southern Wildfire Risk Assessment Data

FIGURE D.21: WILDFIRE RISK AREAS IN BROADWAY



Source: Southern Wildfire Risk Assessment Data

FIGURE D.22: WILDFIRE RISK AREAS IN SANFORD



Source: Southern Wildfire Risk Assessment Data

TABLE D.46: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Broadway	1	13	$102,350
Sanford	13	12	$7,770,000
Unincorporated Area	2,072	2,654	$138,040,400
LEE COUNTY TOTAL	**2,086**	**2,679**	**$145,912,750**

Looking at jurisdictional level, unincorporated areas in the southern corner of the county face the highest level of concern areas. However, the municipalities also have some areas where the level of concern is above 1.

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities

The critical facility analysis revealed that there are 4 critical facilities located in wildfire areas of concern, including 2 fire stations and 2 schools. It should also be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Lee County.

Nuclear Accident

The location of Shearon Harris Nuclear Station northeast of Lee County demonstrates that the county is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. All of Lee County is located within one of the risk zones. **Table D.47** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE D.47: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Broadway	0	0	$0	700	844	$68,903,880
Sanford	0	0	$0	11,665	13,980	$1,439,592,100
Unincorporated Area	1,215	1,973	$66,555,100	19,182	28,806	$1,608,803,600
LEE COUNTY TOTAL	**1,215**	**1,973**	**$66,555,100**	**31,547**	**43,630**	**$3,117,299,580**

Source: International Atomic Energy Agency

Social Vulnerability

Since all areas of the county are within at least the 50-mile buffer area, the total population is considered to be at risk to a nuclear accident. However, populations in the northeastern part of the county are considered to be at an elevated risk.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in the 10-mile nuclear buffer area in Lee County. However, all critical facilities in the county are located within the 50-mile

[24] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[25] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table D.49** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in Lee County, though areas in the northeastern corner of the county are at a higher risk than others. All structures in the county are at some risk given that they are all located within the 50-mile buffer area.

Conclusions on Hazard Vulnerability

Table D.48 presents a summary of annualized loss for each hazard in Lee County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the county.

TABLE D.48: ANNUALIZED LOSS FOR LEE COUNTY

Event	Lee County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	Negligible
Hurricane & Tropical Storm	$674,000
Lightning	$22,027
Severe Thunderstorm / High Wind	$18,425
Tornado	$1,040,079
Winter Storm & Freeze	$40,343
Geologic Hazards	
Earthquake	$15,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	Negligible
Other Hazards	
HAZMAT Incident	$40
Wildfire	Negligible
Nuclear Accident	Negligible
Terror Threat	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme temperature, hailstorm, hurricane and

tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table D.49** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE D.49: AT-RISK CRITICAL FACILITIES IN LEE COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
LEE COUNTY																							
FD VFD FIRE DEPT POCKET	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD VFD FIRE LEMON SPRINGS VOL	Fire Station	X	X	X	X	X	X	X	X	X									X	X	X		X
FD DEPT TRAMWAY	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD DEPT CAROLINA TRACE	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
FD VFD DEEP RIVER	Fire Station	X	X	X	X	X	X	X	X	X		X											X
FD NORTHVIEW VFD STA # 6	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
FD VFD FIRE WEST SANFORD VFD	Fire Station	X	X	X	X	X	X	X	X	X						X		X	X	X			X
FD VFD DEEP RIVER FIRE SUBSTATION	Fire Station	X	X	X	X	X	X	X	X	X		X								X			X
SCH GRACE CHAPEL SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X			X		X
SCH GREENWOOD ELEMENTERY	School	X	X	X	X	X	X	X	X	X									X	X	X		X
SCH BETHEL BIBLE COLLEGE	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH TRAMWAY ELEM	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH CENT CAR COMM COLL MAINT BUILD	School	X	X	X	X	X	X	X	X	X						X		X		X			X
SCH J GLENN EDWARDS ELEM	School	X	X	X	X	X	X	X	X	X						X				X			X
SCH DEEP RIVER ELEM	School	X	X	X	X	X	X	X	X	X		X											X
FD CAPE FEAR VOL	Fire Station	X	X	X	X	X	X	X	X	X													X
BU BROADWAY POLICE DEPT	Police Station	X	X	X	X	X	X	X	X	X													X
SCH BROADWAY ELEMENTARY	School	X	X	X	X	X	X	X	X	X								X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
BU EMERGENCY MANAGEMENT	EOC	X	X	X	X	X	X	X	X	X							X	X	X	X			X
FD CITY STA #3	Fire Station	X	X	X	X	X	X	X	X	X								X					X
BU CENTRAL CAROLINA HOSPITAL	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X			X
BU SANFORD MUNICIPAL CENTER	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X		X
BU LEE COUNTY SHERIFFS OFFICE	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH WEST LEE MIDDLE	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH CENTRAL CAROLINA COMM COLLEGE	School	X	X	X	X	X	X	X	X	X					X	X		X		X			X
SCH LEE SENIOR HIGH	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH LEE CO BUS GARAGE	School	X	X	X	X	X	X	X	X	X							X	X		X			X
SCH JONESBORO ELEM	School	X	X	X	X	X	X	X	X	X							X	X		X			X
SCH EAST LEE MIDDLE	School	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
SCH BRAGG ST	School	X	X	X	X	X	X	X	X	X								X		X			X
SCH MONTESSORI	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH FLOYD L KNIGHT	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH OLD MCIVER	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH LEE CHRISTIAN SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH J R INGRAM ELEM	School	X	X	X	X	X	X	X	X	X							X	X					X
SCH MONTESSORI	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH BENJAMIN T BULLOCK ELEM	School	X	X	X	X	X	X	X	X	X					X	X	X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
SCH TRACY HOOVER MONTESSORI	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
SCH SOUTHERN LEE HIGH SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SCH SAN LEE MIDDLE SCHOOL	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X

D.4 LEE COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Lee County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

D.4.1 Planning and Regulatory Capability

Table D.50 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Lee County. 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE D.50: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
LEE COUNTY	✓	✓		✓				✓	✓			✓	✓		✓	✓	✓	✓		✓	✓	✓	
Broadway	✓							✓					✓		✓	✓	✓	✓		✓	✓	✓	
Sanford	✓	✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Lee County has previously adopted a hazard mitigation plan. Both of the participating municipalities were also included in this plan.

Emergency Operations Plan
Lee County maintains an emergency operations plan through its Emergency Management Department. This plan has been adopted by each of the municipalities within the county.

Continuity of Operations Plan
Lee County Health Department has developed an all hazards continuity of operations plan.

General Planning

Comprehensive Land Use Plan
Lee County and the City of Sanford have both adopted the Sanford-Lee County 2020 Land Use Plan.

Capital Improvements Plan
Lee County and the City of Sanford both have five-year capital improvement plans in place.

Zoning Ordinance
Lee County, Broadway, and Sanford have adopted zoning ordinances. The county and both municipalities include zoning regulations as part of their local unified development ordinance.

Subdivision Ordinance
Lee County, Broadway, and Sanford have adopted subdivision regulations. Again, the county and both municipalities include subdivision regulations as part of its local unified development ordinance.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Sanford/Lee County Inspections Services provides building code inspection services for Sanford, Broadway, and Lee County.

Floodplain Management

Table D.51 provides NFIP policy and claim information for each participating jurisdiction in Lee County.

TABLE D.51: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
LEE COUNTY†	09/06/89	02/02/07	62	$16,522,600	7	$111,156
Broadway	03/13/09	(NSFHA)	1	$350,000	0	$0
Sanford	09/06/89	02/02/07	51	$11,480,400	7	$60,597

†Includes unincorporated areas of county only
(NSFHA) – No Special Flood Hazard Area – All Zone C
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Lee County, Broadway, and Sanford all participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Lee County has a parks and recreation master plan which was also adopted by the City of Sanford.

D.4.2 Administrative and Technical Capability

Table D.52 provides a summary of the capability assessment results for Lee County 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 D.52: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
LEE COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	
Broadway	✓	✓	✓	✓	✓		✓	✓		
Sanford	✓	✓	✓	✓	✓		✓	✓	✓	

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

D.4.3 Fiscal Capability

Table D.53 provides a summary of the results for Lee County 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) according to the previous county hazard mitigation plan.

TABLE D.53: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.
LEE COUNTY	✓	✓	✓						✓	✓
Broadway	✓	✓	✓						✓	✓
Sanford	✓	✓	✓						✓	✓

D.4.4 Political Capability

The previous hazard mitigation plan indicates that Lee County is currently a participant in the NFIP and has adopted the required flood damage prevention ordinance. Additionally, the Unified Development Ordinance includes sedimentation and erosion control and watershed protection standards. This demonstrates to some extent both favorable political support and willingness to adopt hazard mitigation efforts in an active manner.

D.4.5 Conclusions on Local Capability

Table D.54 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 34.0, which falls into the moderate capability ranking.

TABLE D.54: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
LEE COUNTY	42	High
Broadway	25	Moderate
Sanford	35	Moderate

D.5 LEE COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Lee County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

D.5.1 Mitigation Goals

Lee County developed six mitigation goals in coordination with the other participating Cape Fear Region jurisdictions. The regional mitigation goals are presented in **Table D.55**.

TABLE D.55: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

D.5.2 Mitigation Action Plan

The mitigation actions proposed by Lee County, the Town of Broadway, and the City of Sanford are listed in the following individual Mitigation Action Plans.

Lee County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the county is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the county will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	All Hazards	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.
Property Protection							
PP-1	Work to improve individual homes and businesses in terms of their resistance to wind event.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2019	Public education efforts have been undertaken to try to encourage property owners to improve the resistance of structures to wind, however, more outreach is still necessary to try to improve other existing buildings that have not implemented stronger wind protection measures.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county board has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	All Hazards	High	Emergency Management	Local	Completed, Annual Review and Update	The county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies in the county. This action is complete and will be removed from the next update as a capability.
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

Town of Broadway Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the town is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the town will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Work to improve individual homes and businesses in terms of their resistance to wind event.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2019	Public education efforts have been undertaken to try to encourage property owners to improve the resistance of structures to wind, however, more outreach is still necessary to try to improve other existing buildings that have not implemented stronger wind protection measures.
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed, Annual Review and Update	In conjunction with the towns, the county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies throughout the county. This action is complete and will be removed from the next update as a capability.
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

City of Sanford Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.
P-2	Evaluate flood damage potential of electric utility, water and sewer distribution systems.	Flood	High	Public Works, Utilities	Local	2019	Although flood damage potential to utility distribution systems has been evaluated to some degree, a more in-depth assessment would be useful in identifying particular areas that require mitigation.
P-3	Increase jurisdiction's classification in the NFIP Community Rating System.	Flood	High	Emergency Management, Community Development	Local	2019	In many ways, this action is ongoing as the town is constantly working to improve its floodplain management in a way that would improve its classification in the Community Rating System. Therefore, the town will continue to develop and carry out actions that will improve its CRS rating going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop comprehensive open space/reuse plan to support floodplain acquisition initiatives and recreational opportunities by acquiring structures in the floodplain.	Flood	High	Community Development	Local	2018	The county is in the process of developing an open space/reuse plan to support floodplain acquisition initiatives, so this action has not been completed and will require additional work in the future.
P-5	Evaluate clear cutting and building in the floodplain.	Flood	High	Forest Service, UDO	Local	2017	An in-depth evaluation of clear cutting and building in the floodplain has not been carried out. Additional coordination with the Forest Service is likely required in order to complete this action.
P-6	Evaluate flood damage potential of transportation infrastructure.	Flood	High	GIS, Engineering	Local	Completed	An evaluation of the flood damage potential to transportation infrastructure has been completed. This action will be removed from the next update as a capability.
P-7	Identify high hazard dams on waterways that drain through county.	Dam/Levee Failure, Flood	High	DOT, Public Works	Local	Completed	During the plan update, high hazard dams that are located within the county and towns were identified so this action has been completed and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Obtain and maintain North Carolina Certified Floodplain Manager status.	Flood	High	Community Development	Local	Completed	The county has continually worked to maintain a certified floodplain manager on staff and will continue to do so going forward. This action has been completed and will be removed from the next update as a capability.
P-9	Standardize procedures for handling certain post-damage permit processing procedures.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Community Development, Inspections	Local	2017	Standardized procedures for handling post-disaster damage permitting have not been established in full and current procedures need to be reviewed and updated.
P-10	Implement stronger building codes that recognize the importance of preparing new homes and businesses for wind events.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado	High	Community Development	Local	2018	Stronger building codes for new structures to resist damage from wind events have not been implemented. Higher standards will need to be developed and evaluated to determine which should be implemented.
Property Protection							
PP-1	Incorporate digital floodplain and topographic data into automated permit database/system and Geographic Information System data layer inventory.	Flood	High	Community Development, GIS	Local, State	Completed	Digital floodplain and topographic data have been incorporated into the automated permit system and GIS data layer. This action is completed and will be removed as a capability during the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Support enhancement of emergency management functions in Lee County.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed	Emergency Management functions have been improved substantially and the county has been supportive of improving emergency management generally. This action has been completed and will be removed from the next update as a capability.
Public Education and Awareness							
PEA-1	Develop and implement multi-year public awareness campaign concerning hazard mitigation.	Thunderstorm, Flood, Winter Storm/Freeze, Hurricane, Severe Storm, Tornado, Drought, Severe Heat, Wildfire, Dam/Levee Failure	High	Emergency Management	Local	Completed, Annual Review and Update	In conjunction with the towns, the county has developed and implemented a public awareness campaign that addresses hazard mitigation. However, this campaign will need to be re-evaluated and continually implemented to ensure the public is informed with up to date hazard information. Therefore, this action will remain in the plan and be evaluated and reviewed annually.
PEA-2	Make flood hazard information available to other public agencies.	Flood	High	Joint responsibility	Local	Completed	A system has been developed to make flood hazard information available to other public agencies throughout the county. This action is complete and will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Evaluate whether public buildings and facilities are exposed to flood hazards.	Flood	High	GIS	Local		Completed as of 2011.
	Improve pre-disaster flood warning and public safety.	Flood	High	San Lee Park	Local		Completed as of 2011.
	Identify hazardous materials handlers/waste sites in the mapped floodplain.	Hazardous Materials, Flood	High	GIS	Local		Complete as of 2011.

Annex E
Moore County

This annex includes jurisdiction-specific information for Moore County and its participating municipalities. It consists of the following five subsections:

- ❑ E.1 Moore County Community Profile
- ❑ E.2 Moore County Risk Assessment
- ❑ E.3 Moore County Vulnerability Assessment
- ❑ E.4 Moore County Capability Assessment
- ❑ E.5 Moore County Mitigation Strategy

E.1 MOORE COUNTY COMMUNITY PROFILE

E.1.1 Geography and the Environment

Moore County is located in the southern central portion of North Carolina. It comprises 11 municipalities, the Town of Aberdeen, Town of Cameron, Town of Carthage, Foxfire Village, Town of Pinebluff, Village of Pinehurst, Town of Robbins, Town of Southern Pines, Town of Taylortown, Town of Vass, and Village of Whispering Pines, as well as many small communities. An orientation map is provided as **Figure E.1**.

Moore County is located partially in the Piedmont and partially in the Inner Coastal Plain regions of North Carolina, with topography ranging from hilly in the north to gently rolling and flat in the southern portions of the county. Deep and Little Rivers and Drowning Creek are the major water bodies in the county. The total area of the county is 706 square miles, 8 square miles of which is water area.

From December to February, the average high temperature is in the low to mid 50s and low temperatures average around 30°F. However, the temperature drops to 10°F or 12°F about once during an average winter. Snow and sleet is usually light and occurs on average once or twice per year.

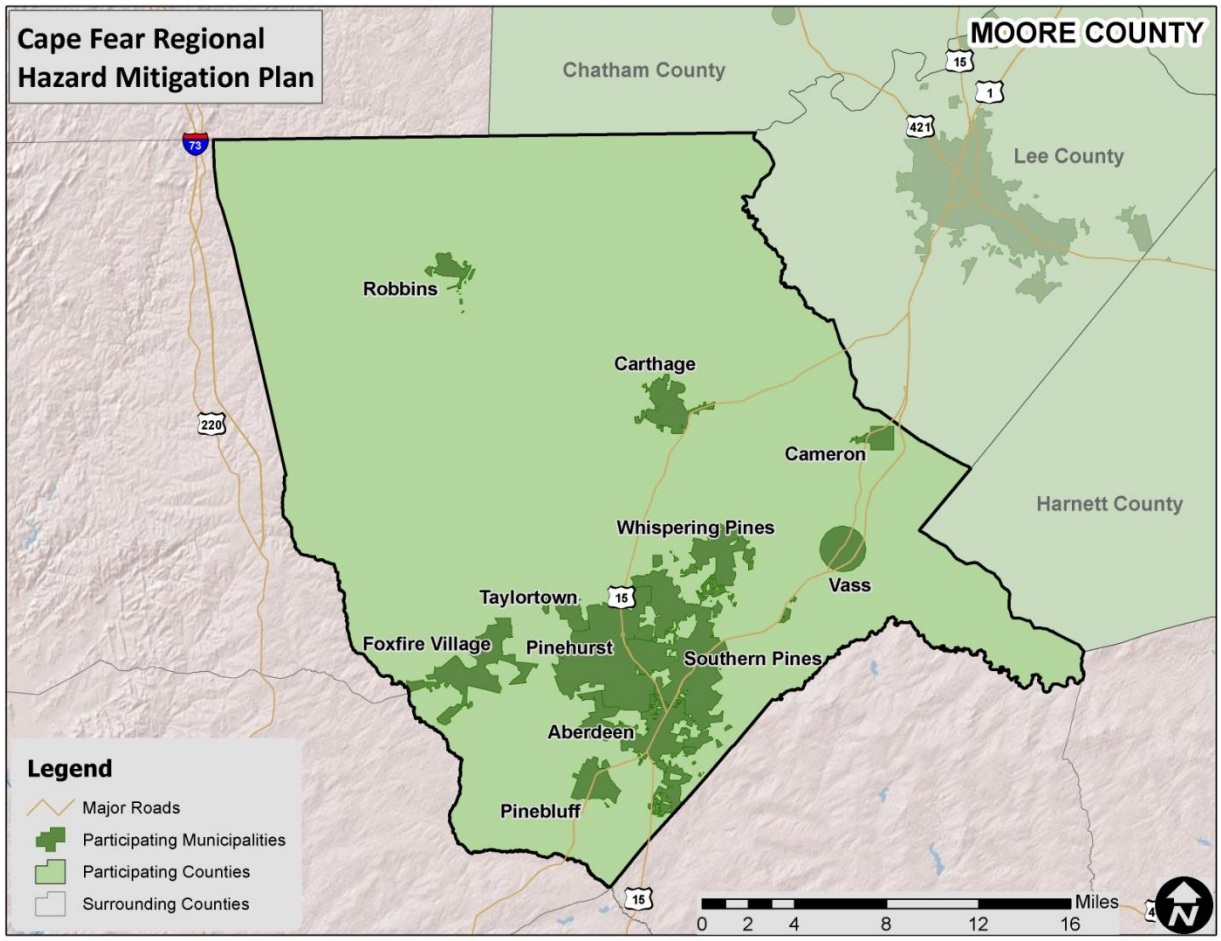
During the spring months, the days are warm and the nights are cool. Average high temperatures increase from the lower 60s in March to the high 70s in May. There is a similar increase in average low temperatures, which start in the upper 30s in March and climb to the mid 50s in May. Additionally, tornadoes are most likely early in the spring.

The summer is characterized by warm temperatures and rather high humidity. Average high temperatures range from the mid to upper 80s and low temperatures average in the mid to upper 60s. Summer precipitation is normally the greatest, but also the most variable, and thunderstorms are common events.

Autumn is typified by the most rapidly changing temperature. The drop-off is greatest in October and continues through November. Average high temperatures begin in the lower 80s in September and fall

to the lower 60s by November. Average lows also drop significantly from 60°F to 40°F from September to November. Autumn is the driest season.

FIGURE E.1: MOORE COUNTY ORIENTATION MAP



E.1.2 Population and Demographics

According to the 2010 Census, Moore County has a population of 88,247 people. The county has seen 18 percent growth between 2000 and 2010, and the average population density is 127 people per square mile. Population counts from the U.S. Census Bureau for 1990, 2000, and 2010 for the county and participating municipalities are presented in **Table E.1**.

TABLE E.1: POPULATION COUNTS FOR MOORE COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Moore County	**59,013**	**74,769**	**88,247**	**18.0%**
Town of Aberdeen	2,700	3,400	6,350	86.8%
Town of Cameron	215	151	285	88.7%
Town of Carthage	976	1,871	2,205	17.9%

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Foxfire Village	334	474	902	90.3%
Town of Pinebluff	876	1,109	1,337	20.6%
Village of Pinehurst	5,103	9,706	13,124	35.2%
Town of Robbins	970	1,195	1,097	-8.2%
Town of Southern Pines	9,129	10,918	12,334	13.0%
Town of Taylortown	543	845	722	-14.6%
Town of Vass	670	750	720	-4.0%
Village of Whispering Pines	1,243	2,090	2,928	40.1%

Source: United States Census Bureau

Based on the 2010 Census, the median age of residents of Moore County is 45.0 years. The racial characteristics of the county are presented in **Table E.2**. Whites make up the majority of the population in the county, accounting for around 80 percent of the population.

TABLE E.2: DEMOGRAPHICS OF MOORE COUNTY

Jurisdiction	White, Percent (2010)	Black or African American, Percent (2010)	American Indian or Alaska Native, Percent (2010)	Asian, Percent (2010)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Other Race, Percent (2010)	Two or More Races, percent (2010)	Persons of Hispanic Origin, Percent (2010)*
Moore County	**80.4%**	**13.4%**	**0.8%**	**0.9%**	**0.1%**	**2.7%**	**1.7%**	**6.0%**
Town of Aberdeen	67.9%	24.7%	1.3%	1.8%	0.0%	1.5%	2.9%	5.1%
Town of Cameron	71.2%	22.5%	2.1%	0.4%	0.0%	0.0%	3.9%	2.1%
Town of Carthage	70.7%	23.9%	0.7%	0.7%	0.0%	1.3%	2.7%	3.3%
Foxfire Village	89.8%	8.5%	0.3%	0.4%	0.0%	0.3%	0.6%	0.7%
Town of Pinebluff	81.2%	11.8%	1.6%	0.5%	0.0%	2.2%	2.6%	5.9%
Village of Pinehurst	92.8%	3.8%	0.4%	1.3%	0.0%	0.5%	1.2%	2.1%
Town of Robbins	72.1%	2.6%	0.6%	0.0%	1.5%	21.4%	1.7%	50.3%
Town of Southern Pines	71.7%	24.0%	0.6%	0.8%	0.1%	1.3%	1.4%	3.9%
Town of Taylortown	32.0%	65.0%	0.4%	0.8%	0.0%	0.4%	1.4%	1.0%
Town of Vass	79.6%	13.1%	2.6%	0.0%	0.1%	3.1%	1.5%	9.6%
Village of Whispering Pines	95.5%	1.3%	0.2%	1.0%	0.1%	0.6%	1.3%	2.9%

*Hispanics may be of any race, so also are included in applicable race categories
Source: United States Census Bureau

E.1.3 Housing

According to the 2010 U.S. Census, there are 43,940 housing units in Moore County, the majority of which are single family homes or mobile homes. Housing information for the county and towns is presented in **Table E.3**. As shown in the table, Foxfire Village and the Town of Pinehurst have a higher percentage of seasonal units compared to the rest of the county.

TABLE E.3: HOUSING CHARACTERISTICS OF MOORE COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2006-2010)
Moore County	**35,151**	**43,940**	**4.3%**	**$186,900**
Town of Aberdeen	1,655	3,081	0.8%	$155,100
Town of Cameron	78	148	1.4%	$83,000
Town of Carthage	768	1,070	0.9%	$106,300
Foxfire Village	324	523	8.8%	$236,400
Town of Pinebluff	481	579	0.5%	$147,700
Village of Pinehurst	5,668	7,634	10.9%	$260,400
Town of Robbins	471	457	0.2%	$69,500
Town of Southern Pines	5,488	6,859	5.0%	$226,800
Town of Taylortown	337	350	0.3%	$99,700
Town of Vass	351	348	0.9%	$96,400
Village of Whispering Pines	1,054	1,365	2.8%	$249,100

Source: United States Census Bureau

E.1.4 Infrastructure

Transportation

There are several major highways that cross Moore County. US Route 1 links southeastern Moore County to Lee County, Wake County, and the Triangle, passing through Aberdeen and Southern Pines. US-501 again connects Moore County to neighboring Lee County, traveling through Aberdeen, Pinehurst, and Carthage. Interstate 73 also serves the county and runs north to south along the westernmost border to the Triad. There are also three designated scenic byways in Moore County, Devil's Stompin' Ground Road, which extends from the Chatham County Courthouse in Pittsboro through the farmlands and forests of the lower Piedmont into Moore County; Pottery Road, which traverses through an area known worldwide for beautiful pottery; and Sandhills Scenic Drive, which passes through fertile farmlands, rolling hills, and Weymouth Woods-Sandhills Nature Preserve, the last remaining cluster of ancient long-leaf pines in this area.

Raleigh-Durham International Airport (RDU) is the nearest commercial airport to Moore County. The airport currently offers daily direct flights to 39 domestic and international cities. The RDU airport is about 60 miles from Carthage. An additional relief airport, Raleigh Exec, is also located nearby just outside of Sanford and provides additional capacity to the RDU airport. An additional general aviation airport servicing the county is Moore County Airport.

Utilities

Electrical power in Moore County is provided by one public utility and three electricity cooperatives. Duke Energy Progress serves all areas within the town limits of the 11 incorporated municipalities as well as other selected locations in the county while Central Electric Membership Corporation serves an area of rural customers in the northeastern part of the county, Pee Dee Electric Membership Corporation services a small area in the southwest corner of the county, and Randolph Electric Membership Corporation services rural areas in the northwestern portion of the county.

Water and sewer service is provided by Moore County Public Utilities in the following service areas: Addor, East Moore district, Hyland Hills, Pinehurst, Seven Lakes, Vass, Jackson Hamlet, West End, and the Carolina Gulf Club in Whispering Pines. Water is also supplied by the Town of Aberdeen, Town of Carthage, Foxfire Village, Town of Pinebluff, Town of Robbins, Town of Southern Pines, and the Village of Whispering Pines, and sewer service is provided the Town of Aberdeen, Town of Carthage, Town of Robbins, and Town Southern Pines. However, sewer service is not available in the Town of Cameron, Foxfire Village, Town of Pinebluff, and Village of Whispering Pines. Therefore, some parts of the county require the use of septic systems.

Community Facilities

There are a number of buildings and community facilities located throughout Moore County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 21 fire stations, 16 police stations, and 38 public schools located within the county.

There is one medical care facility located in Moore County. This facility, Moore Regional Hospital, is a 395-bed acute care hospital located in Pinehurst which serves as the referral center for a 15-county region in North Carolina.

In addition to Weymouth Woods-Sandhills Nature Preserve, the Walthour-Moss Foundation, and world-renowned golf courses, the county contains numerous local parks and recreation areas. These facilities offer recreational opportunities to area residents and many visitors each year.

E.1.5 Land Use

Moore County is experiencing growth and development due to its proximity to the major metropolitan areas in the Triangle and Triad. There are several incorporated municipalities located throughout the county which make up most of the county's population. The incorporated areas are also where many businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of residential and commercial development in the municipal areas with some agricultural and recreational uses in the more rural areas. Agriculture remains one of the largest land uses in the region and comprises a mix of cropland, pastureland, and woodland dispersed across the region. However, over the last two decades, the region has become more urbanized and there has been a decline in agriculture.

E.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Moore County had an average annual employment of 34,909 workers and an average unemployment rate of 8.6 percent (compared to 8.0 percent for the state). In 2012, the Health Care and Social Assistance industry was the largest employment sector with 25.8 percent of the county's workforce. The other leading industries were Accommodation and Food Services (14.0%); Retail Trade (13.1%); and Educational Services (8.8%). The American Community Survey (ACS) found the average annual median household income in Moore County was $48,238 from 2008 to 2012 compared to $46,450 for the state of North Carolina.

E.2 MOORE COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Moore County. Each hazard profile includes a description of the hazard's location and extent, notable historical occurrences, and the probability of future occurrences. Additional information can be found in Section 5: *Hazard Profiles*.

E.2.1 Drought

Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. Furthermore, it is assumed that the county would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

Historical Occurrences

According to the North Carolina Drought Monitor, Moore County has had drought occurrences in each of the last fourteen years (2000-2013). **Table E.4** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications. It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional but a majority of the county may actually be in a less severe condition.

TABLE E.4: HISTORICAL DROUGHT OCCURRENCES IN MOORE COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Moore County
2000	MODERATE
2001	**EXTREME**
2002	**EXCEPTIONAL**
2003	ABNORMAL
2004	ABNORMAL
2005	SEVERE
2006	SEVERE
2007	**EXCEPTIONAL**
2008	**EXCEPTIONAL**
2009	MODERATE
2010	MODERATE
2011	SEVERE
2012	MODERATE
2013	MODERATE

Source: North Carolina Drought Monitor

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Moore County has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location but each area has an equal probability of experiencing a drought. However, historical

information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

E.2.2 Extreme Heat

Location and Spatial Extent

Excessive heat typically impacts a large area and cannot be confined to any geographic or political boundaries. All of Moore County is susceptible to extreme heat conditions.

Historical Occurrences

Data from the National Climatic Data Center was used to determine historical extreme heat and heat wave events in Moore County. One event was reported:

July 22, 1998 – *Excessive Heat* – Excessive heat plagued central North Carolina July 22 through July 23. Maximum temperatures reached the 98 to 103 degree range combined with dew points in the 78 to 80 degree range with little wind to give heat index values of around 110 degrees.

In addition, information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the county. Temperature information has been reported since 1893. The recorded maximum for Moore County can be found below in **Table E.5**.

TABLE E.5: HIGHEST RECORDED TEMPERATURE IN MOORE COUNTY

Location	Date	Temperature (F)
Carthage WTP	6/23/1981	107
MOORE COUNTY MAXIMUM	**--**	**107**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures; however no temperatures are available at the observation station in Moore County. The nearest location is Jackson Springs, Montgomery County. **Table E.6** shows the average maximum temperatures from 1971 to 2000 at the Jackson Springs 5 WNW observation station which can be used as a general comparison for the county.

TABLE E.6: AVERAGE MAXIMUM TEMPERATURE IN JACKSON SPRINGS 5 WNW, MONTGOMERY COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	49.7	54.1	52.7	72.1	79.0	85.9	89.2	87.4	82.1	72.0	62.4	52.9

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Moore County has a probability level of likely (10 to 100 percent annual probability) for future extreme heat events to impact the county.

E.2.3 Hailstorm

Location and Spatial Extent

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that Moore County is uniformly exposed to severe thunderstorms; therefore, all areas of the county are equally exposed to hail which may be produced by such storms.

Historical Occurrences

According to the National Climatic Data Center, 99 recorded hailstorm events have affected Moore County since 1970.[1] **Table E.7** is a summary of the hail events in Moore County. **Table E.8** provides detailed information about each event that occurred in the county. In all, hail occurrences did not result in any recorded monetary property damages. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Climatic Data Center. Therefore, it is likely that damages are greater than the reported value.

TABLE E.7: SUMMARY OF HAIL OCCURRENCES IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	5	0/0	$0
Cameron	2	0/0	$0
Carthage	8	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	1	0/0	$0
Pinehurst	2	0/0	$0
Robbins	12	0/0	$0
Southern Pines	6	0/0	$0
Taylortown	0	0/0	$0
Vass	2	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	61	0/0	$0
MOORE COUNTY TOTAL	**99**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE E.8: HISTORICAL HAIL OCCURRENCES IN MOORE COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Aberdeen				
ABERDEEN	9/25/2000	0.88 in.	0/0	$0
ABERDEEN	5/24/2005	0.75 in.	0/0	$0
ABERDEEN	5/20/2008	1.75 in.	0/0	$0
ABERDEEN	6/21/2011	1.00 in.	0/0	$0
ABERDEEN	7/22/2012	1.00 in.	0/0	$0

[1] These hail events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional hail events have affected Moore County. In addition to NCDC, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

	Date	Magnitude	Deaths / Injuries	Property Damage*
Cameron				
CAMERON	4/26/2003	0.88 in.	0/0	$0
CAMERON	5/31/2003	0.75 in.	0/0	$0
Carthage				
CARTHAGE	5/27/1998	1.00 in.	0/0	$0
CARTHAGE	4/1/2001	0.75 in.	0/0	$0
CARTHAGE	6/1/2001	1.75 in.	0/0	$0
CARTHAGE	5/18/2006	0.75 in.	0/0	$0
CARTHAGE	4/4/2008	1.00 in.	0/0	$0
CARTHAGE	4/4/2008	1.75 in.	0/0	$0
CARTHAGE	5/9/2008	1.00 in.	0/0	$0
CARTHAGE	7/22/2008	1.00 in.	0/0	$0
Foxfire Village				
None Reported	--	--	--	--
Pinebluff				
PINEBLUFF	5/20/2008	0.75 in.	0/0	$0
Pinehurst				
Pinehurst	3/24/1993	0.75 in.	0/0	$0
PINEHURST	5/23/2012	1.75 in.	0/0	$0
Robbins				
Robbins	8/27/1994	0.75 in.	0/0	$0
Robbins	7/3/1995	1.00 in.	0/0	$0
Robbins	7/3/1995	2.75 in.	0/0	$0
ROBBINS	7/5/1997	0.75 in.	0/0	$0
ROBBINS	9/10/1997	0.75 in.	0/0	$0
ROBBINS	5/20/1998	1.00 in.	0/0	$0
ROBBINS	5/21/2000	1.75 in.	0/0	$0
ROBBINS	4/1/2001	0.75 in.	0/0	$0
ROBBINS	4/30/2003	0.75 in.	0/0	$0
ROBBINS	1/11/2006	0.88 in.	0/0	$0
ROBBINS	5/18/2006	0.88 in.	0/0	$0
ROBBINS	6/29/2007	0.75 in.	0/0	$0
Southern Pines				
Southern Pines	5/19/1995	1.75 in.	0/0	$0
SOUTHERN PINES	4/17/2006	1.00 in.	0/0	$0
SOUTHERN PINES	5/18/2006	0.75 in.	0/0	$0
SOUTHERN PINES	8/30/2006	1.25 in.	0/0	$0
SOUTHERN PINES	6/12/2007	0.75 in.	0/0	$0
SOUTHERN PINES	5/23/2012	1.00 in.	0/0	$0
Taylortown				
None Reported	--	--	--	--
Vass				
VASS	4/3/1998	1 in.	0/0	$0
VASS	5/18/2006	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
Whispering Pines				
None Reported	--	--	--	--
Unincorporated Area				
Moore County	4/13/1970	1.00 in.	0/0	$0
Moore County	6/1/1974	0.75 in.	0/0	$0
Moore County	6/16/1982	0.75 in.	0/0	$0
Moore County	4/2/1983	1.75 in.	0/0	$0
Moore County	3/28/1984	1.75 in.	0/0	$0
Moore County	4/14/1984	1.75 in.	0/0	$0
Moore County	3/24/1985	0.75 in.	0/0	$0
Moore County	4/16/1985	0.75 in.	0/0	$0
Moore County	6/7/1985	1.75 in.	0/0	$0
Moore County	10/3/1985	1.00 in.	0/0	$0
Moore County	5/13/1987	0.75 in.	0/0	$0
Moore County	8/21/1987	1.00 in.	0/0	$0
Moore County	8/29/1987	1.75 in.	0/0	$0
Moore County	5/16/1988	1.50 in.	0/0	$0
Moore County	5/24/1988	1.75 in.	0/0	$0
Moore County	5/24/1988	0.75 in.	0/0	$0
Moore County	6/26/1988	0.75 in.	0/0	$0
Moore County	7/10/1988	0.75 in.	0/0	$0
Moore County	6/16/1989	1.75 in.	0/0	$0
Moore County	4/2/1990	1.75 in.	0/0	$0
Moore County	8/16/1990	0.75 in.	0/0	$0
Moore County	1/16/1991	0.75 in.	0/0	$0
Moore County	3/19/1992	1.75 in.	0/0	$0
Moore County	6/21/1992	1.75 in.	0/0	$0
Moore County	7/18/1992	1.75 in.	0/0	$0
Moore County	7/18/1992	1.75 in.	0/0	$0
Moore County	5/15/1995	1.75 in.	0/0	$0
WEST END	7/31/1996	1.75 in.	0/0	$0
WEST END	5/20/1998	1.00 in.	0/0	$0
EASTWOOD	5/27/1998	1.00 in.	0/0	$0
EAGLE SPGS	8/26/1999	0.75 in.	0/0	$0
EAGLE SPGS	4/30/2003	0.75 in.	0/0	$0
EAGLE SPGS	4/17/2006	0.75 in.	0/0	$0
HIGH FALLS	5/18/2006	1.75 in.	0/0	$0
HIGH FALLS	4/15/2007	1.00 in.	0/0	$0
EASTWOOD	3/15/2008	0.75 in.	0/0	$0
WEST END	3/15/2008	1.00 in.	0/0	$0
ADDOR	5/20/2008	1.00 in.	0/0	$0
GARREN HILL	5/20/2008	0.75 in.	0/0	$0
PARKWOOD	6/14/2008	0.88 in.	0/0	$0
GLENDON	7/5/2008	1.00 in.	0/0	$0
MT PLEASANT	7/22/2008	1.75 in.	0/0	$0
WEST END	7/23/2008	0.75 in.	0/0	$0
SPIES	4/14/2009	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
MURDOCKSVILLE	6/2/2009	0.88 in.	0/0	$0
GLENDON	7/20/2009	1.00 in.	0/0	$0
GLENDON	7/20/2009	0.88 in.	0/0	$0
HARRIS	7/20/2009	0.88 in.	0/0	$0
HIGH FALLS	7/20/2009	1.00 in.	0/0	$0
HIGH FALLS	7/27/2009	1.75 in.	0/0	$0
LEAMAN	7/27/2009	0.88 in.	0/0	$0
HOWARD MILL	6/26/2010	1.00 in.	0/0	$0
WEST END	10/25/2010	1.00 in.	0/0	$0
WEST END	6/21/2011	1.00 in.	0/0	$0
SPIES	3/25/2012	1.00 in.	0/0	$0
SPIES	3/25/2012	1.00 in.	0/0	$0
SPIES	3/25/2012	1.00 in.	0/0	$0
MT PLEASANT	5/23/2012	0.75 in.	0/0	$0
SOUTHERN PINES ARPT	5/23/2012	0.75 in.	0/0	$0
ADDOR	8/2/2012	1.25 in.	0/0	$0
MC CONNELL	8/2/2012	1.00 in.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is highly likely (100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that Moore County has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the county.

E.2.4 Hurricane and Tropical Storm

Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect Moore County. The entire county is equally susceptible to hurricane and tropical storms.

Historical Occurrences

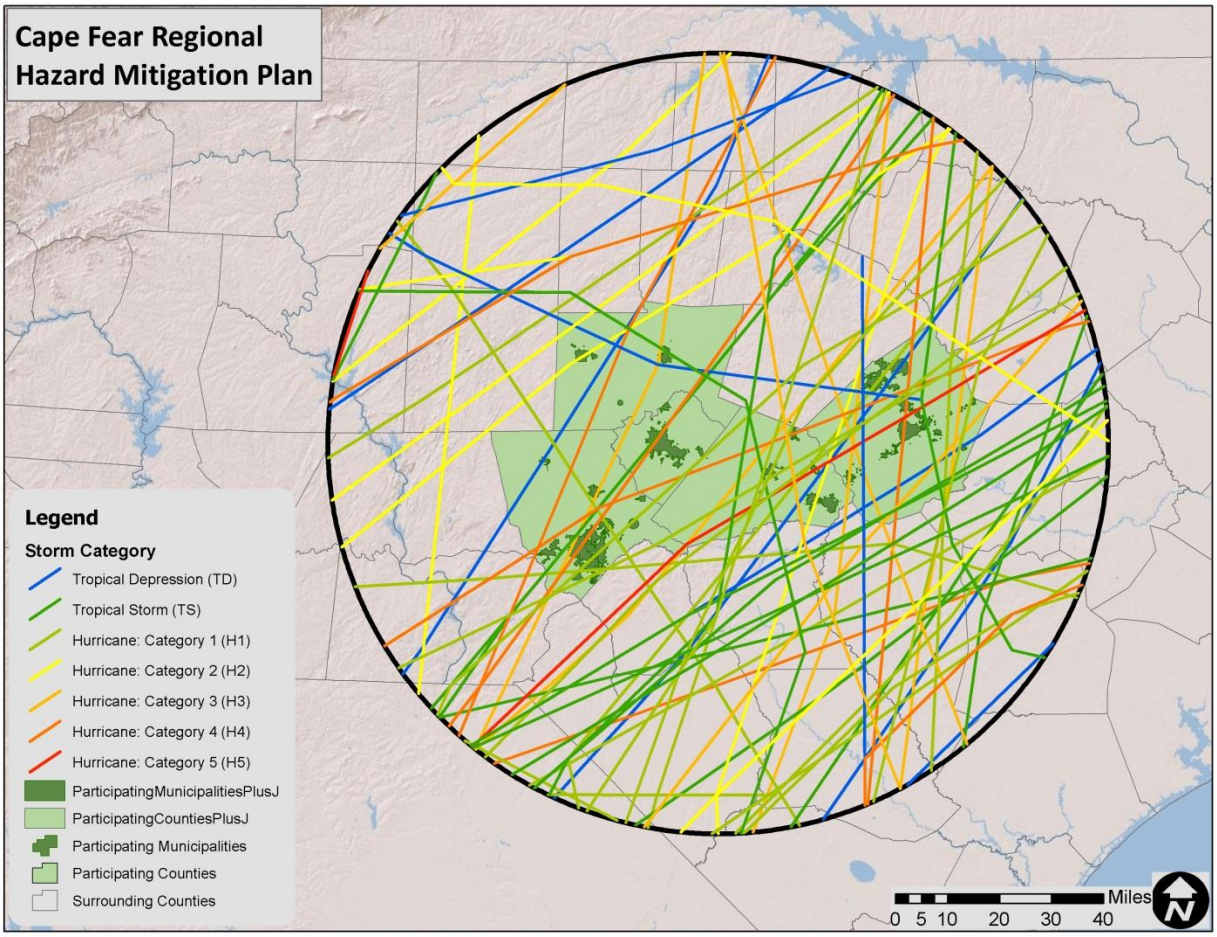
According to the National Hurricane Center's historical storm track records, 68 hurricane or tropical storm tracks have passed within 75 miles of the Cape Fear Region since 1851.[2] This includes 43 hurricanes, 14 tropical storms, and 10 tropical depressions (based on the maximum storm category reached by the storm).

Of the recorded storm events, 13 have traversed directly through Moore County as shown in **Figure E.2**. **Table E.9** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

within 75 miles of the Cape Fear Region) and Maximum Category of the storm based on the Saffir-Simpson Scale for each event.

FIGURE E.2: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE E.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CAPE FEAR REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
8/25/1851	NOT NAMED	35	Tropical Storm (TS)
9/10/1854	NOT NAMED	57	Tropical Depression (TD)
1859	NOT NAMED	-	Tropical Depression (TD)
9/17/1859	NOT NAMED	35	Hurricane: Category 1 (H1)
6/23/1867	NOT NAMED	35	Hurricane: Category 1 (H1)
10/4/1877	NOT NAMED	48	Hurricane: Category 3 (H3)
9/13/1878	NOT NAMED	44	Hurricane: Category 2 (H2)
9/12/1883	NOT NAMED	44	Hurricane: Category 3 (H3)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
10/13/1885	NOT NAMED	35	Tropical Depression (TD)
7/2/1886	NOT NAMED	31	Hurricane: Category 2 (H2)
6/22/1886	NOT NAMED	35	Tropical Depression (TD)
1886	NOT NAMED	53	Tropical Depression (TD)
1887	NOT NAMED	-	Hurricane: Category 1 (H1)
9/10/1888	NOT NAMED	31	Tropical Storm (TS)
9/24/1889	NOT NAMED	35	Hurricane: Category 2 (H2)
1891	NOT NAMED	-	Tropical Depression (TD)
10/4/1893	NOT NAMED	70	Hurricane: Category 3 (H3)
10/13/1893	NOT NAMED	35	Hurricane: Category 4 (H4)
9/30/1896	NOT NAMED	62	Hurricane: Category 3 (H3)
10/31/1899	NOT NAMED	66	Hurricane: Category 2 (H2)
7/13/1901	NOT NAMED	31	Hurricane: Category 1 (H1)
6/16/1902	NOT NAMED	31	Tropical Storm (TS)
9/14/1904	NOT NAMED	53	Hurricane: Category 1 (H1)
8/31/1911	NOT NAMED	22	Hurricane: Category 2 (H2)
6/14/1912	NOT NAMED	31	Tropical Storm (TS)
9/4/1913	NOT NAMED	66	Hurricane: Category 1 (H1)
10/10/1913	NOT NAMED	35	Hurricane: Category 1 (H1)
5/16/1916	NOT NAMED	31	Tropical Storm (TS)
9/6/1916	NOT NAMED	31	Tropical Storm (TS)
9/23/1920	NOT NAMED	31	Hurricane: Category 1 (H1)
9/30/1924	NOT NAMED	53	Hurricane: Category 1 (H1)
1927	NOT NAMED	44	Tropical Storm (TS)
8/11/1928	NOT NAMED	26	Hurricane: Category 2 (H2)
10/2/1929	NOT NAMED	35	Hurricane: Category 4 (H4)
9/6/1935	NOT NAMED	48	Hurricane: Category 5 (H5)
8/15/1940	NOT NAMED	62	Tropical Depression (TD)
8/2/1944	NOT NAMED	31	Hurricane: Category 1 (H1)
10/20/1944	NOT NAMED	48	Hurricane: Category 3 (H3)
9/18/1945	NOT NAMED	35	Hurricane: Category 4 (H4)
10/9/1946	NOT NAMED	22	Hurricane: Category 4 (H4)
9/25/1947	NOT NAMED	53	Tropical Storm (TS)
10/15/1954	HAZEL	35	Hurricane: Category 4 (H4)
8/17/1955	DIANE	53	Hurricane: Category 3 (H3)
9/26/1956	IVY	35	Hurricane: Category 1 (H1)
7/10/1959	CINDY	26	Hurricane: Category 1 (H1)
8/31/1964	CLEO	26	Hurricane: Category 4 (H4)
6/16/1965	UNNAMED	35	Tropical Storm (TS)
6/10/1968	CELESTE	31	Tropical Storm (TS)
5/26/1970	ALMA	22	Hurricane: Category 1 (H1)
9/13/1971	HEIDI	40	Tropical Depression (TD)
10/1/1971	UNNAMED	40	Tropical Storm (TS)
6/21/1972	AGNES	26	Hurricane: Category 1 (H1)
9/15/1976	SUBTROP:SUBTROP 3	53	Tropical Storm (TS)

Date of Occurrence	Storm Name	Maximum Wind Speed Within Buffer Area (knots)	Maximum Storm Category Achieved
9/5/1979	DAVID	35	Hurricane: Category 5 (H5)
9/14/1984	DIANA	40	Hurricane: Category 4 (H4)
8/18/1985	ONE-C	22	Tropical Depression (TD)
9/8/1987	UNNAMED	53	Tropical Depression (TD)
9/6/1996	FRAN	57	Hurricane: Category 3 (H3)
7/24/1997	DANNY	31	Hurricane: Category 1 (H1)
9/4/1998	EARL	66	Hurricane: Category 2 (H2)
9/5/1999	DENNIS	26	Hurricane: Category 2 (H2)
9/16/1999	FLOYD*	66	Hurricane: Category 1 (H1)
9/19/2000	GORDON	35	Tropical Storm (TS)
9/23/2000	HELENE	35	Hurricane: Category 1 (H1)
8/30/2004	GASTON	35	Hurricane: Category 3 (H3)
9/27/2004	JEANNE	-	Tropical Storm (TS)
6/13/2006	ALBERTO	35	Hurricane: Category 1 (H1)
9/6/2008	HANNA	40	Tropical Depression (TD)

**Although Hurricane Floyd's track traversed just outside of the 75 mile buffer area, it was included in the hazard history since a federal disaster area was declared for all five Cape Fear counties as a result of the storm's impact.*
Source: National Hurricane Center

The National Climatic Data Center has reported four events associated with a hurricane or tropical storm in Moore County since 1996. These storms are listed in **Table E.10** and are generally representative of storms with the greatest impact on the county over that time period.

TABLE E.10: HISTORICAL HURRICANE/TROPICAL STORM OCCURRENCES IN MOORE COUNTY

Date of Occurrence	Storm Name	Deaths/Injuries	Property Damage*
7/12/1996	Hurricane Bertha	0/0	$0
9/5/1996	Hurricane Fran	0/0	$0
9/4/1999	Hurricane Dennis	0/0	$0
9/15/1999	Hurricane Floyd	0/0	$645,322,144

*Property damage is reported in 2013 dollars; all damage may not have been reported.

Federal records also indicate that two disaster declarations were made in 1996 (Hurricane Fran) and 1999 (Hurricane Floyd) for the county.[3]

Flooding and high winds are both hazards of concern with hurricane and tropical storm events in Moore County as evidenced by the difference in impacts caused by Hurricanes Fran and Floyd. Whereas Floyd's effects were primarily due to flooding, Fran's high winds caused damage throughout the county in conjunction with flooding impacts. Some anecdotal information is available for the major storms that have impacted the area as found below:

Tropical Storm Fran – September 5-6, 1996
After being saturated with rain just a few weeks earlier by Hurricane Bertha, the Cape Fear region was impacted by the one of the most devastating storms to ever make landfall along the Atlantic Coast. Fran

[3] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

dropped more than 10 inches of rain in many areas and had sustained winds of around 115 miles per hour as it hit the coast and began its path along the I-40 corridor central North Carolina. In the end, over 3 billion dollars in damages were reported in the state. Damages to infrastructure and agriculture added to the overall toll and more than 1.7 million people in the state were left without power.

Hurricane Floyd – September 16-17, 1999
Much like Hurricane Fran, Hurricane Floyd hit the North Carolina coast just 10 days after Tropical Storm Dennis dropped more than 10 inches of rain in many areas of the state. As a result, the ground was heavily saturated when Floyd dumped an additional 15 to 20 inches in some areas. Although much of the heavy damage from the storm was found further east, the Cape Fear region suffered significant damage from the storm. Across the state more than 6 billion dollars in property damage was recorded and agricultural impacts were extremely high.

Probability of Future Occurrences
Given the inland location of the county, Moore County is less likely to be affected by a hurricane or tropical storm system than counties closer to the coast. However, given the county's location in the eastern part of the state, hurricanes and tropical storms still remain a real threat. Based on historic evidence, the probability level of future occurrence is likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. When the county is impacted, the damage could be significant, threatening lives and property throughout the planning area.

E.2.5 Lightning

Location and Spatial Extent
Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of Moore County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been nine recorded lightning events in Moore County since 2000, as listed in summary **Table E.11**.[4] These events resulted in almost $637,000 (2013 dollars) in damages and caused one fatality and one injury. A complete listing of those events can be found in **Table E.12**. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE E.11: SUMMARY OF LIGHTNING OCCURRENCES IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	0	0/0	$0
Cameron	2	0/0	$1,069
Carthage	1	0/0	$427,791
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	1	0/0	$0

[4] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional lightning events have occurred in Moore County. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Robbins	1	0/1	$0
Southern Pines	3	1/0	$197,167
Taylortown	0	0/0	$0
Vass	0	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	1	0/0	$10,695
MOORE COUNTY TOTAL	**9**	**1/1**	**$636,722**

Source: National Climatic Data Center

TABLE E.12: HISTORIC LIGHTNING OCCURRENCES IN MOORE COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Aberdeen				
None Reported	--	--	--	--
Cameron				
CAMERON	6/14/2000	0/0	$0	Lightning set fire to two 400 foot chicken houses, killing about 40,000 chicks.
CAMERON	6/29/2010	0/0	$1,069	An old abandoned tobacco barn near Cameron, NC was burned down.
Carthage				
CARTHAGE	8/19/2010	0/0	$427,791	A Carthage home was completely destroyed when lightning hit a tree right behind the house and branched off into the home.
Foxfire Village				
None Reported	--	--	--	--
Pinebluff				
None Reported	--	--	--	--
Pinehurst				
PINEHURST	6/26/2000	0/0	$0	A house was struck by lightning.
Robbins				
ROBBINS	5/23/2002	1/0	$0	A 7-year old boy was struck by lightning under a tree in his backyard. He was taken to the hospital and died three days later.
Southern Pines				
SOUTHERN PINES	7/14/2004	0/0	$12,323	Lightning started a fire at a villa in Pine Grove village.
SOUTHERN PINES	7/14/2004	0/0	$184,844	Lightning started a fire at the Sedgemere Horse Farm on Niagara-Carthage Road. A

	Date	Deaths / Injuries	Property Damage*	Details
				horse barn was completely destroyed.
SOUTHERN PINES	8/8/2006	1/0	$0	Lightning struck 17 year old as he was removing clothes from a clothesline outside his home. He died several days later at UNC Hospital in Chapel Hill. M17OU
Taylortown				
None Reported	--	--	--	--
Vass				
None Reported	--	--	--	--
Whispering Pines				
None Reported	--	--	--	--
Unincorporated Area				
VINA VISTA	6/26/2010	0/0	$10,695	Two houses were struck by lightning in Pinehurst, NC.

*Property Damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

Although there was not a high number of historical lightning events reported in Moore County via NCDC data, it is considered a regular occurrence, especially accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), Moore County is located in an area of the country that experienced an average of 3 to 5 lightning flashes per square kilometer per year between 1997 and 2010. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the county.

E.2.6 Thunderstorm Wind / High Wind

Location and Spatial Extent

A wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, Moore County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Moore County has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms have not resulted in any disaster declarations in Moore County.[5] According to NCDC, there have been 160 reported thunderstorm wind and high wind events since 1959 in Moore County.[6]

[5]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

These events caused almost $191,000 (2013 dollars) in damages. There were also reports of four injuries. **Table E.13** summarizes this information. **Table E.14** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event. [7]

TABLE E.13: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	5	0/0	$0
Cameron	1	0/0	$0
Carthage	19	0/1	$12,725
Foxfire Village	1	0/0	$0
Pinebluff	4	0/0	$510,900
Pinehurst	4	0/0	$496,918
Robbins	11	0/0	$2,173
Southern Pines	9	0/0	$508
Taylortown	3	0/0	$0
Vass	7	0/0	$6,974
Whispering Pines	0	0/0	$0
Unincorporated Area	96	0/3	$190,883
MOORE COUNTY TOTAL	**160**	**0/4**	**$190,883**

Source: National Climatic Data Center

TABLE E.14: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN MOORE COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Aberdeen					
ABERDEEN	5/13/2002	TSTM WIND	50 kts.	0/0	$0
ABERDEEN	6/21/2006	TSTM WIND	50 kts.	0/0	$0
ABERDEEN	7/19/2006	TSTM WIND	50 kts.	0/0	$0
ABERDEEN	6/26/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
ABERDEEN	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
Cameron					
CAMERON	6/22/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
Carthage					
Carthage	1/24/1993	THUNDERSTORM WINDS	0 kts.	0/0	$0
Carthage	8/20/1993	THUNDERSTORM WINDS	0 kts.	0/0	$0
CARTHAGE	6/24/1996	TSTM WIND	0 kts.	0/0	$0
CARTHAGE	7/15/1996	TSTM WIND	0 kts.	0/0	$0
CARTHAGE	4/17/2000	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	7/7/2000	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	11/11/2002	TSTM WIND	50 kts.	0/0	$0

[6] These thunderstorm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional thunderstorm events have occurred in Moore County. As additional local data becomes available, this hazard profile will be amended.

