ATKINS

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

Final











Plan Design Enable

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SECTION 1
INTRODUCTION

This section provides a general introduction to the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region is located in the western part of North Carolina and includes the counties of Cleveland, Gaston, and Lincoln 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 Cleveland Gaston Lincoln 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 three counties and their municipal jurisdictions participating in the development of the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan is to:

- Merge the existing Cleveland, Gaston, and Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the Cleveland Gaston Lincoln 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 Cleveland, Gaston, and Lincoln as well as their incorporated jurisdictions. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLAN

Cleveland County	
Belwood	Lattimore
Boiling Springs	Lawndale
Casar	Mooresboro
Earl	Patterson Springs
Fallston	Polkville
Grover	Shelby
Kingstown	Waco
Kings Mountain	Unincorporated Cleveland County

Gaston County	
Belmont	Lowell
Bessemer City	McAdenville
Cherryville	Mount Holly
Cramerton	Ranlo
Dallas	Spencer Mountain
Gastonia	Stanley
High Shoals	Unincorporated Gaston County
Kings Mountain	
Lincoln County	
Lincolnton	Unincorporated Lincoln County

1.4 AUTHORITY

The Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region
- 2.3 Preparing the 2014 Plan
- 2.4 The Cleveland Gaston Lincoln Regional Hazard Mitigation Council
- 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 CLEVELAND GASTON LINCOLN REGION

Each of the three 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:

- *Cleveland County Multi Jurisdictional Hazard Mitigation Plan* (November 2011)
  - City of Shelby
  - City of Kings Mountain
  - Town of Belwood
  - Town of Boiling Springs
  - Town of Casar
  - Town of Earl
  - Town of Fallston
  - Town of Grover
  - Town of Kingstown
  - Town of Lattimore
  - Town of Lawndale
  - Town of Mooresboro
  - Town of Patterson Springs
  - Town of Polkville
  - Town of Waco

- *Gaston County Multijurisdiction Hazard Mitigation Plan* (September 2011)
  - City of Belmont
  - City of Bessemer City
  - City of Cherryville
  - Town of Cramerton
  - Town of Dallas
  - City of Gastonia
  - City of High Shoals
  - City of Kings Mountain
  - City of Lowell
  - Town of McAdenville
  - City of Mount Holly
  - Town of Ranlo
  - Town of Spencer Mountain
  - Town of Stanley
- *Lincoln County Hazard Mitigation Plan* (November 2010)
  - City of Lincolnton

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 Cleveland Gaston Lincoln Region, Cleveland County, Gaston County, and Lincoln County decided to join together to create the *Cleveland Gaston Lincoln 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 three existing county plans into one multi-jurisdictional plan.

To prepare the 2014 *Cleveland Gaston Lincoln 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