[7] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
CARTHAGE	5/25/2003	TSTM WIND	52 kts.	0/0	$0
CARTHAGE	8/5/2003	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	3/8/2005	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	5/18/2006	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	8/30/2006	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	9/28/2006	TSTM WIND	50 kts.	0/0	$0
CARTHAGE	4/12/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CARTHAGE	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
CARTHAGE	7/27/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
CARTHAGE	6/29/2010	THUNDERSTORM WIND	50 kts.	0/0	$10,695
CARTHAGE	12/7/2011	THUNDERSTORM WIND	50 kts.	0/1	$0
CARTHAGE	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$2,030
Foxfire Village					
FOXFIRE VILLAGE	6/2/1997	TSTM WIND	50 kts	0/0	$0
Pinebluff					
Pinebluff	1/7/1995	THUNDERSTORM WINDS	0 kts.	0/0	$496,918
PINEBLUFF	8/14/1999	TSTM WIND	0 kts.	0/0	$13,982
PINEBLUFF	6/9/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
PINEBLUFF	7/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
Pinehurst					
Pinehurst	1/7/1995	THUNDERSTORM WINDS	0 kts.	0/0	$496,918
PINEHURST	3/8/2005	TSTM WIND	50 kts.	0/0	$0
PINEHURST	6/8/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
PINEHURST	2/28/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
Robbins					
ROBBINS	7/25/1996	TSTM WIND	0 kts.	0/0	$0
ROBBINS	6/22/2001	TSTM WIND	50 kts.	0/0	$0
ROBBINS	5/13/2002	TSTM WIND	50 kts.	0/0	$0
ROBBINS	7/4/2002	TSTM WIND	50 kts.	0/0	$0
ROBBINS	7/7/2005	TSTM WIND	50 kts.	0/0	$0
ROBBINS	7/19/2006	TSTM WIND	50 kts.	0/0	$0
ROBBINS	8/7/2006	TSTM WIND	50 kts.	0/0	$0
ROBBINS	3/2/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
ROBBINS	7/22/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
ROBBINS	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
ROBBINS	8/22/2009	THUNDERSTORM WIND	50 kts.	0/0	$2,173
Southern Pines					
SOUTHERN PINES	6/30/1998	TSTM WIND	50 kts.	0/0	$0
SOUTHERN PINES	5/2/2003	TSTM WIND	60 kts.	0/0	$0
SOUTHERN PINES	7/27/2006	TSTM WIND	50 kts.	0/0	$0
SOUTHERN PINES	7/28/2006	TSTM WIND	50 kts.	0/0	$0
SOUTHERN PINES	8/30/2006	TSTM WIND	50 kts.	0/0	$0
SOUTHERN PINES	7/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTHERN PINES	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTHERN PINES	7/9/2012	THUNDERSTORM WIND	50 kts.	0/0	$508

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
SOUTHERN PINES	8/17/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
Taylortown					
TAYLORTOWN	6/26/2000	TSTM WIND	50 kts.	0/0	$0
TAYLORTOWN	5/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
TAYLORTOWN	6/10/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
Vass					
VASS	8/27/2001	TSTM WIND	50 kts.	0/0	$0
VASS	7/22/2005	TSTM WIND	50 kts.	0/0	$5,959
VASS	7/6/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
VASS	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
VASS	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
VASS	5/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
VASS	7/23/2012	THUNDERSTORM WIND	50 kts.	0/0	$1,015
Whispering Pines					
None Reported	--	--	--	--	--
Unincorporated Area					
Moore County	6/3/1959	TSTM WIND	0 kts.	0/0	$0
Moore County	10/7/1965	TSTM WIND	0 kts.	0/0	$0
Moore County	8/24/1968	TSTM WIND	0 kts.	0/0	$0
Moore County	4/13/1970	TSTM WIND	0 kts.	0/0	$0
Moore County	3/3/1971	TSTM WIND	0 kts.	0/0	$0
Moore County	6/1/1974	TSTM WIND	0 kts.	0/0	$0
Moore County	6/16/1974	TSTM WIND	0 kts.	0/0	$0
Moore County	6/23/1974	TSTM WIND	0 kts.	0/0	$0
Moore County	3/24/1975	TSTM WIND	0 kts.	0/0	$0
Moore County	8/1/1980	TSTM WIND	0 kts.	0/0	$0
Moore County	6/16/1982	TSTM WIND	0 kts.	0/0	$0
Moore County	6/16/1982	TSTM WIND	52 kts.	0/0	$0
Moore County	3/20/1984	TSTM WIND	0 kts.	0/0	$0
Moore County	5/8/1984	TSTM WIND	0 kts.	0/0	$0
Moore County	7/6/1984	TSTM WIND	0 kts.	0/0	$0
Moore County	4/16/1985	TSTM WIND	0 kts.	0/0	$0
Moore County	6/5/1985	TSTM WIND	0 kts.	0/0	$0
Moore County	6/7/1985	TSTM WIND	0 kts.	0/0	$0
Moore County	6/7/1985	TSTM WIND	0 kts.	0/0	$0
Moore County	5/30/1986	TSTM WIND	0 kts.	0/0	$0
Moore County	6/20/1986	TSTM WIND	0 kts.	0/0	$0
Moore County	6/24/1986	TSTM WIND	0 kts.	0/0	$0
Moore County	7/21/1986	TSTM WIND	61 kts.	0/0	$0
Moore County	8/2/1986	TSTM WIND	0 kts.	0/0	$0
Moore County	5/2/1987	TSTM WIND	0 kts.	0/0	$0
Moore County	8/29/1987	TSTM WIND	0 kts.	0/0	$0
Moore County	8/29/1987	TSTM WIND	0 kts.	0/0	$0
Moore County	3/26/1988	TSTM WIND	0 kts.	0/0	$0
Moore County	6/9/1988	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Moore County	6/9/1988	TSTM WIND	0 kts.	0/0	$0
Moore County	7/10/1988	TSTM WIND	70 kts.	0/0	$0
Moore County	2/21/1989	TSTM WIND	0 kts.	0/2	$0
Moore County	2/21/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	4/27/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	4/27/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	6/5/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	6/15/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	6/16/1989	TSTM WIND	0 kts.	0/0	$0
Moore County	5/2/1990	TSTM WIND	0 kts.	0/0	$0
Moore County	5/2/1990	TSTM WIND	0 kts.	0/0	$0
Moore County	6/22/1990	TSTM WIND	0 kts.	0/0	$0
Moore County	8/7/1991	TSTM WIND	0 kts.	0/0	$0
Moore County	3/19/1992	TSTM WIND	0 kts.	0/0	$0
Moore County	3/19/1992	TSTM WIND	65 kts.	0/0	$0
Moore County	6/21/1992	TSTM WIND	0 kts.	0/0	$0
Moore County	6/26/1992	TSTM WIND	0 kts.	0/0	$0
Moore County	7/3/1992	TSTM WIND	0 kts.	0/0	$0
Moore County	11/4/1992	TSTM WIND	0 kts.	0/1	$0
N Portion	8/5/1994	THUNDERSTORM WINDS	0 kts.	0/0	$0
Vass-Lobelia	11/11/1995	THUNDERSTORM WINDS	0 kts.	0/0	$76,449
Moore County	2/3/1998	HIGH WIND	35 kts.	0/0	$0
Moore County	2/16/1998	HIGH WIND	52 kts.	0/0	$0
EASTWOOD	8/26/1999	TSTM WIND	0 kts.	0/0	$0
COUNTYWIDE	8/18/2000	TSTM WIND	50 kts.	0/0	$0
SOUTHERN PINES ARPT	8/27/2001	TSTM WIND	59 kts.	0/0	$65,770
WEST END	8/5/2003	TSTM WIND	50 kts.	0/0	$0
Moore County	3/7/2004	HIGH WIND	65 kts.	0/0	$6,446
SAMARCAND	4/15/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
WEST END	8/21/2007	THUNDERSTORM WIND	50 kts.	0/0	$0
HIGH FALLS	3/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
WEST END	3/4/2008	THUNDERSTORM WIND	52 kts.	0/0	$0
WEST END	4/4/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
ADDOR	5/20/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
PARKWOOD	6/14/2008	THUNDERSTORM WIND	50 kts.	0/0	$0
HILL CREST	5/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
HARRIS	6/9/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
LEAMAN	6/9/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
SAMARCAND	7/13/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
MC CONNELL	7/20/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
WEST END	7/20/2009	THUNDERSTORM WIND	50 kts.	0/0	$16,299
HILL CREST	7/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
MANLY	7/28/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
ROSELAND	8/5/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
HOWARD MILL	8/22/2009	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
HOWARD MILL	8/22/2009	THUNDERSTORM WIND	50 kts.	0/0	$0
HALLISON	6/14/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
HOWARD MILL	6/14/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
VINA VISTA	6/14/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
ROSELAND	6/26/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTHERN PINES ARPT	6/26/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTHERN PINES ARPT	6/26/2010	THUNDERSTORM WIND	50 kts.	0/0	$5,347
VINA VISTA	6/26/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
SPIES	7/9/2010	THUNDERSTORM WIND	50 kts.	0/0	$5,347
MIDTOWN	7/16/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
HARRIS	12/1/2010	THUNDERSTORM WIND	50 kts.	0/0	$0
WEST END	6/18/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
MIDTOWN	7/13/2011	THUNDERSTORM WIND	50 kts.	0/0	$0
MT PLEASANT	7/4/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
HALLISON	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
HARRIS	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTHERN PINES ARPT	7/5/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
GLENDON	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
HILL CREST	7/24/2012	THUNDERSTORM WIND	50 kts.	0/0	$5,075
EAGLE SPGS	7/28/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
HILL CREST	7/28/2012	THUNDERSTORM WIND	50 kts.	0/0	$0
WEST END	7/28/2012	THUNDERSTORM WIND	50 kts.	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

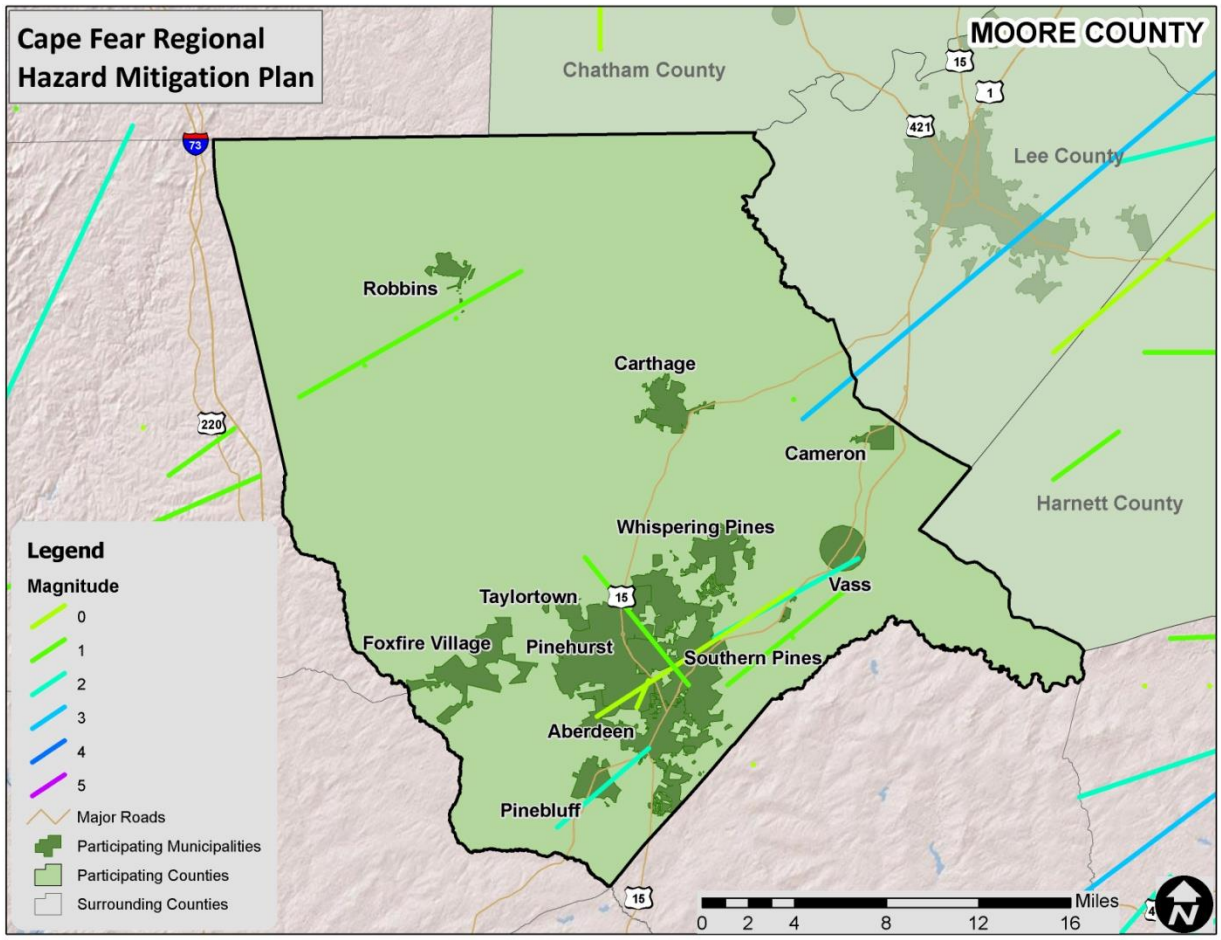
Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire county.

E.2.7 Tornado

Location and Spatial Extent

Tornadoes occur throughout the state of North Carolina, and thus in Moore County. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that Moore County is uniformly exposed to this hazard. With that in mind, Figure **E.3** shows tornado track data for many of the major tornado events that have impacted the county. While no definitive pattern emerges from this data, some areas that have been impacted in the past may be potentially more susceptible in the future.

FIGURE E.3: HISTORICAL TORNADO TRACKS IN MOORE COUNTY



Source: National Weather Service Storm Prediction Center

Historical Occurrences

Tornadoes have resulted in any disaster declarations in Moore County.[8] According to the National Climatic Data Center, there have been a total of 15 recorded tornado events in the Moore County since 1973 (**Table E.15**), resulting in almost $9 million (2013 dollars) in property damages.[9] In addition, three injuries were reported (**Table E.16**). The magnitude of these tornadoes ranges from F0 to F2 in intensity, although an F3 through F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 40 years.

TABLE E.15: SUMMARY OF TORNADO OCCURRENCES IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	1	0/0	$0

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[9] These tornado events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional tornadoes have occurred in Moore County. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cameron	1	0/0	$0
Carthage	0	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	0	0/0	$0
Robbins	0	0/0	$0
Southern Pines	1	0/0	$0
Taylortown	0	0/0	$0
Vass	2	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	10	0/3	$8,963,418
MOORE COUNTY TOTAL	**15**	**0/3**	**$8,963,418**

Source: National Climatic Data Center

TABLE E.16: HISTORICAL TORNADO IMPACTS IN MOORE COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Aberdeen					
ABERDEEN	7/2/2003	F0	0/0	$0	A tornado was sighted moving northeast between Aberdeen and Vass. Numerous trees were blown down along the path, and some homes and vehicles were damaged.
Cameron					
CAMERON	4/16/2011	F0	0/0	$0	A tornado touched down in northeastern Moore County, west of Cameron near the intersection of Red Hill Road and Gilchrist Road. The initial tornado touchdown intensity was EF0 with only minor damage reported to a few homes, consisting of mainly shingle damage.
Carthage					
None Reported	--	--	--	--	--
Foxfire Village					
None Reported	--	--	--	--	--
Pinebluff					
None Reported	--	--	--	--	--
Pinehurst					
None Reported	--	--	--	--	--
Robbins					
None Reported	--	--	--	--	--

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Southern Pines					
SOUTHERN PINES	9/27/2004	F1	0/0	$0	A tornado touched down at the Elks Golf Club just south of Southern Pines. Over 200 trees were snapped or uprooted at the golf course, a few large trees were blown down north of the golf course, and more were blown down onto homes in a neighborhood east of Broad Street and south of Morganton Road. A small shopping center on Broad Street sustained roof and wall failure, and damage was noted at a car dealership as well. The tornado lifted, and touched down again at the Memorial Park Ball Diamonds, where F0 damage was noted. Partial roof damage occurred to several homes in a neighborhood along US Highway 1 and Massachusetts Avenue. Several large trees were blown onto houses between Glover and Carlisle Streets in Pinehurst. The tornado weakened as it crossed the Plantation Golf Club, and as it crossed Midland Road, minor property damage occurred. The Mid-South Country Club lost about 250 trees, and the Midland Country Club sustained significant tree damage. Twelve cars in the Midland parking lot were destroyed. In all, the tornado damaged 121 buildings, eight of which were destroyed.
Taylortown					
None Reported	--	--	--	--	--
Vass					
VASS	9/8/2004	F0	0/0	$0	A tornado touched down briefly just northwest of Woodlake near Line Road.
VASS	9/17/2004	F0	0/0	$0	A tornado touched down briefly near Vass, blowing down trees and snapping power poles.
Whispering Pines					
None Reported	--	--	--	--	--
Unincorporated Area					
Moore County	5/24/1973	F1	0/0	$1,311,518	
Moore County	3/4/1977	F1	0/0	$96,155	
Moore County	8/5/1978	F1	0/0	$0	
Moore County	2/11/1981	F2	0/0	$6,410,356	
Moore County	2/11/1981	F2	0/0	$641,036	

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Moore County	6/10/1982	F1	0/1	$60,351	
Moore County	6/16/1982	F1	0/0	$6,035	
Moore County	3/29/1991	F1	0/2	$427,603	
PARKWOOD	9/27/2004	F0	0/0	$0	A tree was blown down onto a mobile home.
MIDTOWN	9/6/2011	F0	0/0	$10,363	The National Weather Service in Raleigh, NC has confirmed an EF0 tornado with maximum winds of 80 mph near Pinehurst in Moore County North Carolina on September 6, 2011. The damage was mainly confined to several clusters of trees along a narrow path that was 1.3 miles in length in the country club of North Carolina Golf Resort. At least two homes had fallen trees on them, but damage to the homes was minimal. At least two homes experienced extensive debris across the property including a small boat that was lifted out of a nearby pond and tossed up onto the property. Monetary damage was estimated.

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Probability of Future Occurrences

According to historical information, tornado events are not an annual occurrence for the county. However, given the county's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should Moore County experience a direct tornado strike. The probability of future tornado occurrences affecting Chatham County is likely (10 to 100 percent annual probability).

E.2.8 Winter Storm and Freeze

Location and Spatial Extent

Nearly the entire continental United States 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. Moore County is accustomed to severe winter weather conditions and often receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire county has uniform exposure to a winter storm.

Historical Occurrences

Winter weather has resulted in four disaster declarations in Moore County. This includes severe ice storms in 1968 and 2002, the Blizzard of 1996, and a severe winter storm in 2000.[10] According to the

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

National Climatic Data Center, there have been a total of 22 recorded winter storm events in Moore County since 1993 (**Table E.17**).[11] These events resulted in almost $807,000 (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table E.18**.

TABLE E.17: SUMMARY OF WINTER STORM EVENTS IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Moore County	22	0/0	$806,869

Source: National Climatic Data Center

TABLE E.18: HISTORICAL WINTER STORM IMPACTS IN MOORE COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Angier				
None Reported	--	--	--	--
Cameron				
None Reported	--	--	--	--
Carthage				
None Reported	--	--	--	--
Foxfire Village				
None Reported	--	--	--	--
Pinebluff				
None Reported	--	--	--	--
Pinehurst				
None Reported	--	--	--	--
Robbins				
None Reported	--	--	--	--
Southern Pines				
None Reported	--	--	--	--
Taylortown				
None Reported	--	--	--	--
Vass				
None Reported	--	--	--	--
Whispering Pines				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	3/12/1993	WINTER STORM	2/10†	$806,869
MOORE COUNTY	1/6/1996	ICE STORM	0/0	$0
MOORE COUNTY	1/11/1996	ICE STORM	0/0	$0
MOORE COUNTY	2/2/1996	ICE STORM	0/0	$0
MOORE COUNTY	1/19/1998	HEAVY SNOW	0/0	$0

[11] These ice and winter storm events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is certain that additional winter storm conditions have affected Moore County.
[12] The dollar amount of damages provided by NCDC is divided by the number of affected counties to reflect a damage estimate for the county.

	Date	Type of Storm	Deaths / Injuries	Property Damage*
MOORE COUNTY	12/23/1998	ICE STORM	0/0	$0
MOORE COUNTY	1/18/2000	WINTER STORM	0/0	$0
MOORE COUNTY	1/22/2000	WINTER STORM	0/0	$0
MOORE COUNTY	1/24/2000	WINTER STORM	0/0	$0
MOORE COUNTY	1/28/2000	WINTER STORM	0/0	$0
MOORE COUNTY	11/19/2000	HEAVY SNOW	0/0	$0
MOORE COUNTY	1/3/2002	WINTER STORM	0/0	$0
MOORE COUNTY	12/4/2002	WINTER STORM	0/0	$0
MOORE COUNTY	2/16/2003	WINTER STORM	0/0	$0
MOORE COUNTY	1/26/2004	WINTER STORM	0/0	$0
MOORE COUNTY	2/26/2004	WINTER STORM	0/0	$0
MOORE COUNTY	12/26/2004	WINTER STORM	0/0	$0
MOORE COUNTY	2/1/2007	WINTER WEATHER	0/0	$0
MOORE COUNTY	2/1/2007	WINTER STORM	0/0	$0
MOORE COUNTY	1/17/2008	WINTER WEATHER	0/0	$0
MOORE COUNTY	1/19/2008	WINTER WEATHER	0/0	$0
MOORE COUNTY	1/19/2008	WINTER STORM	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
†Deaths/injuries were not reported at the county level; potentially outside of the county.
Source: National Climatic Data Center

There have been several severe winter weather events in Moore County. The text below describes two of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

1996 Winter Storm – January 6-8, 1996
This storm left two feet of snow in some areas and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for many days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

2002 Ice Storm – December 4-5, 2002
An ice storm produced up to an inch of freezing rain in central North Carolina impacting 40 counties. A total of 24 people were killed, and as many as 1.8 million people were left without electricity. Additionally, property damage was estimated at almost $100 million. New records were also set for traffic accidents and school closing durations. The scale of destruction was comparable to that of hurricanes that have impacted the state, such as Hurricane Fran in 1996. The storm cost the state $97.2 million in response and recovery.

Probability of Future Occurrences

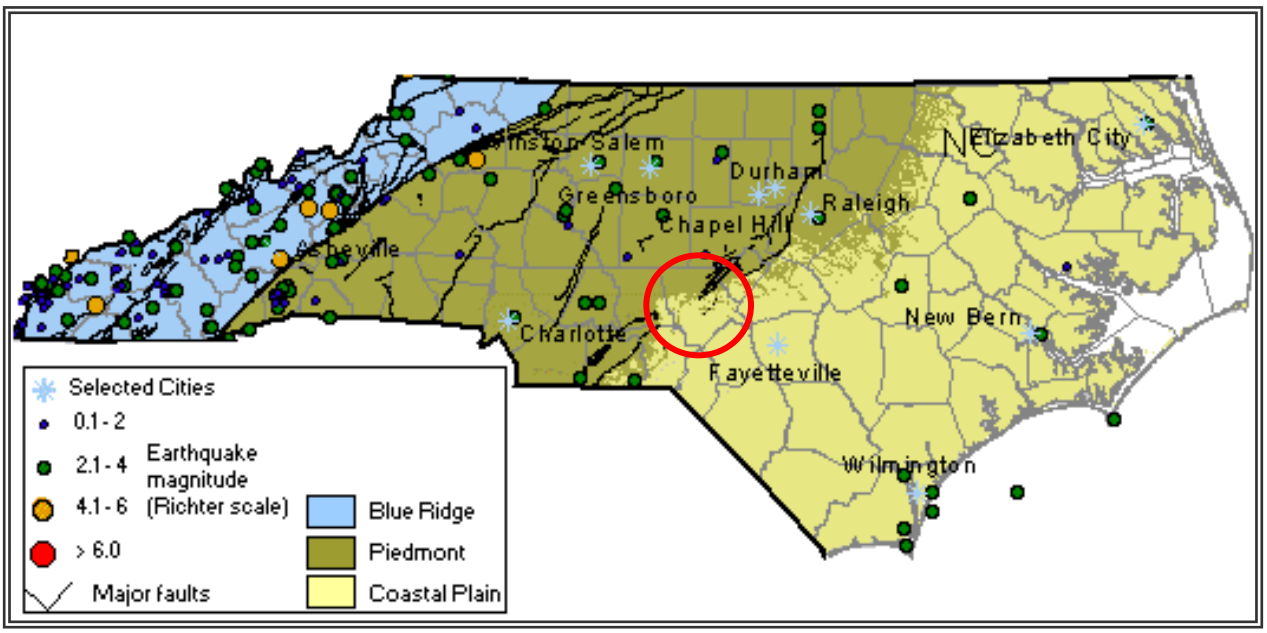
Winter storm events will remain a regular occurrence in Moore County. According to historical information, Moore County generally experiences one winter storm events each year. Therefore, the annual probability is likely (10 to 100 percent).

E.2.9 Earthquake

Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very 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 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure E.4** is a map showing geological and seismic information for North Carolina.

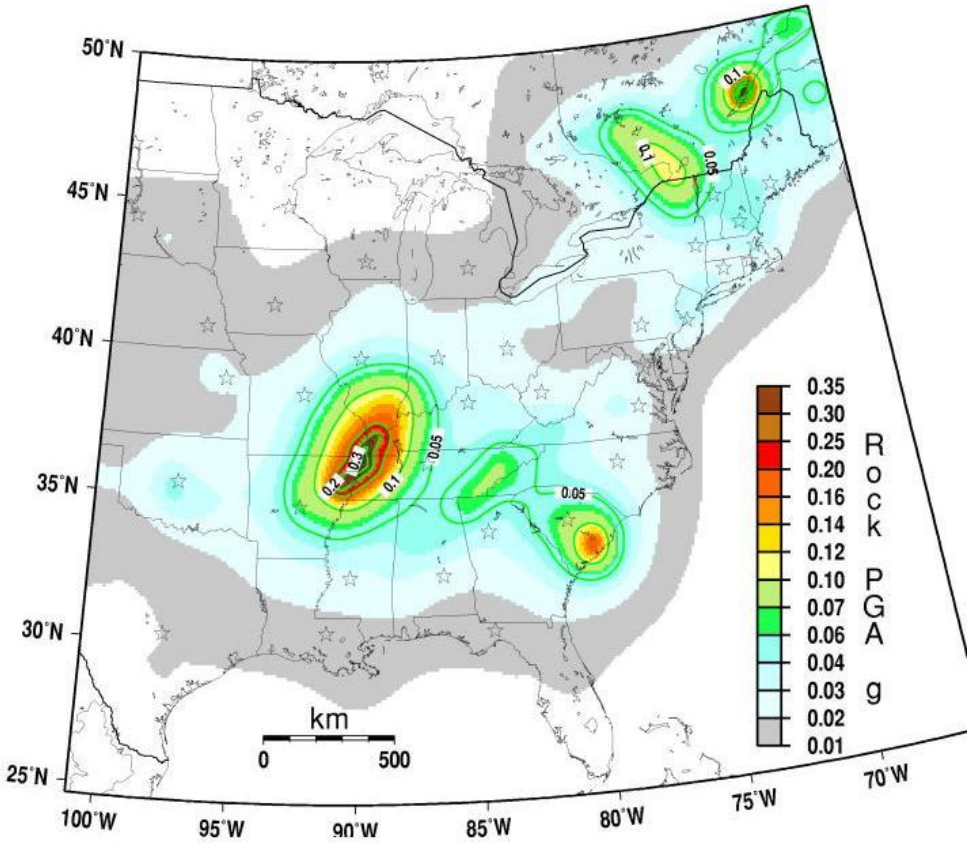
FIGURE E.4: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure E.5 shows the intensity level associated with Moore County, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, Moore County lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the county exists within an area of low to moderate seismic risk.

FIGURE E.5: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

Historical Occurrences

At least two earthquakes are known to have affected Moore County since 1886. The strongest of these measured a V on the Modified Mercalli Intensity (MMI) scale. **Table E.19** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table E.20** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE E.19: SUMMARY OF SEISMIC ACTIVITY IN MOORE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Aberdeen	0	--	--
Cameron	0	--	--
Carthage	1	V	< 4.8
Foxfire Village	0	--	--
Pinebluff	0	--	--
Pinehurst	1	II	< 4.2
Robbins	0	--	--

[13] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Southern Pines	0	--	--
Taylortown	0	--	--
Vass	0	--	--
Whispering Pines	0	--	--
Unincorporated Area	0	--	--
MOORE COUNTY TOTAL	**2**	**V**	**< 4.8**

Source: National Geophysical Data Center

TABLE E.20: SIGNIFICANT SEISMIC EVENTS IN MOORE COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Aberdeen				
None Reported	--	--	--	--
Cameron				
None Reported	--	--	--	--
Carthage				
Carthage	9/1/1886	277.0 km		V
Foxfire Village				
None Reported	--	--	--	--
Pinebluff				
None Reported	--	--	--	--
Pinehurst				
Pinehurst	2/21/1916	276.0 km		II
Robbins				
None Reported	--	--	--	--
Southern Pines				
None Reported	--	--	--	--
Taylortown				
None Reported	--	--	--	--
Vass				
None Reported	--	--	--	--
Whispering Pines				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Moore County is unlikely. It is also unlikely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the county. The annual probability level for the county is estimated between 1 percent (unlikely).

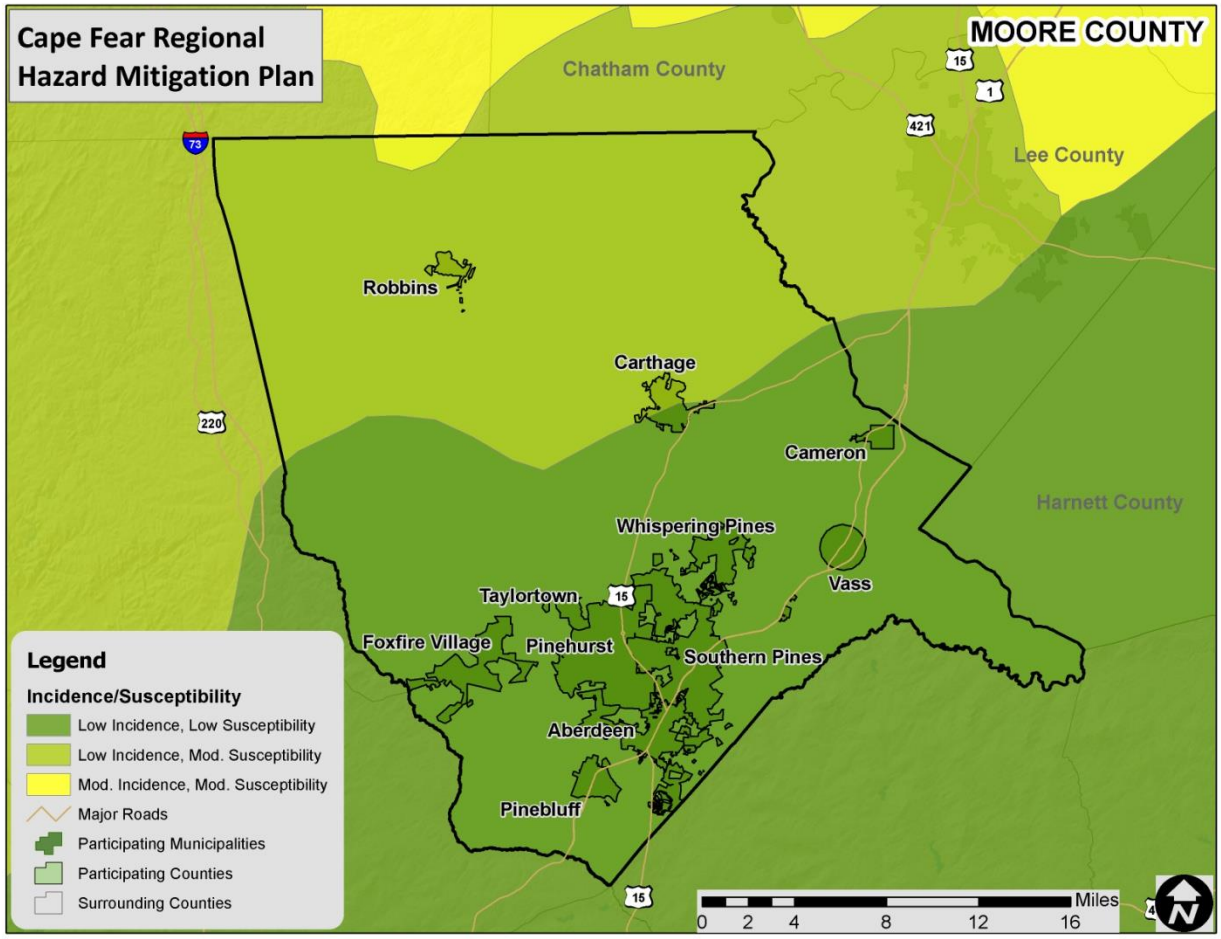
E.2.10 Landslide

Location and Spatial Extent

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout Moore County.

According to **Figure E.6** below, nearly the entire community has low landslide activity. A very small area, along the northern boundary, has a moderate incidence occurrence rate. There is moderate susceptibility throughout the northern half of the county and low susceptibility throughout the southern half.

FIGURE E.6: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF MOORE COUNTY



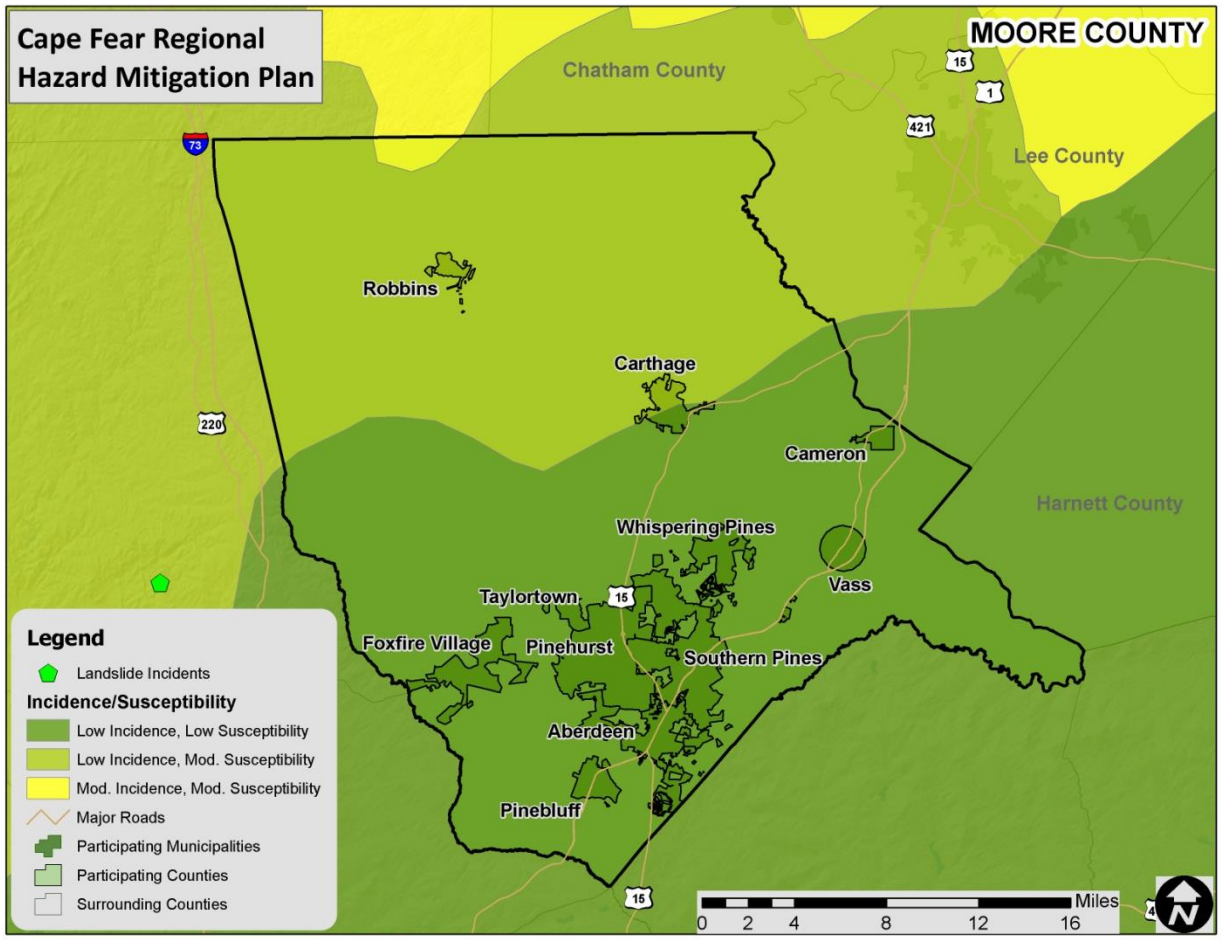
Source: United States Geological Survey

Historical Occurrences

Some areas of Moore County are moderately susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. Although no landslide incidents have been reported in the county, it should be noted that the North Carolina Geological Survey emphasized the dataset provided was incomplete. Therefore, there

may be additional historical landslide occurrences that were not reported. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete either. The locations of landslide events that occurred nearby the county are presented in **Figure E.7**. Again, it should be noted that it is possible more incidents have occurred than what is mapped.

FIGURE E.7: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN MOORE COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

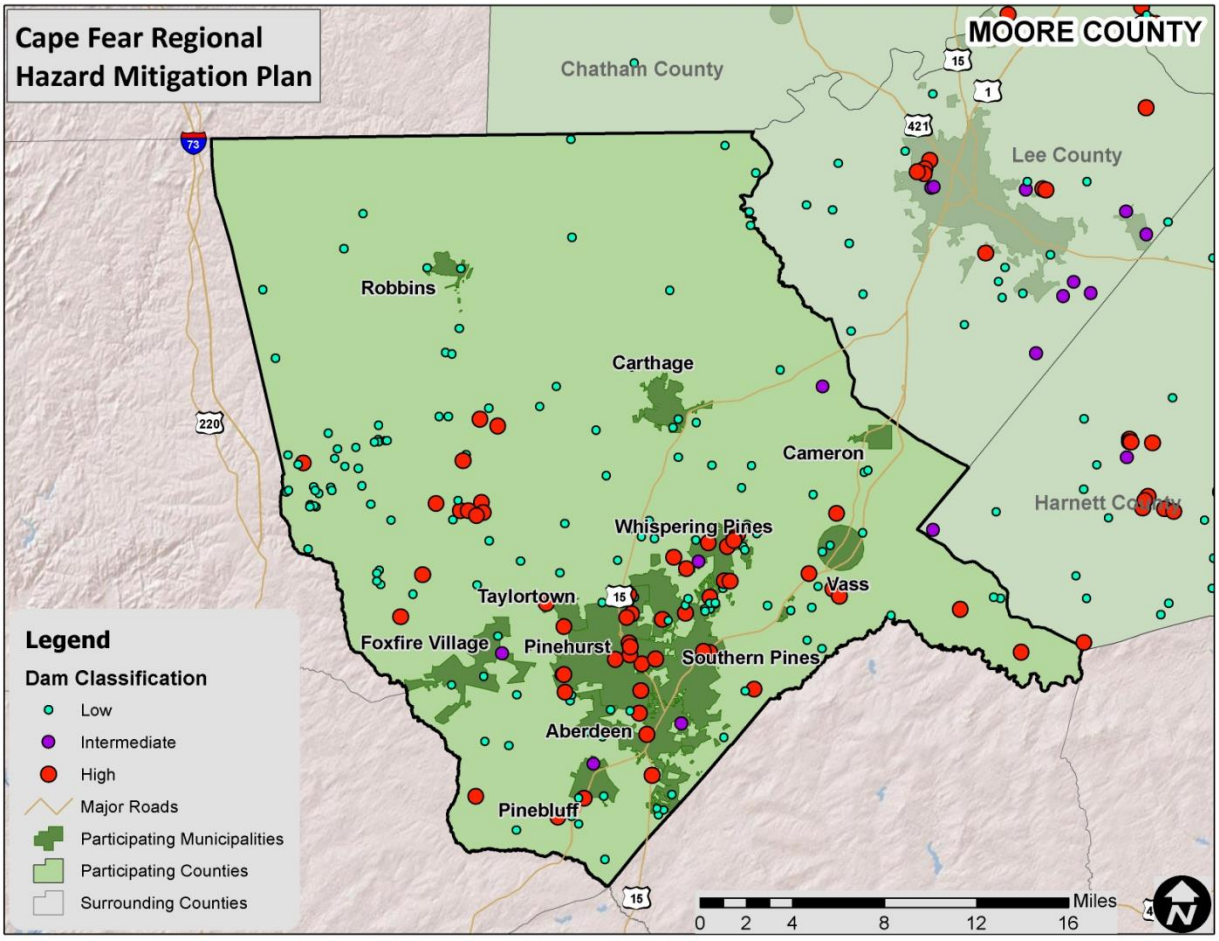
Based on historical information and the USGS susceptibility index, the probability of future landslide events is unlikely (less than 1 percent annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Moore County have greater risk than others given factors such as steepness on slope and modification of slopes.

E.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 200 dams in Moore County.[14] **Figure E.8** shows the dam location and the corresponding hazard ranking for each. Of these dams, 53 are classified as high hazard potential. These high hazard dams are listed in **Table E.21**.

FIGURE E.8: MOORE COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

TABLE E.21: MOORE COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Moore County				
Pinehurst National Dam #4	High	6.0	46	Private
Longleaf Golf Course Dam	High	6.0	36	Private

[14] The September 23, 2013 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Pinecrest High School Dam	High	1.6	17	Local Gov
Swan Lake Dam	High	5.0	24	Private
Firestone Pond Dam	High	3.0	20	Private
Hight Pond Dam	High	5.0	34	Private
Cardinal Club Pond Dam	High	11.0	54	Private
Woodlake Dam	High	1,000.0	10,000	Private
Simpson Lake Dam	High	5.0	151	Private
Eighteenth Fairway Dam	High	8.0	93	Private
Watson Lake Dam #1	High	62.0	579	Private
Aberdeen Town Lake Dam	High	34.0	262	Local Gov
Mid Pines Lake Dam	High	15.0	161	Private
Southern Pines Waterworks Dam	High	61.0	700	Local Gov
Thagards Lake Dam	High	211.0	2,505	Local Gov
Spring Valley Lake Dam	High	85.4	1,880	Private
Pine Lake Dam	High	42.1	3,080	Private
Warrior Lake Dam	High	33.0	265	Private
Thurlow Lake Dam	High	15.0	420	Private
Crystal Lake Dam	High	59.0	385	Private
Boy Scouts Of America Dam Upper	High	25.0	278	Private
Boy Scouts Of America Dam Lower	High	50.0	634	Private
Harris Lake Dam #1	High	8.0	110	Private
Blue Farm	High	6.5	42	Private
Mckeithan Lake Dam	High	9.0	52	Private
Seven Lakes Dam #1	High	51.0	1,115	Private
Seven Lakes Dam #2	High	180.0	3,412	Private
Seven Lakes Dam #3	High	24.0	422	Private
Seven Lakes Dam #4	High	21.0	317	Private
Seven Lakes Dam #5	High	8.0	105	Private
Watson Lake Dam #2	High	35.0	252	Private
Pinehurst Gc #6, Dam #2	High	5.0	38	Private
Lake Pinehurst Pond Dam #2	High	5.5	46	Private
Lake Pinehurst Dam	High	60.0	3,050	Private
Pinehurst Gc#6 Dam#3	High	10.0	120	Private
Pinebrook-Pinehurst Unit 14	High	10.0	76	Private
Pinewild Lake Dam	High	37.0	430	Private
Cardinal Lake Dam	High	5.3	53	Private
Pinehurst National-Dam #1	High	8.0	66	Private
Pinehurst National Dam 3a	High	10.6	110	Private
John Garner Pond Dam	High	2.0	12	Private
J.L. Frith Pond Dam #2	High	18.0	280	Private
Bibey Pond Dam #1	High	1.0	7	Private
Bibey Pond Dam #2	High	0.8	5	Private
Pinesage Lake Dam	High	3.5	27	Private
Johnson Pond Dam	High	1.0	7	Private
Mcneil Lake Dam	High	2.0	20	Private

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Lake Auman Dam	High	753.0	28,014	Private
Mclendon Creek Dam	High	115.0	3,220	Private
Whispering Woods Golf Course Dam	High	3.2	17	Private
Nick's Creek Water Intake Dam	High			
Fairwoods Dam #4	High	0.0	50	
Southern Pines Raw Water Reservoir Dam	High	18.8	537	Local Gov

Source: North Carolina Division of Energy, Mineral, and Land Resources, 2013

It should also be noted that the North Carolina dam classification regulations were recently updated. As a result of the change, more dams are generally classified as high hazard.

Historical Occurrences

There have been no dam breaches reported in Moore County. However, several breach scenarios in the county could be catastrophic.

The information below identifies additional historical information reported in the previous county hazard mitigation plan.

Moore County

No information on past dam failure events in the county was provided.

Probability of Future Occurrences

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events.

E.2.12 Erosion

Location and Spatial Extent

Erosion in Moore County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Moore County soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the county, particularly along the banks of rivers and streams, but it is not an extreme threat. No areas of concern were reported by the planning team.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Moore County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Erosion was not addressed in the previous hazard mitigation plan.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Moore County, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent).

E.2.13 Flood

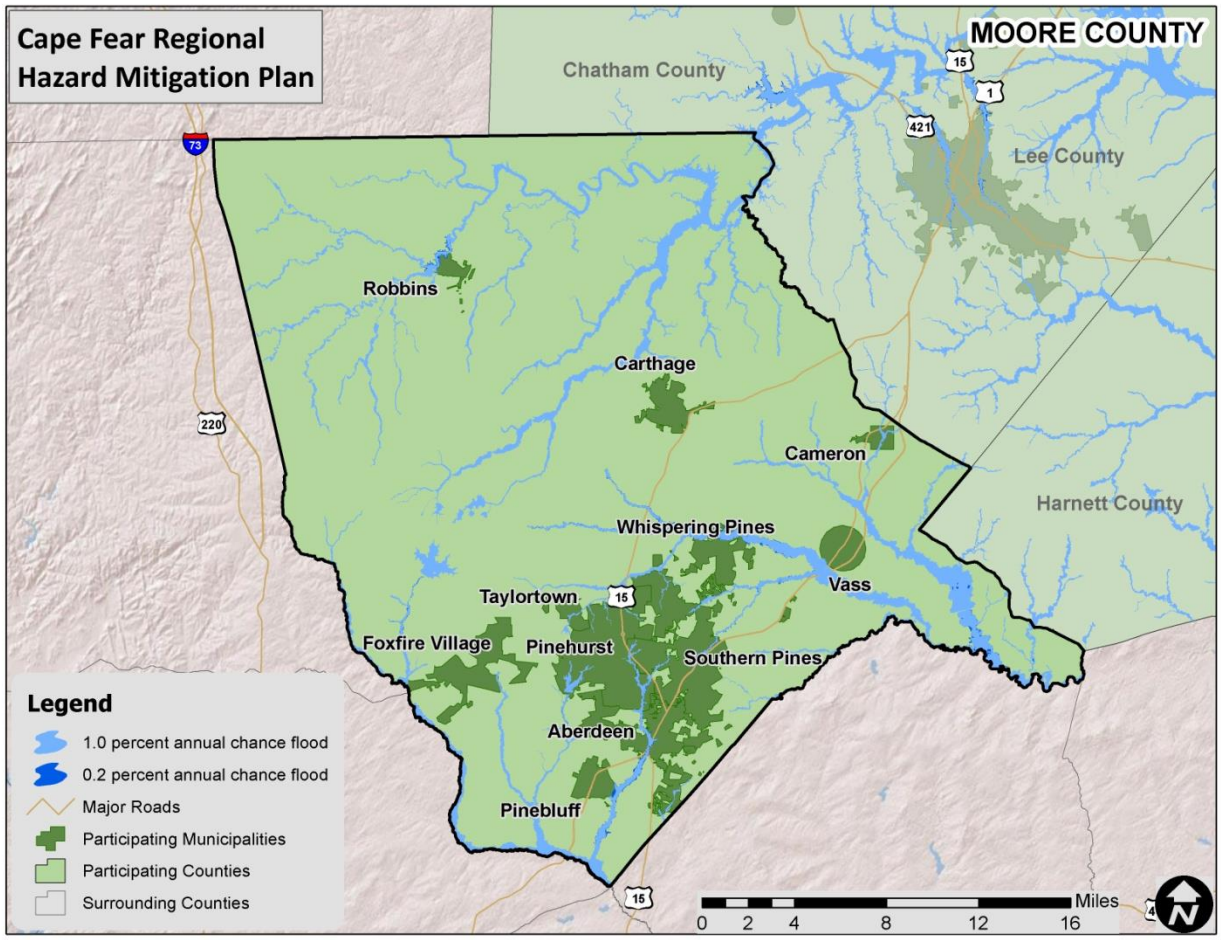
Location and Spatial Extent

There are areas in Moore County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[15] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 706 square miles that make up Moore County, there are 54.2 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 1.1 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 7.8 percent of the total land area in Moore County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure E.9**, **Figure E.10**, **Figure E.11**, **Figure E.12**, **Figure E.13**, **Figure E.14**, **Figure E.15**, **Figure E.16**, **Figure E.17**, **Figure E.18**, **Figure E.19**, and **Figure E.20** illustrate the location and extent of currently mapped special flood hazard areas for Moore County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

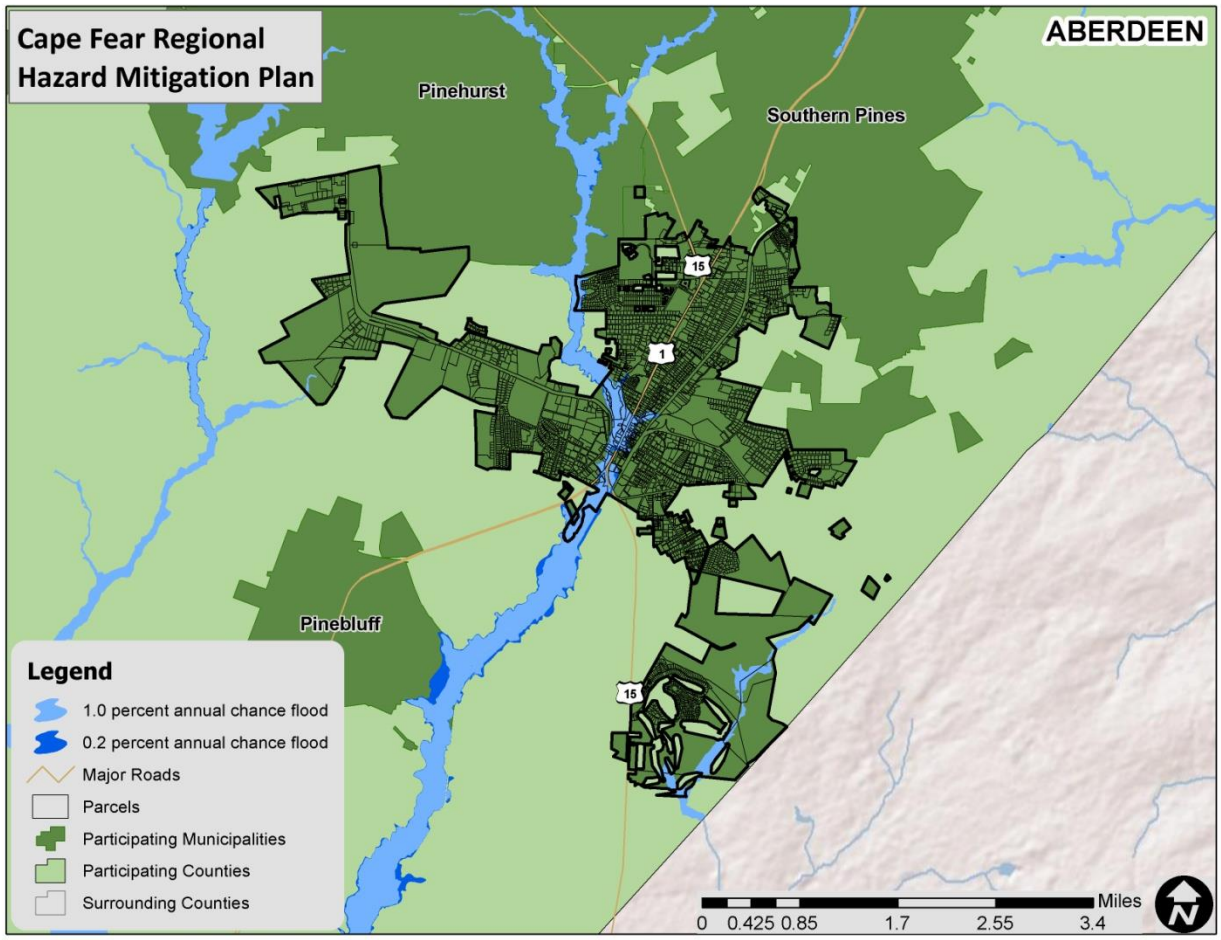
[15] The county-level DFIRM data used for Moore County were updated in 2009.

FIGURE E.9: SPECIAL FLOOD HAZARD AREAS IN MOORE COUNTY



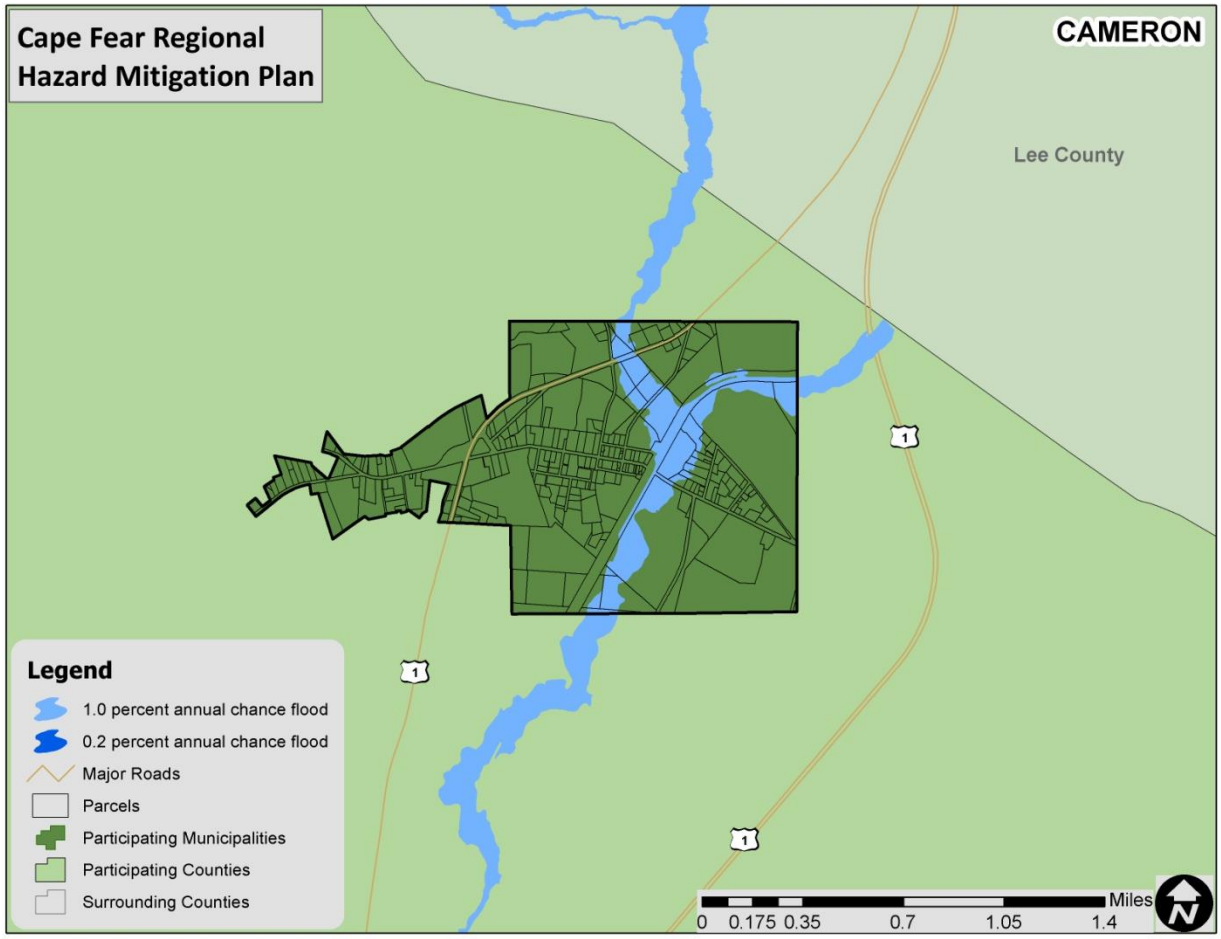
Source: Federal Emergency Management Agency

FIGURE E.10: SPECIAL FLOOD HAZARD AREAS IN ABERDEEN



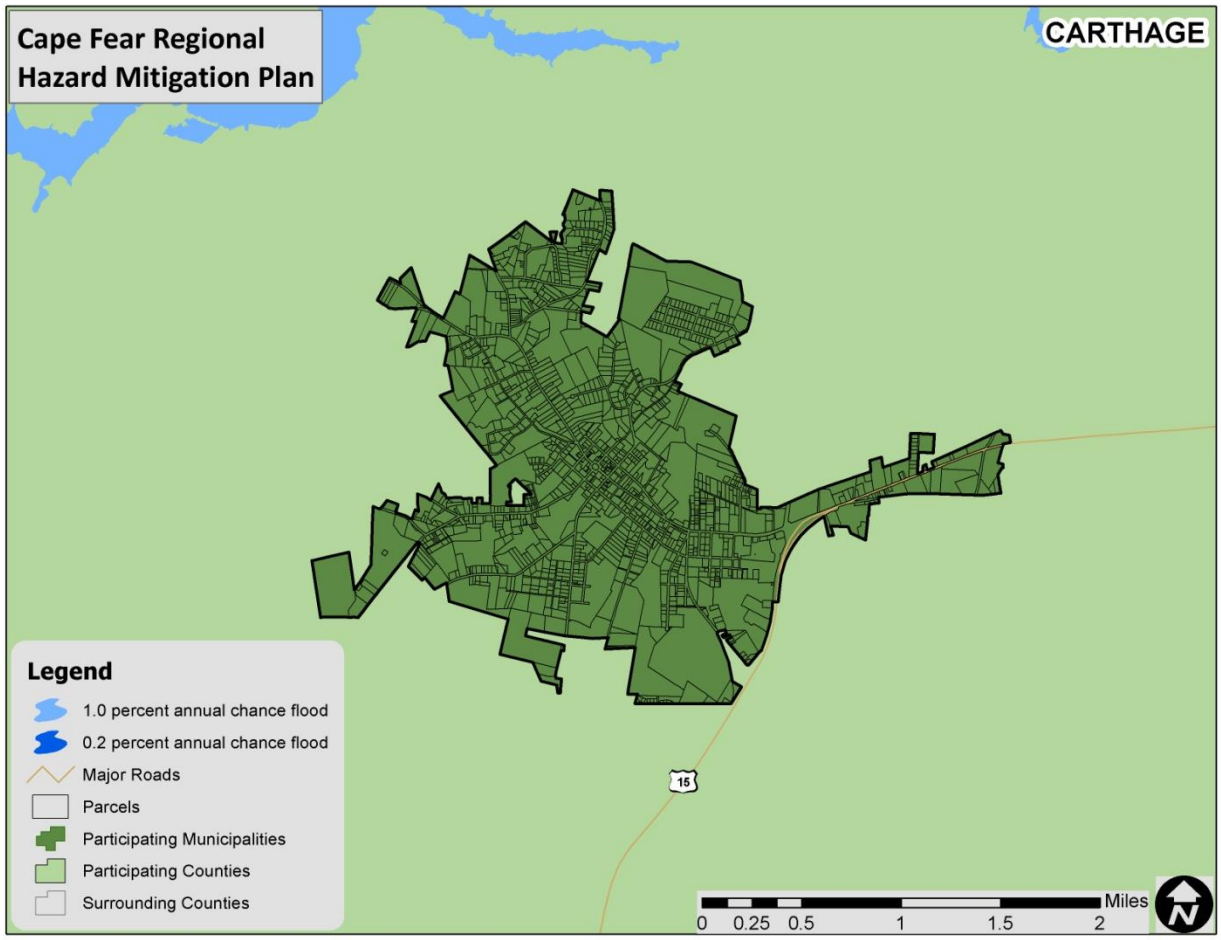
Source: Federal Emergency Management Agency

FIGURE E.11: SPECIAL FLOOD HAZARD AREAS IN CAMERON



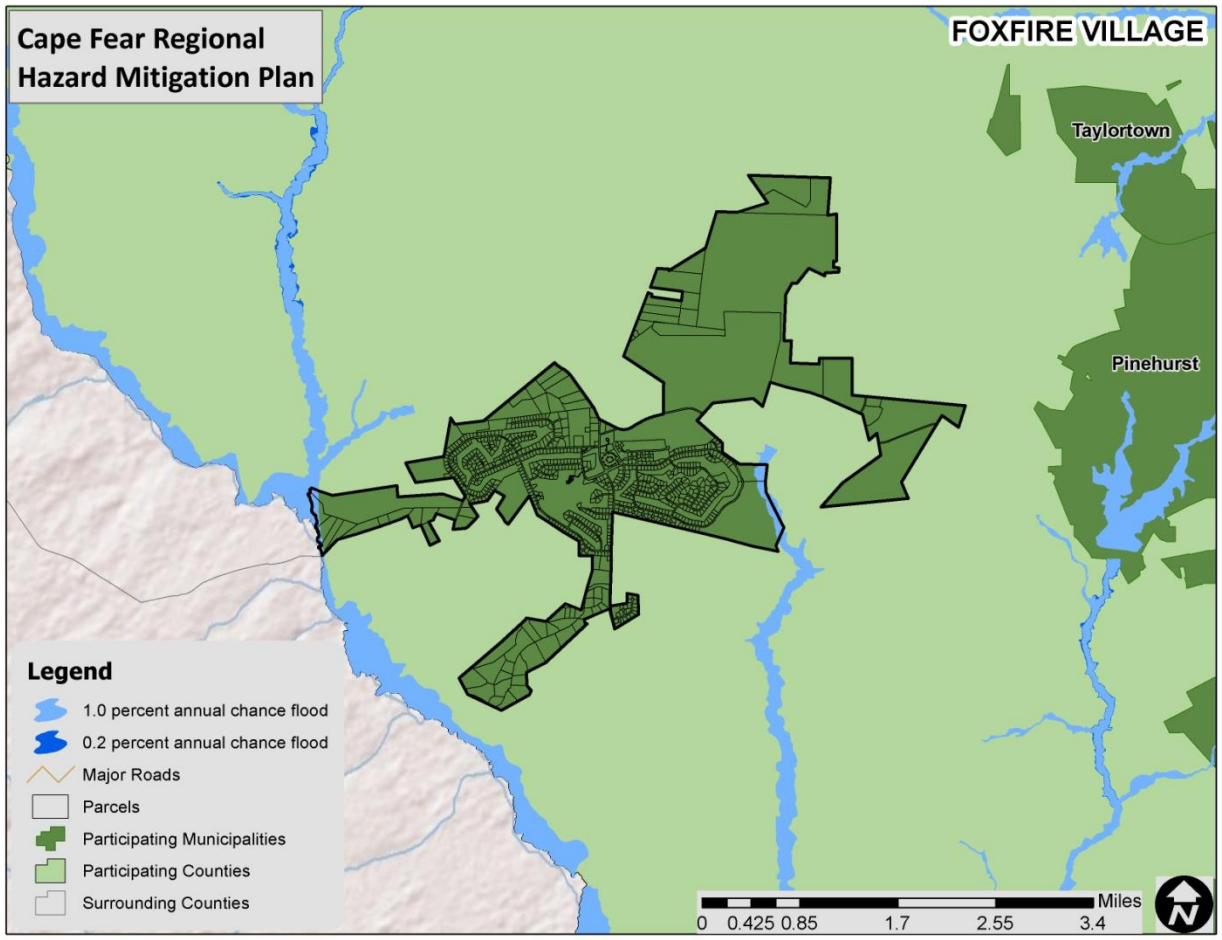
Source: Federal Emergency Management Agency

FIGURE E.12: SPECIAL FLOOD HAZARD AREAS IN CARTHAGE



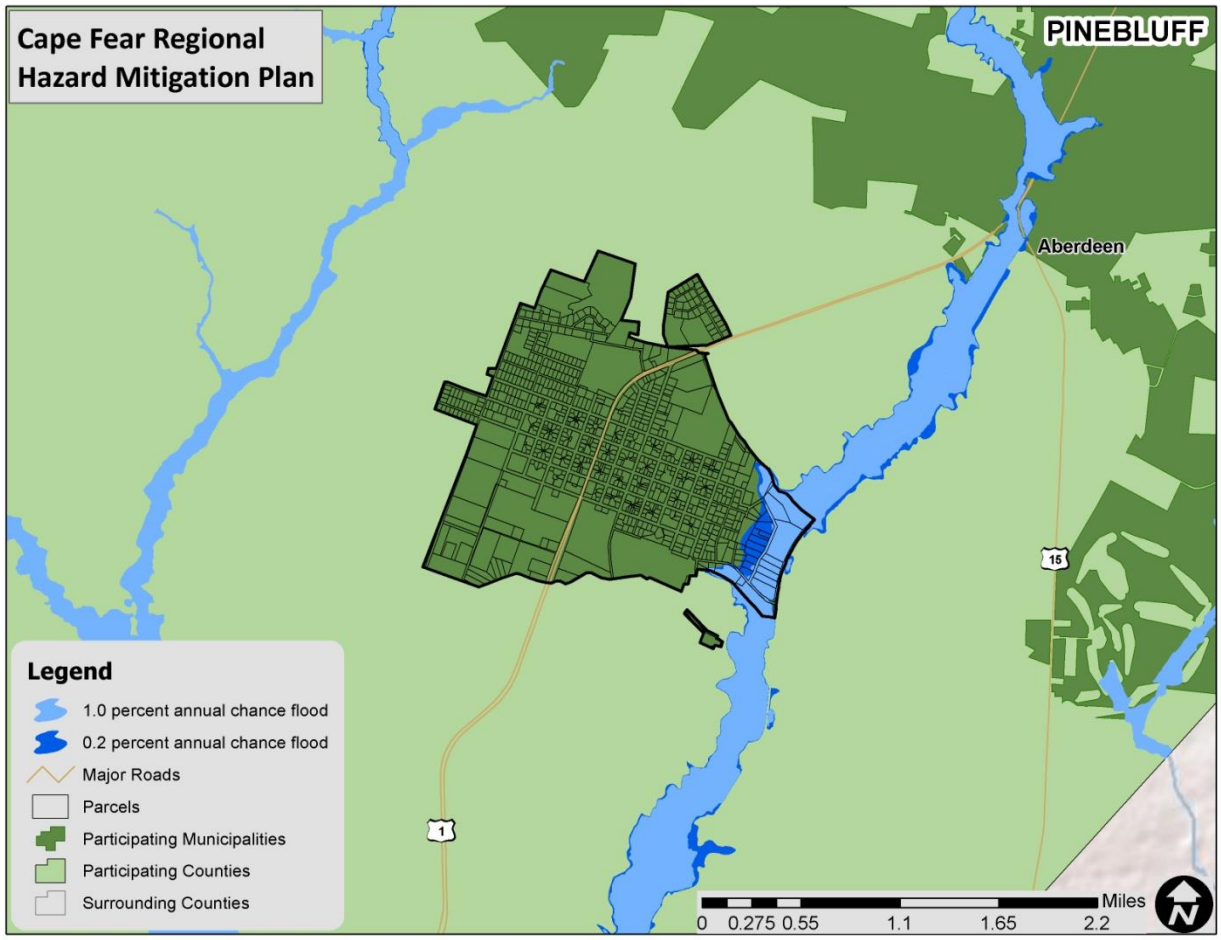
Source: Federal Emergency Management Agency

FIGURE E.13: SPECIAL FLOOD HAZARD AREAS IN FOXFIRE VILLAGE



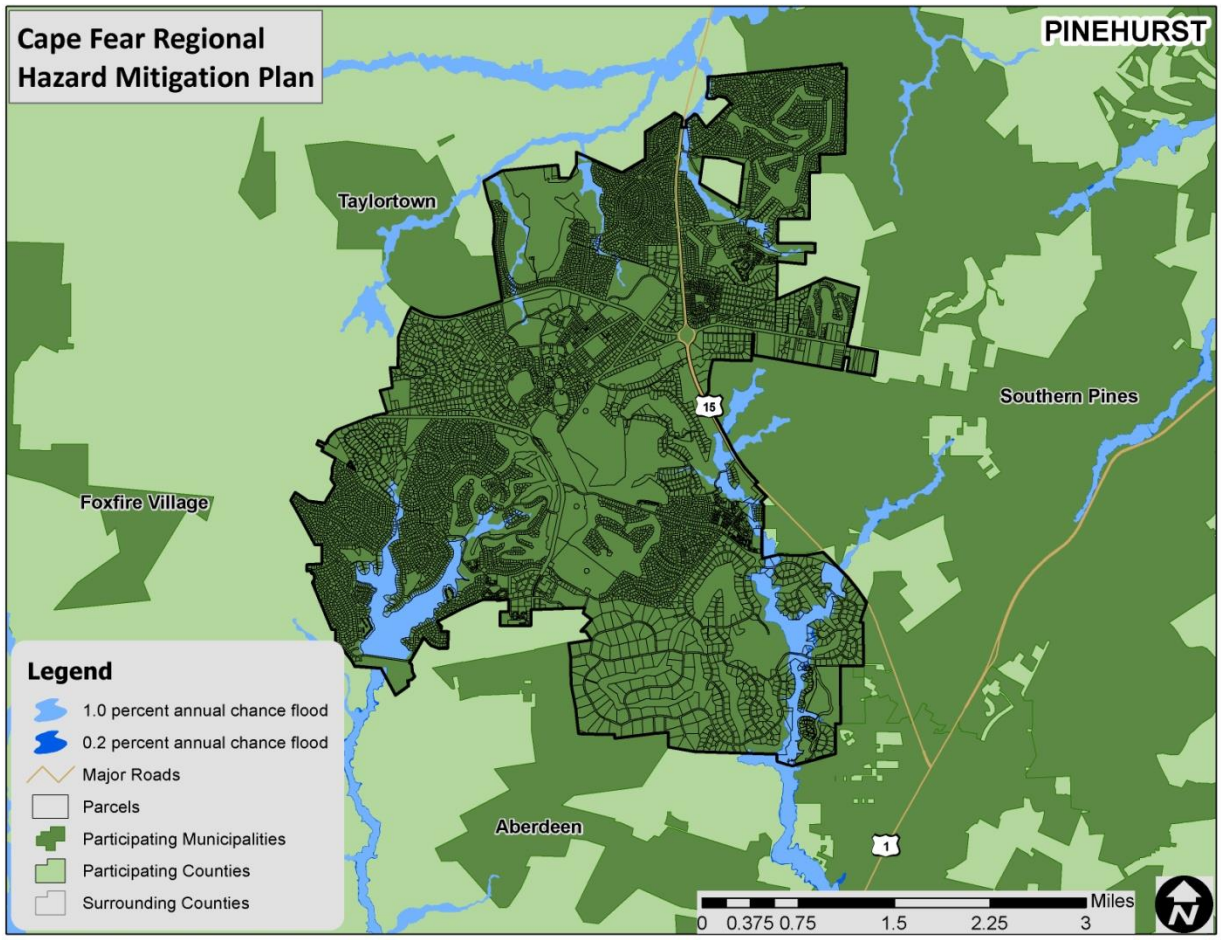
Source: Federal Emergency Management Agency

FIGURE E.14: SPECIAL FLOOD HAZARD AREAS IN PINEBLUFF



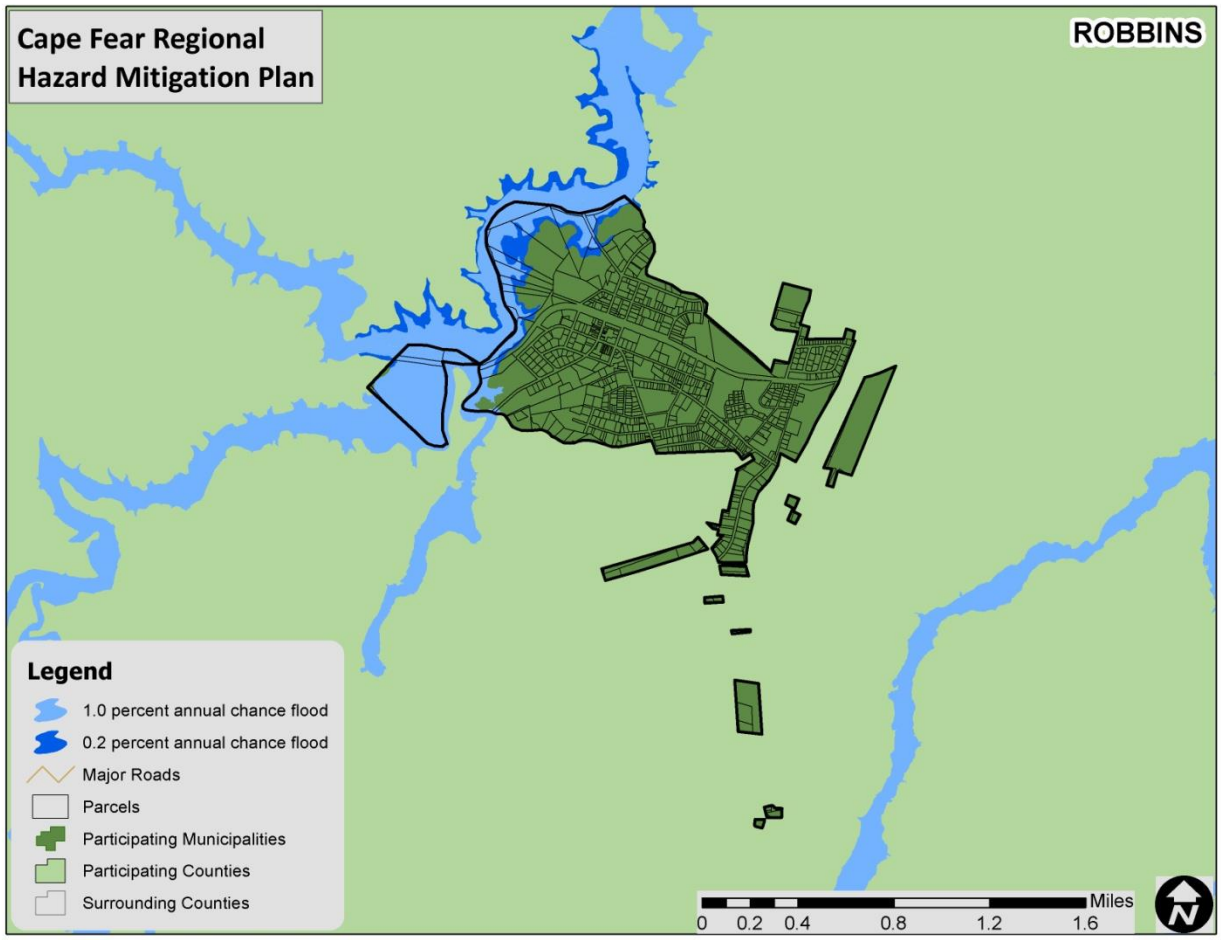
Source: Federal Emergency Management Agency

FIGURE E.15: SPECIAL FLOOD HAZARD AREAS IN PINEHURST



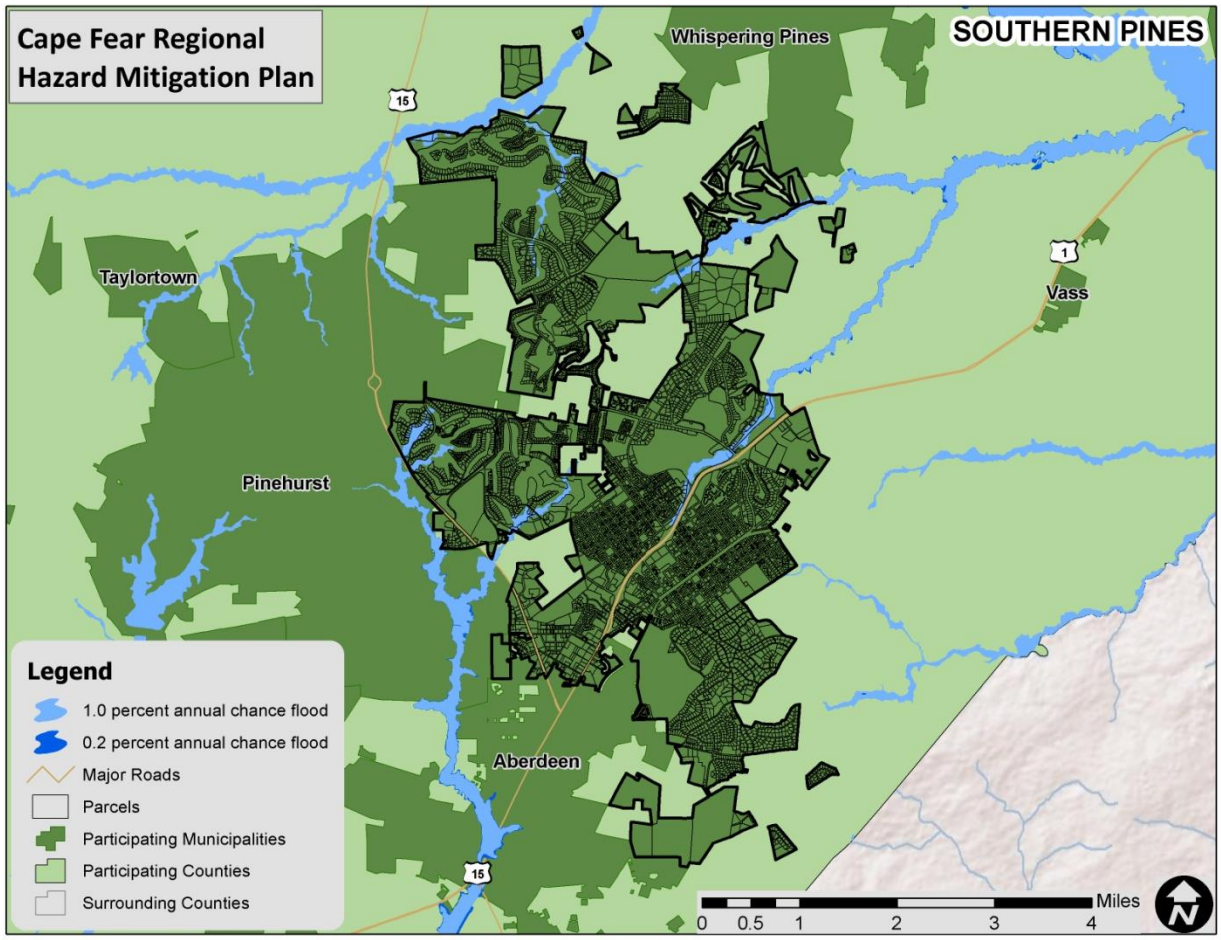
Source: Federal Emergency Management Agency

FIGURE E.16: SPECIAL FLOOD HAZARD AREAS IN ROBBINS



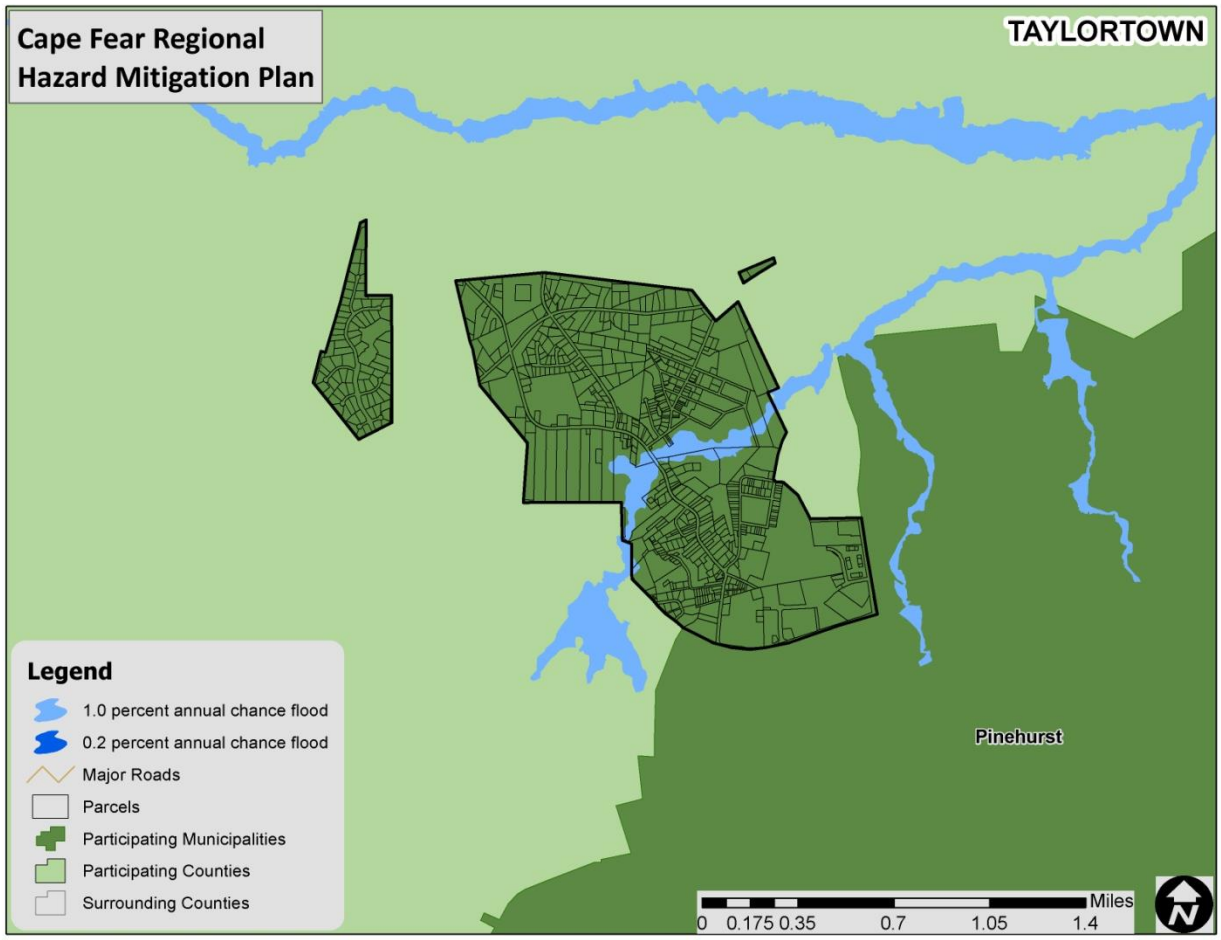
Source: Federal Emergency Management Agency

FIGURE E.17: SPECIAL FLOOD HAZARD AREAS IN SOUTHERN PINES



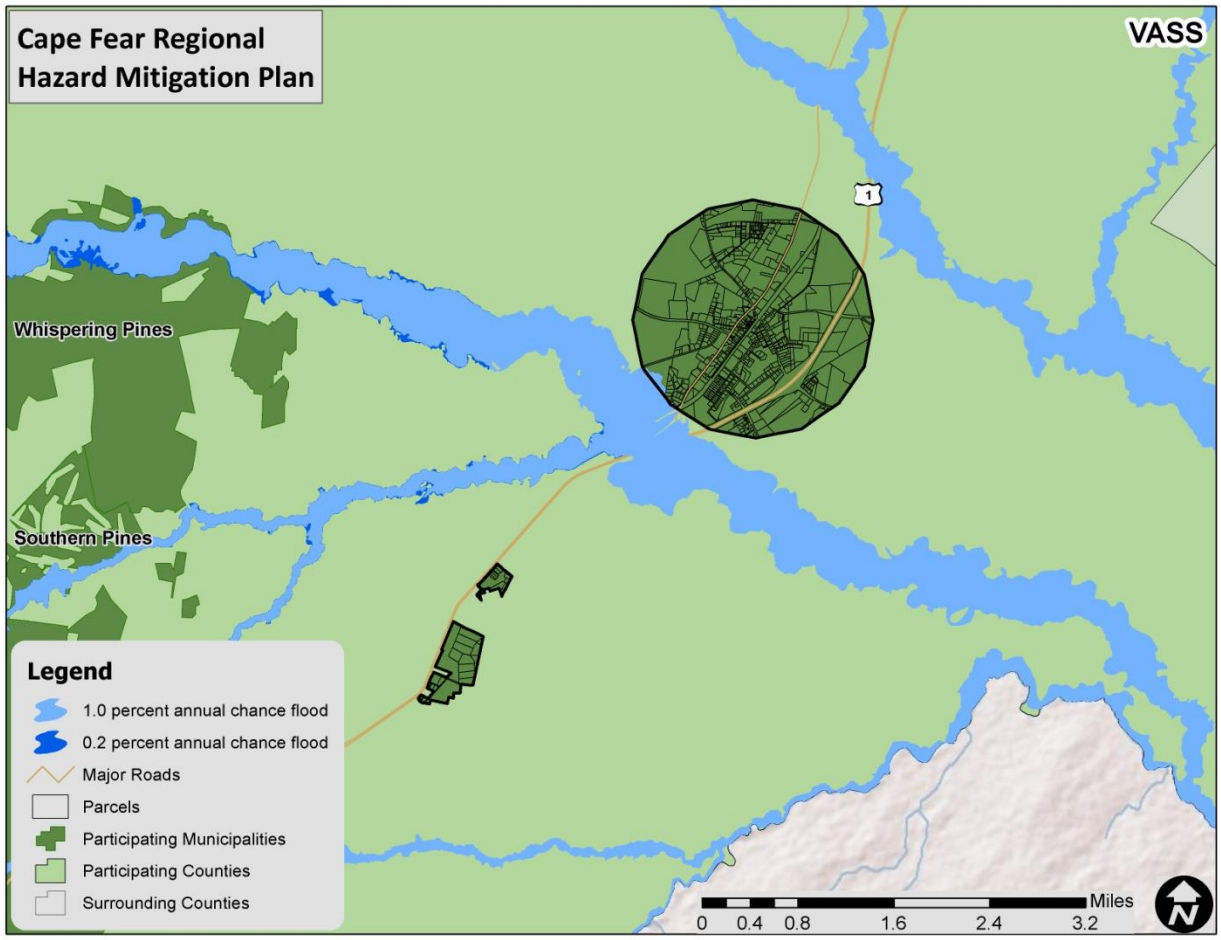
Source: Federal Emergency Management Agency

FIGURE E.18: SPECIAL FLOOD HAZARD AREAS IN TAYLORTOWN



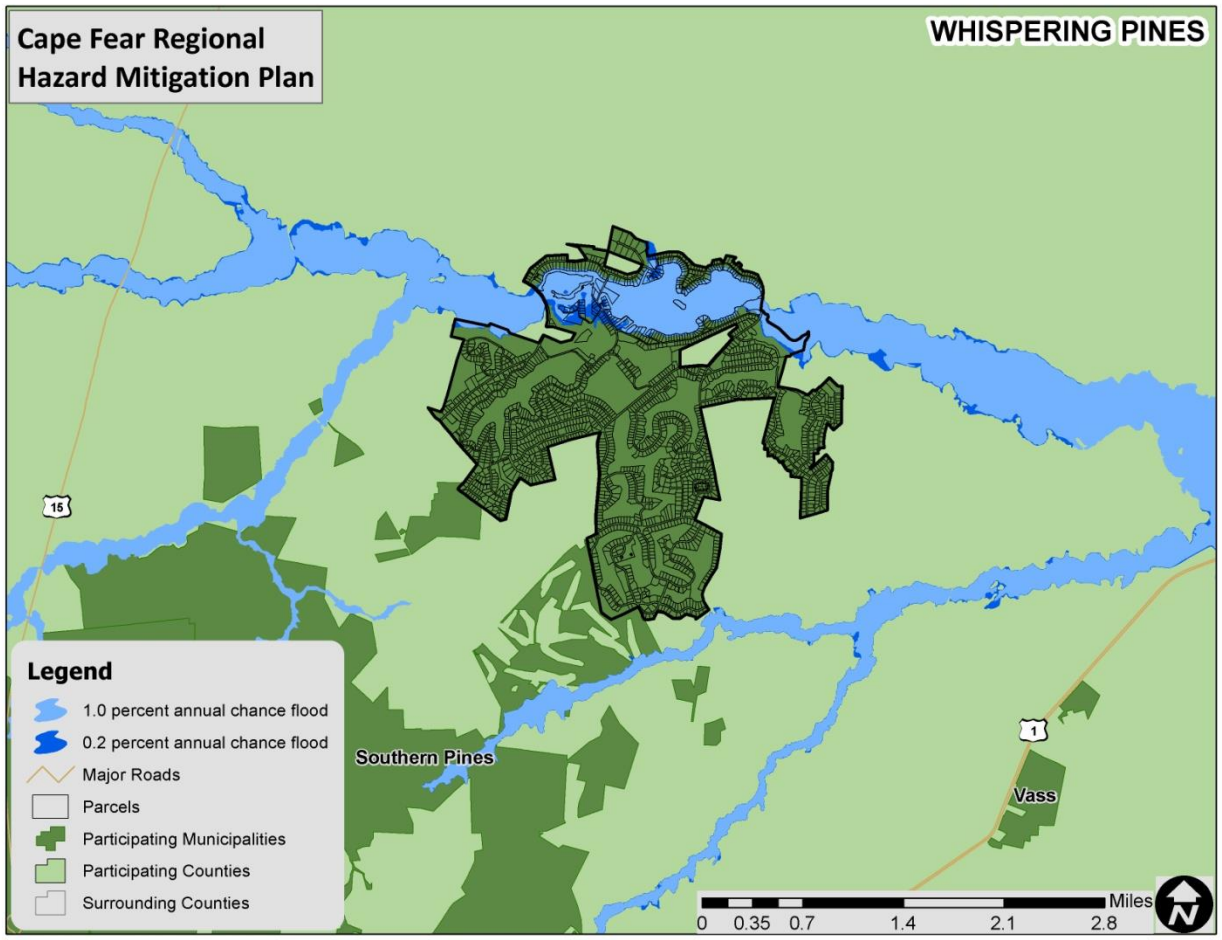
Source: Federal Emergency Management Agency

FIGURE E.19: SPECIAL FLOOD HAZARD AREAS IN VASS



Source: Federal Emergency Management Agency

FIGURE E.20: SPECIAL FLOOD HAZARD AREAS IN WHISPERING PINES



Source: Federal Emergency Management Agency

Historical Occurrences

Flooding has not resulted in any disaster declarations in Moore County.[16] Information from the National Climatic Data Center was used to ascertain additional historical flood events. The National Climatic Data Center reported a total of 30 events in Moore County since 1993.[17] A summary of these events is presented in **Table E.22**. These events accounted for almost $455,000 (2013 dollars) in property damage in the county.[18] Specific information on flood events, including date, type of flooding, and deaths and injuries, can be found in **Table E.23**.

TABLE E.22: SUMMARY OF FLOOD OCCURRENCES IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	1	0/0	$0

[16] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[17] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have gone unreported.
[18] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cameron	1	0/0	$0
Carthage	3	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	1	0/0	$0
Pinehurst	0	0/0	$0
Robbins	4	0/0	$0
Southern Pines	2	0/0	$0
Taylortown	0	0/0	$0
Vass	1	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	17	0/0	$454,835
MOORE COUNTY TOTAL	**30**	**0/0**	**$454,835**

Source: National Climatic Data Center

TABLE E.23: HISTORICAL FLOOD EVENTS IN MOORE COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Aberdeen				
ABERDEEN	8/13/2011	FLASH FLOOD	0/0	$0
Cameron				
CAMERON	2/17/1998	FLASH FLOOD	0/0	$0
Carthage				
CARTHAGE	8/10/2003	FLASH FLOOD	0/0	$0
CARTHAGE	6/29/2007	FLASH FLOOD	0/0	$0
CARTHAGE	1/25/2010	FLASH FLOOD	0/0	$0
Foxfire Village				
None Reported	--	--	--	--
Pinebluff				
PINEBLUFF	7/23/1996	FLASH FLOOD	0/0	$0
Pinehurst				
None Reported	--	--	--	--
Robbins				
Robbins	8/27/1995	FLASH FLOODING	0/0	$0
ROBBINS	3/19/1998	FLASH FLOOD	0/0	$0
ROBBINS	4/9/1998	FLASH FLOOD	0/0	$0
ROBBINS	6/9/2005	FLASH FLOOD	0/0	$0
Southern Pines				
Southern Pines	10/4/1995	FLASH FLOOD	0/0	$0
SOUTHERN PINES	9/6/2008	FLASH FLOOD	0/0	$0
Taylortown				
None Reported	--	--	--	--
Vass				
VASS	6/26/2010	FLASH FLOOD	0/0	$0

	Date	Type	Deaths / Injuries	Property Damage*
Whispering Pines				
None Reported	--	--	--	--
Unincorporated Area				
Moore County	3/23/1993	FLASH FLOODS	0/0	$0
Moore County	9/24/1994	FLASH FLOOD	0/0	$0
Moore County	6/19/1995	FLASH FLOOD	0/0	$229,347
Southern	6/24/1995	FLASH FLOOD	0/0	$0
ERN PART	9/10/1996	FLASH FLOOD	0/0	$0
COUNTYWIDE	7/23/1997	FLASH FLOOD	0/0	$0
COUNTYWIDE	7/24/1997	FLASH FLOOD	0/0	$0
Moore County	1/27/1998	FLOOD	0/0	$0
Moore County	3/20/2003	FLOOD	0/0	$9,040
Moore County	4/10/2003	FLOOD	0/0	$0
EAST PORTION	6/16/2003	FLASH FLOOD	0/0	$0
CENTRAL PORTION	8/5/2003	FLASH FLOOD	0/0	$0
COUNTYWIDE	8/8/2003	FLASH FLOOD	0/0	$0
EAST PORTION	8/9/2003	FLASH FLOOD	0/0	$0
COUNTYWIDE	6/14/2006	FLASH FLOOD	0/0	$0
MANLY	9/6/2008	FLASH FLOOD	0/0	$216,448
HOWARD MILL	6/18/2009	FLASH FLOOD	0/0	$0

*Property damage is reported in 2013 dollars; all damage may not have been reported.
Source: National Climatic Data Center

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2014, there have been 11 flood losses reported in Moore County through the National Flood Insurance Program (NFIP) since 1978, totaling almost $310,000 in claims payments. A summary of these figures for the county is provided in **Table E.24**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in Moore County were either uninsured, denied claims payment, or not reported.

TABLE E.24: SUMMARY OF INSURED FLOOD LOSSES IN MOORE COUNTY

Location	Flood Losses	Claims Payments
Aberdeen	0	$0
Cameron	0	$0
Carthage	0	$0
Foxfire Village	0	$0
Pinebluff	0	$0
Pinehurst	4	$62,318
Robbins	0	$0
Southern Pines	0	$0
Taylortown	0	$0
Vass	0	$0
Whispering Pines	0	$0

Location	Flood Losses	Claims Payments
Unincorporated Area	7	$247,646
MOORE COUNTY TOTAL	**11**	**$309,964**

Source: Federal Emergency Management Agency, National Flood Insurance Program

Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 140,000 repetitive loss properties nationwide.

As of July 2013, there are no non-mitigated repetitive loss properties located in Moore County. **Table E.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Moore County.

TABLE E.25: REPETITIVE LOSS PROPERTIES IN MOORE COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Aberdeen	0	--	0	$0	$0	$0	$0
Cameron	0	--	0	$0	$0	$0	$0
Carthage	0	--	0	$0	$0	$0	$0
Foxfire Village	0	--	0	$0	$0	$0	$0
Pinebluff	0	--	0	$0	$0	$0	$0
Pinehurst	0	--	0	$0	$0	$0	$0
Robbins	0	--	0	$0	$0	$0	$0
Southern Pines	0	--	0	$0	$0	$0	$0
Taylortown	0	--	0	$0	$0	$0	$0
Vass	0	--	0	$0	$0	$0	$0
Whispering Pines	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
MOORE COUNTY TOTAL	**0**		**0**	**$0**	**$0**	**$0**	**$0**

Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Moore County, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The participating jurisdictions and unincorporated areas of the county have risk to flooding, though not all areas will experience floods. The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

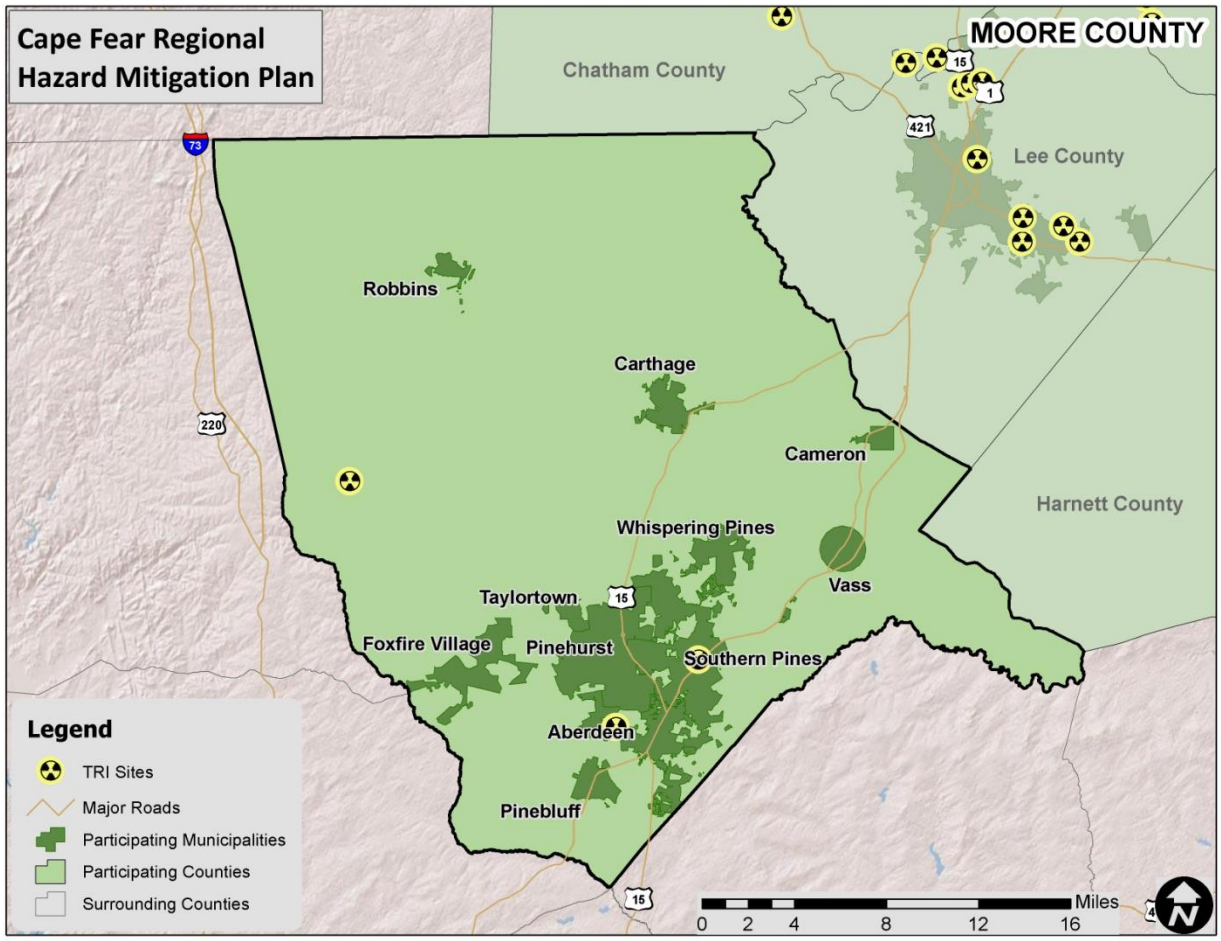
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Carthage, Foxfire Village, and Vass have less floodplain and thus a lower risk of flood than the other municipalities. Flood is not the greatest hazard of concern but will continue to occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

E.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Moore County has three TRI sites. These sites are shown in **Figure E.21.**

FIGURE E.21: TOXIC RELEASE INVENTORY (TRI) SITES IN MOORE COUNTY



Source: Environmental Protection Agency

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are subject to hazardous materials transport and all roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 24 recorded HAZMAT incidents in Moore County since 1976 (**Table E.26**). These events resulted in nearly $600. **Table E.27** presents detailed information on historic HAZMAT incidents in Moore County as reported by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA).

TABLE E.26: SUMMARY OF HAZMAT INCIDENTS IN MOORE COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Aberdeen	14	0/0	$0
Cameron	0	0/0	$0
Carthage	2	0/0	$0
Foxfire Village	0	0/0	$0
Pinebluff	0	0/0	$0
Pinehurst	1	0/0	$0
Robbins	3	0/0	$596
Southern Pines	4	0/0	$0
Taylortown	0	0/0	$0
Vass	0	0/0	$0
Whispering Pines	0	0/0	$0
Unincorporated Area	0	0/0	$0
MOORE COUNTY TOTAL	**24**	**0/0**	**$596**

Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

TABLE E.27: HAZMAT INCIDENTS IN MOORE COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Aberdeen							
I-1976030726	3/17/1976	ABERDEEN	Highway	No	0/0	$0	0
I-1977081042	7/18/1977	ABERDEEN	Highway	No	0/0	$0	30 LGA
I-1984030089	1/30/1984	ABERDEEN	Rail	Yes	0/0	$0	163 LGA
I-1986070123	6/11/1986	ABERDEEN	Rail	No	0/0	$0	5 LGA
I-1995100974	4/24/1995	ABERDEEN	Highway	No	0/0	$0	0.0625 LGA
I-2000040762	4/10/2000	ABERDEEN	Highway	No	0/0	$0	1 SLB
I-2004100695	9/3/2004	ABERDEEN	Highway	No	0/0	$0	0.25 LGA
I-2005031000	2/17/2005	ABERDEEN	Highway	No	0/0	$0	7 LGA
E-2007100186	9/13/2007	ABERDEEN	Highway	No	0/0	$0	1.5 LGA
E-2007120336	12/28/2007	ABERDEEN	Highway	No	0/0	$0	2 LGA
E-2008070297	6/3/2008	ABERDEEN	Highway	No	0/0	$0	2 LGA
E-2009050266	4/30/2009	ABERDEEN	Highway	No	0/0	$0	1 LGA
E-2010040073	2/10/2010	ABERDEEN	Highway	No	0/0	$0	0.125 LGA
E-2013060016	5/30/2013	ABERDEEN	Highway	No	0/0	$0	5 LGA
Cameron							
None Reported	--	--	--	--	--	--	--
Carthage							
I-1990100955	10/13/1990	CARTHAGE	Highway	No	0/0	$0	50 LGA
I-2004061498	6/1/2004	CARTHAGE	Highway	No	0/0	$0	4 SLB
Foxfire Village							
None Reported	--	--	--	--	--	--	--
Pinebluff							
None Reported	--	--	--	--	--	--	--

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Pinehurst							
I-2010100055	9/17/2010	PINEHURST	Highway	No	0/0	$0	0.0625 SLB
Robbins							
I-1997071451	7/11/1997	ROBBINS	Highway	No	0/0	$0	0.0234 LGA
I-2001020372	1/4/2001	ROBBINS	Highway	No	0/0	$0	10 LGA
I-2006010516	12/5/2005	ROBBINS	Highway	Yes	0/0	$596	5 LGA
Southern Pines							
I-1995100979	6/26/1995	SOUTHERN PINES	Highway	No	0/0	$0	1 LGA
I-2000011075	12/16/1999	SOUTHERN PINES	Highway	No	0/0	$0	60 LGA
I-2006031130	3/8/2006	SOUTHERN PINES	Highway	No	0/0	$0	0.125 SLB
I-1979090377	8/28/1979	SOUTHERN PINES	Highway	No	0/0	$0	30 LGA
Taylortown							
None Reported	--	--	--	--	--	--	--
Vass							
None Reported	--	--	--	--	--	--	--
Whispering Pines							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

*Property damage is reported in 2013 dollars.
Source: United States Department of Transportation Pipeline and Hazardous Materials Safety Administration

Probability of Future Occurrences

Given the location of three toxic release inventory sites in Moore County and prior roadway and rail incidents, it is likely that a hazardous material incident may occur in the county (between 1 and 10 percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence. The county may also be impacted by neighboring counties which also face risk due to TRI sites.

E.2.15 Wildfire

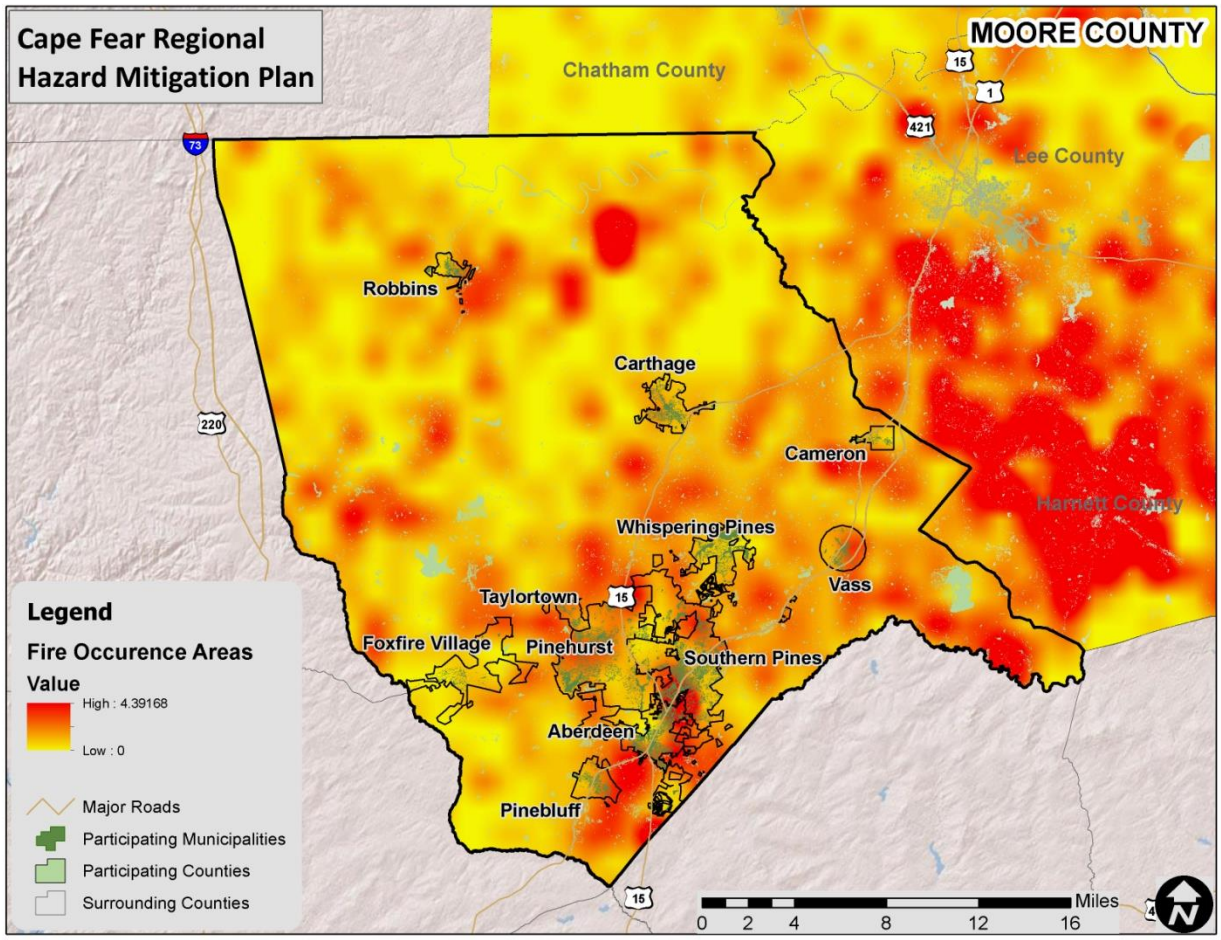
Location and Spatial Extent

The entire county is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas. The Fire Occurrence Areas in the figure below give an indication of historic location.

Historical Occurrences

Figure E.22 shows the Fire Occurrence Areas (FOA) in Moore County based on data from the Southern Wildfire Risk Assessment. This data is based on historical fire ignitions and is reported as the number of fires that occur per 1,000 acres each year.

FIGURE E.22: HISTORIC WILDFIRE EVENTS IN MOORE COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Moore County experienced an average of 129 wildfires annually which burn an average of 317 acres per year. The data indicates that most of these fires are small, averaging two acres per fire. **Table E.28** lists the number of reported wildfire occurrences in the county between the years 2003 and 2012.

TABLE E.28: HISTORICAL WILDFIRE OCCURRENCES IN MOORE COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Moore County										
Number of Fires	35	85	128	120	248	155	131	127	173	90
Number of Acres	90.1	213.8	190.1	912.7	648.0	344.5	146.1	241.9	267.3	99.5

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Moore County. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could

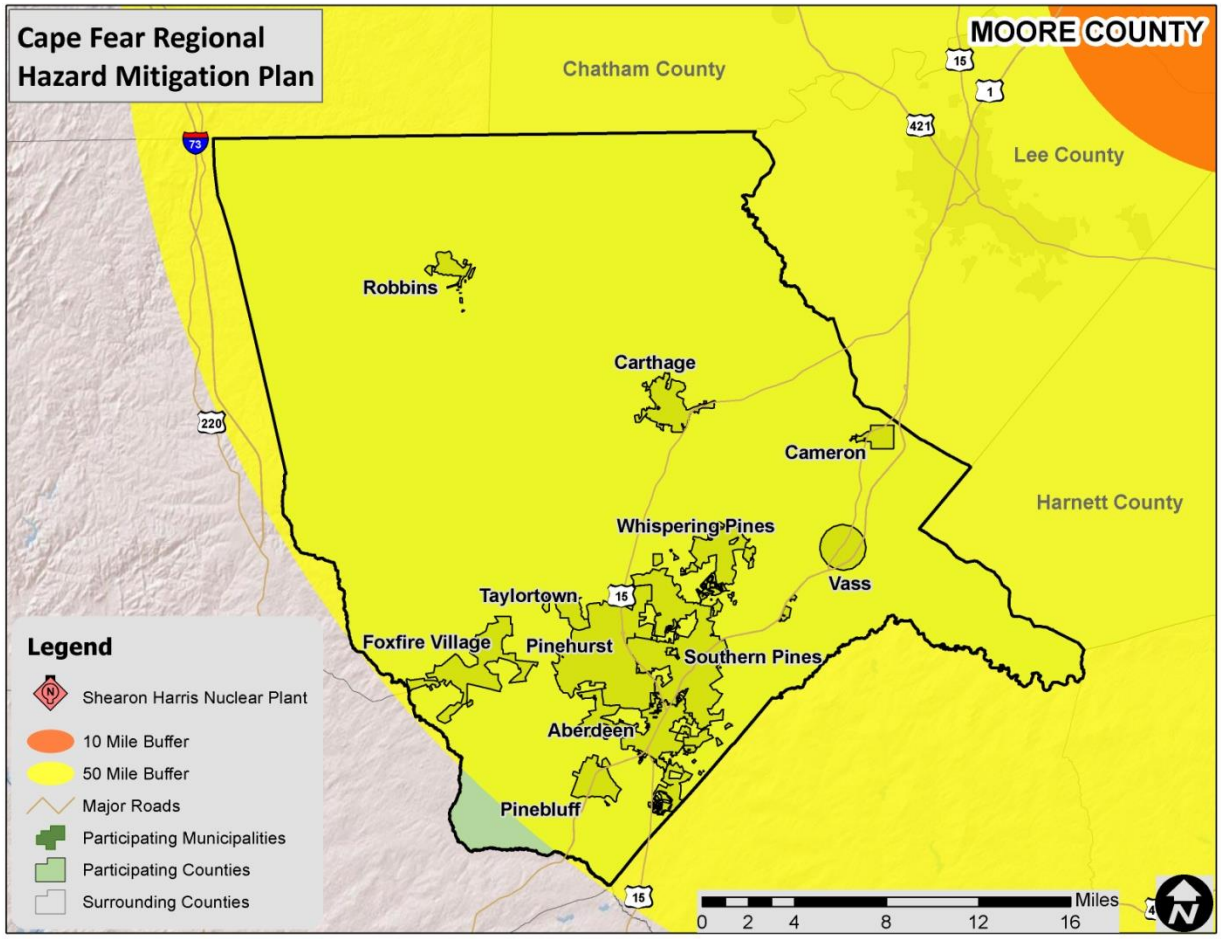
increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to Moore County for future wildfire events is likely (10 to 100 percent annual probability).

E.2.16 Nuclear Accident

Location and Spatial Extent

Nearly the entire county is at risk to a nuclear incident due to its proximity to the Shearon Harris Nuclear Station. Areas located within 10 miles of the station are considered to be within the zone of highest risk to a nuclear incident and is the designated evacuation radius recommended by the Nuclear Regulatory Commission (**Figure E.23**). All areas of the county, except the far southwest corner, are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

FIGURE E.23: SHEARON HARRIS NUCLEAR POWER STATION INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

Historical Occurrences

Although there have been no major nuclear events at the Shearon Harris Nuclear Station, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world. In May of 2013, there was an unplanned shutdown of the plant which resulted from the discovery of a ¼ inch crack in the Reactor Pressure Vessel Head.

Shearon Harris has declared 2 "Alerts" and 28 "Notice of Unusual Events" since 1986. There have also been 338 additional incidents reported to the NRC since 1986, but they did not necessitate an emergency declaration and therefore were not included in this analysis.[19]

Probability of Future Occurrences

A nuclear event is a very rare occurrence in the United States due to the intense regulation of the industry. There have been incidents in the past, but it is considered unlikely (less than 1 percent annual probability).

E.2.17 Terror Threat

Location and Spatial Extent

A terror threat could potentially occur at any location in the county. However, the very definition of a terrorist event indicates that it is most likely to be targeted at a critical or symbolic resource/location. Ensuring and protecting the continuity of critical infrastructure and key resources (CIKR) of the United States is essential to the Nation's security, public health and safety, economic vitality, and way of life. CIKR includes physical and/or virtual systems or assets that, if damaged, would have a detrimental impact on national security, including large-scale human casualties, property destruction, economic disruption, and significant damage to morale and public confidence. **Table E.29** lists the U.S. Department of Homeland Security's (DHS) identified main critical infrastructure sectors.

TABLE E.29 U.S. DEPARTMENT OF HOMELAND SECURITY CRITICAL INFRASTRUCTURE SECTORS

- Agriculture and Food
- Banking and Finance
- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Dams
- Defense Industrial Base
- Emergency Services
- Energy
- Government Facilities
- Healthcare and Public Health
- Information Technology
- National Monuments and Icons
- Nuclear Reactors, Materials, and Waste
- Postal and Shipping
- Transportation Systems
- Water

[19] More information on Shearon Harris Emergency Declaration events can be found in Section 5: *Hazard Profiles*.

Although all critical facilities (see Section E.3.3) are at a heightened level of risk in Moore County, there are several that have been identified as the likely primary targets. These critical facilities include the Rick Rhyne Public Safety: Moore County Emergency Operations Center and Moore Regional Hospital.

Historical Occurrences

Although there have been no major terror events in Moore County, there is some possibility that one could occur in the future as there have been incidents in the United States in the past and there are several facilities that could be potential targets.

Probability of Future Occurrences

Moore County has no recorded terrorist events. Due to no recorded incidents against the county, the probability of future occurrences of a terrorist attack is unlikely (less than 1 percent annual probability).

E.2.18 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

Hazard Extent

Table E.30 describes the extent of each natural hazard identified for Moore County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE E.30: EXTENT OF MOORE COUNTY HAZARDS

Atmospheric Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:6). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Moore County has received this ranking three times over the fourteen-year reporting period.
Extreme Heat	The extent of extreme heat can be defined by the maximum temperature reached. The highest temperature recorded in Moore County is 107 degrees Fahrenheit (reported on June 23, 1981).
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Moore County was 2.75 inches (reported on July 3, 1995). It should be noted that future events may exceed this.
Hurricane and Tropical Storm	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.10). The greatest classification of hurricane to traverse directly through Moore County was an Unnamed 1896 Storm which reached a maximum wind speed of 62 knots in the county.
Lightning	According to the Vaisala flash density map (Figure 5.5), Moore County is located in an area that experiences 3 to 5 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.

Thunderstorm Wind / High Wind	Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 54-year history from the National Climatic Data Center, the strongest recorded wind event in Moore County was reported on July 10, 1988 at 70 knots (approximately 81 mph). It should be noted that future events may exceed these historical occurrences.
Tornado	Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Fujita Scale (Tables 5.16 and 5.17). The greatest magnitude reported was an F2 (last reported on February 11, 1981).
Winter Storm and Freeze	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Moore County was 26 inches on March 2, 1927. Due to unpredictable variations in snowfall throughout the county, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from Lee County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was V (slightly strong) with a correlating Richter Scale measurement of approximately 4.8 (reported on September 1, 1886). The epicenter of this earthquake was located 277.0 km away.
Landslide	As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is low across nearly all of Moore County (there is a very small area, along the northern boundary, that has a moderate incidence). There is also moderate susceptibility throughout the northern half of the county and low susceptibility throughout the southern half.
Hydrologic Hazards	
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 200 dams in Moore County, 53 are classified as high-hazard.
Erosion	The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records located in Moore County.
Flood	Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 7.8 percent of the total land area in Moore County. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the county was at Bear Creek at Robbins in 1956. Water reached a discharge of 43,600 cubic feet per second and the stream gage height was recorded at 34.57 feet. It should also be noted that local officials recall flooding depths of at least 5 feet in some historic events and this is loosely corroborated by NCDC narrative records.

Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 163 LGA released on the railway on January 30, 1984. It should be noted that larger events are possible.
Wildfire	Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county from 2003-2012. The greatest number of fires to occur in Moore County in any year was 248 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2006 when 912.7 acres were burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the county.
Nuclear Accident	Although there is no history of a nuclear accident at the Shearon Harris Nuclear Station, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Shearon Harris is possible.
Terror Threat	There is no history of terror threats in Moore County; however; it is possible that one of these events could occur. If this were to take place, the magnitude of the event could range on the scale of critical damage with many fatalities and injuries to the population.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Moore County, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). More information on the PRI and how it was calculated can be found in Section 5.20.2.

Table E.31 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Team. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE E.31: SUMMARY OF PRI RESULTS FOR MOORE COUNTY

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Atmospheric Hazards						
Drought	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Extreme Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	**2.4**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Likely	Critical	Large	More than 24 hours	Less than 24 hours	**2.9**
Lightning	Highly Likely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Thunderstorm/High Wind	Highly Likely	Critical	Large	6 to 12 hours	Less than 6 hours	**3.3**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Limited	Moderate	More than 24 hours	Less than 1 week	**2.5**
Geologic Hazards						

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Earthquake	Unlikely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**1.7**
Landslide	Unlikely	Minor	Small	Less than 6 hours	Less than 6 hours	**1.5**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.1**
Erosion	Possible	Minor	Small	More than 24 hours	More than 1 week	**1.8**
Flood	Likely	Limited	Small	6 to 12 hours	Less than 1 week	**2.8**
Other Hazards						
Hazardous Materials Incident	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Wildfire	Likely	Minor	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Nuclear Accident	Unlikely	Limited	Moderate	6 to 12 hours	Less than 1 week	**1.9**
Terror Threat	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**

E.2.19 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Moore County, including the PRI results and input from the Regional Hazard Mitigation Planning Team, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table E.32**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of Moore County. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment* and below in Section E.3. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE E.32: CONCLUSIONS ON HAZARD RISK FOR MOORE COUNTY

HIGH RISK	Thunderstorm Wind / High Wind Hurricane and Tropical Storm Flood Tornado Hailstorm Drought Winter Storm and Freeze
MODERATE RISK	Hazardous Material Incident Extreme Heat Wildfire Lightning
LOW RISK	Nuclear Accident Terror Threat Dam and Levee Failure Erosion Earthquake Landslide

E.3 MOORE COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Moore County to the significant hazards previously identified. This includes identifying and characterizing an inventory of assets in the county and assessing the potential impact and expected amount of damages caused to these assets by each identified hazard event. More information on the methodology and data sources used to conduct this assessment can be found in Section 6: *Vulnerability Assessment*.

E.3.1 Asset Inventory

Table E.33 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Moore County and its participating jurisdictions (study area of vulnerability assessment).[20]

[20] Total assessed values for improvements is based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

TABLE E.33: IMPROVED PROPERTY IN MOORE COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements[21]
Aberdeen	3,268	$506,861,340	3,339	$362,337,820
Cameron	222	$16,494,610	362	$12,184,480
Carthage	1,220	$171,090,030	1,428	$134,851,010
Foxfire Village	887	$123,111,560	472	$90,386,300
Pinebluff	862	$81,763,510	975	$62,333,510
Pinehurst	9,496	$2,931,076,680	7,111	$2,164,614,510
Robbins	631	$47,844,530	809	$36,792,390
Southern Pines	7,735	$1,962,592,842	6,285	$1,253,968,868
Taylortown	644	$70,729,730	575	$51,615,140
Vass	662	$63,353,460	770	$45,738,310
Whispering Pines	1,788	$356,890,320	1,378	$274,595,350
Unincorporated Area	42,167	$6,853,018,664	51,013	$3,688,244,140
MOORE COUNTY TOTAL	**69,582**	**$13,184,827,276**	**74,517**	**$8,177,661,828**

Table E.34 lists the fire stations, police stations, EMS/rescue stations, emergency operations centers (EOCs), medical care facilities, schools and other critical facilities located in Moore County. Local governments at the county level provided a majority of the data for this analysis; however, gaps in the data were filled using Hazus 2.1 to obtain the location of some critical facilities for which spatial data was not available. In addition, **Figure E.24** shows the locations of essential facilities in Moore County. **Table E.49**, near the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the county and Hazus 2.1.

TABLE E.34: CRITICAL FACILITY INVENTORY IN MOORE COUNTY

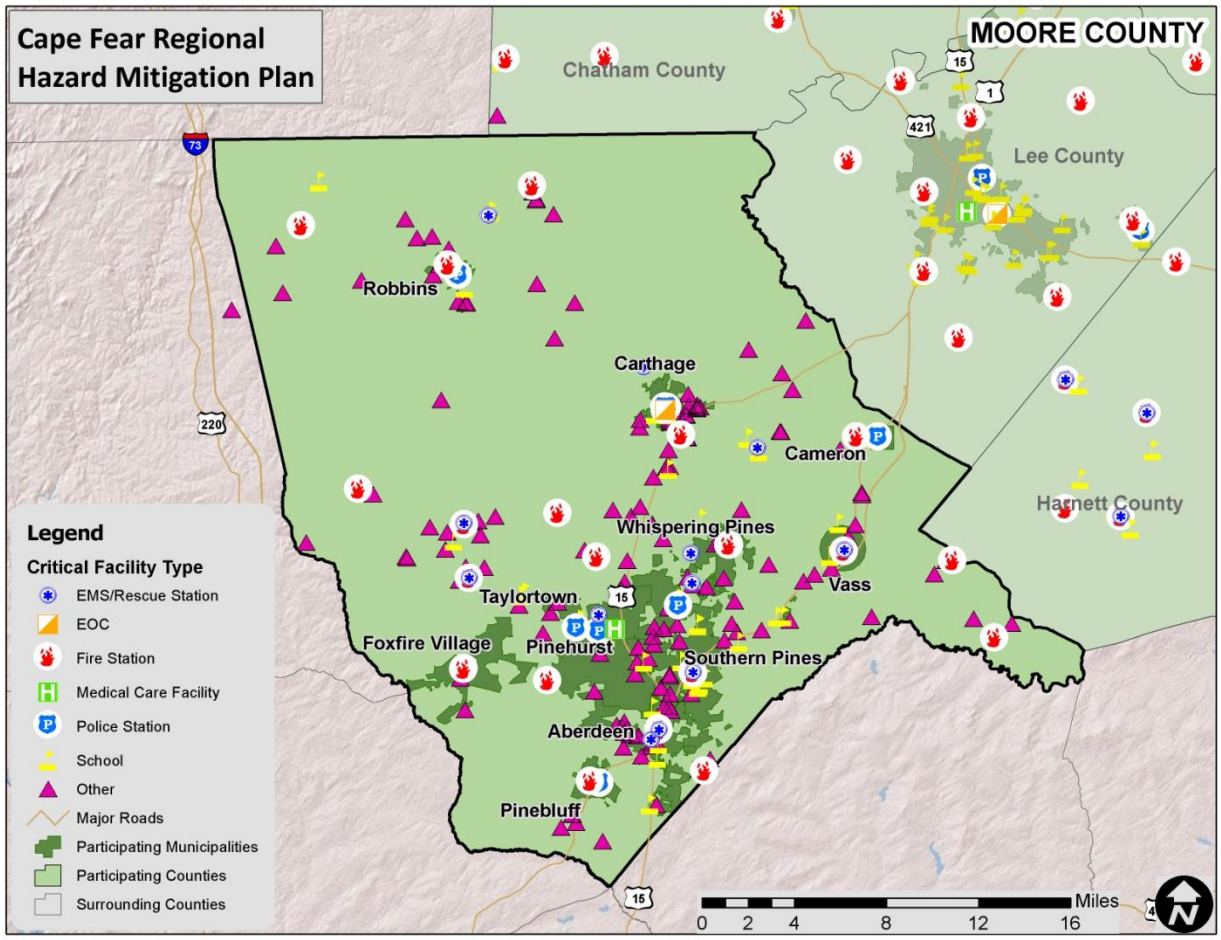
Location	Fire Stations	Police Stations	EMS/Rescue Stations*	Medical Care Facilities	EOC	Schools	Other
Aberdeen	1	1	2	0	0	4	16
Cameron	1	1	0	0	0	1	1
Carthage	0	3	0	0	1	2	24
Foxfire Village	1	1	0	0	0	0	2
Pinebluff	1	1	0	0	0	0	3
Pinehurst	0	1	2	1	0	1	4
Robbins	2	1	0	0	0	1	3
Southern Pines	1	3	1	0	0	11	13
Taylortown	0	1	0	0	0	1	3
Vass	1	1	1	0	0	1	3
Whispering Pines	1	0	1	0	0	0	3
Unincorporated Area	12	2	6	0	0	16	112
MOORE COUNTY TOTAL	**21**	**16**	**13**	**1**	**1**	**38**	**187**

*Some jurisdictions included their EMS/Rescue Stations as separate facilities, while others elected to list only Fire Stations which in many cases are co-located with EMS/Rescue Stations.

Source: Local Government; Hazus-MH

[21] Building value for each county is based on the number of parcels with an improved building value greater than zero.

FIGURE E.24: CRITICAL FACILITY LOCATIONS IN MOORE COUNTY



Source: Hazus-MH 2.1

E.3.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in Moore County that are potentially at risk to these hazards.

Table E.35 lists the population by jurisdiction according to U.S. Census 2010 population estimates. The total population in Moore County according to Census data is 88,247 persons. Additional population estimates are presented above in Section E.1.

TABLE E.35: TOTAL POPULATION IN MOORE COUNTY

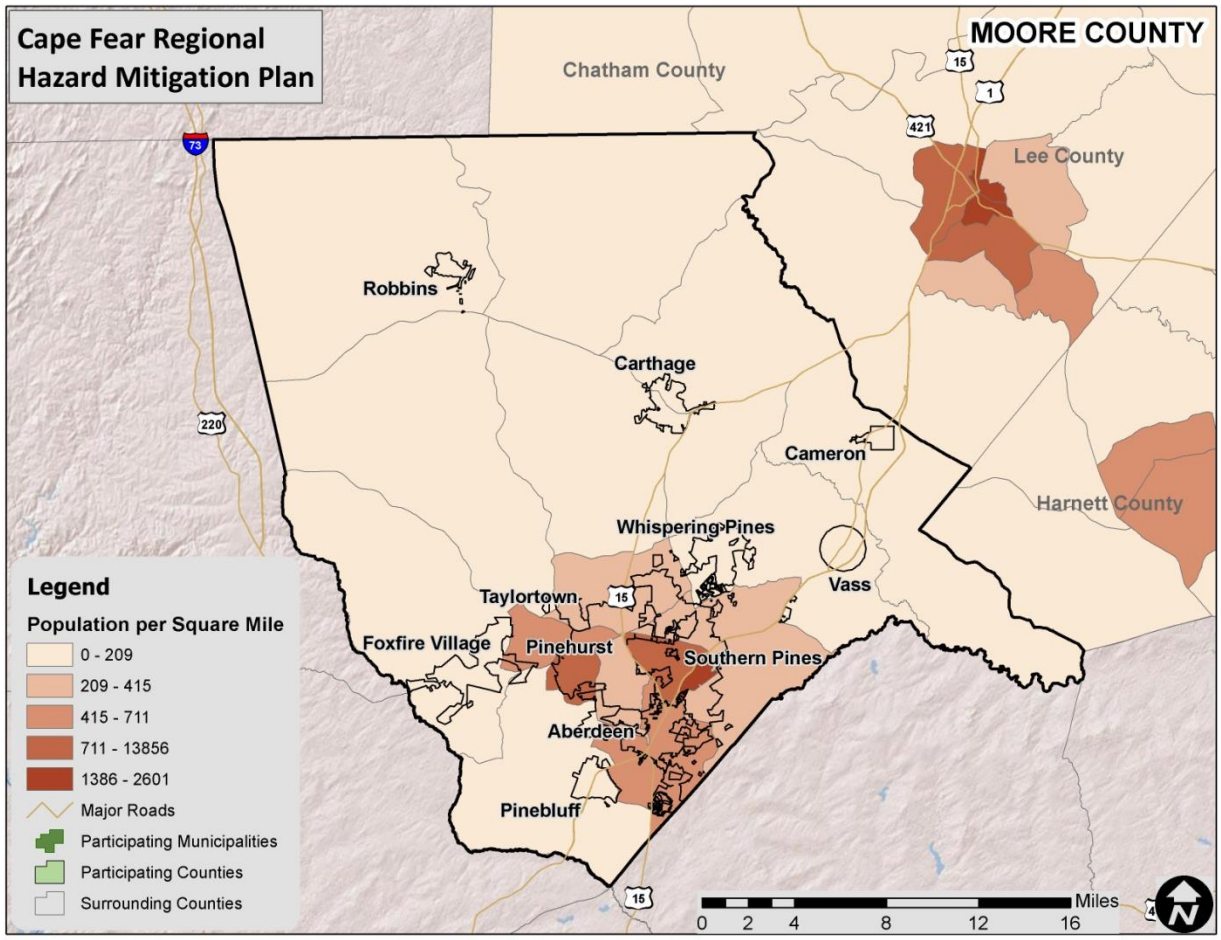
Jurisdiction	2010 Census Population
Moore County	**88,247**
Town of Aberdeen	6,350
Town of Cameron	285
Town of Carthage	2,205

Jurisdiction	2010 Census Population
Foxfire Village	902
Town of Pinebluff	1,337
Village of Pinehurst	13,124
Town of Robbins	1,097
Town of Southern Pines	12,334
Town of Taylortown	722
Town of Vass	720
Village of Whispering Pines	2,928

Source: United States Census 2010

In addition, **Figure E.25** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.

FIGURE E.25: POPULATION DENSITY IN MOORE COUNTY



Source: United States Census Bureau, 2010

E.3.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans was approved (in 2011), Moore County has experienced some growth and development. **Table E.36** shows the number of building units constructed since 2010 according to the U.S. Census American Community Survey.

TABLE E.36: BUILDING COUNTS FOR MOORE COUNTY

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Aberdeen	3,401	54	1.6%
Cameron	154	0	0.0%
Carthage	833	5	0.6%
Foxfire Village	594	0	0.0%
Pinebluff	591	4	0.7%
Pinehurst	8,078	10	0.1%
Robbins	550	2	0.4%
Southern Pines	6,443	0	0.0%
Taylortown	495	0	0.0%
Vass	318	0	0.0%
Whispering Pines	1,356	14	1.0%
Unincorporated Area	21,077	73	0.3%
MOORE COUNTY TOTAL	**43,890**	**162**	**0.4%**

Source: United States Census Bureau

Table E.37 shows population growth estimates for the county from 2010 to 2013 based on the U.S. Census Annual Estimates of Resident Population.

TABLE E.37: POPULATION GROWTH FOR MOORE COUNTY

Jurisdiction	Population Estimates (as of July 1)				% Change 2010-2013
	2010	2011	2012	2013	
Aberdeen	6,382	6,478	6,682	6,906	8.2%
Cameron	290	291	294	296	2.1%
Carthage	2,282	2,297	2,319	2,341	2.6%
Foxfire Village	914	924	936	949	3.8%
Pinebluff	1,309	1,341	1,364	1,397	6.7%
Pinehurst	14,725	14,866	15,041	15,255	3.6%
Robbins	1,128	1,136	1,147	1,158	2.7%
Southern Pines	12,401	12,563	12,764	13,005	4.9%
Taylortown	774	780	788	797	3.0%
Vass	713	719	726	734	2.9%
Whispering Pines	2,962	2,994	3,031	3,071	3.7%
Unincorporated Area	44,682	44,955	45,295	45,678	2.2%
MOORE COUNTY TOTAL	**88,562**	**89,344**	**90,387**	**91,587**	**3.4%**

Source: United States Census Bureau

Based on the data above, there has been a relatively low rate of residential development and population growth in the county since 2010. However, Aberdeen and Whispering Pines have experienced slightly higher rates of development compared to the rest of the Cape Fear Region, resulting in an increased number of structures that are vulnerable to the potential impacts of the identified hazards. Additionally, there have been slightly higher rates of population growth in Aberdeen and Pinebluff. Since the population has increased in these municipalities, there are now greater numbers of people exposed to the identified hazards. Therefore, development and population growth have impacted the county's vulnerability since the previous local hazard mitigation plans were approved and there has been a slight increase in the overall vulnerability.

It is also important to note that as development increases in the future, greater populations and more structures and infrastructure will be exposed to potential hazards if development occurs in the floodplains, moderate landside susceptibility areas, high wildfire risk areas, or primary and secondary TRI site buffers.

E.3.4 Vulnerability Assessment Results

As noted in Section 6: *Vulnerability Assessment*, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results, specific to Moore County, are presented here. All other hazards are assumed to impact the entire planning region (drought, extreme heat, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (dam and levee failure, erosion, and terror threat). The total county exposure, and thus risk, was presented in **Table E.33**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table E.48.**

The hazards presented in this section include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, wildfire, and nuclear accident.

Hurricane and Tropical Storm

Historical evidence indicates that Moore County has a significant risk to the hurricane and tropical storm hazard. Several tracks have come near or traversed through the county, as shown and discussed in Section E.2.4.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. Hazus-MH 2.1 was used to determine annualized losses for the county as shown below in **Table E.38.** Only losses to buildings, contents, and inventory are reported, in order to best match annualized losses reported for other hazards. Hazus-MH reports losses at the U.S. Census tract level, so determining participating jurisdiction losses was not possible.

TABLE E.38: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Moore County	$1,262,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table E.39.**

TABLE E.39: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Aberdeen	75.4	85.4	104.6	111.4
Cameron	75.3	85.2	103.8	111.4
Carthage	72.4	82.4	100.7	108.4
Foxfire Village	74.4	84.3	103.9	110.4
Pinebluff	75.1	84.9	104.1	111.4
Pinehurst	75.1	84.9	104.1	111.4
Robbins	71.7	81.2	101.3	108.4
Southern Pines	75.4	85.4	104.6	111.4
Taylortown	73.6	83.3	103.0	109.3
Vass	75.4	85.4	104.6	111.2
Whispering Pines	74.7	84.6	102.8	110.5
Unincorporated Area	75.4	85.4	104.6	111.4
MAXIMUM WIND SPEED REPORTED	**75.4**	**85.4**	**104.6**	**111.4**

Source: Hazus-MH 2.1

Social Vulnerability

Given equal susceptibility across the county, it is assumed that the total population is at risk to the hurricane and tropical storm hazard.

Critical Facilities

Given equal vulnerability across Moore County, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among other factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in Moore County. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

Earthquake

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for Moore County. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage and do not include losses to contents, inventory, or business interruption. **Table E.40** summarizes the findings.

TABLE E.40: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Moore County	$35,000

Source: Hazus-MH 2.1

Social Vulnerability
It can be assumed that all existing future populations are at risk to the earthquake hazard.

Critical Facilities
The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all critical facilities should be considered at-risk to minor damage, should an event occur. A list of individual critical facilities and their risk can be found in **Table E.49**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Moore County. Minor earthquakes may rattle dishes and cause minimal damage while stronger earthquakes will result in structural damage as indicated in the Hazus scenario above. Impacts of earthquakes include debris clean-up, service disruption and, in severe cases, fatalities due to building collapse. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

Landslide

In order to complete the vulnerability assessment for landslides in Moore County, GIS analysis was used. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section E.2.10), county level tax parcel data, and GIS analysis. **Table E.41** presents the potential at-risk property where available. All areas of Moore County are identified as low incidence areas by the USGS landslide data, excluding a small area along the northern border. Approximately half of the county is of moderate landslide susceptibility. Since no areas of high incidence were identified, the moderate incidence level was used to identify areas of concern for the analysis below.

TABLE E.41: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Aberdeen	0	0	$0
Cameron	0	0	$0
Carthage	0	0	$0
Foxfire Village	0	0	$0
Pinebluff	0	0	$0
Pinehurst	0	0	$0
Robbins	0	0	$0
Southern Pines	0	0	$0
Taylortown	0	0	$0
Vass	0	0	$0

Location	Number of Parcels At Risk	Number of Improvements At Risk	Total Value of Improvements At Risk ($)
Incidence Level	**Moderate**		
Whispering Pines	0	0	$0
Unincorporated Area	266	543	$12,243,960
MOORE COUNTY TOTAL	**266**	**543**	**$12,243,960**

Source: U.S. Geological Survey

Social Vulnerability

Given moderate susceptibility across the northern half of the county, it is assumed that the population in this area is at risk.

Critical Facilities

Approximately one-fifth of critical facilities are located in a moderate susceptibility area. However, all critical facilities in Moore County are located in a low incidence area (moderate or low susceptibility). A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a landslide has the potential to impact some existing and future buildings, facilities, and populations in Moore County, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for county assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

Flood

Historical evidence indicates that Moore County is susceptible to flood events. A total of 30 flood events have been reported by the National Climatic Data Center resulting in almost $455,000 dollars in damages. On an annualized level, these damages amount to $22,742 for Moore County.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for the county. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table E.42** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE E.42: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Aberdeen	92	68	$8,716,810	43	25	$3,941,560
Cameron	20	1	$145,810	0	0	$0
Carthage	0	0	$0	0	0	$0

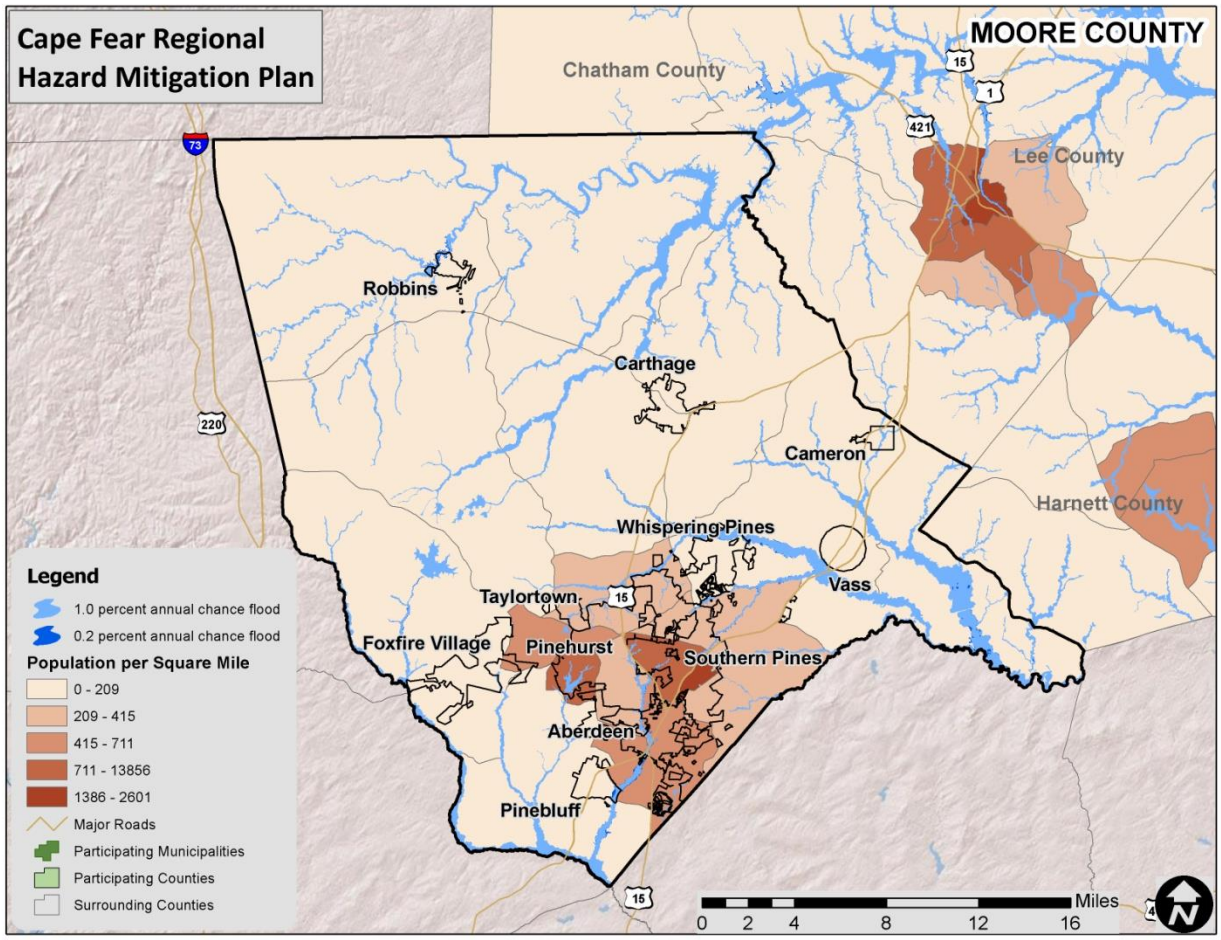
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	21	0	$981,520	8	7	$67,720
Pinehurst	651	154	$372,422,300	7	5	$1,186,550
Robbins	12	4	$500,040	2	6	$2,234,830
Southern Pines	142	9	$41,464,100	4	3	$536,800
Taylortown	11	1	$107,130	0	0	$0
Vass	4	0	$0	0	0	$0
Whispering Pines	179	35	$24,426,800	15	41	$1,527,290
Unincorporated Area	4,817	566	$524,454,290	69	85	$2,864,360
MOORE COUNTY TOTAL	**5,949**	**838**	**$973,218,800**	**148**	**172**	**$12,359,110**

Source: Federal Emergency Management Agency DFIRM

Social Vulnerability

Since 2010 tract level population data and flood zones do not overlay precisely, at-risk population figures are difficult to determine. **Figure E.26** is presented to gain a better understanding of at risk population.

FIGURE E.26 : POPULATION DENSITY NEAR FLOODPLAINS IN MOORE COUNTY



Source: Federal Emergency Management Agency DFIRM; United States Census 2010

Critical Facilities

The critical facility analysis revealed that there are 7 critical facilities located in the Moore County 1.0-percent annual chance floodplain, including 1 EMS/rescue station, a town hall, and several communications towers/units, based on FEMA DFIRM boundaries and GIS analysis. There is also 1 additional critical facility, a wastewater treatment plant, located in the 0.2-percent annual chance floodplain. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Moore County, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

Hazardous Materials Incident

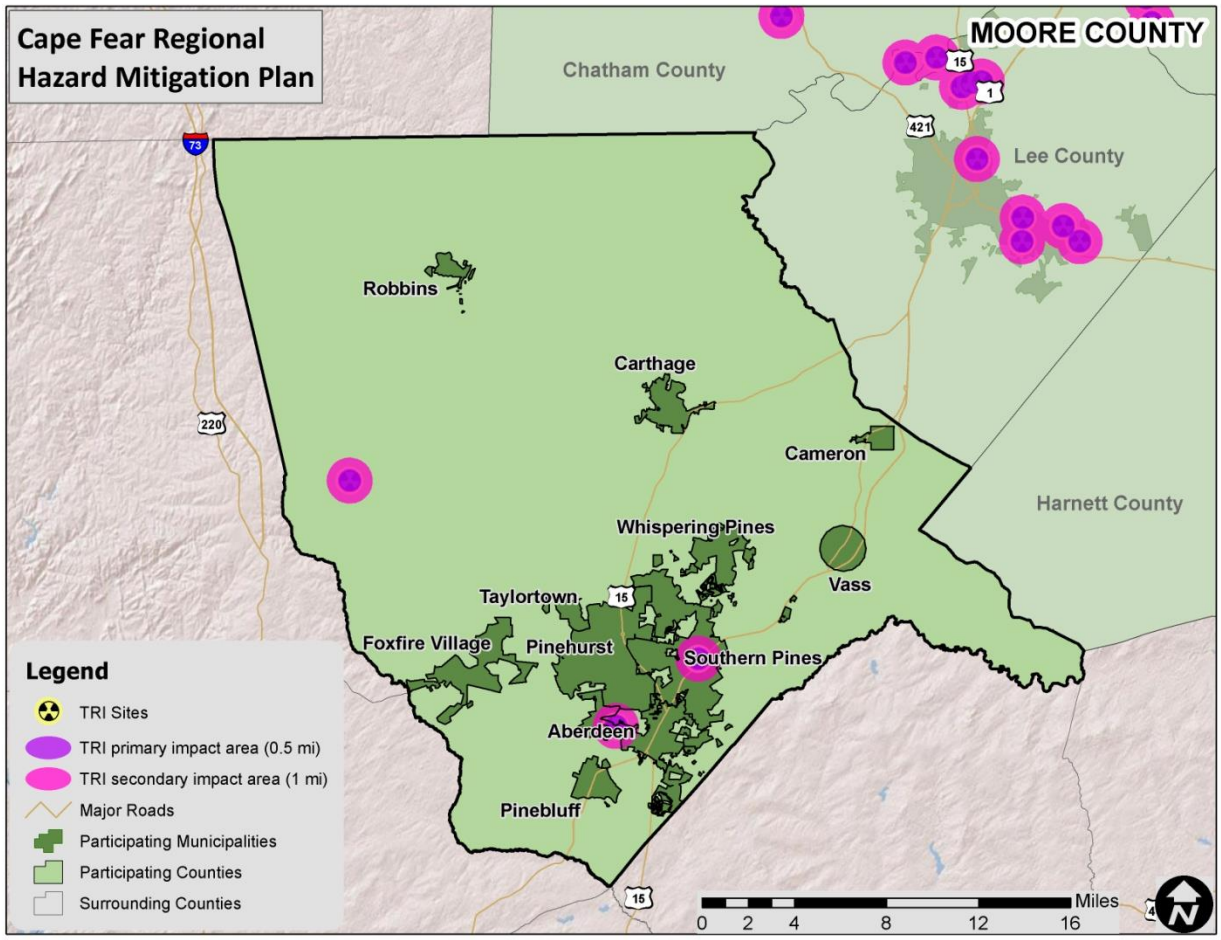
Historical evidence indicates that Moore County is susceptible to hazardous materials events. A total of 24 HAZMAT incidents have been reported by the Pipeline and Hazardous Materials Safety Administration resulting in approximately $600 in property damages. On an annualized level, these damages amount to $16 for Moore County.

Most hazardous materials incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels.[22] In both scenarios, two sizes of buffers—0.5-mile and 1.0-mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in Moore County, along with buffers, were used for analysis as shown in **Figure E.27.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure E.28** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table E.43** (fixed sites), **Table E.44** (mobile road sites) and **Table E.45** (mobile railroad sites).[23]

[22] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1.0-mile analysis are also included in the 0.5-mile analysis.

FIGURE E.27 : TRI SITES WITH BUFFERS IN MOORE COUNTY



Source: Environmental Protection Agency

TABLE E.43: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Aberdeen	50	69	$5,678,000	272	239	$37,631,880
Cameron	0	0	$0	0	0	$0
Carthage	0	0	$0	0	0	$0
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	0	0	$0	0	0	$0
Pinehurst	0	0	$0	17	19	$7,611,530
Robbins	0	0	$0	0	0	$0
Southern Pines	618	458	$43,565,000	2,547	2,080	$269,029,140
Taylortown	0	0	$0	0	0	$0
Vass	0	0	$0	0	0	$0
Whispering Pines	0	0	$0	0	0	$0
Unincorporated Area	167	157	$10,716,540	582	573	$40,184,880
MOORE COUNTY TOTAL	**835**	**684**	**$59,959,540**	**3,418**	**2,911**	**$354,457,430**

FIGURE E.28 : MOBILE HAZMAT BUFFERS IN MOORE COUNTY

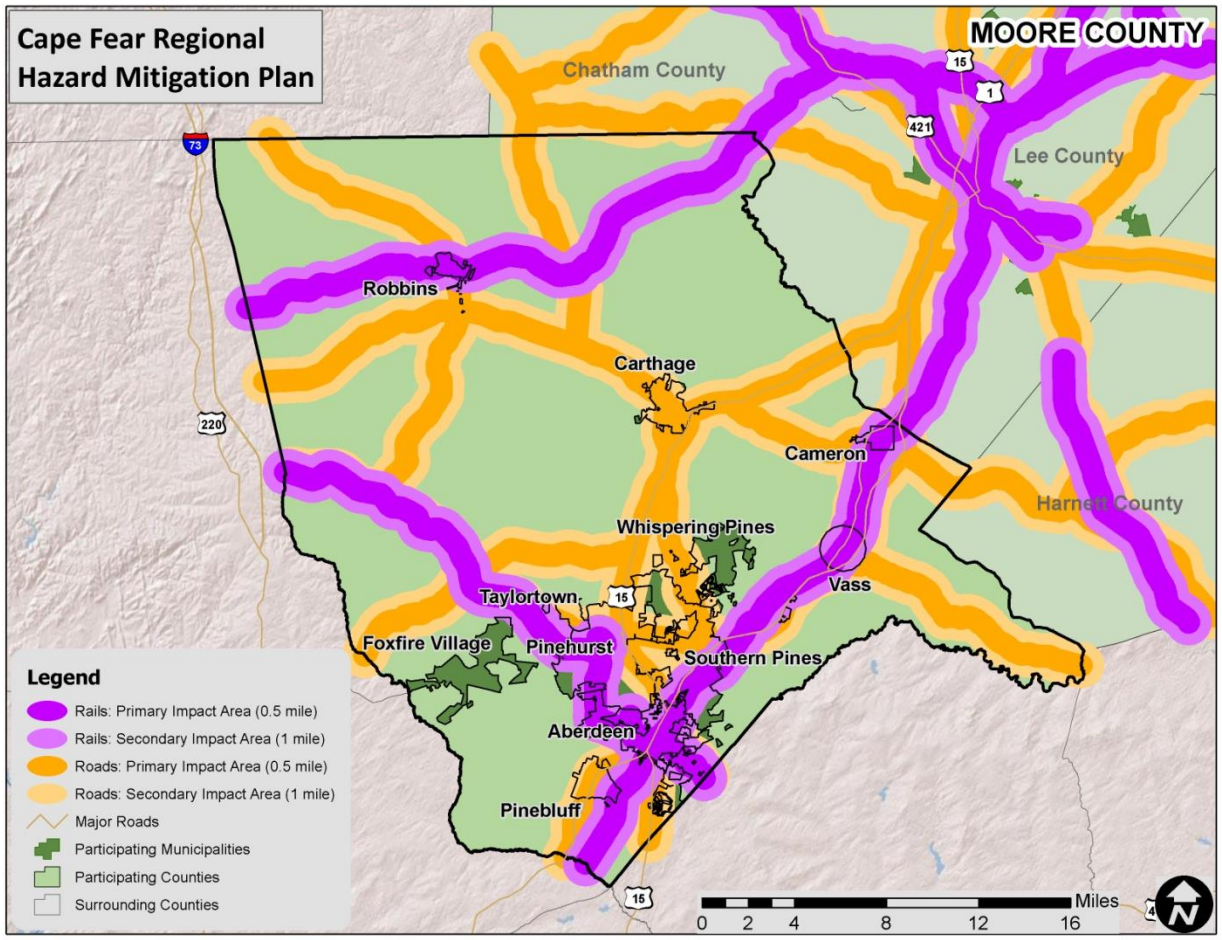


TABLE E.44: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Aberdeen	2,727	2,954	$302,590,390	3,261	3,328	$361,460,040
Cameron	222	362	$12,184,480	222	362	$12,184,480
Carthage	1,036	1,267	$127,870,220	1,216	1,424	$134,751,010
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	605	688	$43,943,660	856	971	$62,333,510
Pinehurst	5,519	3,866	$1,387,032,900	8,116	5,929	$1,892,762,910
Robbins	549	666	$32,953,060	631	809	$36,792,390
Southern Pines	4,218	3,461	$679,321,908	6,631	5,223	$1,027,620,558
Taylortown	356	265	$41,625,120	644	571	$51,615,140
Vass	643	725	$45,044,780	662	770	$45,738,310
Whispering Pines	0	0	$0	219	148	$34,101,010

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	16,241	17,693	$1,449,728,700	25,180	27,736	$2,361,952,020
MOORE COUNTY TOTAL	**32,116**	**31,947**	**$4,122,295,218**	**47,638**	**47,271**	**$6,021,311,378**

TABLE E.45: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

Location	0.5-mile buffer			1.0-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Aberdeen	2,275	2,592	$267,715,730	3,010	3,306	$346,408,630
Cameron	187	240	$9,970,980	216	344	$11,812,920
Carthage	0	0	$0	0	0	$0
Foxfire Village	0	0	$0	0	0	$0
Pinebluff	86	65	$5,347,930	329	321	$21,176,000
Pinehurst	2,721	2,052	$699,164,590	5,510	4,189	$1,483,220,110
Robbins	615	767	$35,900,470	629	800	$36,607,070
Southern Pines	2,157	2,051	$296,184,208	3,753	3,472	$453,906,838
Taylortown	0	0	$0	173	135	$37,626,040
Vass	577	612	$41,234,140	662	770	$45,738,310
Whispering Pines	0	0	$0	0	0	$0
Unincorporated Area	7,421	7,312	$825,799,440	12,755	12,787	$1,440,101,330
MOORE COUNTY TOTAL	**16,039**	**15,691**	**$2,181,317,488**	**27,037**	**26,124**	**$3,876,597,248**

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk to a hazardous materials incident. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

Critical Facilities

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 16 Moore County facilities located in a HAZMAT risk zone. The primary impact zone includes 5 facilities, all other facilities. The remaining 11 at-risk critical facilities are in the secondary, 1.0-mile, zone. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Moore County revealed that there are 232 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 112 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for railroad are also located in the buffer areas for road. The primary road buffer area includes the following critical facilities: 8 EMS/rescue stations, 1 EOC, 14 fire stations, 1 medical care facility, 14 police stations, 29 schools, and 136 other facilities. The remaining 29 at-risk critical facilities are located in the secondary road buffer area. The primary railroad buffer area includes the following critical facilities: 5 EMS/rescue stations, 8 fire stations, 8 police

stations, 14 schools, and 48 other facilities. The remaining 29 at-risk critical facilities are located in the secondary railroad buffer. Although this is a worst case scenario model, it indicates that many of the critical facilities in Moore County are vulnerable to a potential mobile HAZMAT incident. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Moore County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc. Further, incidents from neighboring counties could also impact the county and participating jurisdictions.

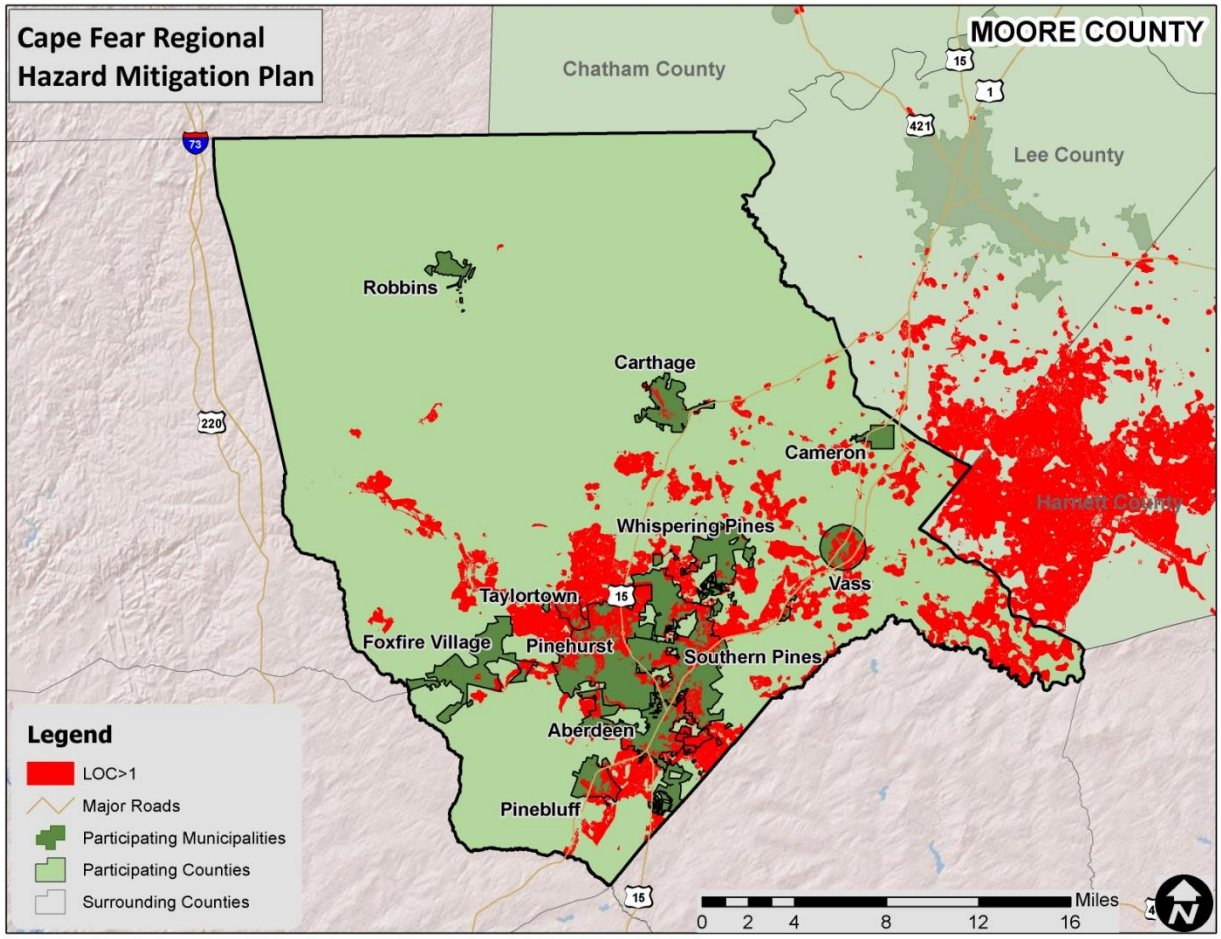
Wildfire

Although historical evidence indicates that Moore County is susceptible to wildfire events, there are few reports which include dollar damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the county.

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern were intersected with critical facility locations. **Figure E.29**, **Figure E.30**, **Figure E.31**, **Figure E.32**, **Figure E.33**, **Figure E.34**, **Figure E.35**, **Figure E.36**, **Figure E.37**, **Figure E.38**, **Figure E.39**, and **Figure E.40** show the Level of Concern data. Initially provided as raster data, it was converted to a polygon to allow for analysis. The LOC data ranges from 1 – 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Sixteen was the highest level recorded in the Cape Fear planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The county contains some lands where the value falls into the at-risk category, and though it has somewhat less land labeled as at-risk compared to other regions of North Carolina, the level of concern in those areas that are considered at-risk is somewhat higher than other areas of the state. Since all of this land area is on the lower fifth of the overall LOC scale, there is likely considerably less risk in the county than in other areas of the country.

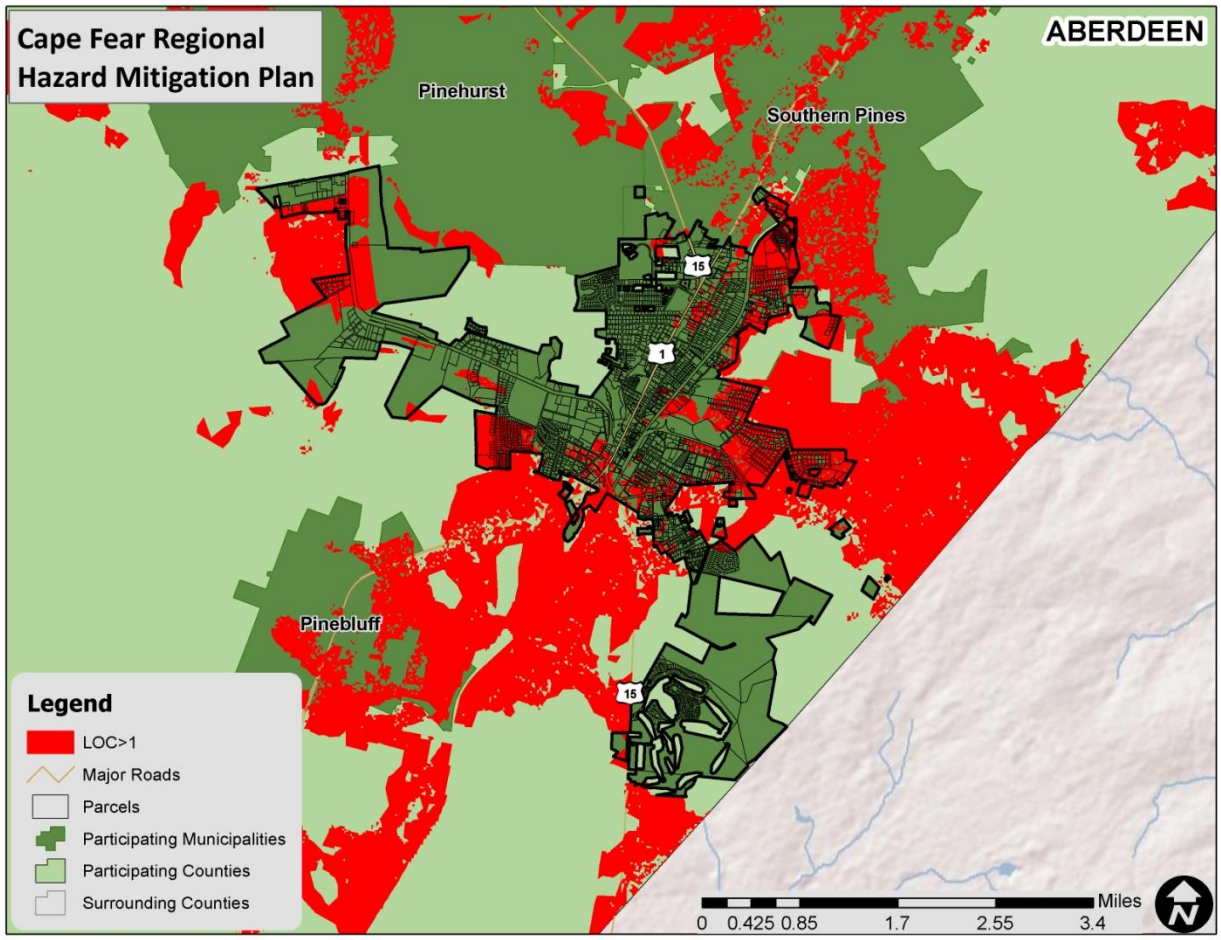
Table E.46 shows the results of the analysis.

FIGURE E.29: WILDFIRE RISK AREAS IN MOORE COUNTY



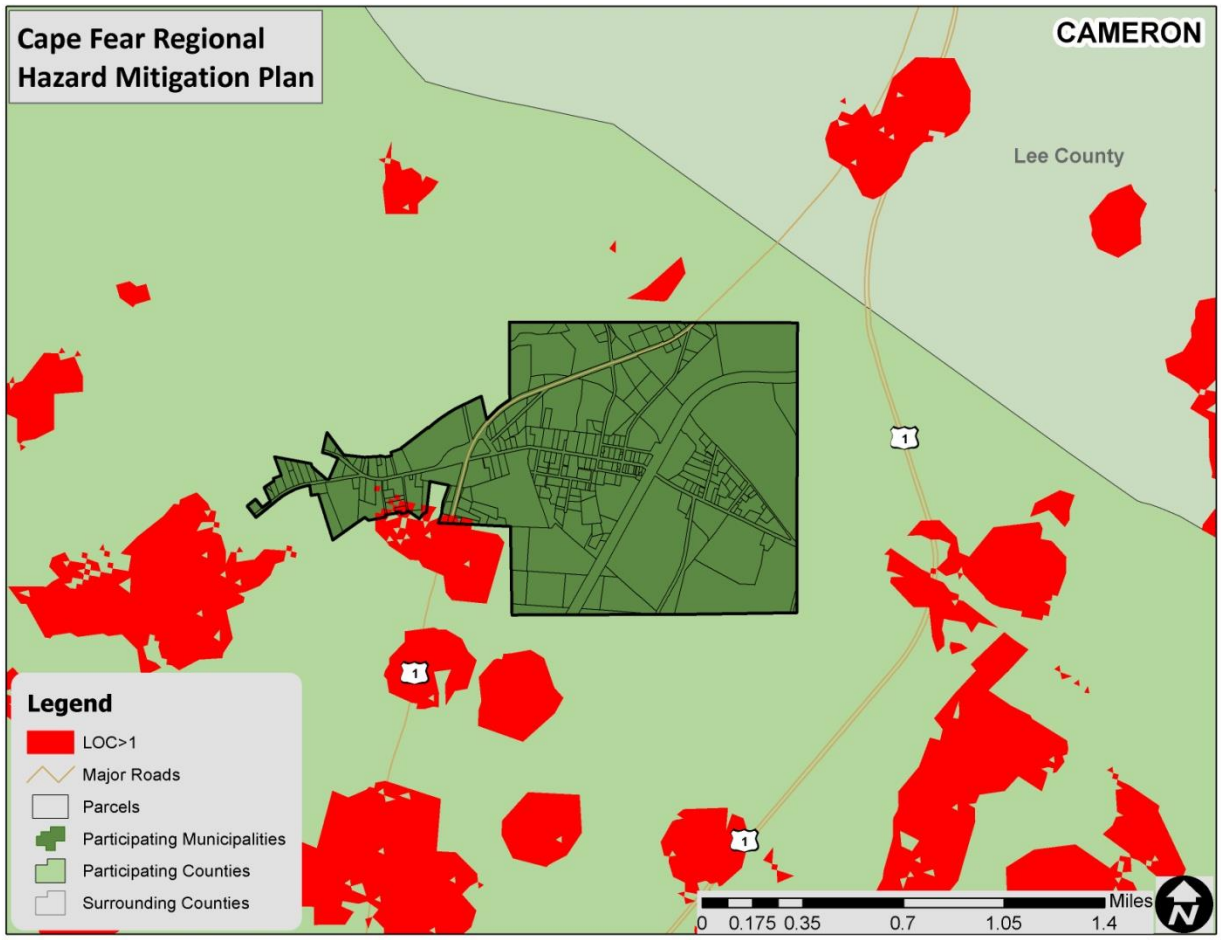
Source: Southern Wildfire Risk Assessment Data

FIGURE E.30: WILDFIRE RISK AREAS IN ABERDEEN



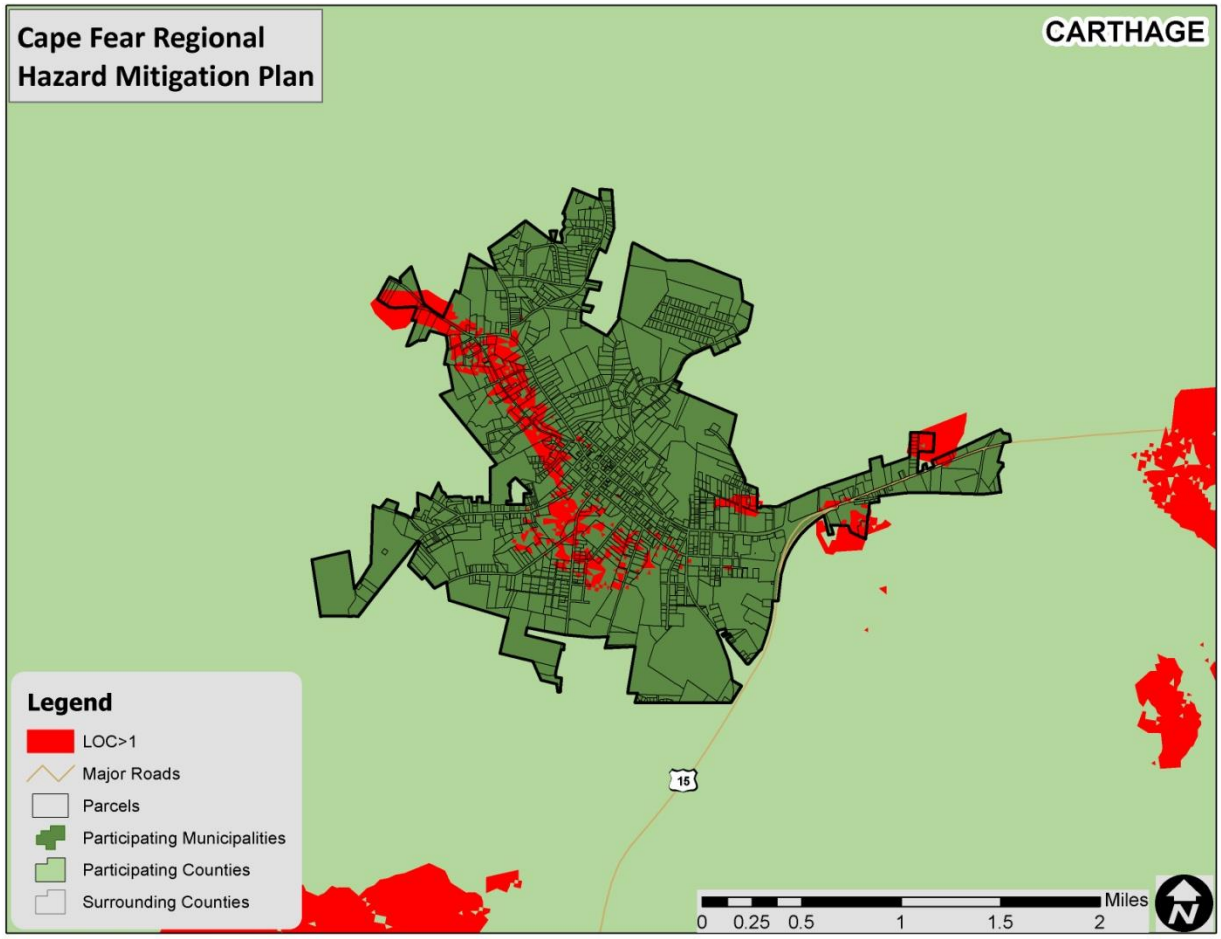
Source: Southern Wildfire Risk Assessment Data

FIGURE E.31: WILDFIRE RISK AREAS IN CAMERON



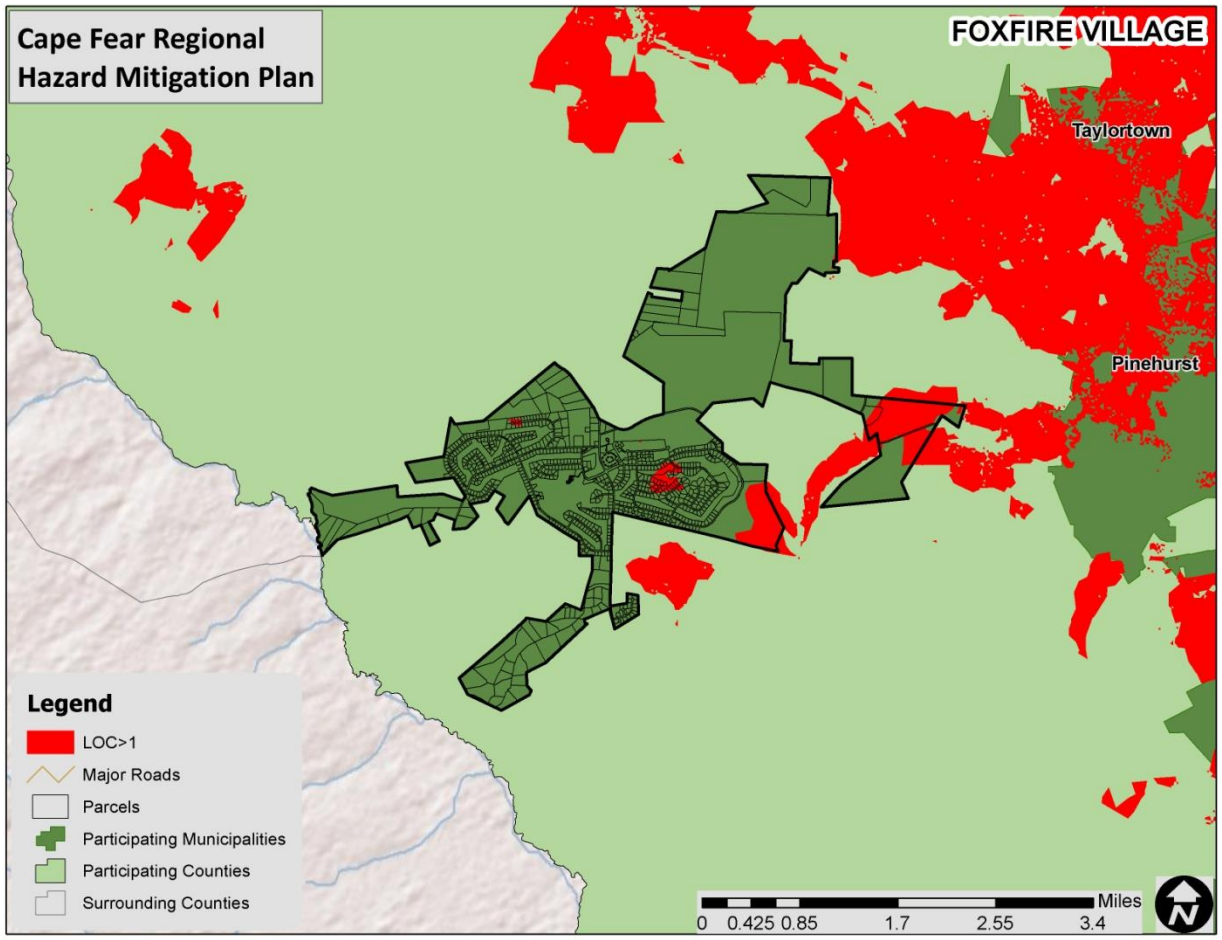
Source: Southern Wildfire Risk Assessment Data

FIGURE E.32: WILDFIRE RISK AREAS IN CARTHAGE



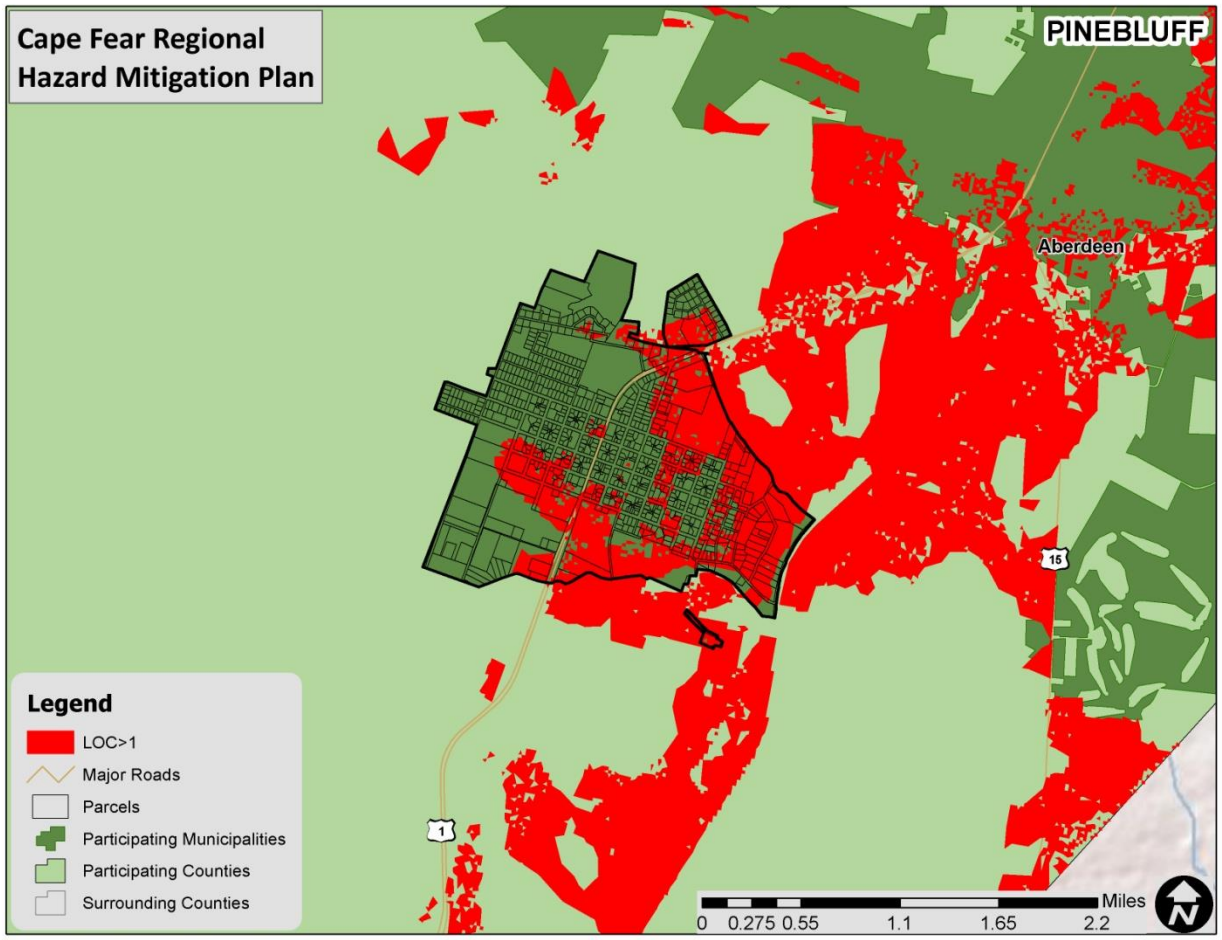
Source: Southern Wildfire Risk Assessment Data

FIGURE E.33: WILDFIRE RISK AREAS IN FOXFIRE VILLAGE



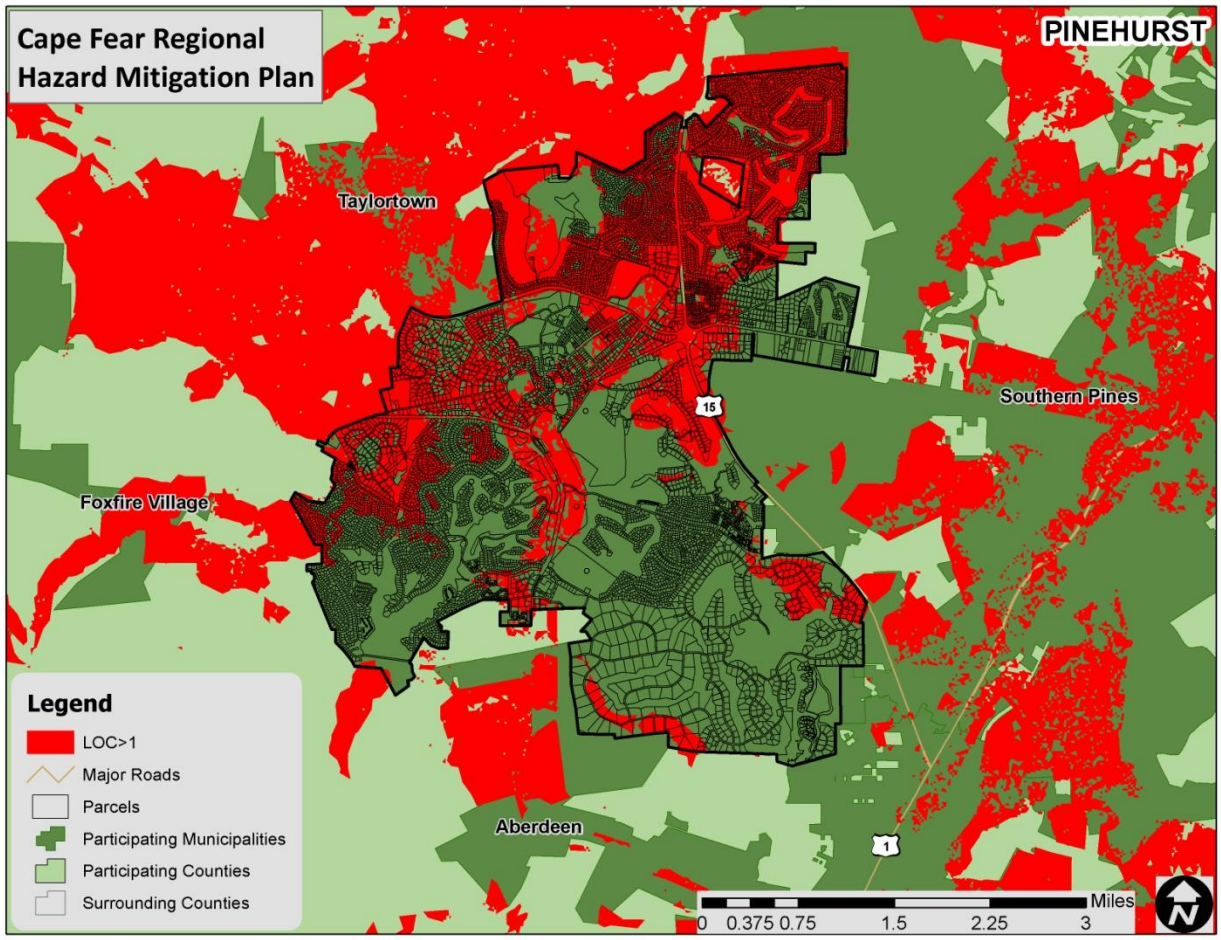
Source: Southern Wildfire Risk Assessment Data

FIGURE E.34: WILDFIRE RISK AREAS IN PINEBLUFF



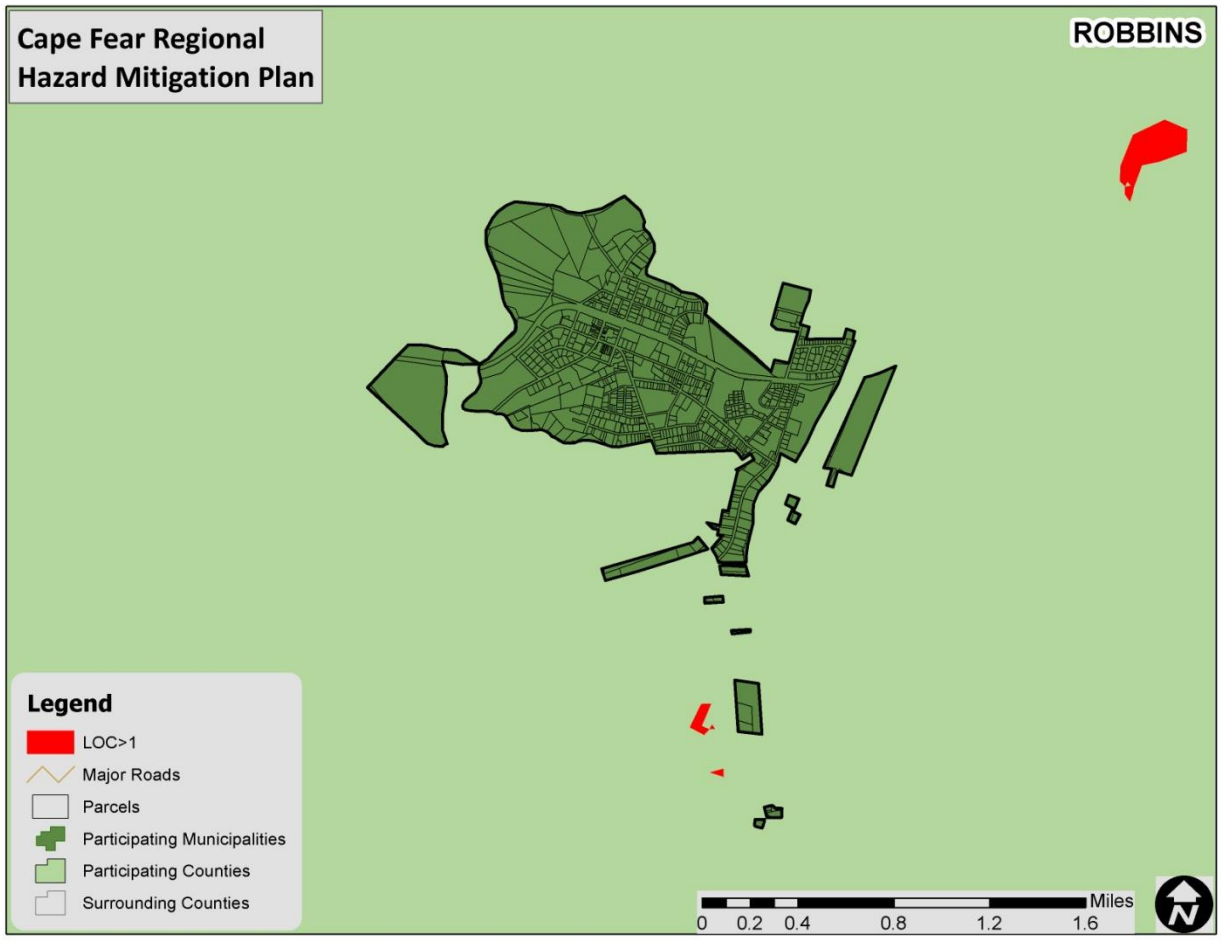
Source: Southern Wildfire Risk Assessment Data

FIGURE E.35: WILDFIRE RISK AREAS IN PINEHURST



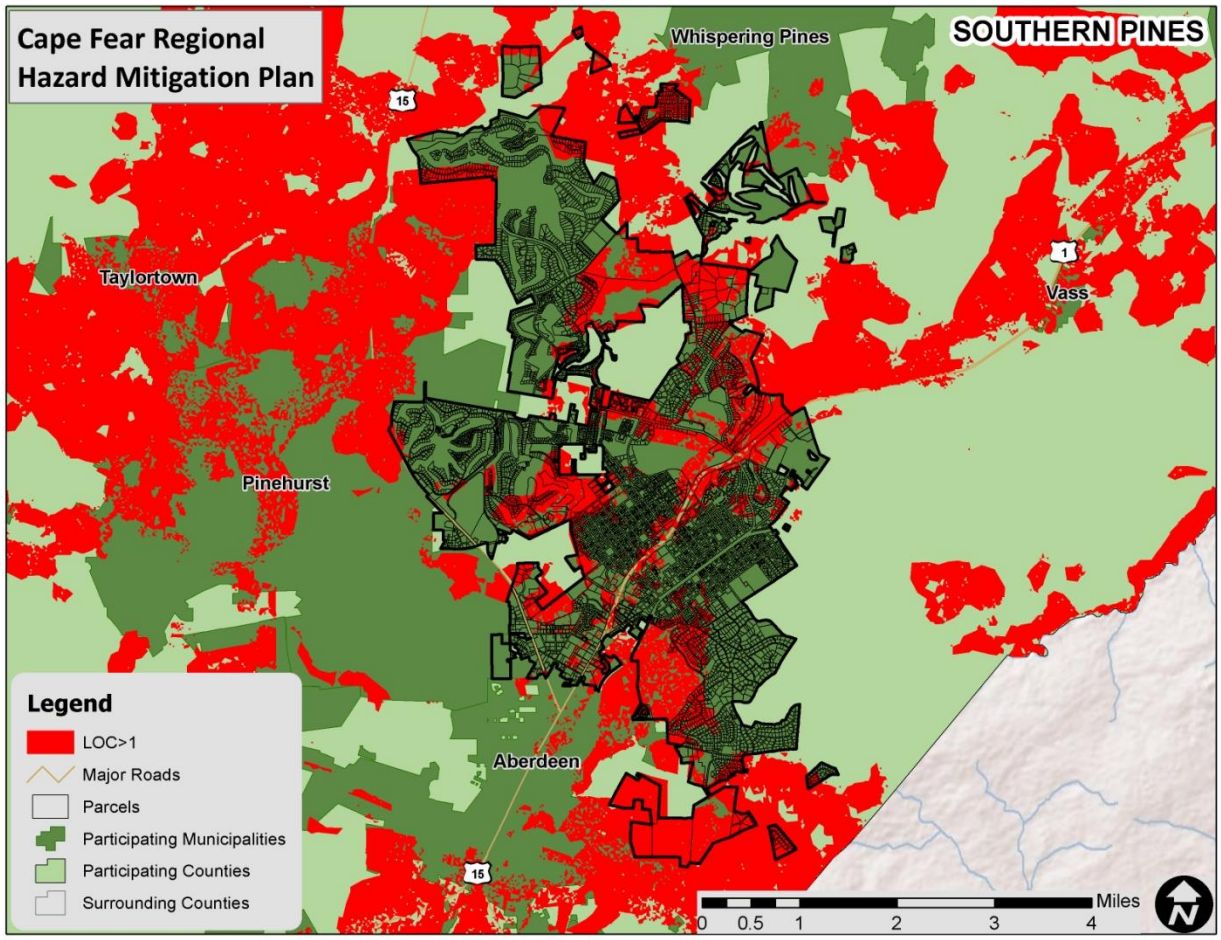
Source: Southern Wildfire Risk Assessment Data

FIGURE E.36: WILDFIRE RISK AREAS IN ROBBINS



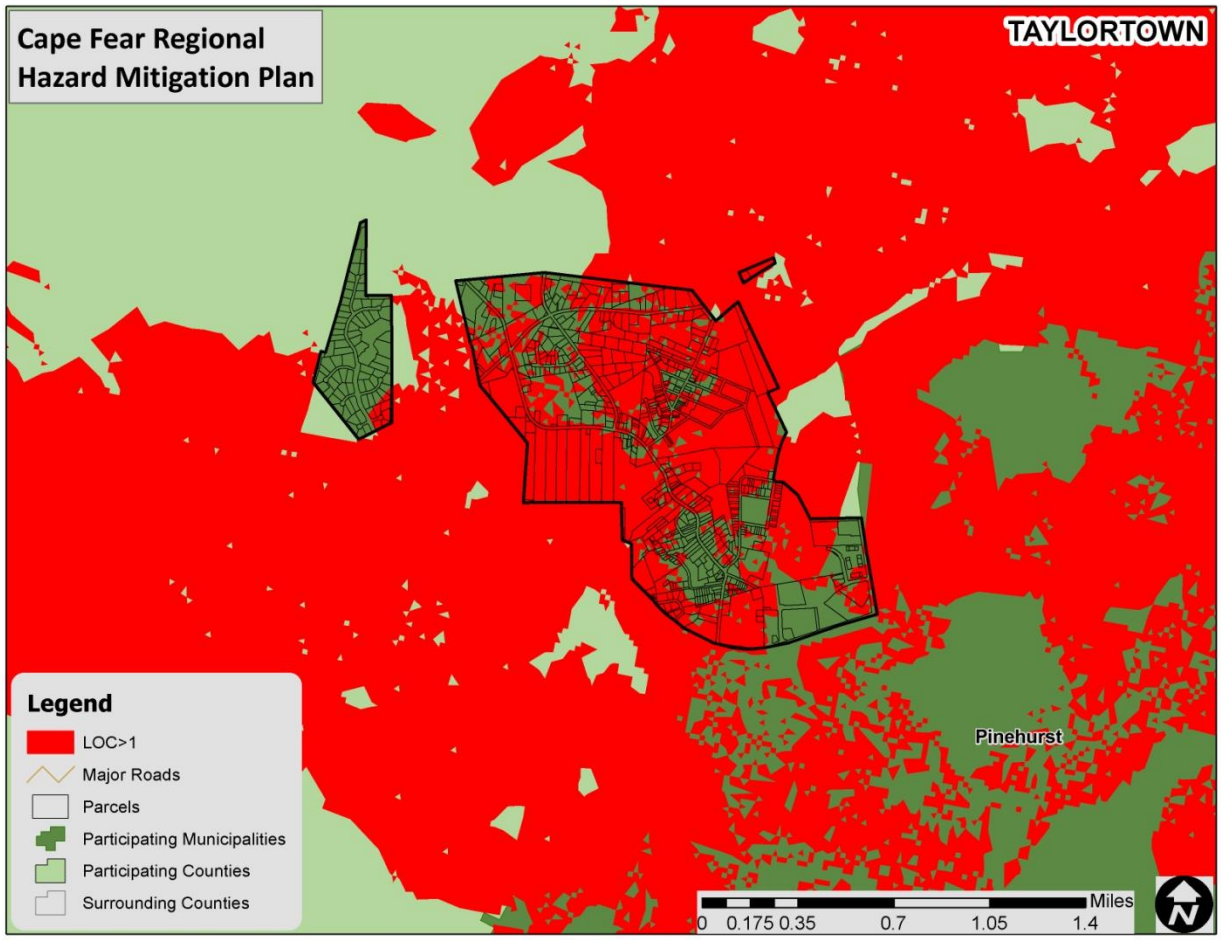
Source: Southern Wildfire Risk Assessment Data

FIGURE E.37: WILDFIRE RISK AREAS IN SOUTHERN PINES



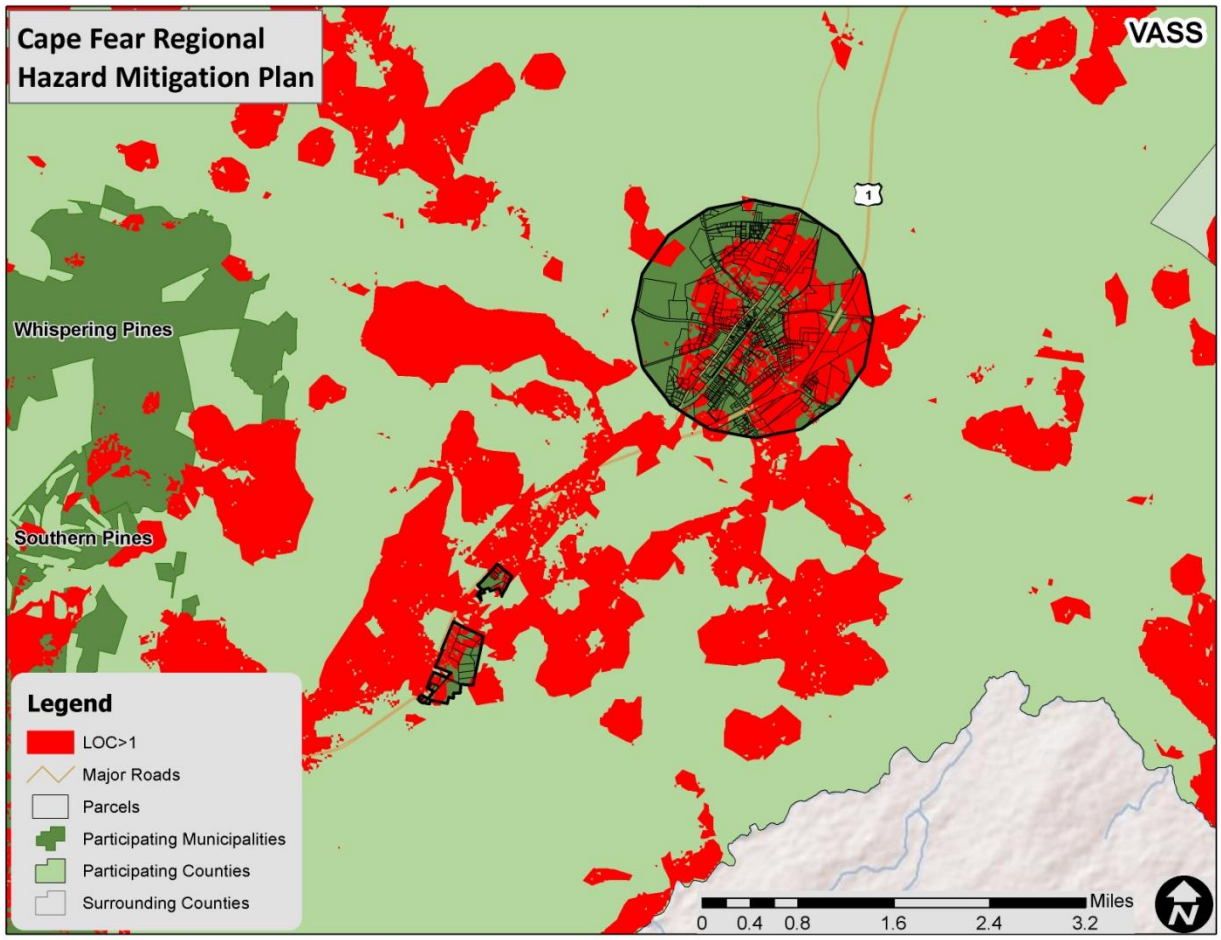
Source: Southern Wildfire Risk Assessment Data

FIGURE E.38: WILDFIRE RISK AREAS IN TAYLORTOWN



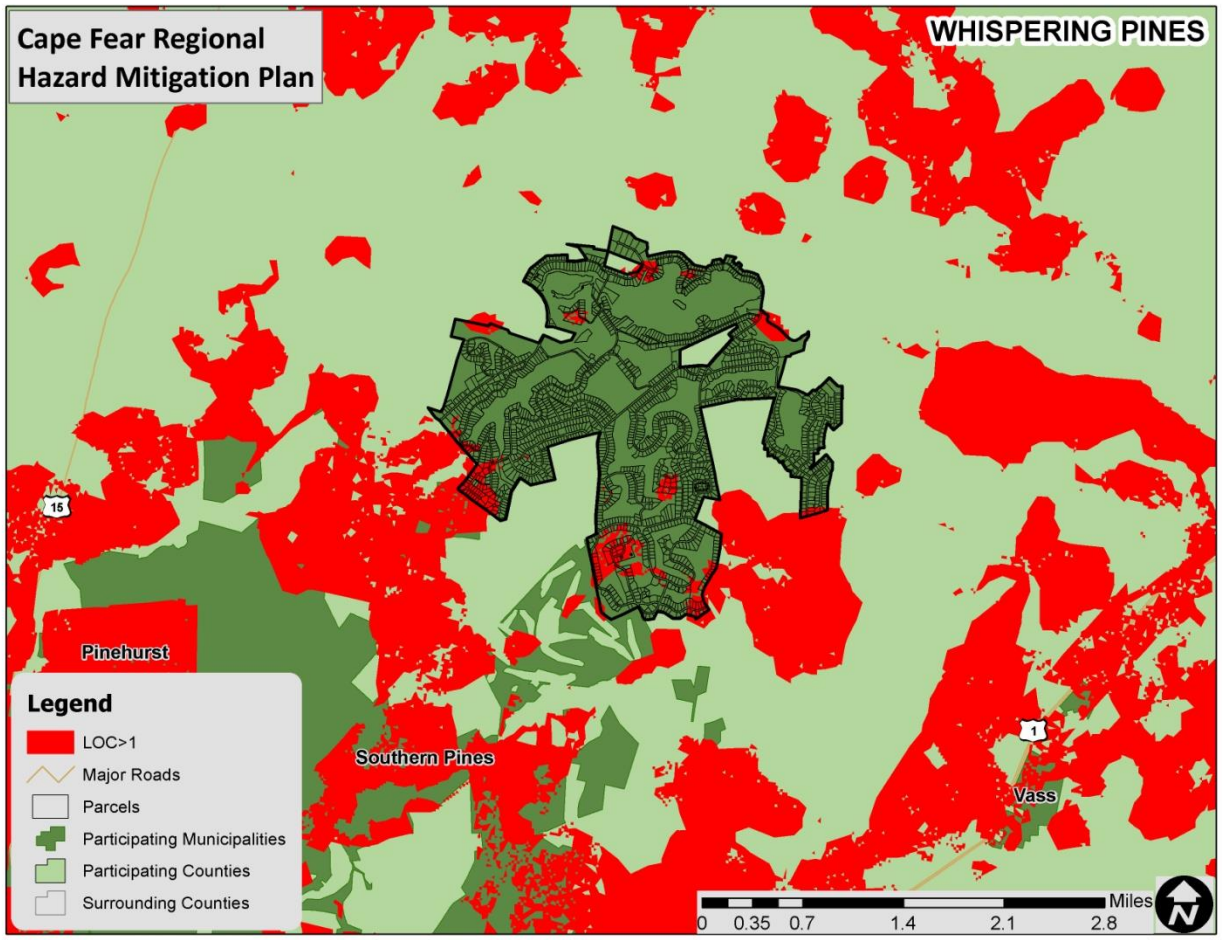
Source: Southern Wildfire Risk Assessment Data

FIGURE E.39: WILDFIRE RISK AREAS IN VASS



Source: Southern Wildfire Risk Assessment Data

FIGURE E.40: WILDFIRE RISK AREAS IN WHISPERING PINES



Source: Southern Wildfire Risk Assessment Data

TABLE E.46: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Aberdeen	1,233	1,091	$157,030,050
Cameron	7	10	$250,430
Carthage	278	198	$59,544,610
Foxfire Village	50	14	$4,716,320
Pinebluff	315	233	$24,031,590
Pinehurst	5,841	3,829	$1,434,214,860
Robbins	0	0	$0
Southern Pines	2,549	1,652	$446,086,160
Taylortown	500	307	$31,726,180
Vass	414	345	$35,304,090
Whispering Pines	242	91	$29,045,670
Unincorporated Area	11,328	8,800	$1,463,361,140
MOORE COUNTY TOTAL	**22,757**	**16,570**	**$3,685,311,100**

Looking at jurisdictional level, the southern portion of the county faces the highest level of concern areas.

Social Vulnerability
Although not all areas have equal vulnerability, there is some susceptibility across the county. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

Critical Facilities
The critical facility analysis revealed that there are 44 critical facilities located in wildfire areas of concern, including 3 EMS/rescue stations, 3 fire stations, 1 medical care facility, 3 schools, and 34 other facilities. It should also be noted, that several factors could impact the spread of a wildfire putting all facilities at risk. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in Moore County.

Nuclear Accident

The location of Shearon Harris Nuclear Station northeast of Moore County demonstrates that the county is at risk to the effects of a nuclear accident. Although there have not been any major events at this plant in the past, there have been major events at other nuclear stations around the country. Additionally, smaller scale incidents at Shearon-Harris Nuclear Station have occurred.

In order to assess nuclear risk, a GIS-based analysis was used to estimate exposure during a nuclear event within each of the risk zones described in Section 5: *Hazard Profiles*. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within one of the risk zones. All of Moore County, excluding a small area in the southwest corner, is located within the 50-mile risk zone. **Table E.47** presents the potential at-risk property. Both the number of parcels/buildings and the approximate value are presented.

TABLE E.47: ESTIMATED EXPOSURE OF PARCELS/BUILDINGS TO A NUCLEAR ACCIDENT

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Aberdeen	0	0	$0	3,268	3339	$362,337,820
Cameron	0	0	$0	222	362	$12,184,480
Carthage	0	0	$0	1,220	1428	$134,851,010
Foxfire Village	0	0	$0	887	472	$90,386,300
Pinebluff	0	0	$0	862	975	$62,333,510

[24] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 10-mile buffer, since building footprints were not associated with dollar value data.
[25] Improved value of buildings is estimated based on the building value associated with parcels that have been identified as being located in the 50-mile buffer, since building footprints were not associated with dollar value data.

Location	10-mile buffer			50-mile buffer		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[24]	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings[25]
Pinehurst	0	0	$0	9,496	7111	$2,164,614,510
Robbins	0	0	$0	631	809	$36,792,390
Southern Pines	0	0	$0	7,735	6285	$1,253,968,868
Taylortown	0	0	$0	644	575	$51,615,140
Vass	0	0	$0	662	770	$45,738,310
Whispering Pines	0	0	$0	1,788	1378	$274,595,350
Unincorporated Area	0	0	$0	42121	50949	$3,687,407,990
MOORE COUNTY TOTAL	**0**	**0**	**$0**	**69,536**	**74,453**	**$8,176,825,678**

Source: International Atomic Energy Agency

Social Vulnerability

Since all areas of the county are within the 50-mile buffer area, excluding a small area in the southwest corner, the total population is considered to be at risk to a nuclear accident.

Critical Facilities

The critical facility analysis revealed that there are no critical facilities located in the 10-mile nuclear buffer area in Moore County. However, all critical facilities in the county are located within the 50-mile nuclear buffer. A list of specific critical facilities and their associated risk can be found in **Table E.49** at the end of this section.

In conclusion, a nuclear accident has the potential to impact many existing and future buildings, facilities, and populations in Moore County. All structures in the county are at some risk given that they are nearly all located within the 50-mile buffer area.

Conclusions on Hazard Vulnerability

Table E.48 presents a summary of annualized loss for each hazard in Moore County. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE E.48: ANNUALIZED LOSS FOR MOORE COUNTY

Event	Moore County
Atmospheric Hazards	
Drought	Negligible
Extreme Heat	Negligible
Hailstorm	Negligible
Hurricane & Tropical Storm	$1,262,000

Event	Moore County
Lightning	$168,152
Severe Thunderstorm / High Wind	$61,319
Tornado	$224,085
Winter Storm & Freeze	$40,343
Geologic Hazards	
Earthquake	$35,000
Landslide	Negligible
Hydrologic Hazards	
Dam Failure	Negligible
Erosion	Negligible
Flood	$22,742
Other Hazards	
HAZMAT Incident	$16
Wildfire	Negligible
Nuclear Accident	Negligible
Terror Threat	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, extreme heat, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table E.49** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

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TABLE E.49: AT-RISK CRITICAL FACILITIES IN MOORE COUNTY

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
MOORE COUNTY																							
Moore County Medic 1	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
Moore County Medic 2	EMS/Rescue Station	X	X	X	X	X	X	X	X	X													X
Moore County Medic 3	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Moore County Medic 5	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Rescue 30	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X
Seven Lakes Rescue 69	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X		X			X
High Falls Station 12	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Westmoore Station 14	Fire Station	X	X	X	X	X	X	X	X	X													X
Cypress Point Station Station 3 (Woodlake)	Fire Station	X	X	X	X	X	X	X	X	X											X		X
Crains Creek Station 23	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Station 31	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Eastwood Station 52	Fire Station	X	X	X	X	X	X	X	X	X							X	X			X		X
West End 60/61	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Eagle Springs Station 62	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Seven Lakes Station 63	Fire Station	X	X	X	X	X	X	X	X	X								X		X			X
Crestline Station 72	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Pinehurst Station 91	Fire Station	X	X	X	X	X	X	X	X	X													X
Pinehurst Station 92	Fire Station	X	X	X	X	X	X	X	X	X													X
Samarkand Youth Development Center	Other	X	X	X	X	X	X	X	X	X													X
Beacon Ridge Golf and Country Club	Other	X	X	X	X	X	X	X	X	X													X
Hyland Hills Resort	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Legacy Golf Links	Other	X	X	X	X	X	X	X	X	X							X	X					X
Little River Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Midland Country Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pinebluff Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pine Needles Golf Club	Other	X	X	X	X	X	X	X	X	X								X					X
Pinewild Country Club	Other	X	X	X	X	X	X	X	X	X								X	X	X	X		X
The Pit Golf Links	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Riverside Country Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Seven Lakes Country Club	Other	X	X	X	X	X	X	X	X	X													X
Talamore	Other	X	X	X	X	X	X	X	X	X								X					X
Woodlake Country Club	Other	X	X	X	X	X	X	X	X	X			X					X					X
Water Treatment Facilities	Other	X	X	X	X	X	X	X	X	X							X	X					X
Main Office-Moore County Public Utilitie	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Southern Pines	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage	Other	X	X	X	X	X	X	X	X	X													X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Moore County Airport	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Progress Energy	Other	X	X	X	X	X	X	X	X	X													X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X
REMC Station	Other	X	X	X	X	X	X	X	X	X										X			X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X
REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
REMC Substation	Other	X	X	X	X	X	X	X	X	X													X
REMC Breaker Station	Other	X	X	X	X	X	X	X	X	X										X			X
CEMC Substation	Other	X	X	X	X	X	X	X	X	X							X	X					X
CEMC Substation	Other	X	X	X	X	X	X	X	X	X													X
CEMC	Other	X	X	X	X	X	X	X	X	X							X	X					X
Communications Center	Other	X	X	X	X	X	X	X	X	X													X
Carthage Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Cranes Creek Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Seven Lakes Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Westmoore Tower	Other	X	X	X	X	X	X	X	X	X													X
Alltel, Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X								X	X	X	X		X
Alltel, Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Alltel Substation	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Alltel, Bellsouth, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Alltel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Bellsouth, Sprint Cell Tower	Other	X	X	X	X	X	X	X	X	X			X				X	X					X
Bellsouth, SunCom, Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Bellsouth, Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Bellsouth, Alltel, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Cingular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Cingular Wireless Tower	Other	X	X	X	X	X	X	X	X	X													X
Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X								X					X
Nextel Cell Tower	Other	X	X	X	X	X	X	X	X	X													X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Nextel, Sprint PCS, Bellsouth Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Cingular Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint PCS Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint PCS, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X	X		X
SunCom, Bellsouth Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X								X		X	X		X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Verizon Comm. Site	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Central Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Century Link	Other	X	X	X	X	X	X	X	X	X													X
Embarq Station	Other	X	X	X	X	X	X	X	X	X							X	X					X
Embarq Telephone Pedestal	Other	X	X	X	X	X	X	X	X	X							X	X					X
Embarq Station	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Sprint Pedestal	Other	X	X	X	X	X	X	X	X	X													X
Sprint Distribution	Other	X	X	X	X	X	X	X	X	X									X	X			X
Sprint Switch Box	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint Switch Box	Other	X	X	X	X	X	X	X	X	X													X
Sprint Phone Box	Other	X	X	X	X	X	X	X	X	X													X
Sprint 1001 #2	Other	X	X	X	X	X	X	X	X	X			X				X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Sprint Centel	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint/Embarq Pedestal	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Telephone Utility	Other	X	X	X	X	X	X	X	X	X													X
Telephone Pad	Other	X	X	X	X	X	X	X	X	X													X
United Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Coastal Agrobusiness	Other	X	X	X	X	X	X	X	X	X							X	X					X
Southern States Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sandhills Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Dixie Denning Propane	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Airport Fuel Tanks	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Woodlake Maintenance Shop	Other	X	X	X	X	X	X	X	X	X											X		X
RBI Retail Golf Balls	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Little River Golf	Other	X	X	X	X	X	X	X	X	X							X	X					X
Kens Body Works	Other	X	X	X	X	X	X	X	X	X								X					X
High Falls Oil	Other	X	X	X	X	X	X	X	X	X							X	X					X
Greens Fuel	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Eastwood Fire Department	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Deep River Mills	Other	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Wastewater Treatment Plant	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Hussey Oil	Other	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Spies Rd. Booster Station	Other	X	X	X	X	X	X	X	X	X										X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Van DerVeers LP - Robbins	Other	X	X	X	X	X	X	X	X	X							X	X					X
McNeil Oil Company	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Synergy LP	Other	X	X	X	X	X	X	X	X	X							X	X					X
Coopers LP	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
Seven Lakes South Maintenance	Other	X	X	X	X	X	X	X	X	X													X
Moore County Senior Enrichment Center	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Animal Control	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Works	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Water Pollution	Other	X	X	X	X	X	X	X	X	X									X	X			X
Vass Waste Water Treatment Plant	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Carthage Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X					X
Whispering Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X													X
Carthage Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Southern Middle School	School	X	X	X	X	X	X	X	X	X							X	X					X
West End Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
West Pine Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
West Pine Middle School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Union Pines High School	School	X	X	X	X	X	X	X	X	X													X
North Moore High School	School	X	X	X	X	X	X	X	X	X													X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Sandhills Farmlife Elementary School	School	X	X	X	X	X	X	X	X	X													X
Crain's Creek Middle School	School	X	X	X	X	X	X	X	X	X								X		X			X
New Century Middle School	School	X	X	X	X	X	X	X	X	X								X					X
Moore County Schools Admin Building	School	X	X	X	X	X	X	X	X	X							X	X					X
Highfalls Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Westmoore Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Robbins Elementary School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Stars Charter School	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Longleaf Academy	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Highland Christian Academy	School	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Moore County Medic 6	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Rescue 40	EMS/Rescue Station	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X
Aberdeen Station 41	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
CP & L Transmission	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
CP& L	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Transformer Station	Other	X	X	X	X	X	X	X	X	X						X		X		X	X		X
Alltel	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Sprint PCS, Aberdeen Water Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
US Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Sprint Equipment Box	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Telephone Drop	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X
Gulistan Carpet	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
WC Richards	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Ferrell Gas - Vann Pl	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Ferrell Gas - NC 5	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			X
Cardinal Chemical	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Town Hall	Other	X	X	X	X	X	X	X	X	X			X				X	X	X	X			X
Aberdeen Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Aberdeen Primary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Academy of Moore County	School	X	X	X	X	X	X	X	X	X							X	X					X
Soild Rock Christian School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cypress Point Station 2 (Cameron)	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Cameron Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cameron Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Cameron Elementary School	School	X	X	X	X	X	X	X	X	X							X	X		X			X
Rick Rhyne-Public Safety Moore Cnty EOC	EOC	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Jail	Other	X	X	X	X	X	X	X	X	X							X	X					X
Sprint, SunCom Cellular Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Agribusiness - Southern States	Other	X	X	X	X	X	X	X	X	X							X	X					X
Van DerVeers LP - Carthage	Other	X	X	X	X	X	X	X	X	X													X
Energy United	Other	X	X	X	X	X	X	X	X	X							X	X					X
Ferrell Gas	Other	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Oil Company	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Jail	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Library	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Historic Courthouse	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Board of Elections	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Child Support	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Register of Deeds	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Courthouse	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Social Services	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Health Department	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Information Technology	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County Planning & Zoning	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Safety	Other	X	X	X	X	X	X	X	X	X							X	X					X
NC Cooperative Extension Service / Soil	Other	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Moore County Day Reporting Center / Yout	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Environmental Health	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Financial Services	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Moore County GIS / Transportation / Vete	Other	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Public Safety	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Rick Rhyne-Moore County Sheriffs Office	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Sheriff's Office	Police Station	X	X	X	X	X	X	X	X	X							X	X					X
Pinckney Academy Alternative School	School	X	X	X	X	X	X	X	X	X							X	X					X
Carthage Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
West End/Foxfire Substation	Fire Station	X	X	X	X	X	X	X	X	X													X
Foxfire Country Club	Other	X	X	X	X	X	X	X	X	X													X
Foxfire Village	Other	X	X	X	X	X	X	X	X	X													X
Foxfire Police Department	Police Station	X	X	X	X	X	X	X	X	X													X
Pinebluff Station 71	Fire Station	X	X	X	X	X	X	X	X	X							X	X					X
Pinebluff Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Telephone Co	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pinebluff Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X		X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Pinebluff Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X		X			X
Moore County Medic 4	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Pinehurst Rescue 90	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Moore Regional Hospital	Medical Care Facility	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Country Club of North Carolina	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Mid Pines Inn and Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Pinehurst Resort and Country Club	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Pinehurst Village Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Pinehurst Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Station 11	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Rescue 10	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Tower	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Water Treatment Plant	Other	X	X	X	X	X	X	X	X	X				X			X	X	X	X			X
Robbins Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Robbins Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Elise Middle School	School	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Moore County Medic 7	EMS/Rescue Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Southern Pines 81	Fire Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
The Carolina	Other	X	X	X	X	X	X	X	X	X								X					X
The Club at Longleaf	Other	X	X	X	X	X	X	X	X	X							X	X					X
Forest Creek Golf Club	Other	X	X	X	X	X	X	X	X	X								X					X
Knollwood Fairways	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Mid South	Other	X	X	X	X	X	X	X	X	X							X	X					X
National Golf Club	Other	X	X	X	X	X	X	X	X	X							X	X					X
Elks Lodge	Other	X	X	X	X	X	X	X	X	X								X	X	X			X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X			X		X
Southern Pines Tower	Other	X	X	X	X	X	X	X	X	X								X		X			X
Bellsouth, SunCom Cell Tower	Other	X	X	X	X	X	X	X	X	X							X	X					X
Century Link	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Dixie Pipeline	Other	X	X	X	X	X	X	X	X	X							X	X					X
Southern Pines Town Hall	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Southern Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Police Department	Police Station	X	X	X	X	X	X	X	X	X								X					X
Southern Pines Police Department	Police Station	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Community College	School	X	X	X	X	X	X	X	X	X							X	X					X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Southern Pines Elementary School	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Southern Pines Primary School	School	X	X	X	X	X	X	X	X	X						X		X					X
Pinecrest High School	School	X	X	X	X	X	X	X	X	X							X	X					X
Sandhills Community College	School	X	X	X	X	X	X	X	X	X							X	X					X
The O'Neal School	School	X	X	X	X	X	X	X	X	X							X	X					X
Episcol Day School	School	X	X	X	X	X	X	X	X	X								X	X	X			X
Calvary Christian School	School	X	X	X	X	X	X	X	X	X						X	X	X	X	X			X
Sandhills Classical Christian School	School	X	X	X	X	X	X	X	X	X							X	X					X
Pope John Paul II Catholic School	School	X	X	X	X	X	X	X	X	X						X		X	X	X			X
Sandhills Childrens Center	School	X	X	X	X	X	X	X	X	X							X	X					X
CP & L Sub Station	Other	X	X	X	X	X	X	X	X	X							X	X		X	X		X
Sprint Equipment Box	Other	X	X	X	X	X	X	X	X	X								X			X		X
Taylortown Village Hall	Other	X	X	X	X	X	X	X	X	X							X	X		X			X
Taylortown Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X		X			X
Academy Heights Elementary School	School	X	X	X	X	X	X	X	X	X							X	X					X
Moore County Medic 8	EMS/Rescue Station	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Cypress Point Station 1 (Vass)	Fire Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sprint	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Sandhills Pool and Spa	Other	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Vass Town Hall	Other	X	X	X	X	X	X	X	X	X							X	X	X	X			X

FACILITY NAME	FACILITY TYPE	ATMOSPHERIC								GEOLOGIC			HYDROLOGIC		OTHER								
		Drought	Extreme Heat	Hailstorm	Hurricane and Tropical Storm	Lightning	Thunderstorm	Tornado	Winter Storm and Freeze	Earthquake	Landslide – High Incidence	Landslide- Mod. Incidence	Flood – 100 yr	Flood – 500 yr	Fixed HAZMAT 0.5 mile	Fixed HAZMAT 1 mile	Mobile HZMT 0.5 Mile (road)	Mobile HZMT 1 mile (road)	Mobile HZMT 0.5 mile (rail)	Mobile HZMT 1 mile (rail)	Wildfire	Nuclear Accident	Terror Threat
Vass Police Department	Police Station	X	X	X	X	X	X	X	X	X							X	X	X	X			X
Vass-Lakeview Elementary School	School	X	X	X	X	X	X	X	X	X							X	X	X	X	X		X
Whispering Pines Rescue 50	EMS/Rescue Station	X	X	X	X	X	X	X	X	X								X					X
Whispering Pines Station 51	Fire Station	X	X	X	X	X	X	X	X	X													X
Country Club of Whispering Pines	Other	X	X	X	X	X	X	X	X	X													X
Whispering Woods	Other	X	X	X	X	X	X	X	X	X													X
Whispering Pines Village Hall	Other	X	X	X	X	X	X	X	X	X													X

E.4 MOORE COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Moore County to implement hazard mitigation activities. More information on the purpose and methodology used to conduct the assessment can be found in Section 7: *Capability Assessment*.

E.4.1 Planning and Regulatory Capability

Table E.50 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Moore County. 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. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the Cape Fear Regional Hazard Mitigation Plan.

TABLE E.50: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
MOORE COUNTY	✓	✓			✓			✓	✓		*	✓	✓		✓	✓	✓	✓		✓	✓	✓	
Aberdeen	✓	✓		✓	✓			✓				✓			✓	✓	✓	✓		✓	✓	✓	
Cameron	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Carthage	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Foxfire Village	✓	✓						✓				✓			✓	✓	✓			✓	✓	✓	
Pinebluff	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Pinehurst	✓	✓		✓	✓			✓				✓			✓	✓	✓	✓		✓	✓	✓	
Robbins	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Southern Pines	✓	✓		✓	✓			✓							✓	✓	✓	✓		✓	✓	✓	

Planning Tool/Regulatory Tool	Hazard Mitigation Plan	Comprehensive Land Use Plan	Floodplain Management Plan	Open Space Management Plan (Parks & Rec/Greenway Plan	Stormwater Management Plan/Ordinance	Natural Resource Protection Plan	Flood Response Plan	Emergency Operations Plan	Continuity of Operations Plan	Evacuation Plan	Disaster Recovery Plan	Capital Improvements Plan	Economic Development Plan	Historic Preservation Plan	Flood Damage Prevention Ordinance	Zoning Ordinance	Subdivision Ordinance	Unified Development Ordinance	Post-Disaster Redevelopment Ordinance	Building Code	Fire Code	National Flood Insurance Program (NFIP)	NFIP Community Rating System
Taylortown	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Vass	✓	✓						✓							✓	✓	✓			✓	✓	✓	
Whispering Pines	✓	✓		✓	✓			✓				✓			✓	✓	✓	✓		✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Moore County has previously adopted a hazard mitigation plan. All of the participating municipalities were also included in this plan.

Disaster Recovery Plan
Moore County Planning and Community Development and the Public Safety Departments are currently in the process of developing a disaster recovery plan.

Emergency Operations Plan
Moore County maintains an emergency operations plan through its Emergency Management Department. This plan has been adopted by each of the municipalities within the county.

Continuity of Operations Plan
Moore County has a continuity of operations plan in place.

General Planning

Comprehensive Land Use Plan
Moore County and has adopted a land use plan. Each of the municipalities in the county has adopted a land use or comprehensive plan as well.

Capital Improvements Plan
Moore County, Aberdeen, Foxfire Village, Pinehurst, and Whispering Pines have capital improvement plans.

Zoning Ordinance
Moore County and all of its municipalities have adopted zoning ordinances. The county, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines include zoning regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand-alone zoning ordinances.

Subdivision Ordinance
Moore County and all of its municipalities have adopted subdivision regulations. Again, the county, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines include subdivision regulations as part of their local unified development ordinance. The remaining municipalities have adopted stand-along subdivision ordinances.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Moore County Inspections provides building inspection services to the county and all municipalities except Aberdeen, Pinehurst, Southern Pines, and Pinebluff, which administer their own building code enforcement.

Floodplain Management

Table E.51 provides NFIP policy and claim information for each participating jurisdiction in Moore County.

TABLE E.51: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
MOORE COUNTY†	12/15/89	01/02/08	311	$70,069,900	7	$247,646
Aberdeen	05/15/86	01/02/08	37	$8,058,400	0	$0
Cameron	05/21/09	01/02/08	1	$28,000	0	$0
Carthage	05/06/10	01/02/08	0	$0	0	$0
Foxfire Village	02/14/97	01/02/08	1	$350,000	0	$0
Pinebluff	07/17/86	01/02/08	1	$329,400	0	$0
Pinehurst	03/25/91	01/02/08	105	$28,138,000	4	$62,318
Robbins	07/03/86	01/02/08	0	$0	0	$0
Southern Pines	03/04/88	01/02/08	68	$16,455,500	0	$0
Taylortown	10/17/07	01/02/08	0	$0	0	$0
Vass	05/22/09	01/02/08	1	$350,000	0	$0
Whispering Pines	12/15/89	01/02/08	39	$9,140,700	0	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 8/15/14; NFIP claims and policy information as of 6/30/14

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Moore County and all of its municipalities participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Moore County does not have an open space management plan in place; however, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines have all adopted parks, recreation, greenway, and or open space plans.

Stormwater Management Plan
Although Moore County and its municipalities do not have stormwater management plans in place, the county, Aberdeen, Pinehurst, Southern Pines, and Whispering Pines have adopted stormwater management regulations through various local ordinances.

E.4.2 Administrative and Technical Capability

Table E.52 provides a summary of the capability assessment results for Moore County 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 E.52: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
MOORE COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	
Aberdeen	✓	✓	✓	✓	✓		✓	✓		
Cameron		✓		✓	✓		✓	✓		
Carthage		✓		✓	✓		✓	✓		
Foxfire Village		✓		✓	✓		✓			

Staff / Personnel Resource	Planners with knowledge of land development/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	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists familiar with the hazards of the community	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or Hazus	Resource development staff or grant writers
Pinebluff		✓		✓	✓		✓	✓		
Pinehurst	✓	✓	✓	✓	✓		✓	✓		
Robbins		✓		✓	✓		✓	✓		
Southern Pines	✓	✓	✓	✓	✓		✓	✓	✓	
Taylortown		✓		✓	✓		✓	✓		
Vass		✓		✓	✓		✓	✓		
Whispering Pines	✓	✓	✓	✓	✓		✓	✓		

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

E.4.3 Fiscal Capability

Table E.53 provides a summary of the results for Moore County 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) according to the previous county hazard mitigation plan.

TABLE E.53: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	Capital Improvement Programming	Community Development Block Grants (CDBG)	Special Purpose Taxes (or taxing districts)	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other: PDM, FMAP, HMGP, PA, SBA, and other Federal and state funding sources, etc.
MOORE COUNTY	✓	✓	✓						✓	✓
Aberdeen	✓	✓	✓						✓	✓
Cameron	✓	✓	✓						✓	✓
Carthage	✓	✓	✓						✓	✓
Foxfire Village	✓	✓	✓						✓	✓
Pinebluff	✓	✓	✓						✓	✓
Pinehurst	✓	✓	✓						✓	✓
Robbins	✓	✓	✓							✓
Southern Pines	✓	✓	✓						✓	✓
Taylortown	✓	✓	✓						✓	✓
Vass	✓	✓	✓						✓	✓
Whispering Pines	✓	✓	✓						✓	✓

E.4.4 Political Capability

The previous hazard mitigation plan indicates that the following principles of political acceptability are applicable for Moore County and all of its incorporated municipalities: independent of existing regulations that directly address hazard mitigation (e.g., floodplain management ordinance), hazard mitigation is not a goal that should be addressed independent of other goals and objectives of the local government, due to limited government resources. Hazard mitigation should be considered and incorporated into policies, procedures, and programs which affect land use and development, such as siting of roadways, siting and building of public facilities, zoning and subdivision ordinances, and extension of infrastructure necessary for growth. Local revenues are insufficient to support hazard mitigation projects for mitigation of existing hazards at the local level; however, Federal and state grant

funds should be pursued when available. One of the local government's primary roles in implementing hazard mitigation is educating the public about the risks of natural hazards and how to reduce these risks and/or the costs of these risks.

E.4.5 Conclusions on Local Capability

Table E.54 shows the results of the capability assessment using the designed scoring methodology described in Section 7: *Capability Assessment*. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for the county and its municipalities is 30.3, which falls into the moderate capability ranking.

TABLE E.54: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
MOORE COUNTY	43	High
Aberdeen	36	Moderate
Cameron	25	Moderate
Carthage	25	Moderate
Foxfire Village	25	Moderate
Pinebluff	26	Moderate
Pinehurst	37	Moderate
Robbins	25	Moderate
Southern Pines	36	Moderate
Taylortown	25	Moderate
Vass	25	Moderate
Whispering Pines	35	Moderate

E.5 MOORE COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Moore County to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Regional Hazard Mitigation Planning Committee and the findings and conclusions of the capability assessment and risk assessment. Additional Information can be found in Section 8: *Mitigation Strategy* and Section 9: *Mitigation Action Plan*.

E.5.1 Mitigation Goals

Moore County developed six mitigation goals in coordination with the other participating Cape Fear Region jurisdictions. The regional mitigation goals are presented in **Table E.55**.

TABLE E.55: CAPE FEAR REGIONAL MITIGATION GOALS

	Goal
Goal #1	Increase public awareness of hazards and encourage collective and individual responsibility for mitigating hazard risks.
Goal #2	Strive to reduce loss of life, personal injury, and property damage from natural hazards.
Goal #3	Strive to maintain existing structures and infrastructure in such a manner that they will be as resilient as possible from natural hazards.
Goal #4	Protect the most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #5	Manage future development to minimize vulnerability of public and private property to natural hazards.
Goal #6	Protect and preserve the natural resources and environmentally sensitive areas within the region.

E.5.2 Mitigation Action Plan

The mitigation actions proposed by Moore County, the Town of Aberdeen, the Town of Cameron, the Town of Carthage, the Village of Foxfire, the Town of Pinebluff, the Village of Pinehurst, the Town of Robbins, the Town of Southern Pines, the Town of Taylortown, the Town of Vass, and the Village of Whispering Pines are listed in the following individual Mitigation Action Plans.

Moore County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Aberdeen Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
P-17	Implement at least one of the three stormwater BMP's identified through the Town's existing comprehensive stormwater mapping project.	Flood	High	Town Planning Director	Local	2019	The town has worked to implement BMPs in its stormwater mapping project, but integrating additional BMPs will further improve the program, so this action will be continued into the next plan.
P-18	Promote floodplain mapping of the Ray's Mill Pond (Pee Dee Lake) and Creek system).	Flood	High	Town Planning Director	Local	2018	Floodplain mapping of the pond and creek needs to be carried out. This will be taken on in the coming years.
P-19	Incorporate dam maintenance into the CIP. This task should be coordinated with County efforts.	Dam/Levee Failure	High	Town Planning Director	Local	2018	Dam maintenance has not been incorporated into the CIP process, but the town will work do so going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-20	Revise Land Development Plan goals, objectives, and policies to address natural resource protection, hazard mitigation, and rail corridor protection.	All	High	Town Planning Director	Local	2019	Goals, objectives, and policies in the Land Development Plan have been revised to incorporate aspects of hazard mitigation and natural resource protection, but additional revisions would be useful to further improve the plan.
P-21	Continue to show improvement and maintain ISO audit ratings of building inspections and the fire department at the highest levels possible with available funding.	All	High	Town Planning Director	Local	2018	The building inspections and fire department have maintained high levels, but additional improvements may be implemented.
P-22	Promote use of freeboard for construction of projects adjacent to floodplain boundaries.	Flood	High	Town Planning Director	Local	2019	The town has promoted the use of freeboard in construction projects adjacent to floodplain boundaries, but this will require a proactive effort going forward.
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
PP-2	Seek funding to relocate the repetitively flooded Rescue building located downstream of the Aberdeen Lake Dam.	Flood	High	Town Planning Director	Local, Grants	2018	Funding to relocate the Rescue building has not been acquired, so this project will need to be pursued.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Identify any sewer manholes within floodprone areas that require flood proofing.	Flood	Moderate	Town Planning Director	Local	2016	The town has begun to build a list of floodprone sewer manholes, but needs to build on this list.
PP-4	Investigate the feasibility and cost of floodproofing manholes within floodprone areas.	Flood	Moderate	Town Planning Director	Local	2018	Once floodprone sewer manholes have been identified, the town will need to assess cost and feasibility of floodproofing.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.
NRP-2	Add ½ mile of greenway trail to serve as a buffer to Aberdeen Lake Park.	Flood	Moderate	Town Planning Director	Local	2016	The town is working to complete a project on adding a greenway trail buffer to Aberdeen Lake Park.
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
ES-15	Incorporate the Emergency Evacuation Limits of intermediate to high hazard dams onto maps in use in Town hall, Police, and Fire Departments. Notify all potentially affected property owners.	Dam/Levee Failure	Moderate	Town Planning Director	Local	2017	The town has worked on developing these maps and will need to take action to notify affected property owners of their risk.
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-11	Ensure adequate notification of parties potentially affected by revisions to floodplain boundaries as a result of NCDOT road improvement projects.	Flood	Moderate	Town Planning Director	Local	2019	The town has notified parties affected by revisions to floodplain boundaries and will work to continue to reach out to property owners as additional revisions are made in the future
PEA-12	Provide in-house training for Public Works administrators to ensure compliance of public infrastructure installation with the FDPO.	Flood	Low	Town Planning Director	Local	2016	The town has trained Public Works administrators on ensuring infrastructure is in compliance with FDPO. The town will continue to ensure adequate enforcement and planning in this respect going forward.
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Cameron Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Carthage Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Foxfire Village Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Pinebluff Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

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P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

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ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

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ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

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ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

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ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Village of Pinehurst Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.
	Designing a public awareness brochure.						Completed. Hard copy public awareness information is available at Village Hall; however, the web is currently utilized as the predominant means of communication. The Village is very proactive about providing comprehensive and current information relating to protection from natural and man-made hazards on their website.
	Updating the Village Pinehurst website.						Completed/Ongoing. This effort has been completed, and the website is updated on a regular basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Providing information on natural disasters in the Village's quarterly newsletter.						Completed/Ongoing. The Village produces this newsletter approximately one every three months. The newsletter contains seasonal information relating to protection from both natural and man-made hazards on an as needed/seasonal basis.
	Update Emergency Operations Plan.						Completed. The Village updates it Emergency Operations Plan on an annual basis to ensure that all procedures and processes are current and appropriate.
	Continue to update/amend the Pinehurst Development Ordinance.						Completed. A complete overhaul of the Pinehurst Development Ordinance was completed. The Village does, as a practice, update all development regulations on an as-needed basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
	Develop and implement a Stormwater Master Plan.						Completed/Ongoing. The Village has completed the development and implementation of their stormwater master plan. The Village maintains a listing of stormwater improvements that need to be completed, and completes 4 to 6 projects on an annual basis. The Village maintains a very effective stormwater management program, and will continue to do so through this update. The Village has also initiated a program to purchase lots in drainage ways to preclude development in floodprone areas and preserve greenspace.

Town of Robbins Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Southern Pines Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-12	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-13	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-17	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Taylortown Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Town of Vass Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-6	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-7	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-8	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-10	Moore County, as well as all participating jurisdictions, will consider joining the Community Rating System program. The initial step in achieving CRS status will be the request of a pre-audit assessment. Note: The Village of Whispering Pines is already a participant in the Community Rating System program.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The county and other participating jurisdictions are still considering joining the CRS program, but additional steps are required to become active in the program. The county will continue to evaluate the efficacy of participating.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Village of Whispering Pines Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Moore County Public Safety will work with NCEM to acquire grant funding that will be utilized to acquire and locate flood gauges strategically along watercourses impacting the County. The goal of this effort will be to provide the state and County with better information regarding riverine water levels.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	HMGP	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Seek funding possibilities

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-2	Subsequent to the establishment of additional stream gauges as noted above, Moore County Public Safety will convene a working group including all individuals charged with floodplain and dam management within the County. This working group will be charged with drafting a coordinated Dam Management Plan and Strategy.	Dam/Levee Failure	Moderate	Moore County Public Safety Department	Local	2018	Moore County has initiated discussions with the POA of Woodlake to work on the reduction of repetitive loss to properties in the eastern part of the County. We have worked directly with the National Weather Service in an effort to seek funding from them without success. NCEM has been involved in the process throughout in an effort to seek Disaster Mitigation funding as well. Create a GIS layer naming bodies of water >25 acres and define emergency contact for the dam operations. Create templates for downstream emergency notification process. Much work to be done. Hire experts to review stream flows, dam lock capacities, dam emergency action plans, blocking of primary roads by flooding affecting fire and EMS. Establish working groups. Establish dam management group and develop a plan to mitigate specific hazards.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-3	Moore County Planning and Inspections, with the assistance of all participating jurisdictions, will work towards the development of a vulnerability assessment to address the potential impacts of dam breaches throughout the County. This effort will aim to assess existing vulnerability, as well as mitigate future risk through informed planning efforts.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local, NC DENR	2015/2016	Continue dam assessments and mitigation actions. Each jurisdiction to identify potential dam breach locations within their jurisdictions and provide data to Moore County Planning. Update/Publish EAP Emergency Action Plan for each dam per NC RQs.
P-4	Moore County will consider the development of stormwater regulations aimed at reducing the downstream effects of future development.	Dam/Levee Failure	Low	Moore County Public Safety Department	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Moore Co. can develop a task committee to draft stormwater regulations that could be adopted/modified for each jurisdiction.
P-5	Moore County, as well as all participating jurisdictions, will continue to support implementation of NC State stormwater regulations.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the public water supply watershed provisions of the Zoning Ordinance as well as the new Watershed Overlay District provisions of the Moore County Unified Development Ordinance (2/18/2014). RQ'd by State Law.
P-6	The Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines will continue to enforce and maintain their local stormwater control ordinances.	Flood, Hurricane, Dam/Levee Failure	High	Administrative staff of the Village of Pinehurst, Town of Southern Pines, and the Village of Whispering Pines	Local	Deleted	Delete from Moore County actions as this is a jurisdiction-specific action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Moore County will address the issue of drainage and stormwater management solutions within the context of the County Comprehensive Plan update.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Addressed in 2013 Moore County Land Use Plan: Soils, Public Water Supply Watersheds, and Floodplain and Wetlands Policies. Continue to implement. Push these plan sections to jurisdictions as possible templates for their own plans.
P-8	Moore County, as well as all participating jurisdictions, will continue to enforce the NC State Building Code.	All	High	Moore County Office of Planning and Community Development	Local, NC DENR	2015, Annually	Actively enforcing the International Building Code with NC amendments. Required by law. Should be applied to dam structures, road culvert elevation. NCDENR must have more authority; stronger annual inspection.
P-9	The Moore County Planning and Inspections Department will continue to maintain and enforce the County's Flood Damage Prevention Ordinance. The County will continue to provide this service for all participating jurisdictions with the exception of: Aberdeen, Pinehurst, Southern Pines, and Pinebluff. These jurisdictions, as exhibited in their respective capability assessments, maintain the staff resources to carry out these efforts internally.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Moore County will consider the establishment of a comprehensive stormwater management ordinance.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	Continue stormwater regulation efforts to reduce development of flood hazard areas. Task committee to push the adoption of the ordinance based on the regulations from Strategy #17.
P-11	Moore County will work towards the development of a Comprehensive Plan Update. This update will address a variety of issues, including open space preservation, floodplain development, sustainable development, and mitigation.	All	High	Moore County Office of Planning and Community Development	Local	Completed	Combine with P-7
P-12	Moore County, as well as all participating jurisdictions, will continue to require elevation certificates for all development within a Special Flood Hazard Area (SFHA). All elevation certificates will be submitted on an official FEMA Elevation Certificate Form.	Flood, Hurricane, Dam/Levee Failure	High	Moore County Office of Planning and Community Development	Local	Completed	Continuous enforcement of the flood damage prevention provisions of the Flood Damage Prevention Ordinance as well as the new Flood Damage Prevention provisions of the Moore County Unified Development Ordinance (2/18/2014). These prevention measures are the most effective mitigation measures. FEMA RQ & NCB Code RQ

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Moore County Public Safety will work with all municipalities on the establishment of a County-wide pre-disaster debris management contract. This effort will improve the efficiency of post-disaster recovery. Additionally, this effort will streamline the process of securing reimbursement and grant funds following a disaster.	All	High	Moore County Public Safety Department	Local	2018	Process was begun with a project kick-off meeting and a thorough review, and creation of a draft Emergency Recovery Plan using Brunswick County NC as a model. Continue to consult with all municipalities and pursue funds, determine what funds are needed up front. Difficult for some to commit funds before a disaster. Push draft plan to adoption.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-14	Moore County will work closely with Hoke and Cumberland Counties to ensure that all growth and expansion of Pope Air Force Base and Fort Bragg are managed and that all associated hazards are minimized.	All, Man-made	High	Moore County Office of Planning and Community Development	Local	2015, Quarterly review	Moore County, as well as municipal planners, regularly attend quarterly RLUAC meetings, and maintained active participation in the Ft. Bragg Regional Aliiance's. Sustainable Growth Management Study project (Ph-1 &2). Additionally, Moore County closely coordinates the building permit process for tall buildings near Federal military installations per applicable NCGS. Moore County needs to coordinate with Hoke and Cumberland Counties to ensure that growth and expansion of Pope/Bragg do not adversely impact surrounding jurisdictions and minimize associated hazards. Allocate staff time & resources to attend RLUAC and Sandhills Conservation Partnership meetings on a quarterly basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-15	Moore County will consider the development of policy relating to the encroachment of development on the rail corridors traversing through County within the County's Comprehensive Plan Update. Participating jurisdictions impacted by rail corridors will also consider the adoption of such a policy initiative.	Man-made	Low	Moore County Office of Planning and Community Development, the administrative staffs of all participating jurisdictions	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Work to turn policy into regulations for participating jurisdictions. Moore Co. to reach out to jurisdictions to determine their interest.. A draft resolution could be provided that guides future policies.
P-16	Identify, map, and appraise repetitive loss properties and be prepared to purchase when HMPG funding is available.	Flood, Hurricane	High	Emergency Management, Planning	HMGP	2019	New action
Property Protection							
PP-1	Moore County will work with County residents on the application for Hazard Mitigation Assistance funding (HMA) for the elevation/floodproofing/acquisition/ relocation of repetitive loss properties.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local, HMA	2015-2016	Considering the pursuit of upcoming Hazard Mitigation Grant Funds in regard to a project in Vass. Each jurisdiction to identify repetitive loss properties and assist their residents with funding application.
Natural Resource Protection							
NRP-1	Moore County will work closely with all local land preservation efforts and programs. These efforts will focus on land acquisition within portions of the County that are vulnerable to natural hazards.	Flood, Hurricane, Dam/Levee Failure	Low	Moore County Office of Planning and Community Development	Local	2015/2016	The County's 2013 Land Use Plan Update has policies that further support this action item. Improve regulations that will mitigate risks that are based on adopted policies in the Land Use Plan. Moore Co. to reach out to jurisdictions to determine their interest. Involve Green Growth Toolbox.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
SP-1	Moore County will monitor all areas identified as local drainage "hot spots" within this plan and work towards drainage solutions where deemed feasible. The County acknowledges that not all drainage issues may be rectified; however, this plan establishes an inventory of drainage issues/concerns.	Flood, Hurricane, Dam/Levee Failure	Moderate	Moore County Office of Planning and Community Development	Local	2015, Annual review and update	The county will continue to monitor hot spot areas for drainage issues and try to develop solutions where possible. However, as mentioned, drainage solutions are prevalent and may not all be able to be managed in the immediate future.
SP-2	Continue to identify and map areas where roadways flood during heavy rain events. (Midland Rd. & US Hwy #1; May Street, Southern Pines). Plan out stormwater management projects with construction estimates and have "shovel-ready" to build when grant funds become available.	Flood, Hurricane	High	Emergency Management Departments, NCDOT	HMGP, EMPG	2017	New action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
ES-1	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local, NCEM	2015	Moore County Public Safety continually updates and improves its email group list of employees, partner agencies, emergency services providers and municipalities. Look for ways to improve the POC database for each jurisdiction. Create short hard hitting slide presentations for staff to use to educate residents and Boards as these would be helpful and used more often. Continue to refine distribution methods. Use social media, mobile apps, school administrators and principals & classrooms teachers.
ES-2	Moore County Public Safety will work to broaden efforts regarding the dissemination of information relating to natural and man-made hazard events. This effort will focus on forwarding information provided by NCEM to municipal staff members and elected officials.	All	High	Moore County Public Safety Department	Local	Deleted	Delete, same as ES-1

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Moore County Public Safety will continue to utilize the County's existing emergency notification system, and improve upon the accuracy and effectiveness of this system when feasible.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Switched to a new Emergency Notification Sysytem provider in FY 14 in an effort to improve citizen access to emergency information. Major work has been accomplished in terms of the website, facebook and twitter accounts regarding this issue. Build more templates to speed up notifications. Continue to refine distribution of information and methods.
ES-4	Moore County Public Safety will exercise the County's EOP once annually. All participating jurisdictions should attend and participate in this exercise.	All	High	Moore County Public Safety Department	Local	2015, Annually	Completed annually in conjunction with the LEPC. Increase other jurisdiction participation. Continue to complete annually.
ES-5	In the event of a substantial natural and/or man-made disaster situation, Moore County Public Safety will deliver a VIPER radio to the lead contact (as listed in the EOP) for each municipality.	All	High	Moore County Public Safety Department	Local	2015, After a disaster	Plan in place and radios reserved. The county has now totally transitioned to the VIPER radio system so there would be very few cases that this plan would even be needed due to the wide distribution of radios. Look for funds to place VIPER base stations at each municipality's EOC.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-6	The lead contact for all jurisdictions participating in this plan will acknowledge the importance of developing a strong functional understanding of the County EOP. Additionally, all participating jurisdictions shall provide support, as required, to implement the EOP.	All	High	Moore County Public Safety Department	Local	2015, Annually exercise EOP	We have continued a wide dissemination of information via the LEPC, MAC, and email distribution. Need to increase participation. Exercise EOP through testing sections w/ Co, municipality & State emergency resources annually. Continue to address/locate new hazardous situations (industry, rail), etc. and update plan regularly. Continue to request funding for EOP updates & exercises annually.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-7	Moore County Public Safety will work to improve upon the County's existing medically fragile population registry. This effort will require the cooperation and assistance of all participating jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Annually review and update	Developed policies, conducted training, and exercised the plan. Constructed an equipment trailer with medically fragile population related equipment. Started a very simple list of citizens to be included in our Special Needs Database. Have looked extensively for an economic database without success. Need to publicize the program after we find a solution to our database issue. Finalize and publicize. Expand the special needs database, create economic database, publicize program, track group homes and Sandhills Children center

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-8	Moore County Public Safety will work with local residents on the establishment of additional Community Emergency Response Teams (CERT). This effort will also address the ongoing training and support of the eleven teams currently operating within the County. The County will rely on grant funding for the training and equipment expense associated with establishing new CERT units.	All	High	Moore County Public Safety Department	Local	2017	No luck with advancing the CERT programs. Multiple CERT Teams have went inactive due to a variety of issues. The major issue is all training and no actual responses. While difficult to find participants and maintain interest when disasters strike - these teams are needed to build momentum for recovery. Develop strategy(s) to recruit CERT teams in each community. Conduct community outreach events during well attended community events - Tour-De-Moore, Holly Arts Festival, etc. make this a function of emergency management (County & Municipality)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-9	Moore County will continue to utilize the County's existing emergency notification system as a secondary line of communication to all residents and business owners regarding natural and man-made hazard events. County residents should not rely on this system in taking preparedness measures. The first line of communication should come through a NOAA weather radio system.	All	Moderate	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	We continually enforce the same message in all of our community presentations and press releases. NOAA Weather Radios are the first line of communications and the Emergency Notification System is the 2nd, with Media Outlets to follow. Education efforts must continue to inform people of how to obtain these radios. (RadioShack) Make bi-annual PSAs through social media, Co/Town websites, local media outlets. Test emergency notification system quarterly & work with CVB, Chamber to notify business owners. Make connection w/ Aberdeen's notification system if not done already.
ES-10	All participating jurisdictions shall subsidize the County's efforts to provide advance notification regarding natural and man-made hazard events. This effort should involve the use of first responders employed by each of the municipal jurisdictions.	All	High	Moore County Public Safety Department	Local	2015, Utilize in advance of disaster event	Sharing of very specific weather forecast and predictions via our email distribution list in advance of storms. Connect with Aberdeen's notification system if not already done. Harold Watts, Asst. Public Works Dir.)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-11	Moore County Public Safety will publish and disseminate evacuation information as soon as possible through media outlets defined in the County Emergency Operations Plan.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Annual updates and testing of the Media Distribution List have been completed. Continue to develop and test new/alternate methods of info dissemination. Hamm radio, social media, mobile apps.
ES-12	Moore County Public Safety will work closely with the American Red Cross to ensure that adequate shelter facilities are available to address all hazards identified within this plan. This effort will involve securing an alternate power source for all shelter facilities. This will be achieved either through an ongoing memorandum of understanding with NCEM or acquisition. Additionally, the County will aim to install transfer switches at all shelter facilities. The County acknowledges that this effort will require grant assistance.	All	High	Moore County Public Safety Department	Local, Red Cross, NCEM	2015, Annual review and update	Plans updated annually and functional exercies completed. One large mobile generator and transfer switches for each facility have been purchased via a grant. Improve community awareness of shelter locations in advance of a disaster, locate a shelter in every community.
ES-13	Moore County Public Safety currently provides one pet-friendly shelter, which is located at Southern Middle School. The County will work to establish additional pet-friendly shelters to serve other portions of the County.	All	Low	Moore County Public Safety Department	Local	2015/2016	No work has been completed on this project at this time. Continue, but retain as a low priority. Identify location for shelter, calculate funding resources to implement by Q4 2017. Work w/ local animal advocacy groups for volunteer base.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-14	Purchase and install generators on one of more water wells for small water systems (e.g. Foxfire Village); and/or purchase and install transfer switches to allow for fast hook-up of emergency generators, particularly for water wells.	Tornado, Hurricane, Winter Storm	High	Moore County Emergency Management, Public Utilities	HMGP	2017	New action
Public Education and Awareness							
PEA-1	Moore County will hold a minimum of two public outreach symposiums annually. The focus of these symposiums will be on providing county residents and business owners with information relating to emergency preparedness and response.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Done in conjunction with the Moore County Department of Aging, other partner agencies, and civic organizations throughout the county. Hold bi-annually, and allocate staff time/resources.
PEA-2	Moore County will conduct outreach activities aimed at educating business owners about addressing the issue of continuity of operations in the face of natural and man-made disasters. Following a disaster, the reopening of commercial operations is critical to recovery efforts.	All	High	Moore County Public Safety Department	Local	2015, Annual review and update	Reviewed plans and made suggestions to multiple business continuity of operations plans throughout the cycle. Continue to educate business owners. Push out to municipalities. Continue outreach activities in cooperation with partners.
PEA-3	Moore County Public Safety with the assistance of the MAC will develop a public service campaign focused on stressing the importance of maintaining a National Oceanic and Atmospheric Administration (NOAA) weather radio within all homes and businesses.	All	High	Moore County Public Safety Department	Local	2015, Bi-annually	Completed during the NC Severe Weather Awareness campaign. Information has also been added to all of our community presentations. Do PSAs bi-annually. Seek grant funding opps. To provide low income at risk citizens w/ NOAA radios.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Moore County will work to establish the MAC as a function of the Local Emergency Planning Committee (LEPC). Under this scenario, the MAC will meet quarterly.	All	High	Moore County Public Safety Department	Local	2015, Quarterly	Established, meeting mostly on a quarterly basis since plan adoption. Increase participation. Allocate staff time and resources to attend meetings and work on committee objectives as a part of normal job duties.
PEA-5	Members of the MAC will report all implementation progress regarding the Mitigation Plan to their respective elected bodies through established standard reporting mechanisms.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	Individual reports at each MAC meeting. Include progress reports atleast annually and make hazard mitigation implementation a part of annual department work plans & budgetting efforts municipalities to collaborate with County and regional entities/stakeholders.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	The MAC member representing each participating jurisdiction will ensure that mitigation issues and programs are addressed annually within the context of budget discussions. Programs and/or project identified through this plan, or quarterly MAC meetings, may require local contributions. In order to ensure that necessary funding is available, mitigation issues should be addressed by all participating jurisdictions as deemed necessary.	All	High	Moore County Public Safety Department, Moore County Office of Planning and Community Development	Local	2015, Annually	All MAC and LEPC reports, meeting minutes, etc get sent to the Board of Commissioners. Public Safety continually looks for grants to fund mitigation projects such as the generator and transfer switch projects that we have recently completed. Increase participation from other jurisdictions; realize scarcity of funds in some jurisdictions is the biggest determining factor. Each municipality should develop a plan that follows the County's lead (advise elected body, and research & acquire grants)
PEA-7	Moore County Public Safety will establish an annual calendar of events outlining the dates of all emergency management, public safety, and mitigation functions and programs. This calendar will be disseminated to all elected officials and posted on the County's website.	All	High	Moore County Public Safety Department	Local	Completed	We choose to not reinvent the wheel and to use the NC Training / Exercise Registration Management (TERMS) system. The link as well as multiple educational and exercise offerings has been sent out to all partner agencies, municipalities, etc. Continue to send information from TERMS of available classes. Push information out to all jurisdictions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	The Moore County Office of Public Safety will work to ensure that County residents are prepared for the potential effects of an incident at the Shearon Harris Nuclear Facility located near Holly Springs, NC.	Man-made, Nuclear	High	Moore County Public Safety Department	Local	Completed	Moore County Public Safety staff as well as other partner agencies participated in specific training classes for IPZ counties and participated in the state-wide exercise in the spring of 2013. Continue education and safety exercises. Continue annual emergency response plans as well as recovery plans - include agricultural land owner/operators to mitigate potential agricultural losses. Push out to municiplaities to educate and encourage local adoption.
PEA-9	Improve mapping and communication to property owners regarding the downstream flooding potential hazards from a dam breach and floodplains. Obtain and Catalog all dam emergency action plans and store at Public Safety Departments.	Flood, Hurricane	High	Moore County Emergency Management, NCDENR Dam Safety	HMGP, EMPG	2017	New action
PEA-10	Identify and map areas of urbanized areas adjacent to rural lands that are at risk of wildfire. Conduct outreach efforts to rural land owners to enroll in State and Federal land management programs to reduce wildfire risks.	Wildfire	Moderate	Emergency Management, Planning, Soil and Water Conservation District Offices, Cooperative Extension	WHIP/EQIP Grants, EMPG	2019	New action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Previously Completed Mitigation Actions							
	Use GIS to identify all undeveloped parcels located within the floodplain.						Completed. This task has been completed, and the data has been included in this update.
	Use GIS technology to identify structures located in the floodplain.						Completed. This task has been completed, and the information is presented within this update.
	Appoint an individual to provide information for upgrading the emergency services website.						Completed. Moore County revised its website. This effort involved the update of all departmental information including emergency management.

Appendix A
Plan Adoption

This appendix includes the local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This appendix includes the following:

1. Blank Public Participation Survey
2. GIS Data Inventory Sheet
3. Scoring Criteria for Capability Assessment
4. Blank Mitigation Action Worksheet

PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING

We need your help!

The Counties of Chatham, Harnett, Johnston, Lee, and Moore are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

The Counties, along with participating local jurisdictions and other participating partners, are now working to prepare a multi-jurisdictional *Hazard Mitigation Plan*. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional *Hazard Mitigation Plan* for the five-county region.

This survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

Please help us by completing this survey by August 31, 2014 and returning it to:

Sara Reynolds, Atkins
1616 E Millbrook Road, Suite 310
Raleigh, NC 27609

Surveys can also be faxed to: (919) 876-6848 or emailed to sara.reynolds@atkinsglobal.com

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *Cape Fear Regional Hazard Mitigation Plan*, please contact Atkins, planning consultant for the project. You may reach Nathan Slaughter (Atkins) at 919-431-5251 or by email at nathan.slaughter@atkinsglobal.com.

1. Where do you live?

- ❑ Unincorporated Chatham County
- ❑ Unincorporated Harnett County
- ❑ Unincorporated Johnston County
- ❑ Unincorporated Lee County
- ❑ Unincorporated Moore County
- ❑ Aberdeen
- ❑ Angier
- ❑ Archer Lodge
- ❑ Benson
- ❑ Broadway
- ❑ Cameron
- ❑ Carthage
- ❑ Clayton
- ❑ Coats
- ❑ Dunn
- ❑ Erwin
- ❑ Four Oaks
- ❑ Foxfire Village
- ❑ Goldston
- ❑ Kenly
- ❑ Lillington
- ❑ Micro
- ❑ Pinebluff
- ❑ Pinehurst
- ❑ Pine Level
- ❑ Pittsboro
- ❑ Princeton
- ❑ Robbins
- ❑ Sanford
- ❑ Selma
- ❑ Siler City
- ❑ Smithfield
- ❑ Southern Pines
- ❑ Taylortown
- ❑ Vass
- ❑ Whispering Pines
- ❑ Wilson's Mills
- ❑ Other: _____

2. Have you ever experienced or been impacted by a disaster?

- ❑ Yes
- ❑ No

a. If "Yes," please explain:

3. How concerned are you about the possibility of our community being impacted by a disaster?

- ❑ Extremely concerned
- ❑ Somewhat concerned
- ❑ Not concerned

4. Please select the <u>one</u> hazard you think is the *highest threat* to your neighborhood:

- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Extreme Heat
- ❑ Earthquake
- ❑ Erosion
- ❑ Flood
- ❑ Hailstorm
- ❑ Hazardous Materials Incident
- ❑ Hurricane / Tropical Storm
- ❑ Land Subsidence / Sink Hole
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter Storm / Freeze
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildfire

5. Please select the <u>one</u> hazard you think is the *second highest threat* to your neighborhood:

- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Extreme Heat
- ❑ Earthquake
- ❑ Erosion
- ❑ Flood
- ❑ Hailstorm
- ❑ Hazardous Materials Incident
- ❑ Hurricane / Tropical Storm
- ❑ Land Subsidence / Sink Hole
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter Storm / Freeze
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildfire

6. Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

- ❑ Yes (please explain): _____
- ❑ No

7. Is your home located in a floodplain?

- ❑ Yes
- ❑ No
- ❑ I don't know

8. Do you have flood insurance?

- ❑ Yes
- ❑ No
- ❑ I don't know

a. If "No," why not?

- ❑ Not located in floodplain
- ❑ Too expensive
- ❑ Not necessary because it never floods
- ❑ Not necessary because I'm elevated or otherwise protected
- ❑ Never really considered it
- ❑ Other (please explain): _____

9. Have you taken any actions to make your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

a. If "Yes," please explain:

10. Are you interested in making your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

11. Do you know what office to contact regarding reducing your risks to hazards in your area?

- ❑ Yes
- ❑ No

12. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

- ❑ Newspaper
- ❑ Television
- ❑ Radio
- ❑ Internet
- ❑ Mail
- ❑ Public workshops/meetings
- ❑ School meetings
- ❑ Other (please explain): _____

13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.

Category	Very Important	Somewhat Important	Not Important
1. Prevention Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.	❑	❑	❑
2. Property Protection Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.	❑	❑	❑
3. Natural Resource Protection Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.	❑	❑	❑
4. Structural Projects Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls, and storm sewers.	❑	❑	❑
5. Emergency Services Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.	❑	❑	❑
6. Public Education and Awareness Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.	❑	❑	❑

THANK YOU FOR YOUR PARTICIPATION!

This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):

Name: _____

Address: _____

_____

Phone: _____ **E-Mail:** _____

GIS Data Request Sheet
Cape Fear Regional Hazard Mitigation Plan

Data requested	Available?	Received?	Potential Sources
Tax Parcel Data			Tax Assessor
including replacement value			
Building Footprints			Tax Assessor/GIS office
Critical Facilities (in GIS or list form with addresses)			Tax Assessor/GIS office
examples include:			
government buildings			
hospitals			
senior care			
police/fire/EMS/EOC			
locally significant buildings			
schools			
Local hazard studies			public works, natural resources, planning
examples include:			
Flood Studies (HEC-RAS, Risk MAP)			
Local Hazard History Articles			
Areas of Concern Studies			

If you have any questions, please contact:

Nathan Slaughter
nathan.slaughter@atkinsglobal.com
919-431-5251

Points System for Capability Ranking

0-19 points = Limited overall capability
20-39 points = Moderate overall capability
40-68 points = High overall capability

I. Planning and Regulatory Capability
(Up to 43 points)

Yes = 3 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- National Flood Insurance Program
- NFIP Community Rating System

Yes = 2 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Open Space Management Plan / Parks & Recreation Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point
No = 0 points

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

II. Administrative and Technical Capability
(Up to 15 points)

Yes = 2 points
Service provided by County = 1 point
No = 0 points

- 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
- Emergency manager
- Floodplain manager

Yes = 1 point
No = 0 points

- 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 Geographical Information Systems (GIS) and/or Hazus
- Resource development staff or grant writers

III. Fiscal Capability
(Up to 10 points)

Yes = 1 point
No = 0 points

- Capital Improvement Programming
- Community Development Block Grants (CDBG)
- Special Purpose Taxes (or tax districts)
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation / Revenue / Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

MITIGATION ACTION WORKSHEETS

Mitigation Action Worksheets are used to identify potential hazard mitigation actions that participating jurisdictions in Chatham, Harnett, Johnston, Lee, and Moore Counties will consider to reduce the negative impacts of identified hazards. The worksheets provide a simple yet effective method of organizing potential actions in a user-friendly manner that can easily be incorporated into the Region's Hazard Mitigation Plan.

The worksheets are to be used as part of a strategic planning process and are designed to be:

a.) completed electronically (worksheets and instructions will be e-mailed to members of the Hazard Mitigation Planning Team following the Mitigation Strategy Workshop);
b.) reviewed with your department/organization for further consideration; and
c.) returned according to the contact information provided below.

Please return all completed worksheets to:

Nathan Slaughter, Project Manager Atkins

Electronic copies may be e-mailed to: nathan.slaughter@atkinsglobal.com

Hard copies may be faxed to: 919-876-6848 (Attn: Nathan Slaughter)

INSTRUCTIONS

Each mitigation action should be considered to be a separate local project, policy or program and each individual action should be entered into a separate worksheet. By identifying the implementation requirements for each action, the worksheets will help lay the framework for engaging in distinct actions that will help reduce the community's overall vulnerability and risk. Detailed explanations on how to complete the worksheet are provided below.

Proposed Action: Identify a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.

Site and Location: Provide details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be citywide, countywide or regional, etc.

History of Damages: Provide a brief history of any known damages as it relates to the proposed action and the hazard(s) being addressed. For example, the proposed elevation of a repetitive loss property should include an overview of the number of times the structure has flooded, total dollar amount of damages if available, etc.

Hazard(s) Addressed: List the hazard(s) the proposed action is designed to mitigate against.

Category: Indicate the most appropriate category for the proposed action as discussed during the Mitigation Strategy Workshop (Prevention; Property Protection; Natural Resource Protection; Structural Projects; Emergency Services; Public Education and Awareness).

Priority: Indicate whether the action is a "high" priority, "moderate" priority or "low" priority based generally on the following criteria:

1. Effect on overall risk to life and property
2. Ease of implementation / technical feasibility
3. Project costs versus benefits
4. Political and community support
5. Funding availability

Estimated Cost: If applicable, indicate what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined. Some actions (such as ordinance revisions) may only cost "local staff time" and should be noted so.

Potential Funding Sources: If applicable, indicate how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, a cost-sharing federal or state grant program, etc.

Lead Agency/Department Responsible: Identify the local agency, department or organization that is best suited to implement the proposed action.

Implementation Schedule: Indicate when the action will begin and when the action is expected to be completed. Remember that some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

Comments: This space is provided for any additional information or details that may not be captured under the previous headings.

MITIGATION ACTION	
Proposed Action:	
BACKGROUND INFORMATION	
Site and Location:	
History of Damages:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	
Category:	
Priority (High, Moderate, Low):	
Estimated Cost:	
Potential Funding Sources:	
Lead Agency/Department Responsible:	
Implementation Schedule:	

COMMENTS

Appendix C
Local Mitigation Plan Review Tool

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: Cape Fear Region (Chatham, Harnett, Johnston, Lee, and Moore Counties)	**Title of Plan:** Cape Fear Regional Hazard Mitigation Plan	**Date of Plan:** January 2015
Local Point of Contact: D. Scot Brooks	**Address:** 302 South McNeill St Carthage, NC 28327	
Title: Deputy Director of Public Safety		
Agency: Moore County Public Safety		
Phone Number: 910-947-6317 x4353	**E-Mail:** sbrooks@moorecountync.gov	

State Reviewer:	**Title:**	**Date:**
QUINN WOOLARD	MITIGATION PLANNER	09 JUN 2015

FEMA Reviewer:	**Title:**	**Date:**
Lillian Huffman	Program analyst	November 12, 2015 (Revisions reviewed 12/9/15)
Linda L. Byers (QC)	RIV Sr. Lead Planning Specialist	November 25, 2015
Date Received in FEMA Region IV	June 30, 2015	
Plan Not Approved	November 25, 2015	
Plan Approvable Pending Adoption	December 9, 2015	
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**	**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 1.3; Section 2; App. D **Pages 8:2-8:3**	X	
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 2.4-2.7; App. D **Pages 2:6-2:7**	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.6-2.7; App. B; App. D **Pages 2:16**	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 7.3; Jurisdiction-specific annexes (X.4) **Pages 4:7-4:23, 7:3**	X	
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 10.4 **Page 9:31, 9:38, 9:108, 10:7**	X	
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 10.3 **Pages 10:4-10:5**	X	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	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; Section 5; Jurisdiction-specific annexes (X.2) **Pages 2:11-2:13, 4:8-4:23, 5:4-5:73**	X	
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 5; Jurisdiction-specific annexes (X.2) **Pages 2:11-2:13, 4:8-4:23, 5:5-5:73**	X	
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 5; Section 6; Jurisdiction-specific annexes (X.2 and X.3) **Pages 5:5-5:73, 6:15-6:70**	X	
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 5.15.5; Jurisdiction-specific annexes (X.2.13) **Pp. 5:52-5:53**	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
ELEMENT B: REQUIRED REVISIONS **Element B1 – Flooding Extent**: Element B1 requires that the Plan include a description of the type, location, and **extent** of all natural hazards that can affect **each** jurisdiction. The Local Mitigation Plan Review Guide (page 19) clarifies that extent means the strength or magnitude of the hazard. • **Flooding Extent**: Flooding extent was provided for each jurisdiction using nearby stream gauges. However the maximum stream gauge height was provided without any reference to what height was normal and what height indicates flood stage. **Required revisions: provide information to clarify the magnitude of flooding that the provided gauge heights represent.** Local newspapers, National Climatic Data Center event details, FEMA Flood Insurance Studies, or local officials and citizens can also be consulted about the depth of past flooding events to meet the extent requirement. *(For additional information, please see the "Local Mitigation Plan Review Guide", Element B , Hazard Identification and Risk Assessment, dated October 1, 2011, Pages 19-20 and Tasks 5 of the Local Mitigation Plan Handbook dated March 2013, page 5.3)* **Element B1 – Flood Extent: "Gage height" was re-worded to "crest height". The stream gages measure the crest height of the respective river at that particular point. In general conversation gage height is interchangeable with crest height per several Professional Engineers who specialize in Hydrology.** ***Revisions maybe found on pages 5:68 – 5:70 of the Cape Fear Regional Hazard Mitigation Plan.*** **Revisions Received:** The Cape Fear Regional Hazard Mitigation Plan has been updated to clarify the magnitude/extent of flooding indicated by the provided river gauge heights. **This Element is now met.**			
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 7; Jurisdiction-specific annexes (X.4) **Pages 7:1-7:18**	X	
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 5.15.4; Section 7.3.4; Jurisdiction-specific annexes (X.2.13 and X.4.1) **Pages 5:51-5:52; 7:9-7:10 and Section 9 pages: 6,16-17, 24, 36, 39, 42, 44, 47, 49, 53, 57, 61, 63-64, 66, 70, 73, 75, 77, 78, 83, 88, 93, 95-97, 100, 117, 139, 160, 181, 202, 223, 246, 267, 288, 309, 330**	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 8.2; Jurisdiction-specific annexes (X.5.1) **Pages 8:3-8:4**	X	
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 8.3-8.4; Section 9.2; Jurisdiction-specific annexes (X.5.2) **Pages 9:4-9:346**	X	
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 8.1.1; Section 9.2; Jurisdiction-specific annexes (X.5.2) **Pages 8:2-3, 9:4-9:346, 10:3-10:4**	X	
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 7.3.1 (Table 7.1); Section 10.1-10.2; Jurisdiction-specific annexes (X.4.1) **Pages 10:3-10:4**	X	

ELEMENT C: REQUIRED REVISIONS

Element C4 – Mitigation Actions: Element C4 requires that each jurisdiction participating in the plan must have mitigation actions specific to that jurisdiction. The towns of Goldston and Pittsboro have an exact copy of their county's mitigation actions. The towns can meet this requirement by assigning partial responsibility to their local officials or by including their role in either the action description or the implementation status.

(For additional information, please see the "Local Mitigation Plan Review Guide", Element C , Mitigation Strategy, dated October 1, 2011, Page 24 and Tasks 6 of the Local Mitigation Plan Handbook dated March 2013, page 6:7)

Element C4: The mitigation actions for the Towns of Goldston and Pittsboro have been updated to reflect the respective town's department who will be responsible for implementing the actions in conjunction with the County. *Revisions may be found on pages 9:16 – 9:21 of the Cape Fear Regional Hazard Mitigation Plan.*

Revisions Received: The Cape Fear Regional Hazard Mitigation Plan has been updated to include mitigation actions that are specific to the jurisdictions of Goldston and Pittsboro. **This Element is now met.**

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
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 6.4.3 **Pages 6:12-6:14**	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 2.8; Section 8.5; Section 9.2; Jurisdiction-specific annexes (X.5.2) **Pages 9:4-9:346**	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 5.21 (Table 5.38); Section 9.2; Jurisdiction-specific annexes (X.2.19 and X.5.2; Table X.32) **Pages 8:2-8:4**	X	
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))	App. A		X
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	App. A		X
ELEMENT E: REQUIRED REVISIONS **E1 & E2** - None of the participating jurisdictions have provided documentation of adopting the Updated Plan. This requirement cannot be scored as met until documentation has been submitted. **Required Revisions:** • **The plan must include documentation of plan adoption, usually a resolution by the governing body or other authority.** • **If adopted after FEMA review, adoption must take place within one calendar year of receipt of FEMA's "Approvable Pending Adoption".** • **Each jurisdiction that is included in the plan must have its governing body adopt the plan, even when a regional agency has the authority to prepare such plans.** *(Additional information can be found in the "Local Mitigation Plan Review Guide", Element E: Plan Adoption, dated October 1, 2011, Pages 28-29. Also see the Local Mitigation Plan Handbook dated March 2013, Task 8.)*			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or	Met	Not Met
F1.			
F2.			
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

Strengths – Planning Team: The Cape Fear Regional Hazard Mitigation Planning Team not only included staff from a broad spectrum of local government departments and agencies but also included a wide variety of stakeholders from regional and state agencies as well as non-profit groups and the private sector, including utilities. This combination of experience provides the planning team with a broad range of viewpoints and expertise on a wide variety of hazard mitigation issues.

Strengths – Planning Process: The Planning Team decided to hold additional meetings in each participating county to ensure that municipalities and other stakeholders had good opportunity for involvement.

Strengths – Public Participation: There was strong public participation in the survey. In particular, the Towns of Benson and Clayton in Johnston County had a high percentage of their population responding. In the future, the Planning Team may wish to include more detail in Appendix D concerning answers to the open-ended survey questions to better document the specifics of the public input and how it was considered in the plan development.

Strengths – Continued Public Participation: Several of the jurisdictions included specific mitigation actions to hold community events that will not only educate the public on mitigation activities but will also provide an opportunity for the public to express their observations, ideas, and priorities. These community events include an annual open house in Harnett County and a bi-annual public outreach symposium in Moore County. The Town of Coats regularly holds semi-annual town meetings designed to push out mitigation strategies and seek input from residents.

Element B: Hazard Identification and Risk Assessment

Strengths - The plan did a good job of explaining the methodology used to evaluate potential dollar losses to the region for the wide variety of hazards. Dollar losses provide one means of comparing diverse hazards to help determine which present the greatest risk to the region. Hazus-HM software was used to model the region's risk from hurricane winds and earthquakes. These are two hazards that are difficult to analyze with historic information due to the long return period between events, and it is helpful to use modeling to get a grasp of their potential impacts on the county. By estimating annualized losses for these and the other hazards, a good perspective was achieved on the relative risk that the communities face from the different hazards. In addition, the use of GIS to estimate the value of buildings in the 1% and 2% annual chance floodplain helps communities assess the

need for flood mitigation actions even when there has been no recent flooding. The Priority Risk Index provided a good summary of the relative risk that the region faces from different hazards based on additional criteria.

Element C: Mitigation Strategy

Strengths – Participants in the Cape Fear Regional Mitigation Plan have developed Mitigation Action Plans with a broad range of planning, regulatory, and public information initiatives. Many jurisdictions have also selected specific structure and infrastructure projects to work on, while others plan to use their inspection process to identify new projects for implementation.
Opportunities for Improvement – Other jurisdictions may wish to incorporate specific structure, and infrastructure projects into their plan, which may lead to future opportunities for funding and implementation. The Local Mitigation Planning Handbook discusses the development of mitigation actions on pages 6-3 – 6-6.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

The participating jurisdictions provided thoughtful updates in the implementation status section of their Mitigation Action Plan. The updates showed incremental progress toward completion of the actions and often discussed the continuation of or follow-up to completed actions. Communities that had not made progress with their Mitigation Action Plan were frank concerning the reasons and their future efforts. These detailed updates will help future Planning Team members understand the history of the plan and help interested citizens understand what their local government is doing on their behalf.

B. Resources for Implementing Your Approved Plan

Mitigation Planning Toolkit
This is an extensive web based tool to assist States, Local, and Tribal Communities involved in Hazard Mitigation Plan Development and Updates. The content will help guide the direction of plan development and required updates.
http://www.fema.gov/library/viewRecord.do?id=5580

Local Mitigation Planning Handbook
This Handbook provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements under the Code of Federal Regulations (CFR) Title 44 – Emergency Management and Assistance §201.6.
Use the Local Plan Guide and Handbook in tandem to understand technical requirements
http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=7209

Integrating Mitigation Strategies with Local Planning
This resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns.
http://www.fema.gov/library/viewRecord.do?id=7130

Mitigation Ideas
Communities can use this resource to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters.
http://www.fema.gov/media-library/assets/documents/30627

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	**CHATHAM COUNTY**	**COUNTY**					Y	Y	Y	Y		
2	Goldston	Town					Y	Y	Y	Y		
3	Pittsboro	Town					Y	Y	Y	Y		
4	Siler City	Town					Y	Y	Y	Y		
5	**HARNETT COUNTY**	**COUNTY**					Y	Y	Y	Y		
6	Angier	Town					Y	Y	Y	Y		
7	Coats	Town					Y	Y	Y	Y		
8	Dunn	City					Y	Y	Y	Y		
9	Erwin	Town					Y	Y	Y	Y		

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	Lillington	City					Y	Y	Y	Y		
11	**JOHNSTON COUNTY**	**COUNTY**					Y	Y	Y	Y		
12	Archer Lodge	Town					Y	Y	Y	Y		
13	Benson	Town					Y	Y	Y	Y		
14	Clayton	Town					Y	Y	Y	Y		
15	Four Oaks	Town					Y	Y	Y	Y		
16	Kenly	Town					Y	Y	Y	Y		
17	Micro	Town					Y	Y	Y	Y		
18	Pine Level	Town					Y	Y	Y	Y		
19	Princeton	Town					Y	Y	Y	Y		
20	Selma	Town					Y	Y	Y	Y		
21	Smithfield	Town					Y	Y	Y	Y		
22	Wilson's Mills	Town					Y	Y	Y	Y		
23												

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	**LEE COUNTY**	**COUNTY**					Y	Y	Y	Y		
25	Broadway	Town					Y	Y	Y	Y		
26	Sanford	City					Y	Y	Y	Y		
27	**MOORE COUNTY**	**COUNTY**					Y	Y	Y	Y		
28	Aberdeen	Town					Y	Y	Y	Y		
29	Cameron	Town					Y	Y	Y	Y		
30	Carthage	Town					Y	Y	Y	Y		
31	Foxfire Village	Village					Y	Y	Y	Y		
32	Pinebluff	Town					Y	Y	Y	Y		
33	Pinehurst	Village					Y	Y	Y	Y		
34	Robbins	Town					Y	Y	Y	Y		
35	Southern Pines	Town					Y	Y	Y	Y		
	Taylortown	Town					Y	Y	Y	Y		
36	Vass	Town					Y	Y	Y	Y		

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
37	Whispering PInes	Village					Y	Y	Y	Y		

Appendix D
Planning Process Documentation

This appendix includes:

1. Meeting Agendas
2. Meeting Minutes
3. Meeting Sign-In Sheets
4. Public Survey Summary Results

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Kickoff Meeting

March 20, 2014
10:00AM-12:00PM
Lee County Emergency Operations Center
204 W. Courtland Drive, Sanford, NC 27330

1) **Introductions**

2) **Overview of Mitigation**
   a) **Ice Breaker Exercise**

3) **Project Overview**
   a) **Key Objectives**
   b) **Project Tasks**
   c) **Project Schedule**
   d) **Project Staffing**

4) **Data Collection**

5) **Roles & Responsibilities**

6) **Next Steps**

7) **Questions, Issues, or Concerns**

ATKINS

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting
April 17, 2014
10:00AM-12:00PM

1) **Introductions**

2) **Recap – What We're Doing Today**

3) **Risk Assessment Findings**
   a) Hazard History and Profiles
   b) Conclusions on Risk: PRI

4) **Capability Assessment Findings**
   a) Indicators
   b) Results

5) **Next Steps**
   a) Mitigation Actions
   b) Continue public outreach

6) **Questions, Issues, or Concerns**

ATKINS

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team
Mitigation Strategy Meeting
May 8, 2014
10:00AM-12:00PM

1) **Introductions**

2) **Mitigation Overview**

3) **Project Schedule**

4) **Brief Overview of Risk Assessment**

5) **Brief Overview of Capability Assessment**

6) **Mitigation Strategy**

7) **Next Steps**

ATKINS

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team
Mitigation Strategy Meeting
May 22, 2014
10:00AM-12:00PM

1) **Introductions**

2) **Mitigation Overview**

3) **Project Schedule**

4) **Brief Overview of Risk Assessment**

5) **Brief Overview of Capability Assessment**

6) **Mitigation Strategy**

7) **Next Steps**

ATKINS

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

June 17, 2014
10:00AM-12:00PM

1) **Introductions**

2) **Overview of Mitigation**

3) **Project Overview**
   a) **Key Objectives**
   b) **Project Tasks**
   c) **Project Schedule**
   d) **Project Staffing**

4) **Data Collection**

5) **Roles & Responsibilities**

6) **Next Steps**

7) **Questions, Issues, or Concerns**

ATKINS

AGENDA

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team
Johnston County Meeting
July 16, 2014
10:00AM-12:00PM

1) **Introductions**

2) **Mitigation Overview**

3) **Project Schedule**

4) **Brief Overview of Risk Assessment**

5) **Brief Overview of Capability Assessment**

6) **Mitigation Strategy**

7) **Public Survey Results**

8) **Next Steps**

ATKINS

March 20, 2014
First Regional Hazard Mitigation Team Meeting – Sanford, NC

Mr. Slaughter, Project Manager from Atkins, led the meeting of the Regional Hazard Mitigation Team and began by having attendees introduce themselves. The 22 attendees included representatives from various departments and local jurisdictions within each of the four counties[1] participating in the plan update. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, presentation slides, GIS data inventory, and Public Participation Survey). He then defined mitigation and gave an overview of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

Following the overview, Mr. Slaughter led the group in an "icebreaker" exercise to introduce meeting participants to various mitigation techniques. He briefly explained the six different categories of mitigation techniques: emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection. Each attendee was then given $20 in mock currency and asked to "spend" their mitigation money as they personally deemed appropriate among the six mitigation categories. Money was "spent" by placing it in cups labeled with each of the mitigation techniques. Upon completion of the exercise, Mr. Slaughter stated that the results would be tabulated and shared with the group at the next meeting.

Following the icebreaker exercise, Mr. Slaughter reviewed the key objectives of the project which are to:

- Merge the four County plans into one regional plan;
- Complete update of existing plans to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions; and
- Maintain compliance with State and Federal requirements.

Mr. Slaughter discussed the expiration dates for each County's existing plan and presented a list of all the participating jurisdictions. He confirmed the list of participating jurisdictions with the meeting attendees. Mr. Slaughter then explained the mitigation planning process and specific tasks to be accomplished for this project, including the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan and plan maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point person to coordinate the gathering of GIS data required for the analysis. The project schedule was presented and Mr. Slaughter noted that the nine-month schedule provided ample time to produce a quality plan and meet state and federal deadlines.

The project staffing chart was presented to demonstrate the number of experienced individuals that will be working on this project. Mr. Slaughter then reviewed the roles and responsibilities of Atkins, the County's leads, the participating jurisdictions and other stakeholders. The presentation concluded with a discussion of the next steps to be taken in the project development. He encouraged meeting participants to distribute the Public Participation Survey. An online version of the public survey was also

1 At the time of the first meeting, only four counties were participating in the regional plan. Johnston County was integrated into the plan part way into the planning process, but all necessary integration took place to ensure the county was a full participant in the plan.

made available and each jurisdiction was encouraged to make the link to the survey available on their local websites.

Mr. Slaughter stated that the next Regional Hazard Mitigation Planning Committee meeting would be scheduled for April of 2014 to discuss the findings of the risk and capability assessments and begin proposing mitigation actions. Mr. Slaughter asked each County to review their existing mitigation actions in preparation for the next meeting.

April 17, 2014
Mitigation Strategy Meeting – Pittsboro, NC

Mr. Slaughter initiated the meeting with a review of the meeting handouts, which included an agenda, presentation slides. Mr. Slaughter reviewed the project schedule and stated that a draft of the Hazard Mitigation Plan would be presented to the Regional Hazard Mitigation Team in December.

Ryan Wiedenman with Atkins then presented the findings of the risk assessment. He reviewed the Presidential Disaster Declarations that have impacted the region. He then explained the process for preparing Hazard Profiles and discussed how each hazard falls into one of four basic categories: Atmospheric, Hydrologic, Geologic, and Other. He indicated that each hazard must be evaluated and formally ruled out if it is not applicable to the study area, even where it seems obvious (such as in the case of volcano).

Mr. Wiedenman reviewed the Hazard Profiles and the following bullets summarize the information presented[1]:

- DROUGHT. There have been seven years (out of the past fourteen, 2000-2013) where drought conditions have been reported as severe, extreme or exceptional in the Cape Fear Region and future occurrences are likely.

- EXTREME HEAT. There have only been two recorded extreme heat events reported since 1998 that resulted in one death. Additional significant heat waves were reported in 2000, 2007 and 2012. Future occurrences are likely.

- HAILSTORM. There have been 320 recorded events since 1956. Future occurrences are highly likely.

- LIGHTNING. There have been 16 recorded lightning events since 1997, causing two injuries, 1 death, and $946,000 in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 52 recorded tornado events reported in the region since 1956. $90.9 million in property damages. 3 deaths and 73 injuries have been reported. Future occurrences are likely.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 71 storm tracks have come within 75 miles of the Cape Fear Region since 1850. 42 of these events were tropical storms and 24 were tropical depressions. Future occurrences are likely.

- SEVERE THUNDERSTORM WINDS. There have been 547 severe thunderstorm events reported since 1957 with $3.3 million in reported property damages. 1 death and 14 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 102 recorded winter events in the Cape Fear Region since 1993 resulting in $3.2 million in reported property damages. Future occurrences are likely.

1 Although Johnston County was participating in the planning process at this time, risk assessment data had not yet been compiled for the county. Therefore, data was only presented for the other four counties at this meeting. It was later updated to include all five counties, but meeting minutes did not include that information.

- EARTHQUAKES. There have been 3 recorded earthquake events in the Cape Fear Region since 1886. The strongest had a recorded magnitude of V MMI. Future occurrences are unlikely.

- LANDSLIDE. There have been no recorded landslide events in the Cape Fear Region. Mr. Wiedenman asked the Regional Hazard Mitigation Team to provide local information on landslide events, if available. Future occurrences are unlikely.

- DAM FAILURE. There are 409 dams in the Cape Fear Region, 107 of which are classified as high hazard dams. There have been no reported significant failure but a few smaller breaches have occurred. Future occurrences are unlikely.

- EROSION. Erosion was included in some of the previous County level plans but impacts are minimal. Future occurrences are possible.

- FLOOD. There have been 87 flood events recorded in the Cape Fear Region since 1993, resulting in $473,000 in property damage. There have been 43 NFIP losses since 1978 and approximately $692,000 in claims. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 83 reported hazardous materials events reported in the region. Sixteen were reported as serious incidents. Future occurrences are likely.

- WILDFIRE. There is an average of 395 fires per year reported in the Cape Fear Region. Future occurrences are likely.

- TERROR THREAT. There has been no history of any terrorist events in the region, although several potential structures were identified as being at potential risk. Future occurrences are considered unlikely.

- NUCLEAR ACCIDENT. No major nuclear events have been reported at Shearon Harris Nuclear Station, but 30 emergency declarations were made since 1986. Future occurrences are unlikely.

In concluding the review of Hazard Profiles, Mr. Wiedenman stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email him with their concerns.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Thunderstorm/High Wind, followed by Hurricane and Tropical Storm, Tornado, and Hailstorm. Flood was moved from a moderate risk hazard to a high risk hazard.

Mr. Slaughter presented the Capability Assessment Findings. Atkins has developed a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, Community Rating System (CRS) participation, and the Local Capability Assessment Survey conducted by Atkins.

Mr. Slaughter reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the limited to moderate range for Planning and Regulatory Capability and for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and staff skilled in GIS. Based upon the scoring methodology developed by Atkins, it was determined that over half of the participating jurisdictions have moderate capability to implement hazard mitigation programs and activities and each county has a high overall capability.

Mr. Slaughter then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Team meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- ❑ Prevention $158
- ❑ Emergency Services $130
- ❑ Structural Projects $92
- ❑ Property Protection $83
- ❑ Public Education and Awareness $74
- ❑ Natural Resource Protection $67

Mr. Slaughter then advised the group that the next meeting would involve discussing the mitigation strategy in greater detail, so the planning team should begin to think about actions related to each of the above categories and prioritizing those actions. He then thanked the group for taking the time to attend and the meeting was adjourned.

May 8, 2014
Mitigation Strategy Meeting – Carthage, NC

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 195 responses had been received. Based on preliminary survey results, respondents felt that tornadoes posed the greatest threat to their neighborhood, followed by severe thunderstorm/high wind, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 69 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional Hazard Mitigation Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

May 22, 2014
Mitigation Strategy Meeting – Lillington, NC

NOTE: In order to ensure all stakeholders were involved and to facilitate municipal participation, the counties decided that they would like Atkins to lead a meeting similar to the one held in Carthage at each of the two counties that had not yet hosted a planning meeting (Harnett and Johnston). As a result, the meeting minutes, found below, were very similar for these meetings.

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 195 responses had been received. Based on preliminary survey results, respondents felt that tornadoes posed the greatest threat to their neighborhood, followed by severe thunderstorm/high wind, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 69 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional Hazard Mitigation Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

July 16, 2014
Mitigation Strategy Meeting – Smithfield, NC

NOTE: In order to ensure all stakeholders were involved and to facilitate municipal participation, the counties decided that they would like Atkins to lead a meeting similar to the one held in Carthage at each of the two counties that had not yet hosted a planning meeting (Harnett and Johnston). As a result, the meeting minutes, found below, were very similar for these meetings.

Mr. Slaughter began the meeting by reviewing the handouts for the meeting including proposed goals for the regional plan, mitigation actions from each county's existing plan, and mitigation action worksheets for collecting information for any new mitigation actions

Ryan Wiedenman with Atkins then reviewed the findings of the risk assessment since many of the stakeholders present had not been able to attend the previous meeting. He focused in on two hazards that had been deemed to be high risk hazards at the previous meeting (flood and hurricane/tropical storm).

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and municipal websites. As of the meeting date, 344 responses had been received. Based on preliminary survey results, respondents felt that severe thunderstorm/high wind posed the greatest threat to their neighborhood, followed by tornadoes, hurricane/tropical storm, and severe winter storms/freeze. 82 percent of the respondents were interested in making their homes more resistant to hazards. However, 72 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter gave an overview of Mitigation Strategy Development and presented the proposed goals for the regional plan based on a review of the goals in the five existing county plans. The Regional Hazard Mitigation Team accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Chatham, Harnett, Johnston, Lee, and Moore Counties. Mr. Slaughter then asked each county, and the municipalities to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by August 8, 2014. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by August 8, 2014.

Mr. Slaughter thanked the group for taking the time to attend and the meeting was adjourned.

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

March 20, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Karen Moore	Harnett Co GIS	Lillington	910-814-6172	Kmoore@harnettnc.org
Jay Sikes	Harnett Co Planning	Lillington	910-814-6418	jsikes@harnett.org
Landon Chandler	Harnett Co Planning	Lillington	910-814-6410	LChandler@harnett.org
Chris Riggins	Sanford/Lee Co. Inspection	Sanford	919-718-4654	chris.riggins@sanfordnc.net
JEREMY RUST	MOORE COUNTY PLANNING	CARTHAGE	910-947-5010	jrust@moorecountync.gov
JACK MEADOWS	TOWN OF SILER CITY	SILER CITY	919 742 2323	jmeadows@silercity.org
Charlie McLaurin	Town of Siler City	Siler City	919 742 2323	CMclaurin@Silercity.org
Tony S. Tucker	EM Chatham Co.	Chatham	919 545-8160	Tony.Tucker@chathamnc.org

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

March 20, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Joseph Cherry	Lee County General Se	SANFORD	919-718-4622	Joseph.cherry@leecountync.gov
Russell Spivey	Lee County Comm Se	Sanford	919-718-4622	russell.spivey@leecountync.gov
Yancy King	NCEM	Siler City	919-208-1003	Yancy.King@ncdps.gov
Scot Brooks	Moore Co. EM	Carthage	910-947-6317	sbrooks@moorecountync.gov
Victor Czar	Sanford		919.777.1117	victor.czar@sanfordnc.net
Tim Shaw	City of Sanford	Sanford	919-770-8333	tim.shaw@sanfordnc.net
Kathy Blake	Town of Erwin	Erwin	910-897-5140	kblake@erwinnc.org
DON KOVASCKITZ	LEE CO		919 718-4663	DKOVASCKITZ@LEECOUNTYNC.GOV

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

March 20, 2014
10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Bill Rogers	Lee County ESO	Sanford	919 7184670	brogers@leecountync.gov
Aaron Bullard	Lee County Es	Sanford	919 718-4670	Cbullard@leecountync.gov
Mike Tatum	Lee County Es	Sanford	919-718-4670	Mtatum@leecountync.gov
Jason Sullivan	Chatham Cnty. Planning	Chatham Cnty	919/542-8233	jason.sullivan@chathamnc.org
Samantha Wallenwaber	City of Dunn	Dunn	910-230-3503	SLLoyd@dunn-nc.org

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

April 17, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Tony S. Tucker	Chatham CO EM	Pittsboro	919-545-8160	Tony.Tucker@chathamnc.org
Janet M. Scott	Chatham Co Em	Pittsboro	919-545-8162	janet.scott@Chathamnc.org
Jay Sikes	H.Co Planning	H.Co	910-814-6418	jsikes@harnett.org
Mark Locklear	" "	"	"	Mlocklear@Harnett.org
Yancy King	NC EM	Silc City	919-208-1003	yancy.king@ncdps.gov
Althea Thompson	Planning & Dev City of Sanford	Sanford	(919) 718-4656 ext 5399	althea.thompson@sanfordnc.net
Chris Riggins	Sanford/Lee Co Inspection	"	919-718-4654 ext 5361	chris.riggins@sanfordnc.net
Scot Brooks	Moore County	Carthage	910 947-6317	Sbrooks@MooreCountyNC.gov

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Kickoff Meeting

April 17, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
JEREMY RUST	MOORE CO. PLANNING & COM. DEV	CARTHAGE	910-947-5010	jrust@moorecountync.gov
Jason Sullivan	Chatham Co. Planning		919/542-8233	jason.sullivan@chathamnc.org

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

May 8, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Tony Tucker	Chatham EM	Pittsboro	919-545-8160	tony.tucker@Chathamncorg
Janet Scott	Chatham Em	Pittsboro	919-545-8162	janet.scott@chathamnc.org
Todd Moore	PEEDEE EMC	Anson	704-694-7607	TMOORE@PDEMC.COM
Brian Deel	VASS PD	VASS	910-245-4676	vassch.ct@gmail.com
Bethany Johnson	Town of Vass	Vass	910-245-4676	vassnc@townofvass.com
Debbie Hatfield	NC EM		336-345-4594	debbie.hatfield@ncdps.gov
Aaron Bullard	Lee Co ES	Sanford	919-718-4670	CBullard@leecountync.gov
Andy Conway	Moore Co. Sheriffs Office	Moore	910-639-3787	aconway@moorecounty nc.gov

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

May 8, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Fran D Ringelberg	MC - Animal Control	Moore County	910 986 3003	FRINGELBERG @ MOORECOUNTYNC.GOV
J Doyle Maness	Randolph Elec. Mem.	Moore County	910-670-3837	doyle.maness @ randolphemc.com
Ken SKipper	Moore Co Public Safety	Moore Co.	910-986-3914	KSKipper@moorecountync.gov
DON KOVASCKITZ	LEE CO GIS	LEE CO	(919) 718-4643 x1	DKOVASCKITZ @ LEECOUNTYNC.GOV
Chris Butts	Moore Co GIS	Moore County	910-947-1078	cbutts@moorecountync.gov
Scot Brooks	MOORE EM	MOORE County	910 947-6317	sbrooks@moorecountync.gov
Jason Sullivan	Chatham County		919|542-8233	jason.sullivan@ chathamnc.org
DEBRA Ensminger	Moore County	Moore County	910-947-5010	densminger@moorecountync.gov

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

May 8, 2014
10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
JEREMY RUST	MOORE COUNTY PLANNING	CARTHAGE	910.947.5010	jrust@moorecountync.gov
MATT DAY	TRIANGLE J COG		919-558-9397	MDAY@TJCOG.ORG
STEVE BORDEN	MOORE COUNTY AIRPORT	CARTHAGE	(910) 692-3212	SBORDEN@MOORECOUNTYAIRPORT.com
BOBBIE COX	MOORE COUNTY AIRPORT	CARTHAGE	(910)692-3212	BCOX@MOORECOUNTYAIRPORT.com
Carlton Cole	Village of Pinehurst	Pinehurst	9102455575	jccole@vopnc.org
Yancy King	NCEM	Siler City	919-208-1003	yancy.King@ncdps.gov
Bryan Phillips	MCDPS	CARTHAGE	910-947-6317	bphillips@MooreCountync.gov
GARY BRIGGS	moore Co. TAX	CARTHAGE	910-947-4104	gbriggs@moorecountync.gov

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

May 8, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Jacob Monroe	Moore County Schools	Carthage	910-947-2259	JMONROE@NCMCS.ORG
David McNeill	Duke Energy	Aberdeen	910-690-3718	david.mcneill@duke-energy.com
Rich Lambdin	Village of Whispering Pines	Whispering Pines	910-949-2400	rmlambdin@wpfirerescue.com
Carol Ann Lentz	American Red Cross	Moore Co	910-318-6208	carolann.lentz@redcross.org
Carol Lucas	Cameron	Cameron	910-245-3212	cameronnc@townofcameron.com
Phillip Boles	MCS	Carthage	910-947-2976	pboles@mcmcs.org
Jackie Dunlap	NC DOT	Carthage	910-947-2233	jrdunlap@ncdot.gov
Randy Gould	MCPWD	Carthage	910-947-4300	rgould@moore.countync.gov

Cape Fear Regional Hazard Mitigation Plan
Hazard Mitigation Planning Team Mitigation Strategy Meeting

May 8, 2014

10:00AM:12:00pm

Name	Agency	City	Phone Number	E-mail Address
Matt Garner	MCHD/Moore Co. Med. Reserve	carthage	9109474512	mgarner@moorecountync.gov
CHRIS CREW	NCEM STATE HAZ MIT OFFICER	RALEIGH	919 825 2305	JOHN.CREW@NCDPS.GOV
Ryan Cox	NCEM State Hazard Mitigation planning	Supervisor Raleigh	919-825-2311	ryan.cox@ncdps.gov
SCOTT TOMBERLIN	DIXIE PIPELINE CO.	CHERAW, SC	843-498-7805	stomberlin@dixiepipeline.com
John Mello	NCEM/GTM HAZARD MITIGATION	Raleigh, NC	919-825-2371	john.mello@ncdps.gov
Kris Sheffield	moore County Public Safety	Carthage	910-947-6317	KSheffield@moorecountync.gov

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

June 17, 2014

10:00AM - Noon

	Name	Agency	City	Phone Number	E-mail Address
√	Paul Whitehurst	Johnston Co. Emergency Services	Smithfield	919-989-5050	paul.whitehurst@johnstonnc.com
√	Lee Barbee	Town of Clayton	Clayton	919-422-3021	lbarbee@townofclaytonnc.com
√	Sandy Wood	Johnston Cty Emergency Services	Smithfield	919-989-5705	Sandy wood @ Johnstonnc.com
√	Banks Wallace	Johnston Cty Emergency Services	S		
√	Kim Robertson	Johnston County Emergency Srs.	Smithfield	919-989-5050	Kim.Robertson@johnstonnc.com
√	Ray Stuckey	Town of Pine Level	Pine Level	919-965-2284	publicworks@pinelevel-nc.org
√	Alan Johnson	Benson Fire Dept	Benson	919-894-8990	ajohnson@townofbenson.com
√	David Hess	Wilson's Mills Police	Wilson's Mills	919 938 4448 ext. 24	dhess@wilsonsmillsnc.org

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

June 17, 2014

10:00AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Josh Gibson	Kenly, PD	Kenly	919-284-2116	Josh.Gibson@townofkenly.com
GREG DUNHAM	Town of Kenly, TM	Kenly	11	Gregdunham@townofkenly.com
Phillip McDaniel	Town of Selma FD	Selma	919-524-6579	firechief@selma-nc.com

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

July 16, 2014

10:00AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Chandra Coats	Johnston Co. Utilities	Smithfield	919-209-8333	chandra.coats@johnstonnc.com
Scot Brooks	Moore Co. EM	Carthage	910 947-6317	sbrooks@moorecountync.gov
Marilyn Pearson	J.C. Health Dept	Smithfield	919-989-5225	marilyn.pearson@johnstonnc.
Yancy King	NCEM		919-208-1003	Yancy.King@ncdps.gov
Josh Holloman	JC LEPC	Smithfield	919-989-5050	
Abby Cameron	Red Cross	Raleigh	919-723-6602	Abby.cameron@redcross.org
Chris Johnson	JoCo Economic Dev	Smithfield	919-989-5001	Chris.Johnson@ JohnstonNC.c
Steve Stricklan	J.C. Public Health	Smithfield	919-989-5200	

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

July 16, 2014

10:00AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Sandy Wood	JC Emergency Services	Smithfield	919-989-5705	Sandy.wood@johnstonnc.com
Paul Whitehurst	JC. Emergency Services	Smithfield	919-989-5831	Paul.whitehurst@johnstonnc.com
Banks Wallace	J.C. Emergency Services	Smithfield	919-989-5832	Banks.wallace@johnstonnc.com
Beverly Williams	Harnett County EM	Lillington	910-893-7580	bwilliams@harnett.org
Larry Smith	Harnett Co EM	Lillington	910 893. 7580	lt smith@harnett.org
Aaron Bullard	Lee Co. EM	Sanford	919-718-4670	cbullard@leecountync.gov
JAY SIKES	H. Co PLANNING	LILLINGTON	910-814-6418	jsikes@harnett.org
Shane Searcy	Lee Co ES	SANFORD NC	919-718-4670	sbeagroose@leecountync.gov

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

July 16, 2014
10:00AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Tim Simpson	Town of Clayton Public Works	Clayton	919 553 1530	TSimpson@townofclaytonnc.org
Dale Medlin	Town of Clayton Electric Dept.	Clayton	9195531530	dmedlin@townofclaytonnc.org
Lee Barbee	Town of Clayton FD	Clayton	919-422-3021	lbarbee@townofclaytonnc.org
Kevin Hubbard	JC Emergency Services	Smithfield	919-989-5050	kevin.hubbard@johnstonnc.com
Matt Zapp	Town of Benson Manager	Benson	919 894 1606	mzapp@townofbenson.com
Mike Winslow	NC Forest Service		919-631-7582	Michael.Winslow@ncagr.gov
Johnny Dixon	Town of Micro Micro FD	Micro	919-534-6721	J8dixon@aol.com
JEREMY RUST	MOORE CO. PLAN. & COMM. DEV.	CARTHAGE	910-947.5016	jrust@moorecountync.gov.

Cape Fear Regional Hazard Mitigation Plan
Johnston County Meeting

July 16, 2014

10:00AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Josh Gibson	Kenly PD	Kenly	919-284-2116	Cresa Dunham @ Town of Kenl
Chris Adcock	Kenly PD	Kenly	919-284-2116	



Photo Source: News & Observer

Cape Fear
Regional Hazard Mitigation Plan

Public Participation Survey Results

ATKINS

Public Participation Survey

- Provides an opportunity for the public to share opinions and participate in the planning process
- Link to survey posted on County websites
- 478 completed surveys received

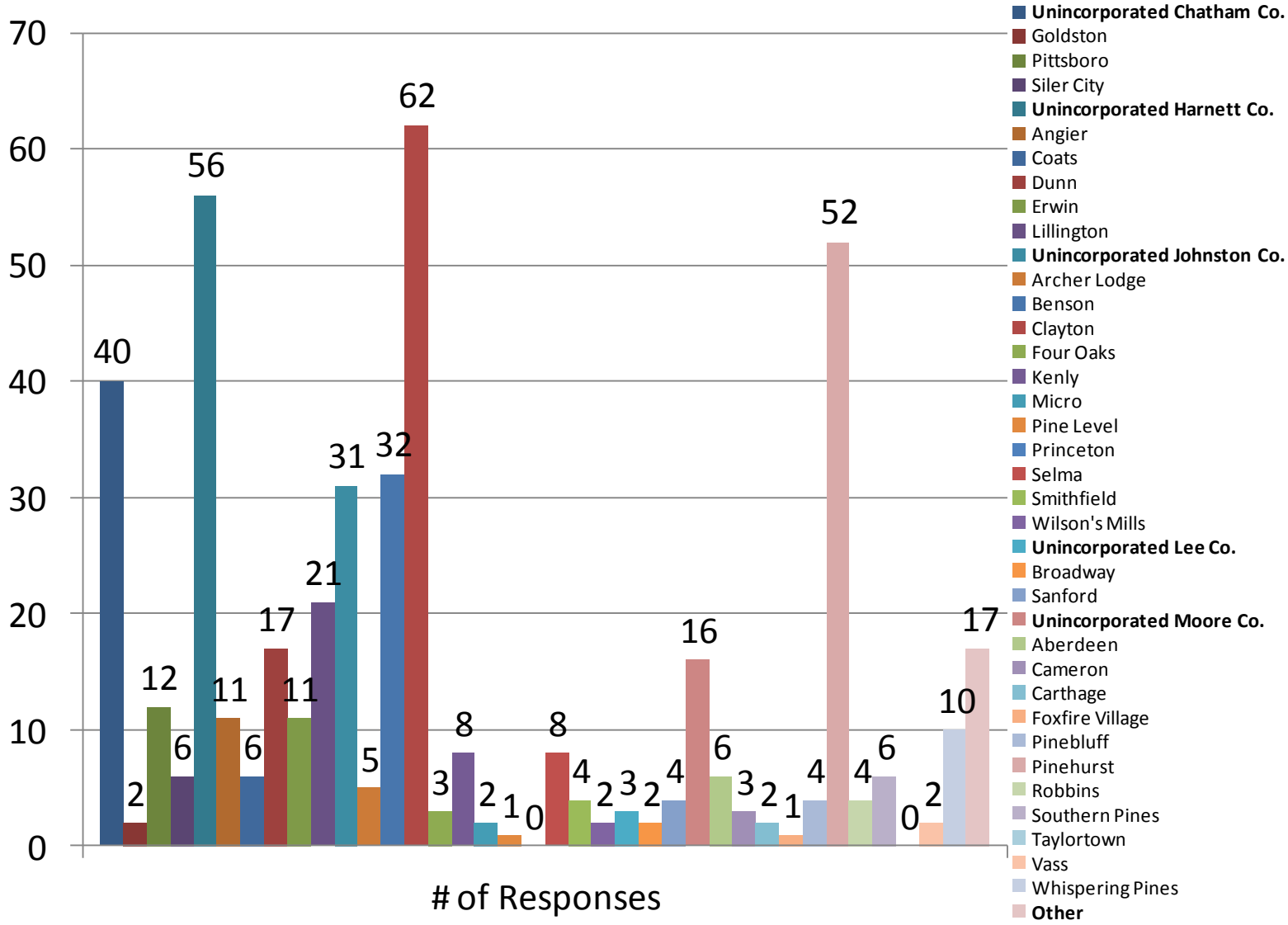
ATKINS

Public Participation Survey Highlights

- 82% of respondents are interested in making their homes more resistant to hazards
- 25% have already taken action to make their homes more hazard resistant
- 74% do not who to contact regarding risk reduction

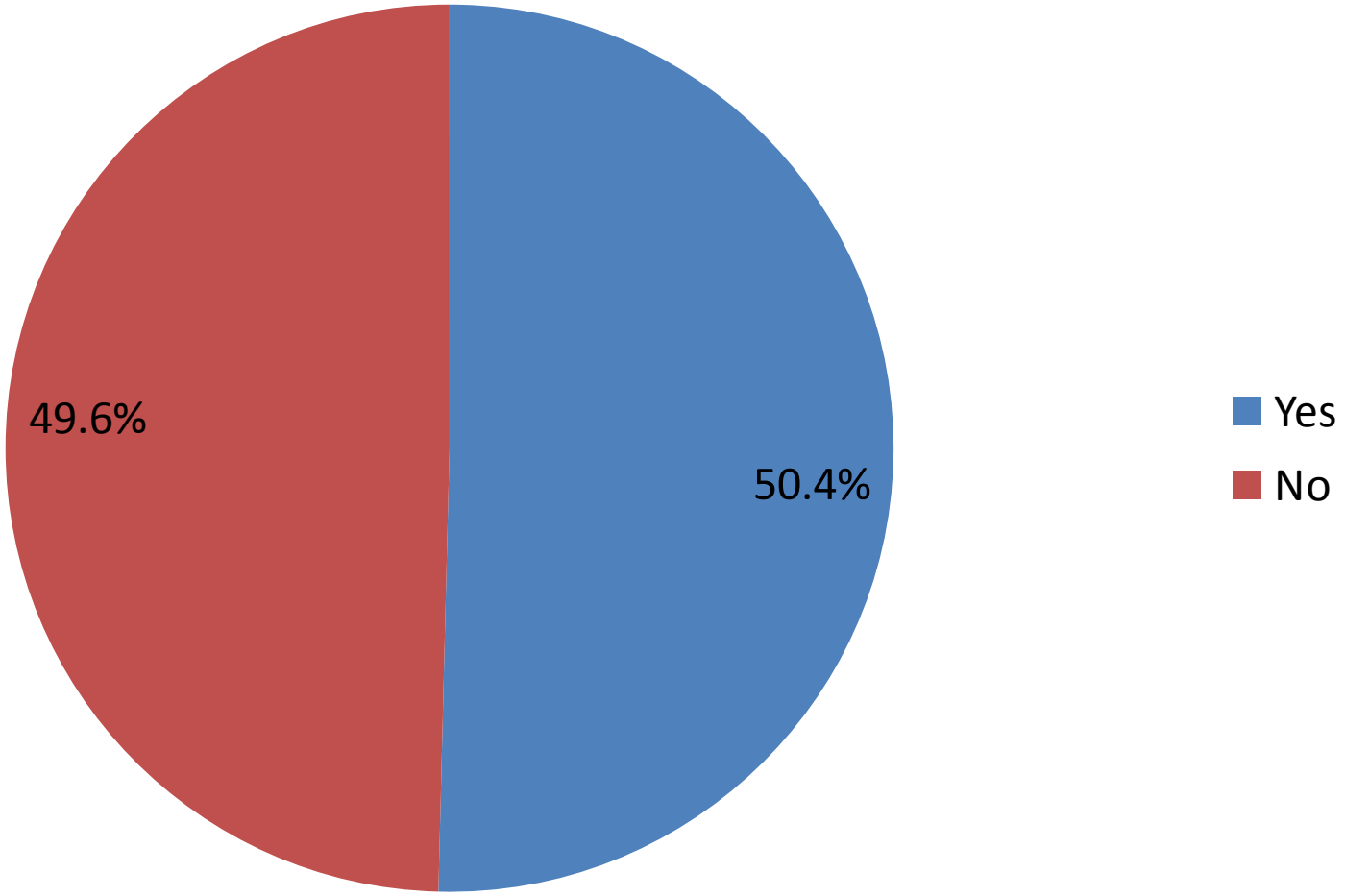
ATKINS

1. Where do you live?



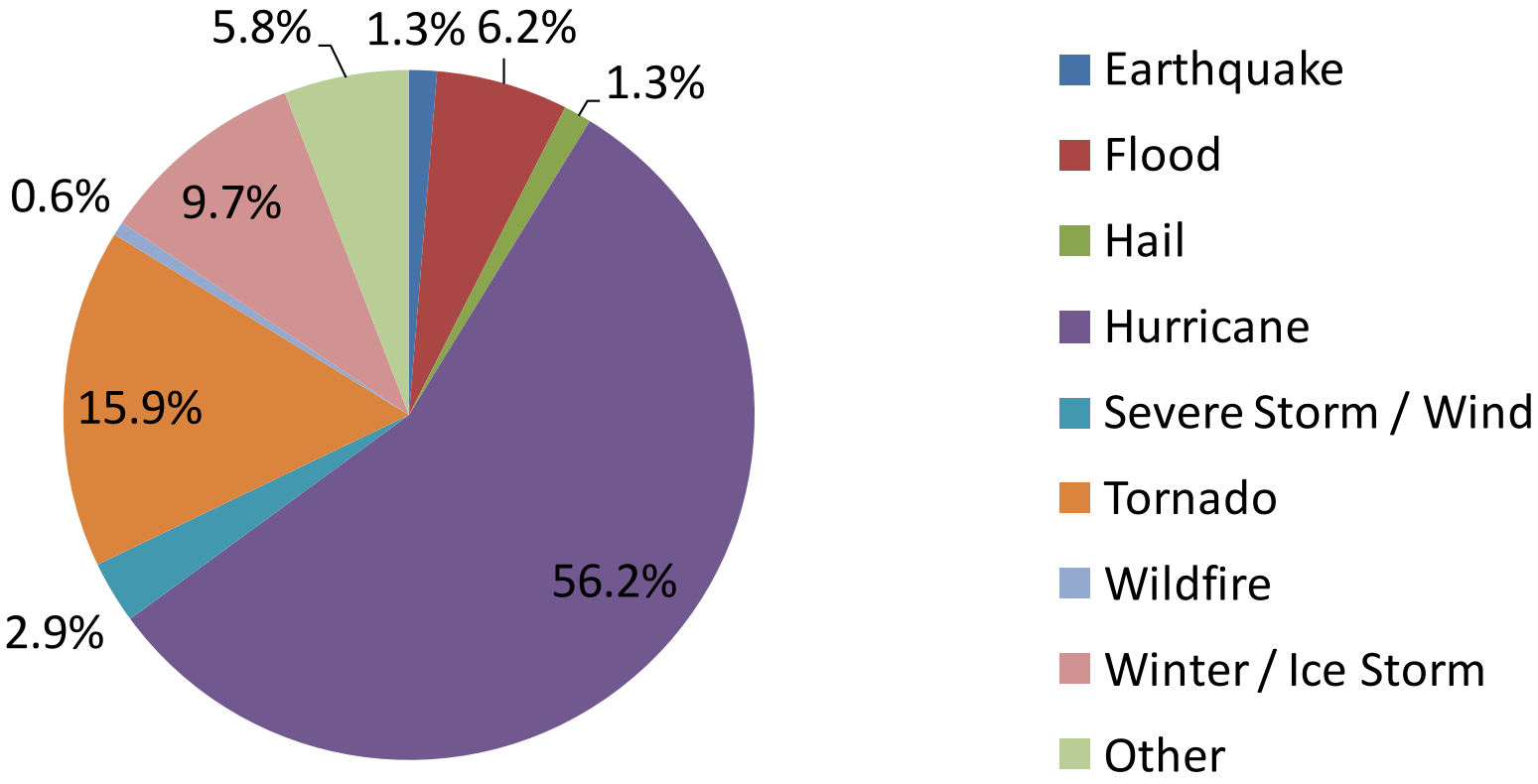
ATKINS

2. Have you experienced a disaster?



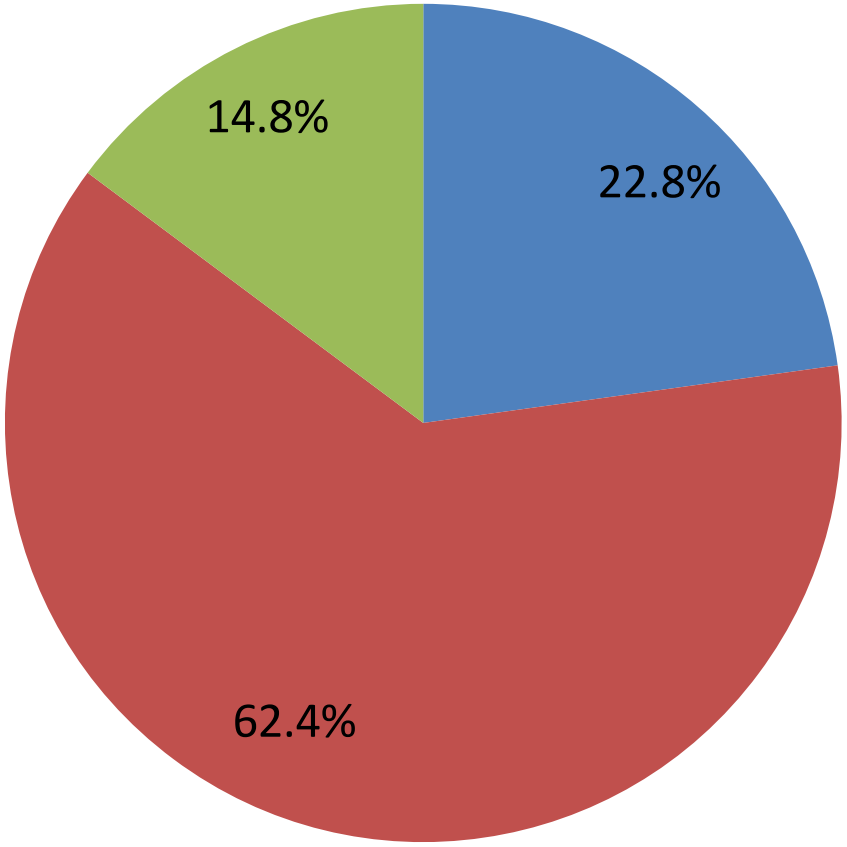
ATKINS

2. Examples of disasters experienced



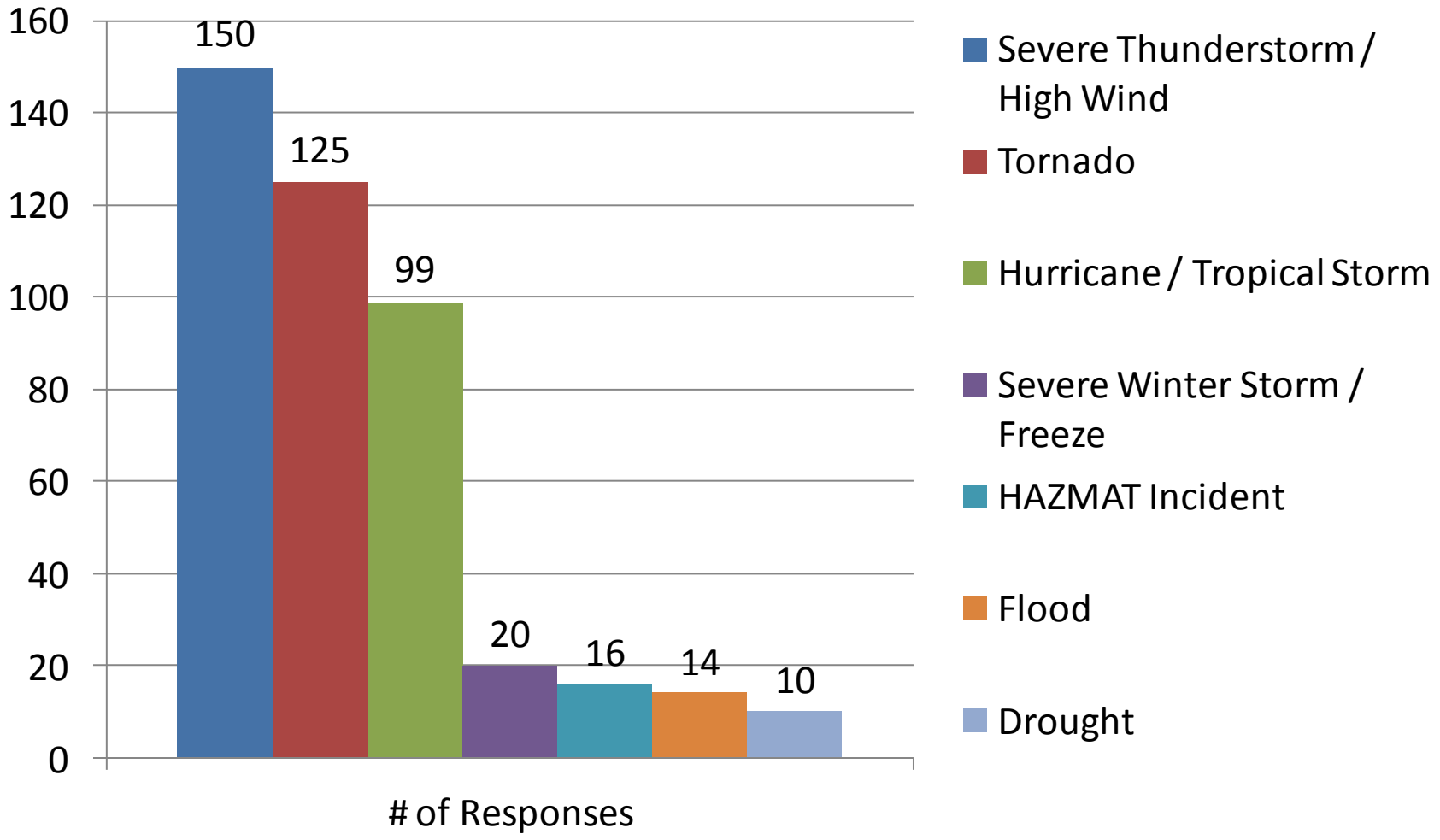
ATKINS

3. How concerned about possibility of disaster?



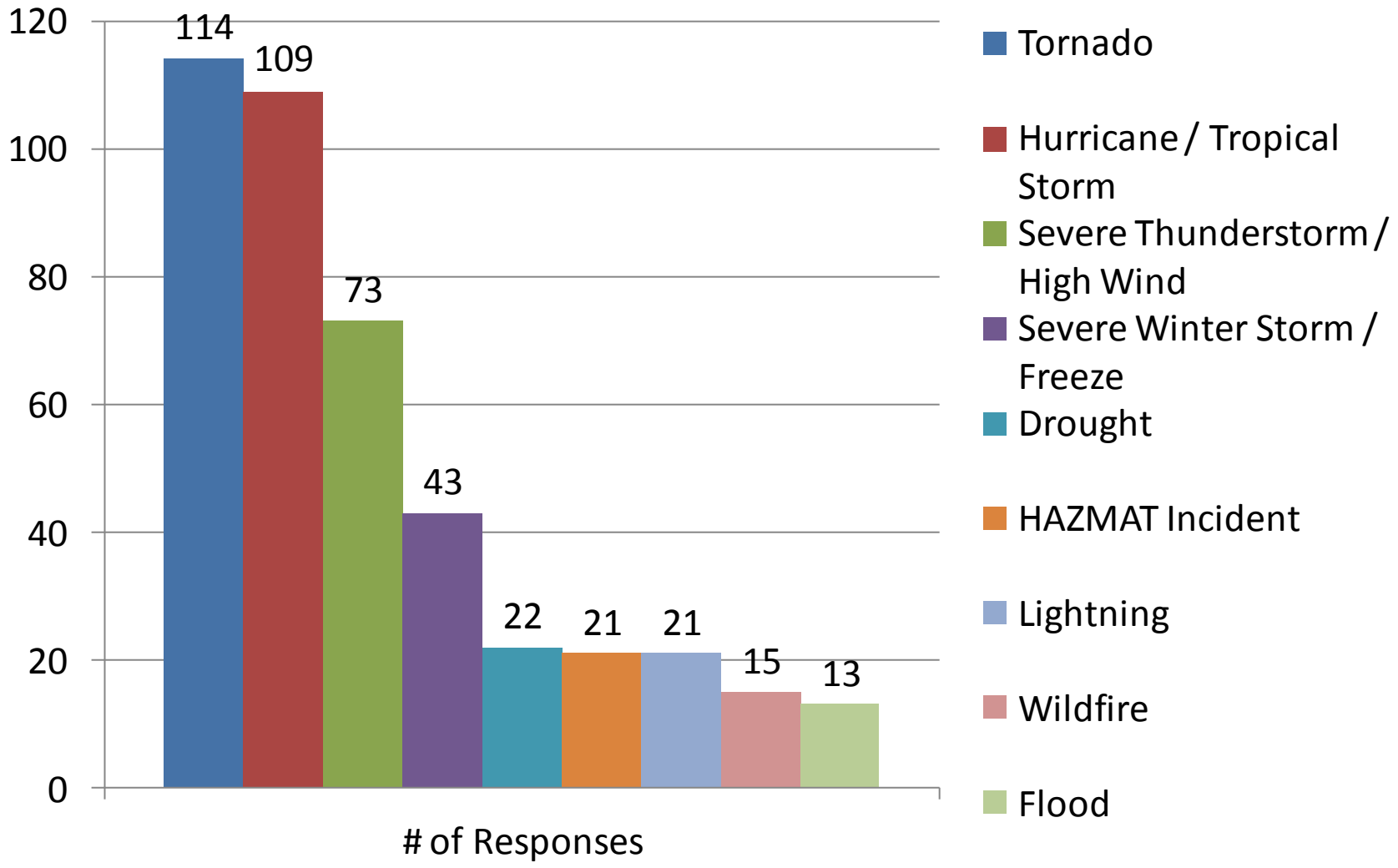
ATKINS

4. Highest hazard threat?



ATKINS

5. Second highest hazard threat?



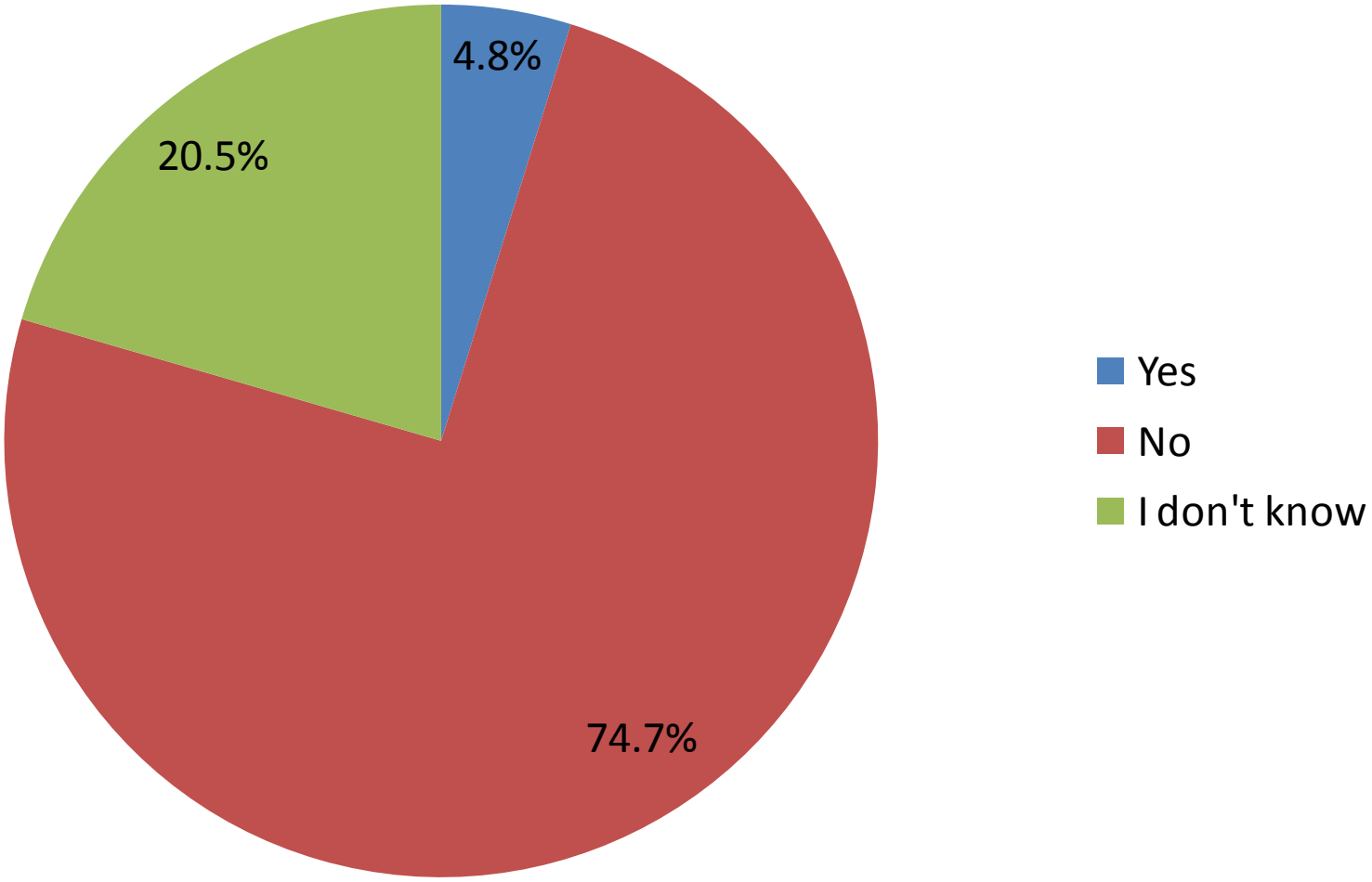
ATKINS

6. Other hazards not listed?

- Fracking
- Nuclear accident
- Terrorism
- Electromagnetic pulse
- Fuel shortage
- Plane / train accident
- Pandemic
- Water contamination
- Power outage
- Environmental degradation / pollution

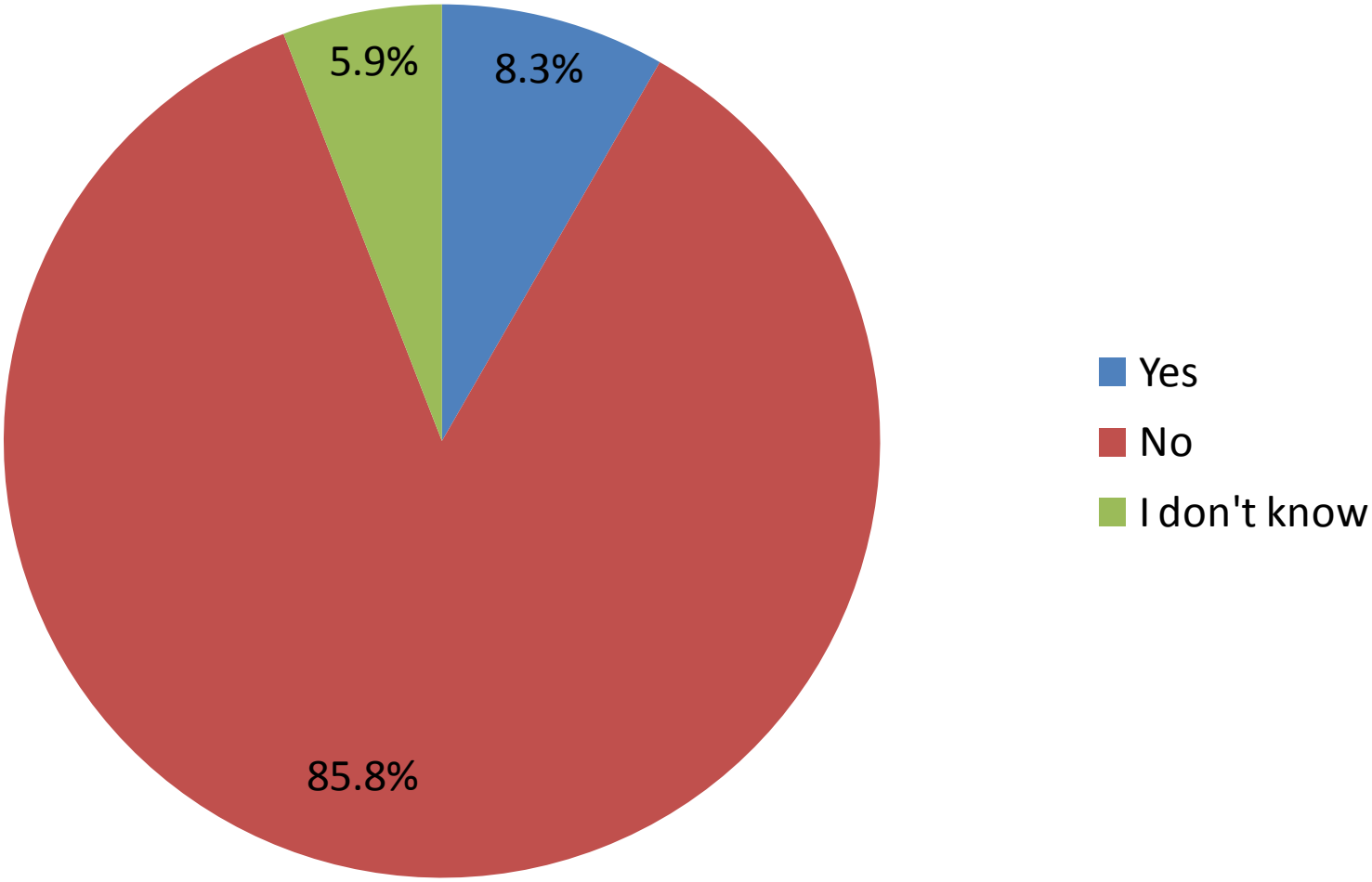
ATKINS

7. Is your home in a floodplain?



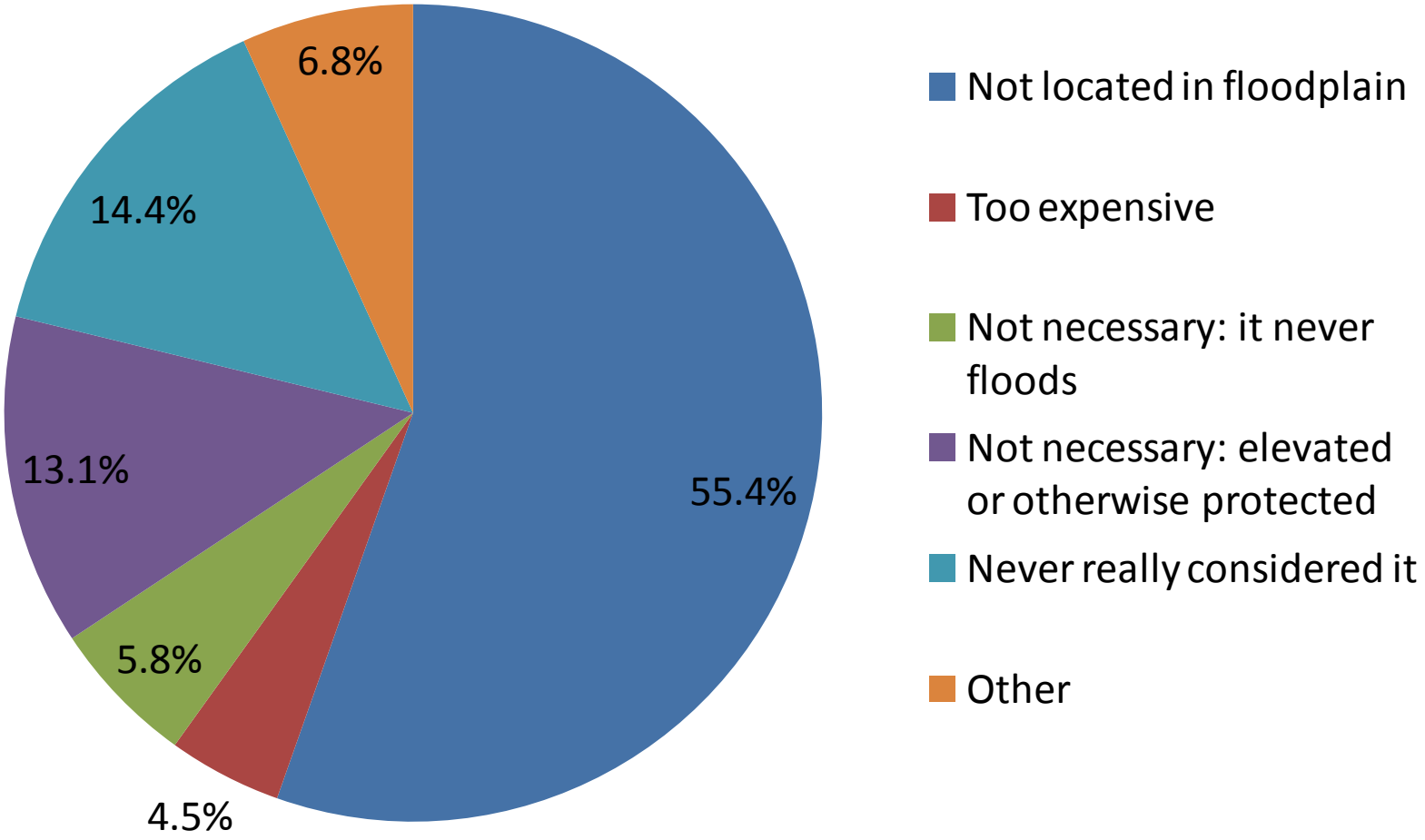
ATKINS

8. Do you have flood insurance?



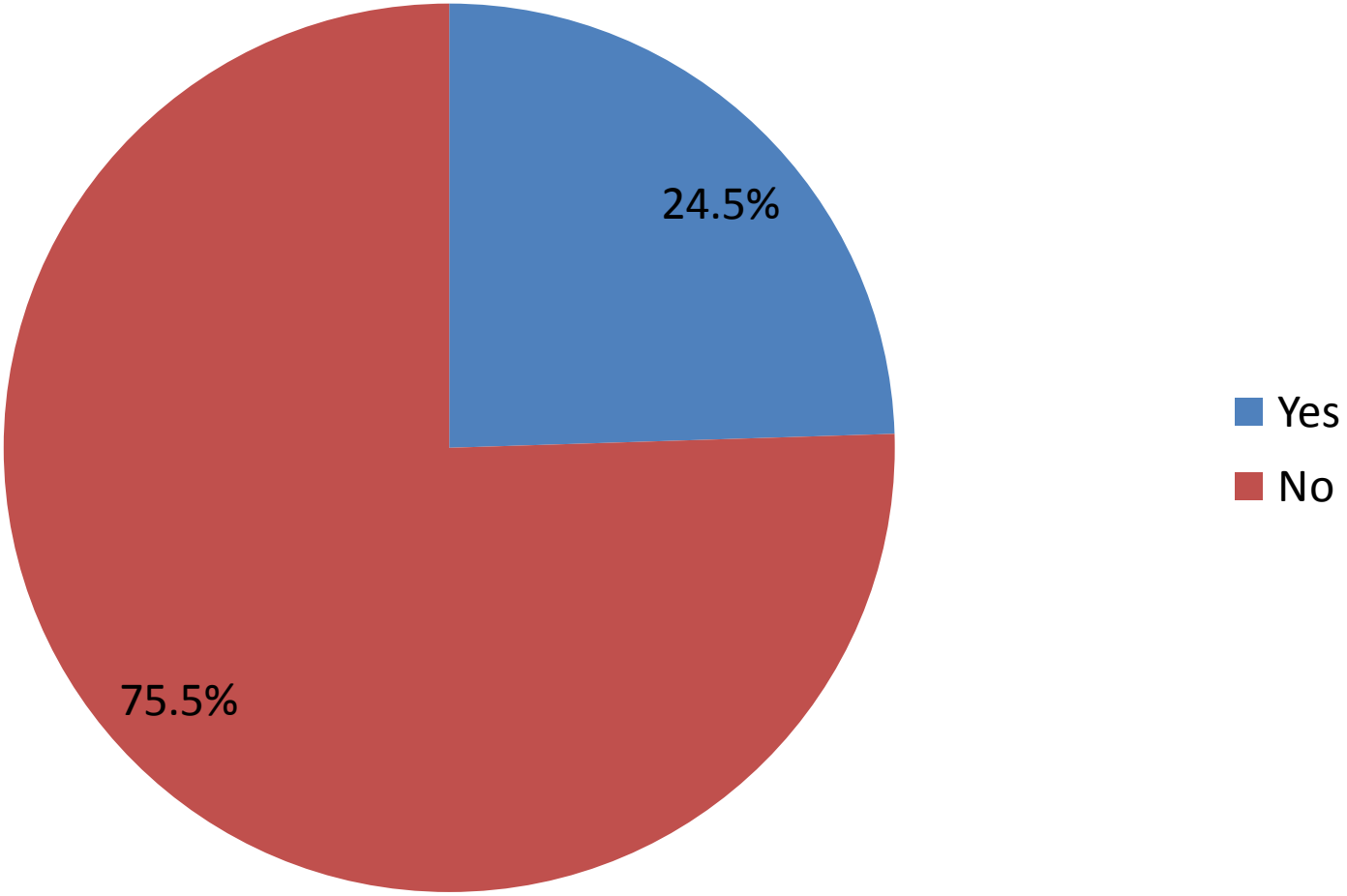
ATKINS

8. Why no flood insurance?



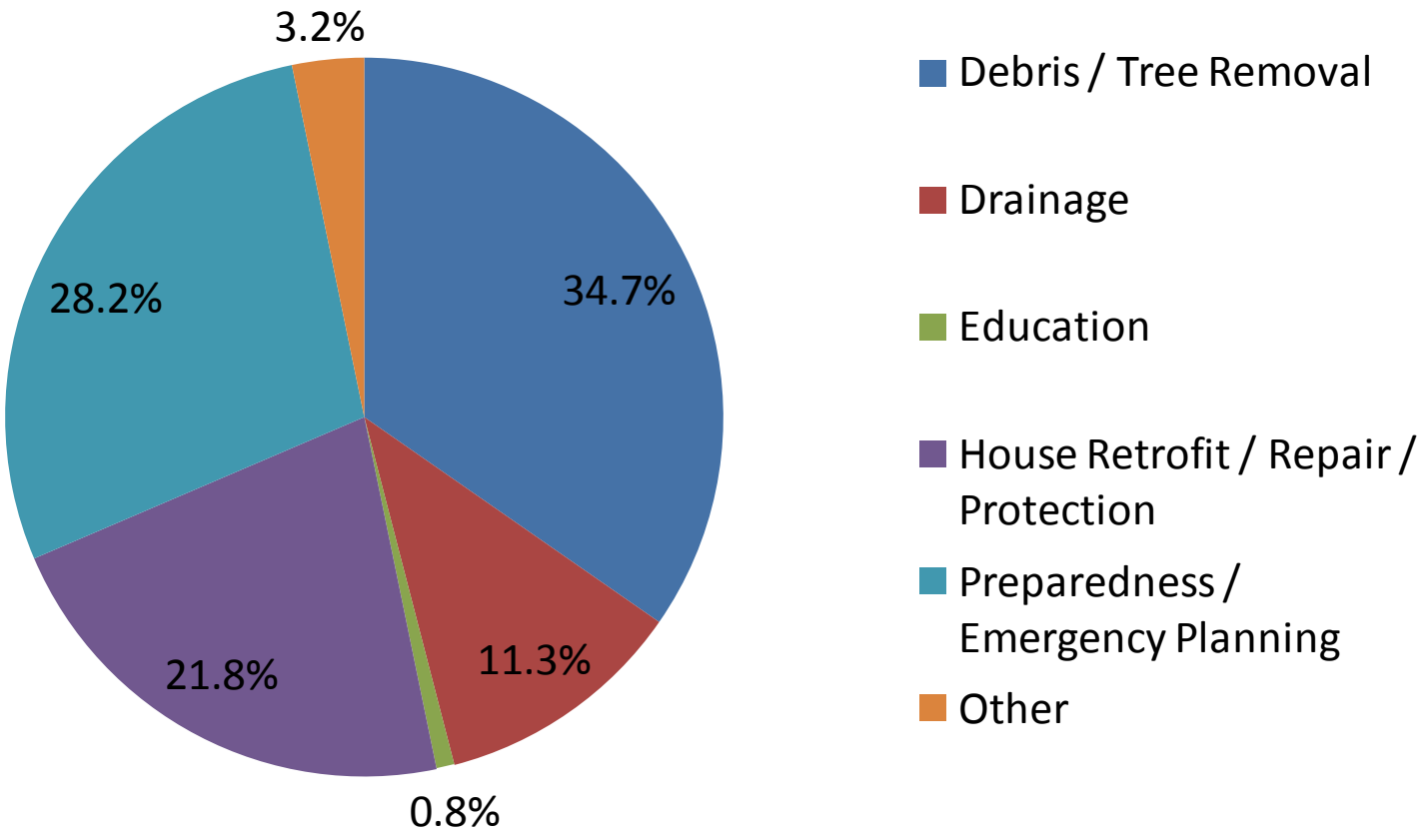
ATKINS

9. Taken action to be more hazard resistant?



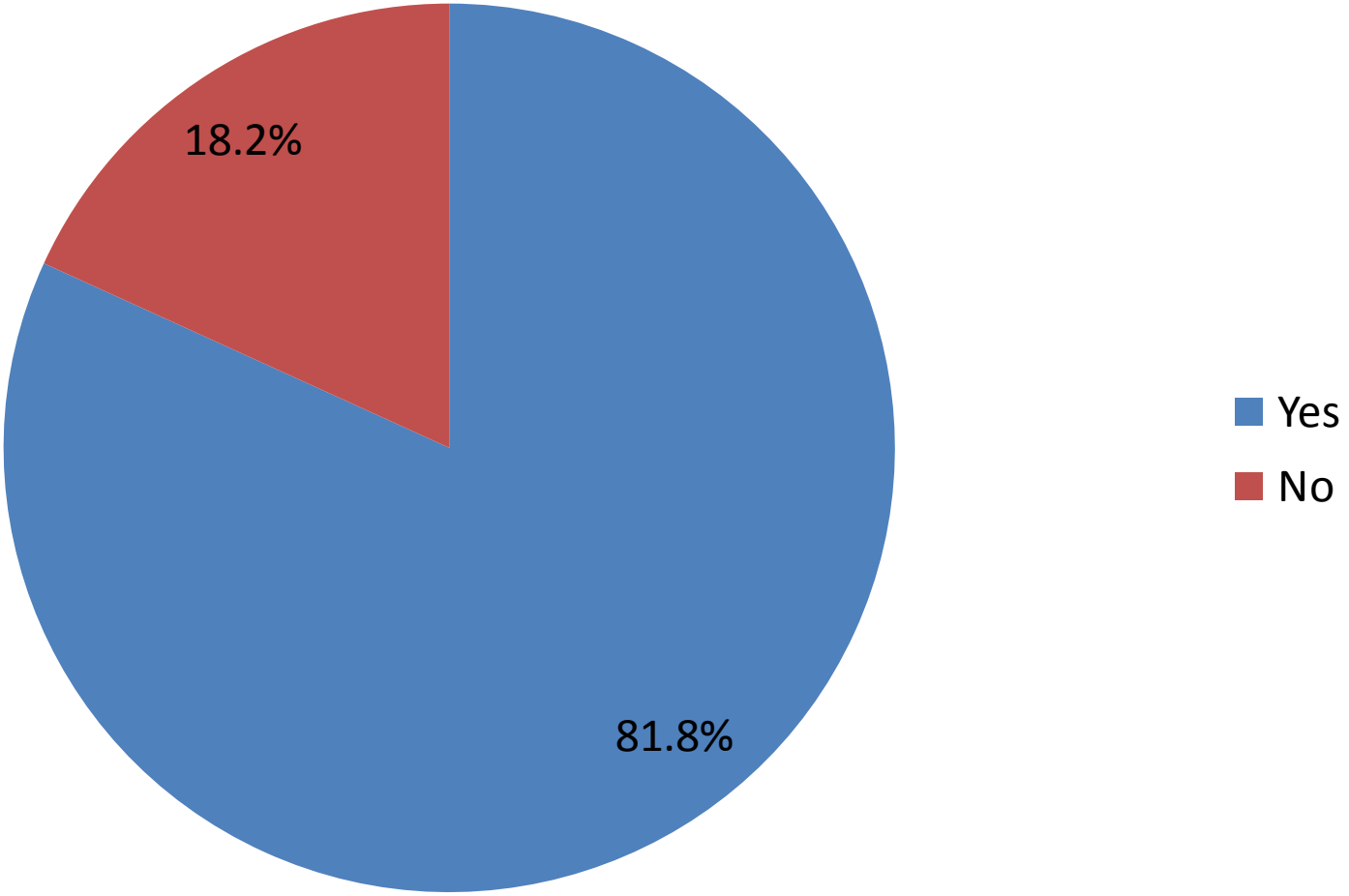
ATKINS

9. Examples of actions taken



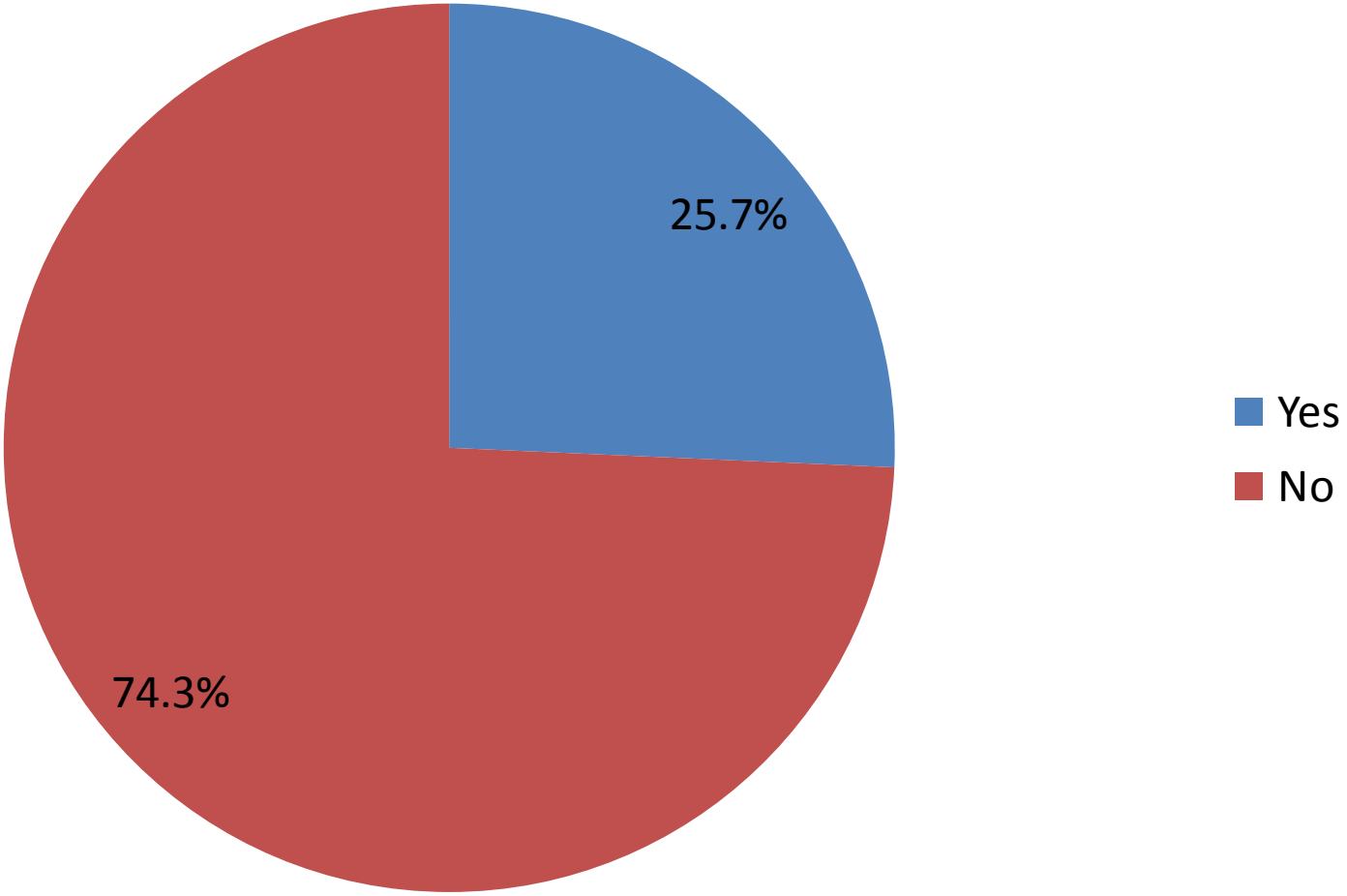
ATKINS

10. Interested in being more hazard resistant?



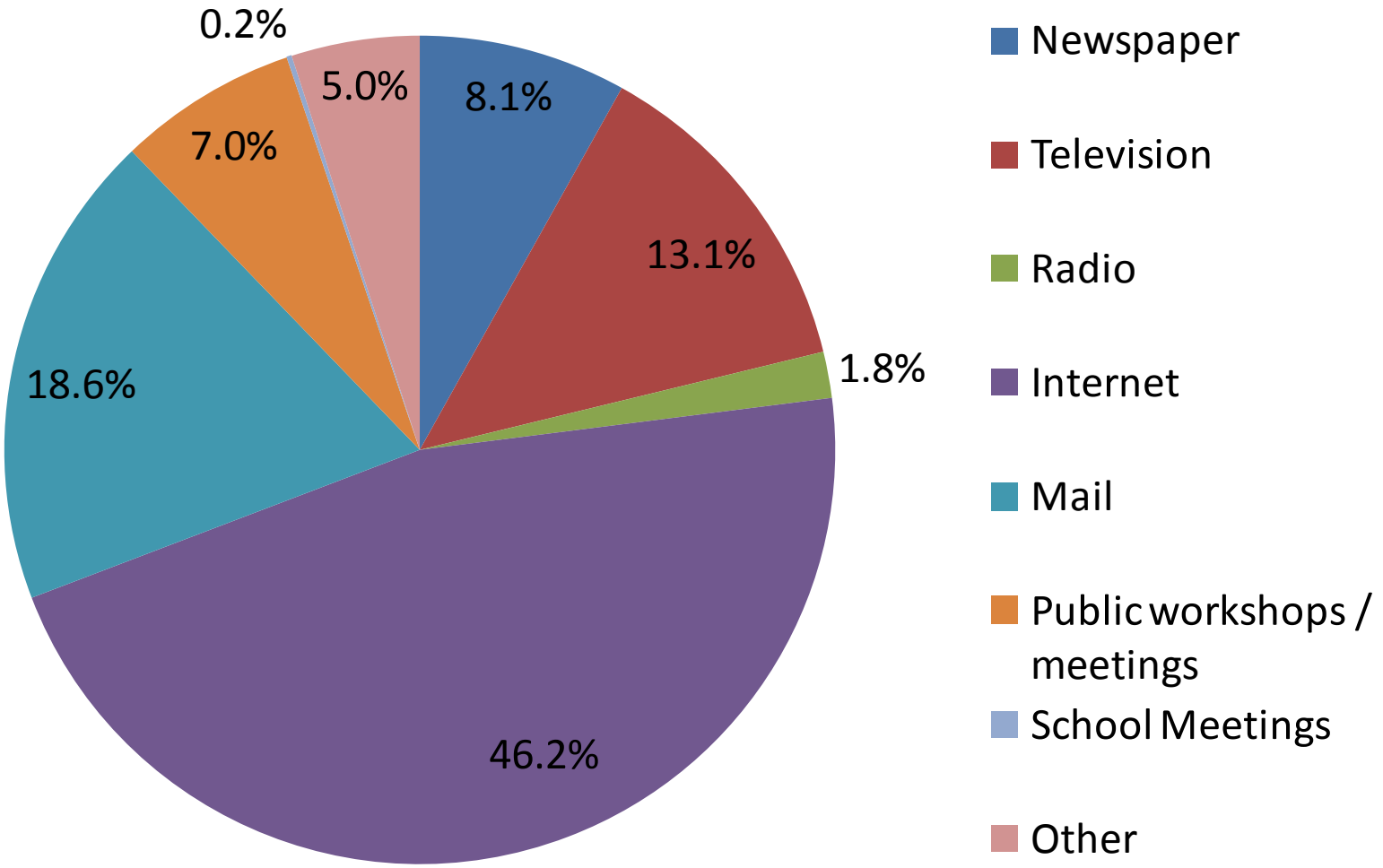
ATKINS

11. Know who to contact for reducing risks?



ATKINS

12. Most effective way to receive information?



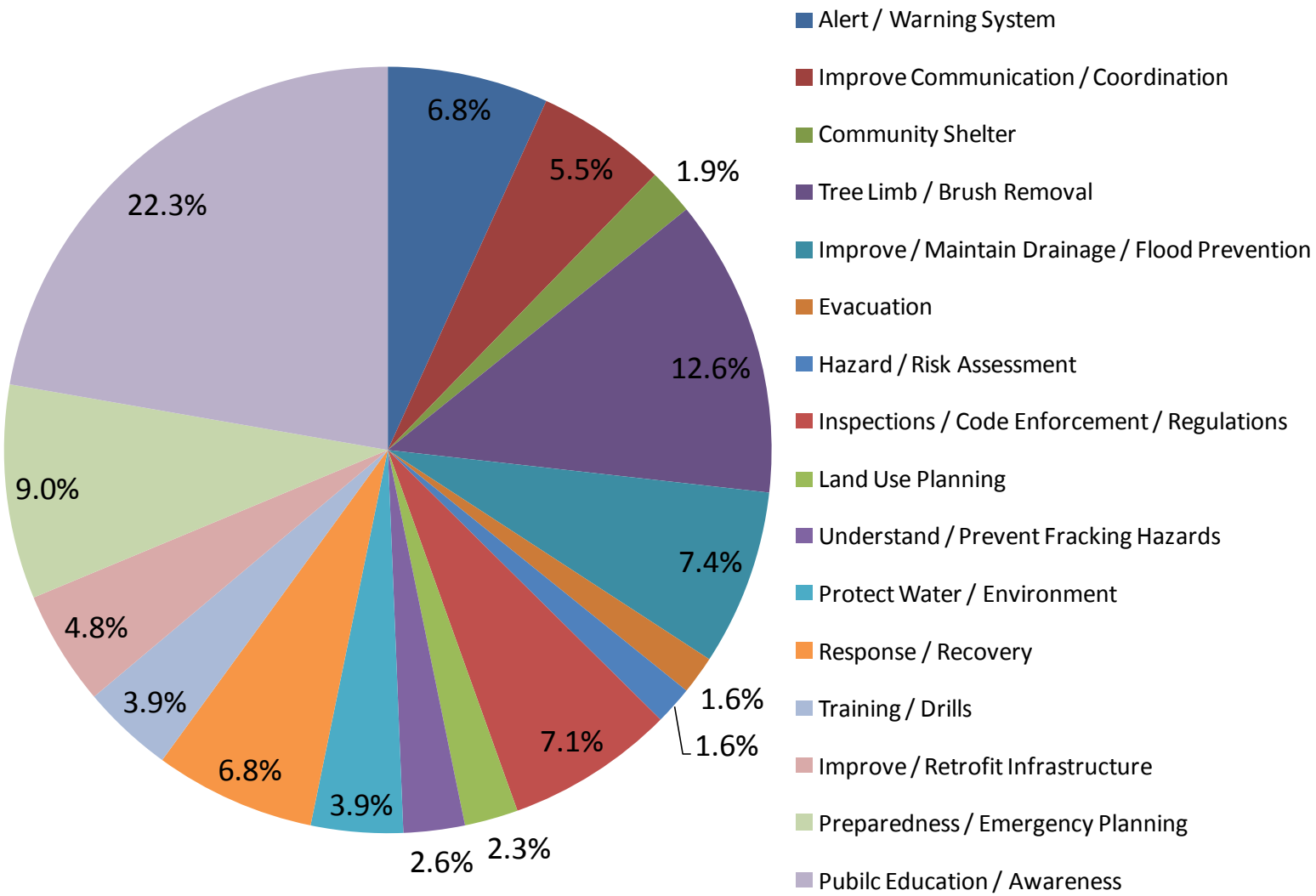
ATKINS

12. Other ways to receive information

- Email
- Social media
- Text message
- Telephone
- EMS / Public Safety Dept.
- CDC

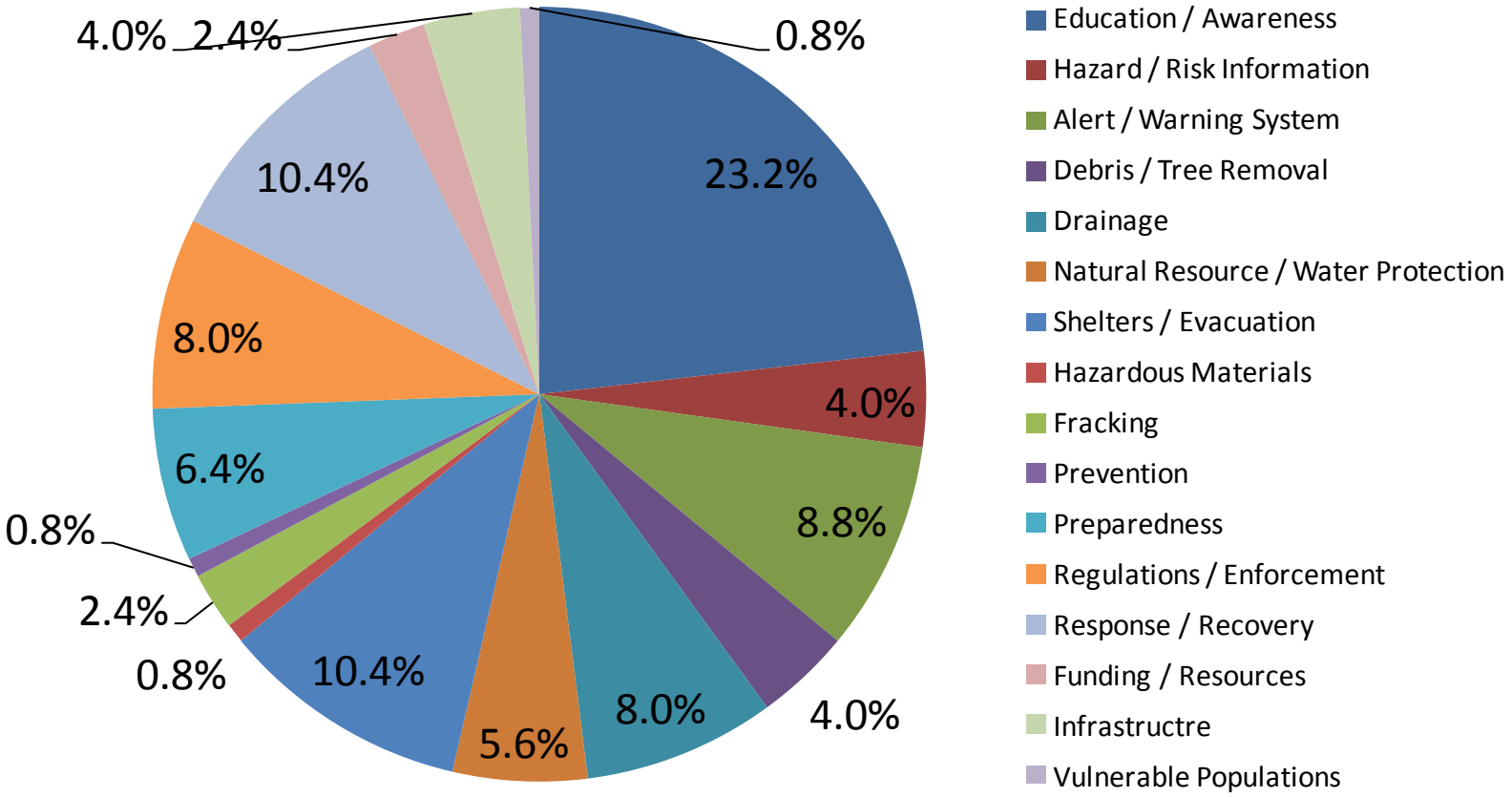
ATKINS

13. Steps local gov't could take to reduce risk



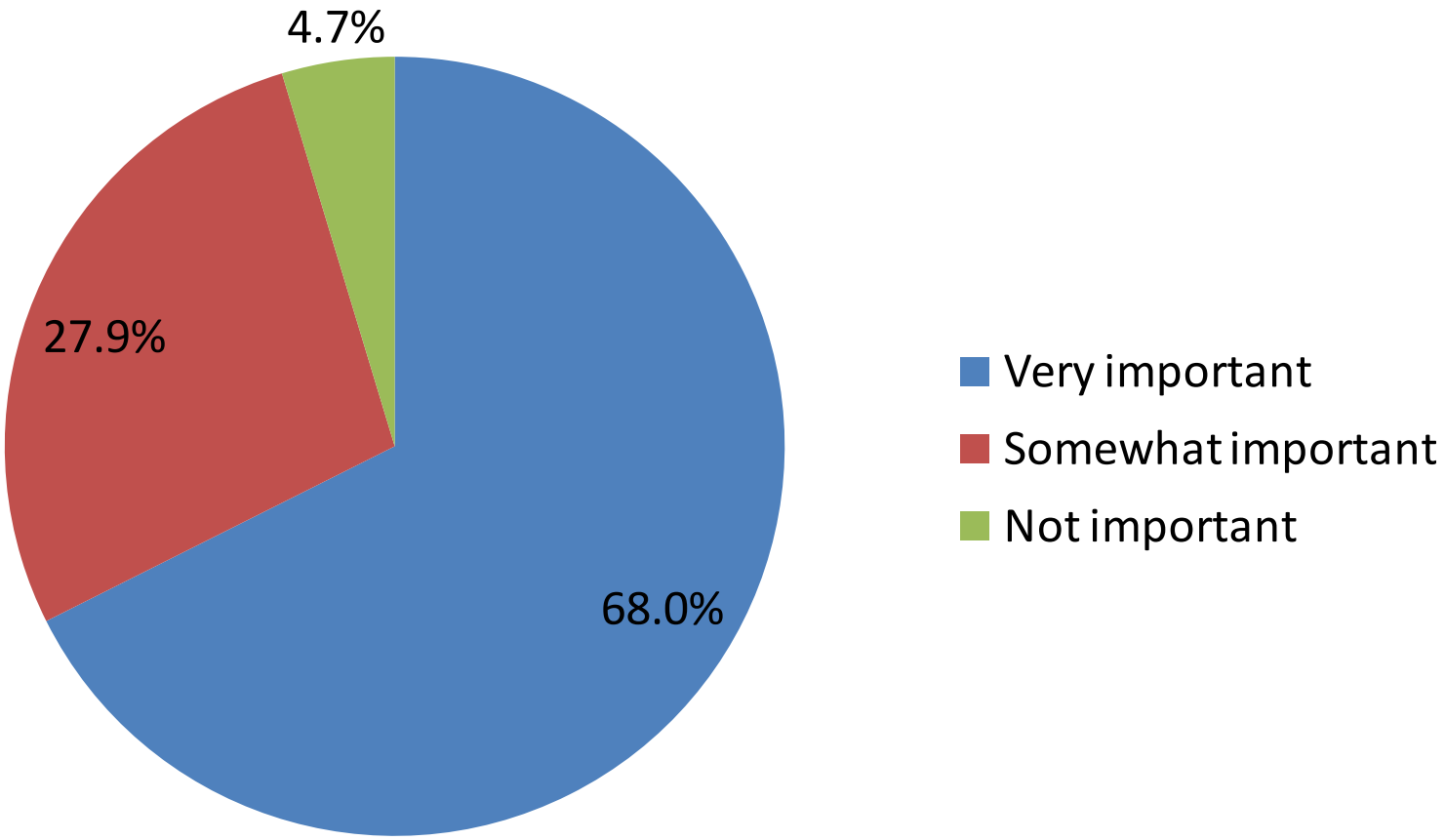
ATKINS

14. Other issues regarding risk and loss



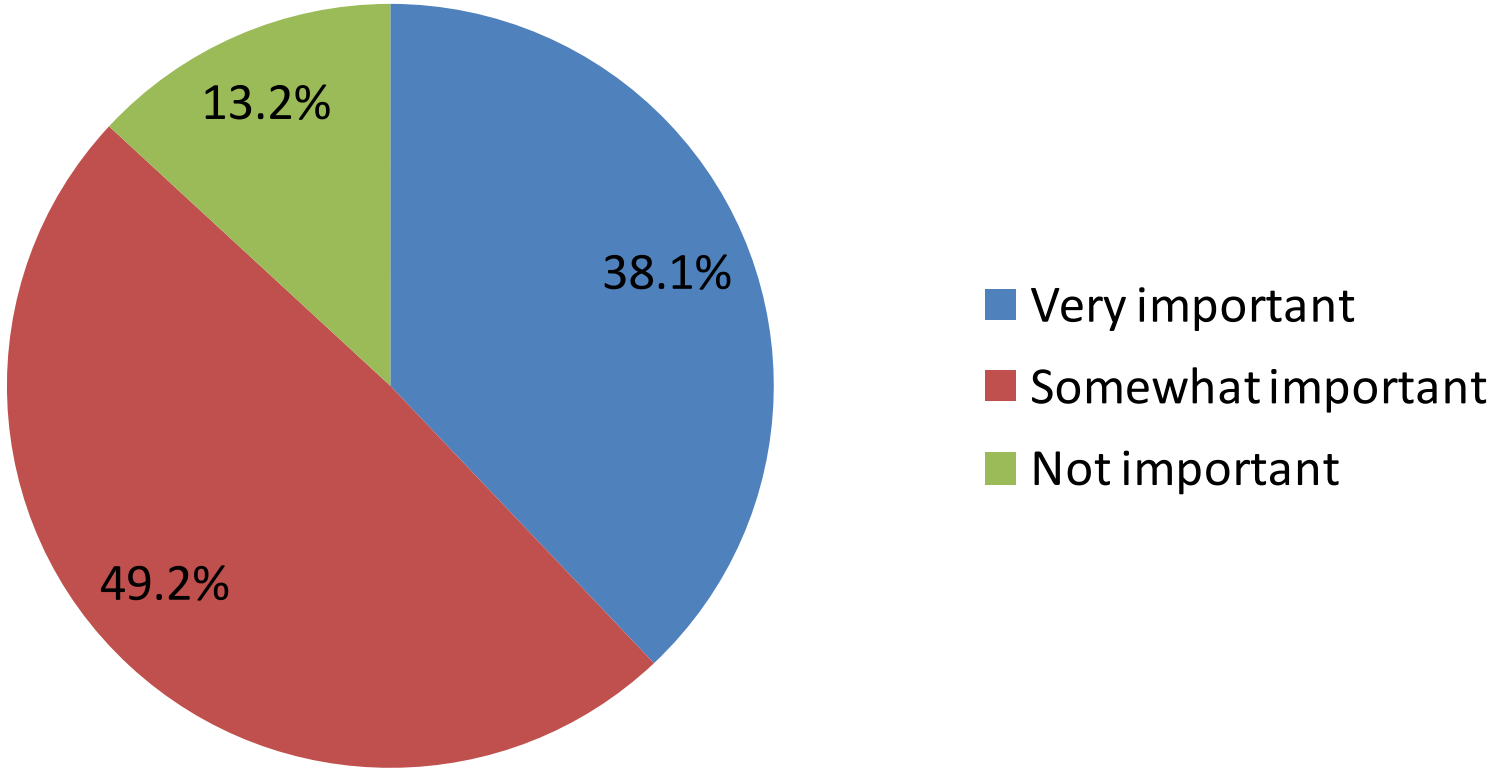
ATKINS

15. Mitigation Actions: Prevention



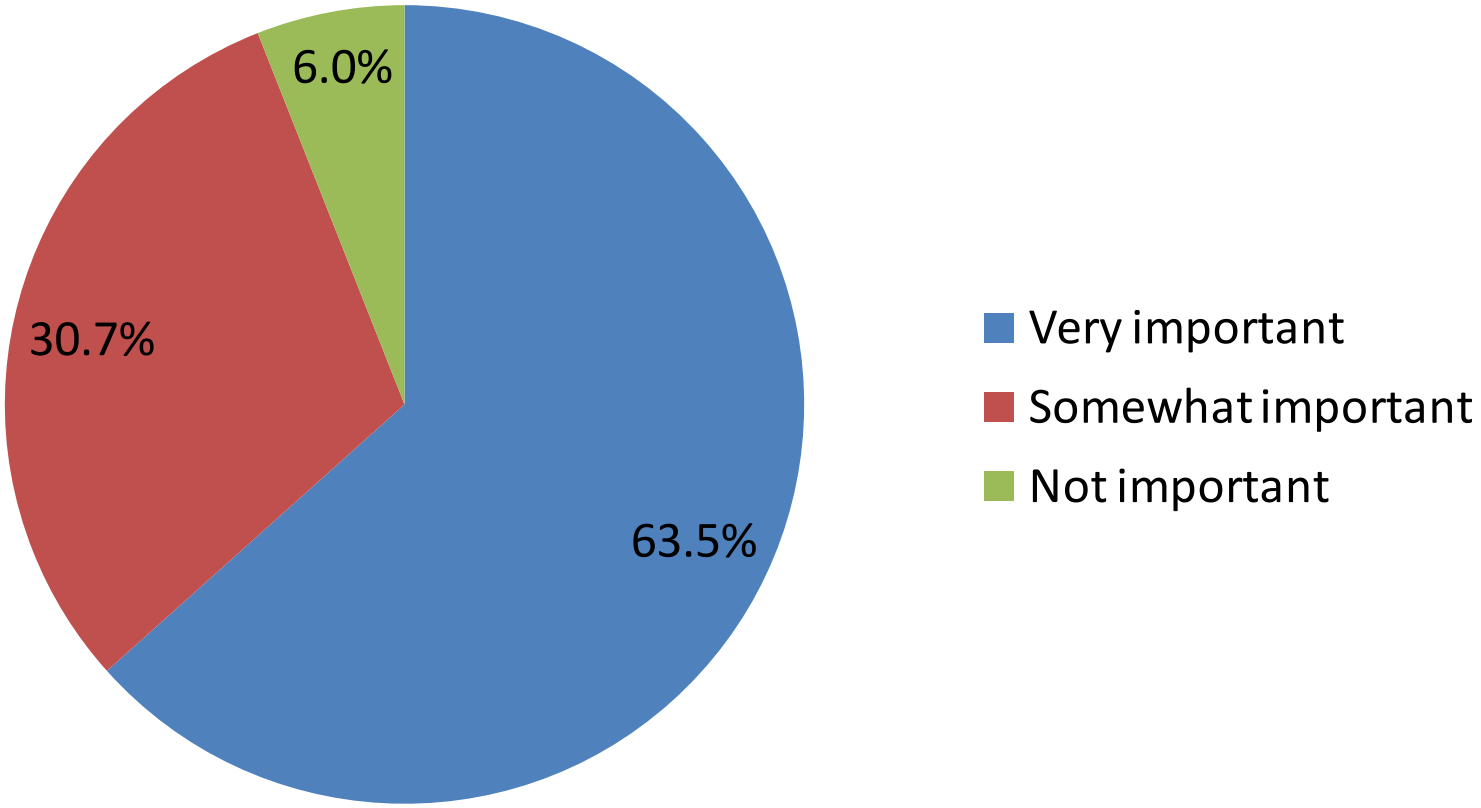
ATKINS

15. Mitigation Actions: Property Protection



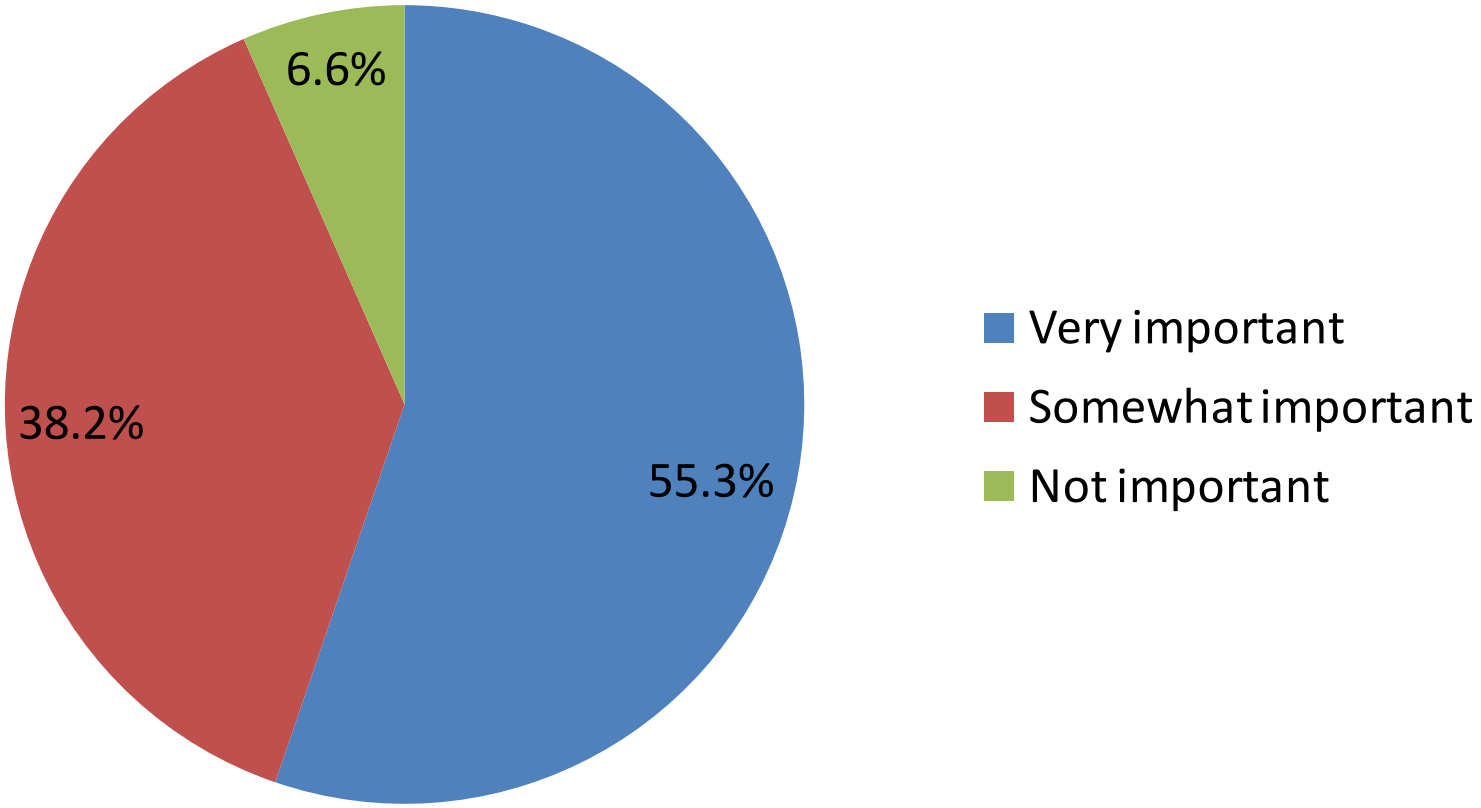
ATKINS

15. Mitigation Actions: Natural Resource Protection



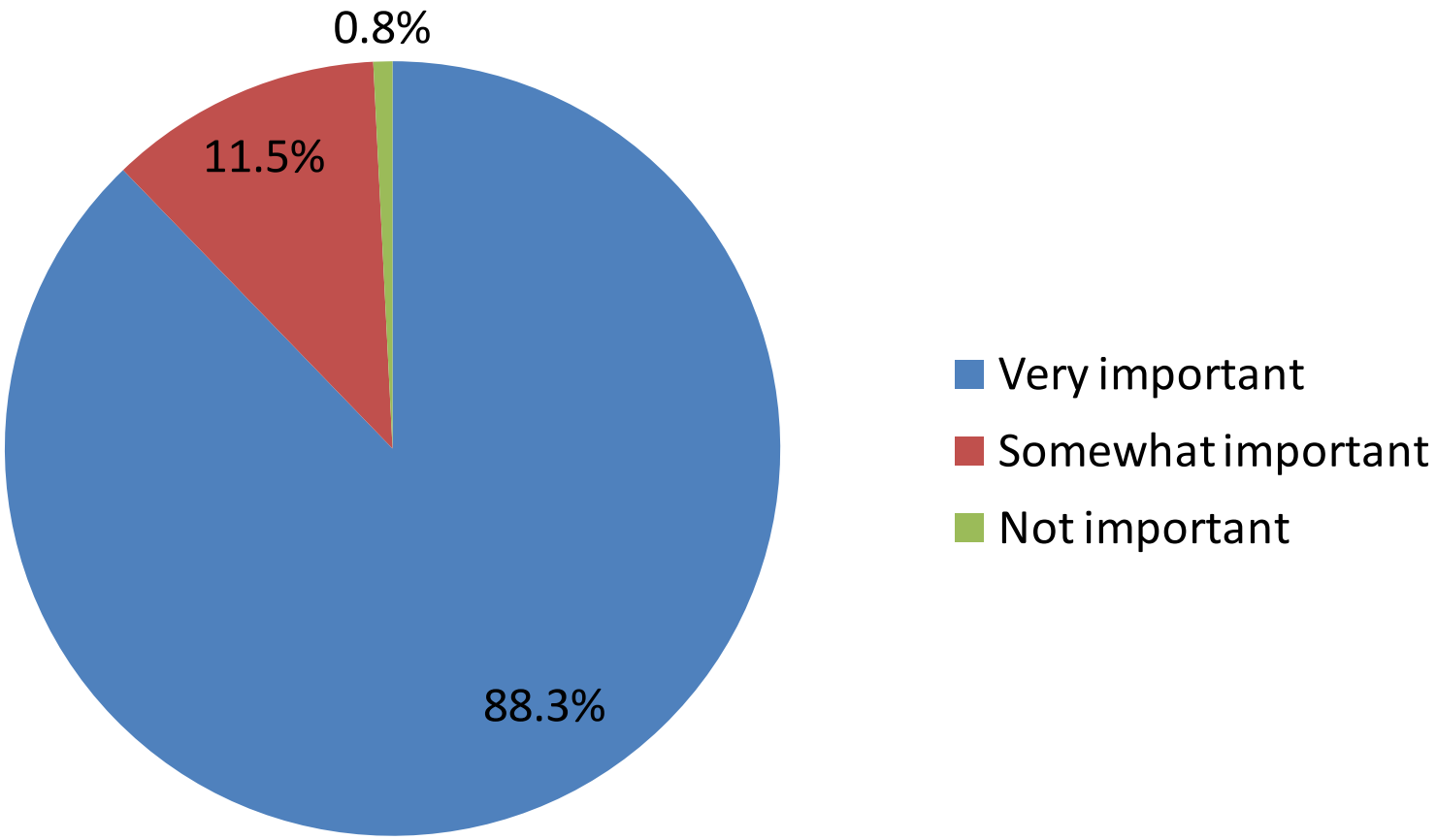
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15. Mitigation Actions: Structural Projects



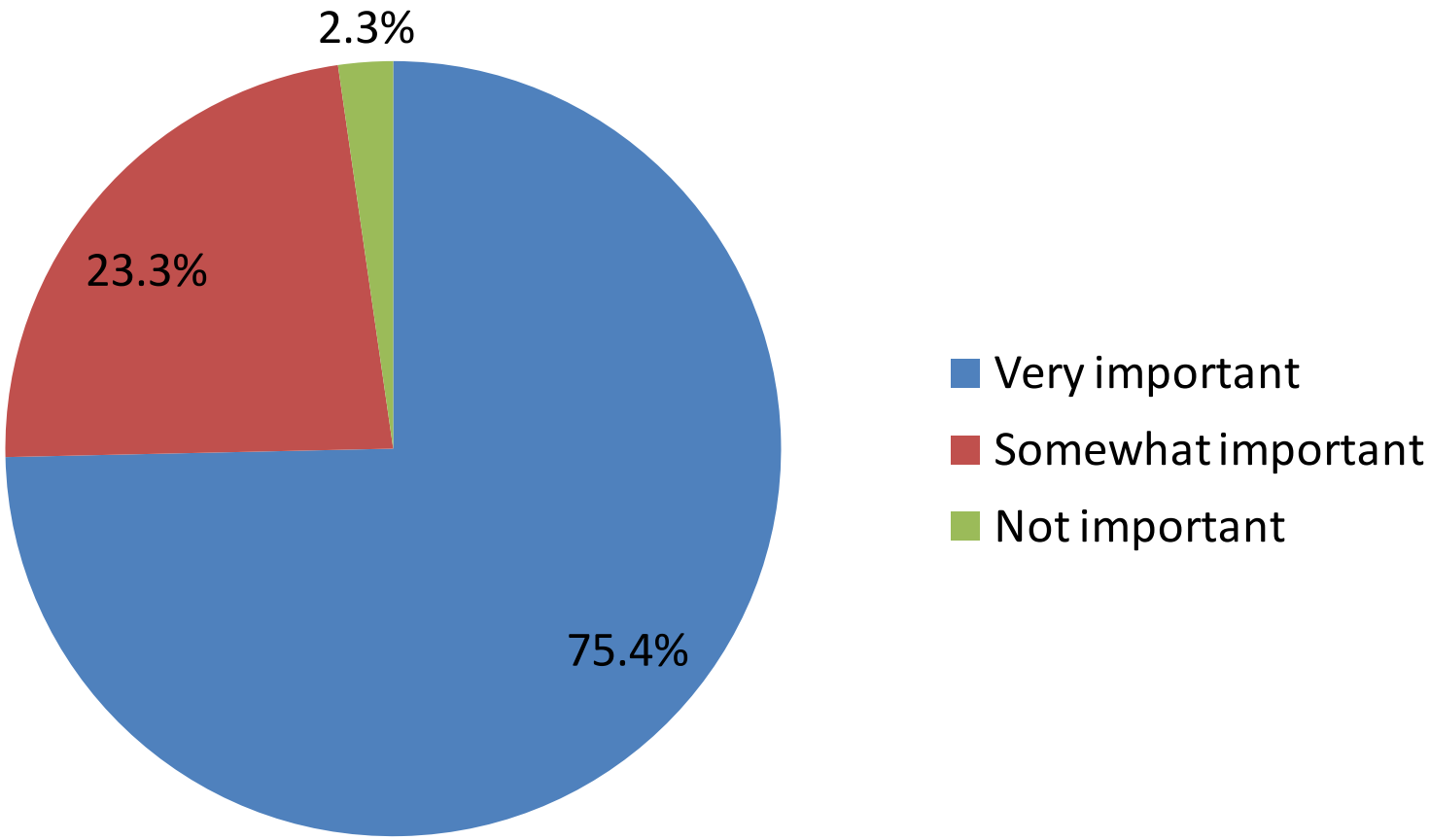
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15. Mitigation Actions: Emergency Services



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15. Mitigation Actions: Public Education & Awareness



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15. Mitigation Actions: Summary

- Highest importance
  - Emergency Services
  - Public Education & Awareness
- Moderate importance
  - Prevention
  - Natural Resource Protection
- Lowest importance
  - Structural Projects
  - Property Protection

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Photo Source: News & Observer

Cape Fear
Regional Hazard Mitigation Plan

Public Participation Survey Results

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Appendix E
Public Health Risk Assessment

This appendix of the Plan reviews the potential hazards and consequences for the health of the Cape Fear Region's population. It identifies the location of at-risk populations, assesses the public health and emerging disease threat, as well as assesses the effect of the hazards identified and prioritized in Section 5: *Hazard Profiles* on public health. It contains the following subsections:

- ❑ E.1 Identification of At-Risk Populations
- ❑ E.2 Public Health and Emerging Disease Threat
- ❑ E.3 Public Health Risk Assessment

E.1 IDENTIFICATION OF AT-RISK POPULATIONS

It is important to identify and assess those particular segments of the resident population in the Cape Fear Region that are considered at-risk populations. These include populations under 5 years, 65 years and over, or with a disability.

Table E.1 lists the at-risk populations by county according to 2013 U.S. American Community Survey population estimates. Additional population estimates are presented in Section 3: *Community Profile*.

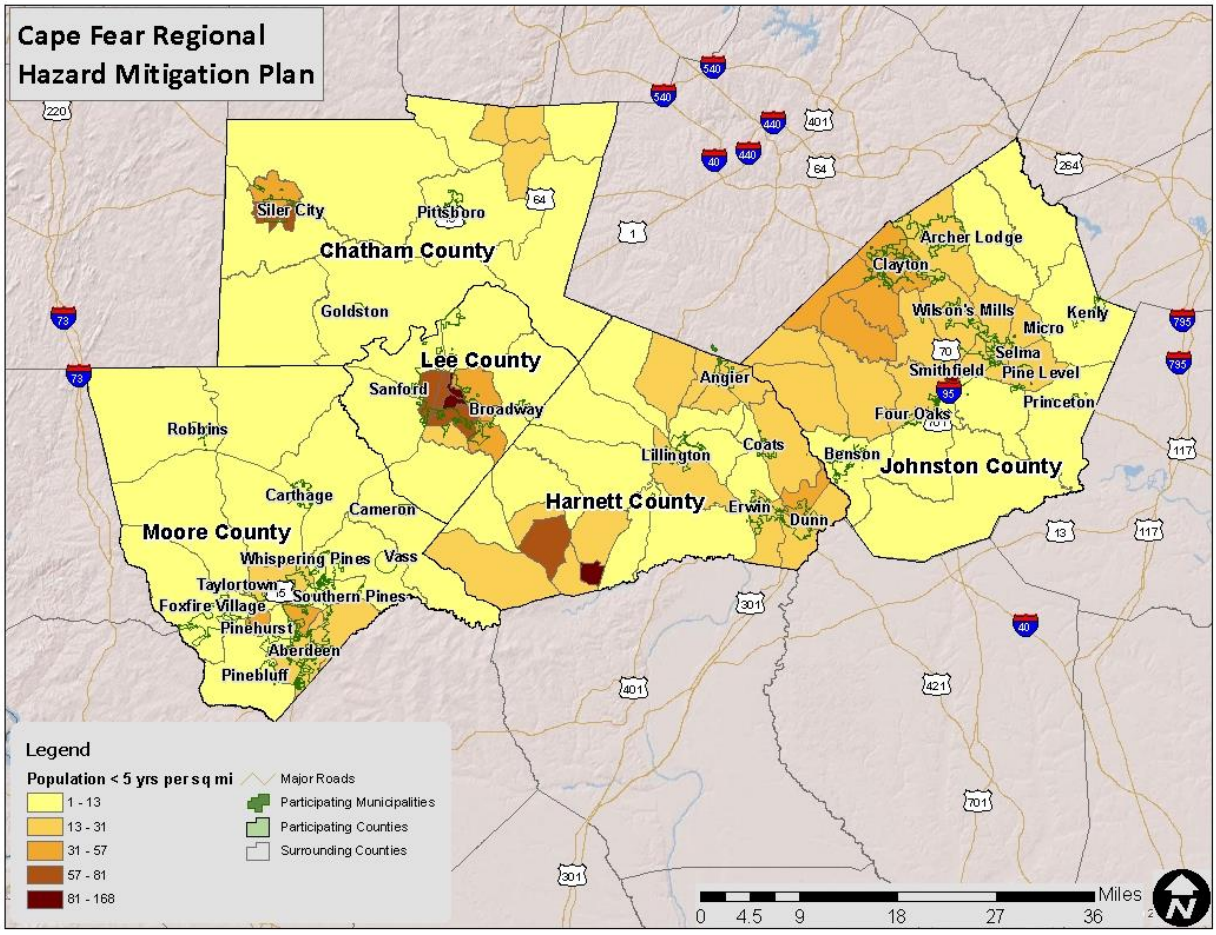
TABLE E.1: TOTAL POPULATION IN THE CAPE FEAR REGION*

Location	Total 2013 Population	Population Under 5		Population 65 and Over		Population with a Disability	
		#	% of Total	#	% of Total	#	% of Total
Chatham County	64,212	3,692	5.7%	12,765	19.9%	7,769	12,1%
Harnett County	113,002	9,441	8.4%	12,201	10.8%	15,288	13.5%
Johnston County	170,566	12,456	7.3%	17,989	10.5%	20,796	12.2%
Lee County	57,487	4,175	7.3%	8,014	13.9%	8,025	14.0%
Moore County	87,234	4,991	5.7%	19,942	22.9%	12,622	14.5%
CAPE FEAR REGION TOTAL	**492,501**	**34,755**	**7.1%**	**70,911**	**14.4%**	**64,500**	**13.1%**

*These population counts are based only on the civilian non-institutionalized population.
Source: United States Census Bureau, 2009-2013 5-Year American Community Survey

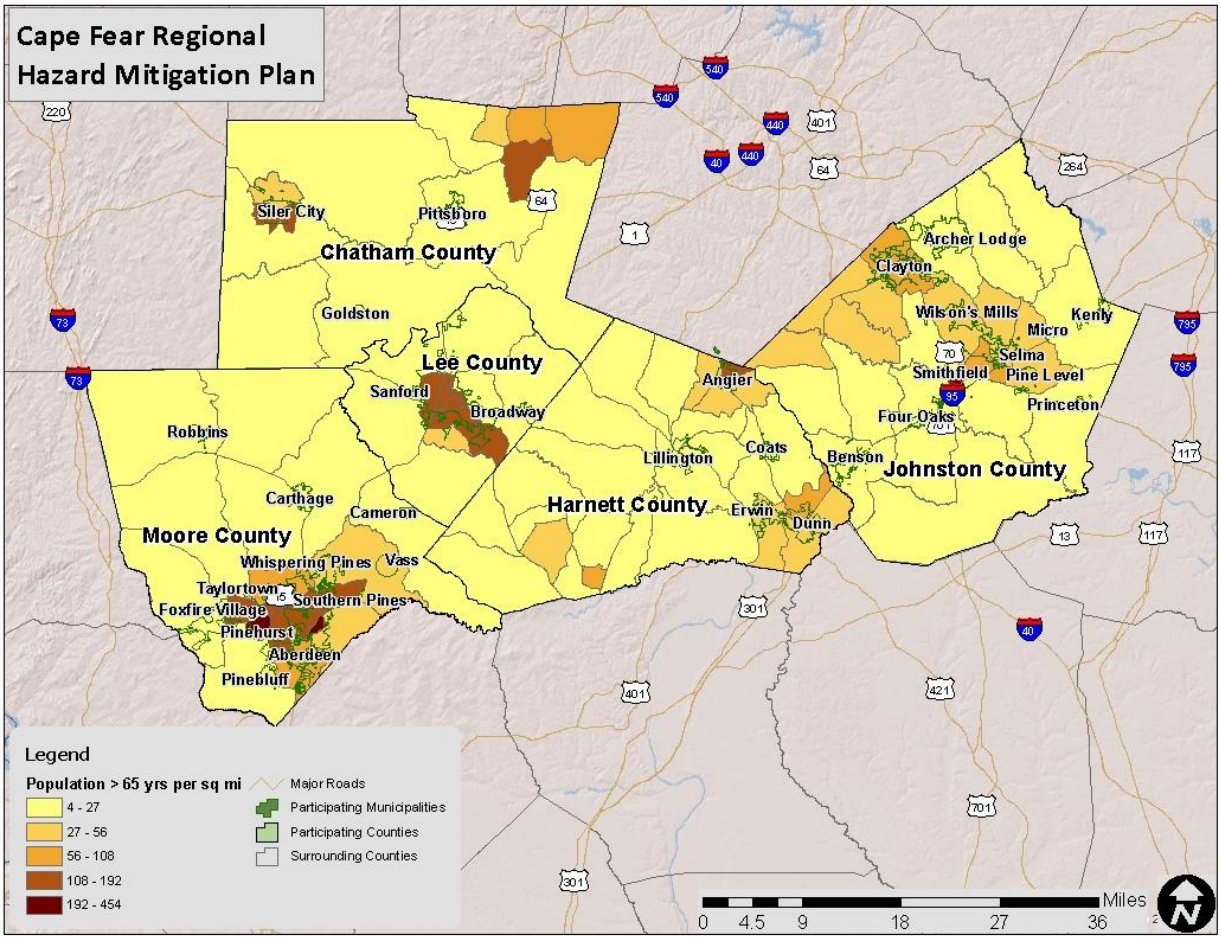
In addition, **Figure E.1**, **Figure E.2**, and **Figure E.3** illustrate the population density of residents under 5 years, 65 years and over, and with a disability, respectively, by census tract as it was reported by the U.S. American Community Survey in 2013.

FIGURE E.1: POPULATION DENSITY OF RESIDENTS UNDER 5 YEARS IN THE CAPE FEAR REGION



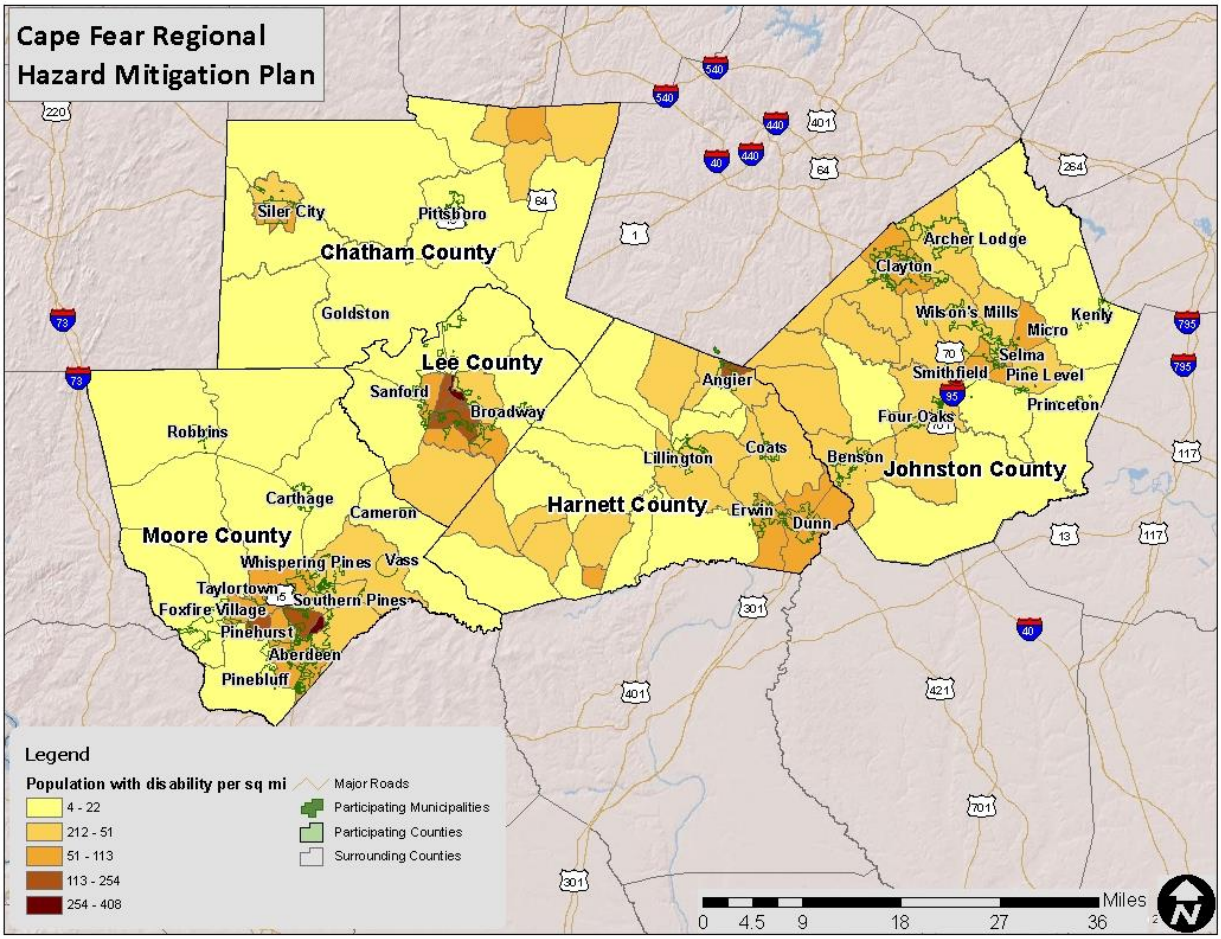
Note: This map is based only on estimates for the civilian non-institutionalized population in each census tract.
Source: United States Census Bureau, 2009-2013 5-Year American Community Survey

FIGURE E.2: POPULATION DENSITY OF RESIDENTS 65 YEARS AND OVER IN THE CAPE FEAR REGION



Note: This map is based only on estimates for the civilian non-institutionalized population in each census tract.
Source: United States Census Bureau, 2009-2013 5-Year American Community Survey

FIGURE E.3: POPULATION DENSITY OF RESIDENTS WITH A DISABILITY IN THE CAPE FEAR REGION



Note: This map is based only on estimates for the civilian non-institutionalized population in each census tract.
Source: United States Census Bureau, 2009-2013 5-Year American Community Survey

E.2 PUBLIC HEALTH AND EMERGING DISEASE THREAT

E.2.1 Background

Communicable diseases, also known as infectious or transmissible diseases, are illness that can be spread directly from one person to another or indirectly through vectors such as insects, air, water, blood, or other objects. The impact of communicable disease can range from no symptoms, mild to severe symptoms, or even fatality. Most communicable diseases are well controlled in the United States and the Cape Fear Region through public health methods of disease reporting, vaccinations, vector control, and effective treatments. However, control systems can fail and outbreaks can potentially occur.

In recent years, there have been two significant viral outbreaks from emerging diseases: West Nile virus and Severe Acute Respiratory Syndrome (SARS). West Nile virus is a virus that is typically passed by mosquitoes to humans and/or animal while SARS is a respiratory syndrome that is transmitted by airborne droplets and spread by close person-to-person contact. Although both of these conditions

were a large public health concern when they were first identified, currently, West Nile virus has a low frequency of occurrence and results in serious disease in a very small percentage of cases while SARS has virtually been eradicated.

Other communicable diseases pose a greater threat to the residents of the Cape Fear Region. Some diseases of greatest concern include influenza, particularly in a pandemic form, norovirus, and tuberculosis.

Influenza, commonly referred to as the "flu," can result in serious illness or even death, especially in people at high risk for developing flu-related complications such as young children, the elderly, and people with weakened immune systems. Additionally, there is also potential risk for an outbreak of pandemic H1N1 forms of the flu, such as during the "Spanish Flu" outbreak in 1918 and 1919 which killed over 50 million people worldwide. Every year, the Cape Fear Region sees hundreds, if not thousands, of cases of the flu, which leads to lost productivity in businesses due to sick employees. However, a vaccine for the flu is produced every year, and it is typically highly effective in preventing the disease.

Norovirus is recognized as the leading cause of foodborne-disease outbreaks in the United States and worldwide, and it is also responsible for at least 50% of all gastroenteritis outbreaks. The virus causes people to become ill with diarrhea and vomiting and is spread by surface to surface contact and through contaminated food or water. Norovirus spreads quickly from person to person in enclosed places, so especially vulnerable populations include those people in nursing homes, assisted living facilities, and other healthcare facilities such as hospitals. Outbreaks also often occur from restaurants and catered-meal settings if contaminated food is served. Additionally, norovirus can be a threat in the event of large public gatherings such as sporting events, concerts, and festivals. The Cape Fear Region and the state of North Carolina experience numerous norovirus outbreaks every year. No vaccine or treatment exists for the norovirus, making it especially dangerous for the public in the event of an outbreak.

Tuberculosis (TB) is a bacterial infection that originates from airborne exposure. The bacteria usually attacks the lungs but it can attack any part of the body, including the kidneys, spine, and brain. If not treated properly, TB can be fatal. TB control is a state-mandated service that is provided in the Cape Fear Region. Services provided include detecting and treating known cases of TB and identifying, screening, and monitoring their contacts. However, if drug-resistant strains become more prevalent in the future, TB is a disease that could become a cause of greater concern in the Cape Fear Region.

Public health threats can occur at any time and can have varying impacts. Discussions between public health professionals, planning officials, and first response agencies are essential in order to facilitate safe, effective, and collaborative efforts to prevent and manage outbreaks.

E.2.2 Location and Spatial Extent

Due to the nature of a public health/emerging disease event, it would be difficult to predict a precise location where this type of event would occur. Moreover, a large-scale event may have impacts that spread throughout the region. Therefore, all areas in the Cape Fear Region are considered equally susceptible to public health/emerging diseases.

E.2.3 Historical Occurrences

Data from the Centers for Disease Control and Prevention (CDC) and the NC Department of Health and Human Services (NC DHHS) was used to ascertain historical public health/emerging disease events.

In February 2003, SARS was first reported in Asia. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the global outbreak was contained. There was a single confirmed case of SARS in North Carolina in June 2003, which was the eighth confirmed case in the U.S. No further confirmed cases were reported in the U.S., and the outbreak was declared contained in July 2003.

West Nile virus was first found in the U.S. in 1999 and has since spread across the country. In North Carolina, most cases have been reported in the piedmont counties, which includes the Cape Fear Region, although it can occur anywhere in the state. From 2003 to 2012, there was only one confirmed or probable West Nile virus case reported in the Cape Fear Region, which was in Harnett County.

Influenza, norovirus, and tuberculosis are regularly occurring health issues in the Cape Fear Region. With the exception of tuberculosis, these conditions are not legally reportable to county or state public health agencies, so data on disease incidence is not readily available. However, these diseases are monitored through local epidemiological surveillance systems in hospitals and health departments, and any potential outbreaks are investigated promptly.

During outbreak events, as stated in NCGS § 130A – 145, the State Health Director and a local health director are empowered to exercise quarantine and isolation authority. Quarantine and isolation authority shall be exercised only when, and so long as, the public health is endangered, all other reasonable means for correcting the problem have been exhausted, and no less restrictive alternative exists.

E.2.4 Probability of Future Occurrence

Due to some recent incidents that have been recorded in the Cape Fear Region, future occurrences of public health and emerging disease threats are considered possible.

E.3 PUBLIC HEALTH RISK ASSESSMENT

The following is an assessment of the potential impacts of high risk hazards on public health in the Cape Fear Region across Chatham, Harnett, Johnston, Lee, and Moore Counties (detailed information on the hazard prioritization process can be found in Section 5: *Hazard Profiles*).

E.3.1 Thunderstorm Wind / High Wind

There have been several reports of injuries and fatalities caused by thunderstorm and high wind events in the Cape Fear Region. Wind events can cause public health and other service interruptions. For example, wind events can result in falling branches, trees, and other debris that block road access to vulnerable populations as well as extensive power outages that may disrupt medication regimens or treatments for people with chronic health conditions.

E.3.2 Flood

While flood-related injuries and fatalities in the Cape Fear Region are rare, they do occasionally occur. Additionally, asthma, chronic obstructive pulmonary disease, and other chronic health conditions can be worsened if medication regimens are disrupted or during the recovery phase as mold, mildew, and contaminated products are encountered by residents during post-flood clean up. The physical and psychological stress resulting from a major flood event will impact healthy individuals as well as those living with chronic conditions. It is anticipated that the demand for mental health services would increase following a significant flood event. Further, hunger rates may increase following a flood since affected households and communities may be at increased risk of food insecurity due to destroyed or contaminated food supplies. A lack of potable water is also possible, especially in rural areas that rely on private wells.

E.3.3 Hurricane and Tropical Storm

While hurricane-related injuries and fatalities in the Cape Fear Region are rare, they do occasionally occur. Additionally, asthma, chronic obstructive pulmonary disease, and other chronic health conditions can be worsened if medication regimens are disrupted or during the recovery phase as mold, mildew, and contaminated products are encountered by residents during post-hurricane clean up. Further, hunger rates may increase following hurricane-induced flooding since affected households and communities may be at increased risk of food insecurity due to destroyed or contaminated food supplies. A lack of potable water is also possible, especially in rural areas that rely on private wells. Hurricane and tropical storm events can also result in falling branches, trees, and other debris that block road access to vulnerable populations.

E.3.4 Tornado

Tornados can result in numerous injuries and fatalities in the Cape Fear Region. Tornado events can also cause public health and other service interruptions. For example, tornado winds can result in falling branches, trees, and other debris that block road access to vulnerable populations as well as extensive power outages that may disrupt medication regimens or treatments for people with chronic health conditions. Extensive damage may also leave many residents without shelter or personal belongings following a significant tornado event. The physical and psychological stress resulting from a major tornado event will impact healthy individuals as well as those living with chronic conditions. It is anticipated that the demand for mental health services would increase following a significant tornado event. Further, hunger rates may increase following a tornado since affected households and communities may be at increased risk of food insecurity due to destroyed food supplies. A lack of potable water is also possible in impacted areas.

E.3.5 Hailstorm

Although there have been no reports of injuries or fatalities related to hailstorms in the Cape Fear Region (according to NCDC), injuries are possible in the future. However, hail is unlikely to cause major interruptions to public health or other services, and therefore it is expected to have a minimum impact on the region's public health.

E.3.6 Drought

While drought-related injuries and deaths are unlikely in the Cape Fear Region, drought events still have the potential impact public health. Drought can significantly affect farming and agricultural production which can result in decreased food security and high rates of hunger. Additionally, a shortage of both portable and non-potable water is possible.

E.3.7 Winter Storm and Freeze

Although there have been no reports of injuries or fatalities related to winter storms in the Cape Fear Region (according to NCDC), they are possible in the future. Winter storms can cause hypothermia, traffic accidents, slip-and-fall accidents, and power outages. Furthermore, residents may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes. Additionally, winter storms may result in public health and other service interruptions. During a winter storm event, it may be difficult to provide care to vulnerable populations and food and water security may decrease as supplies on-hand are depleted.

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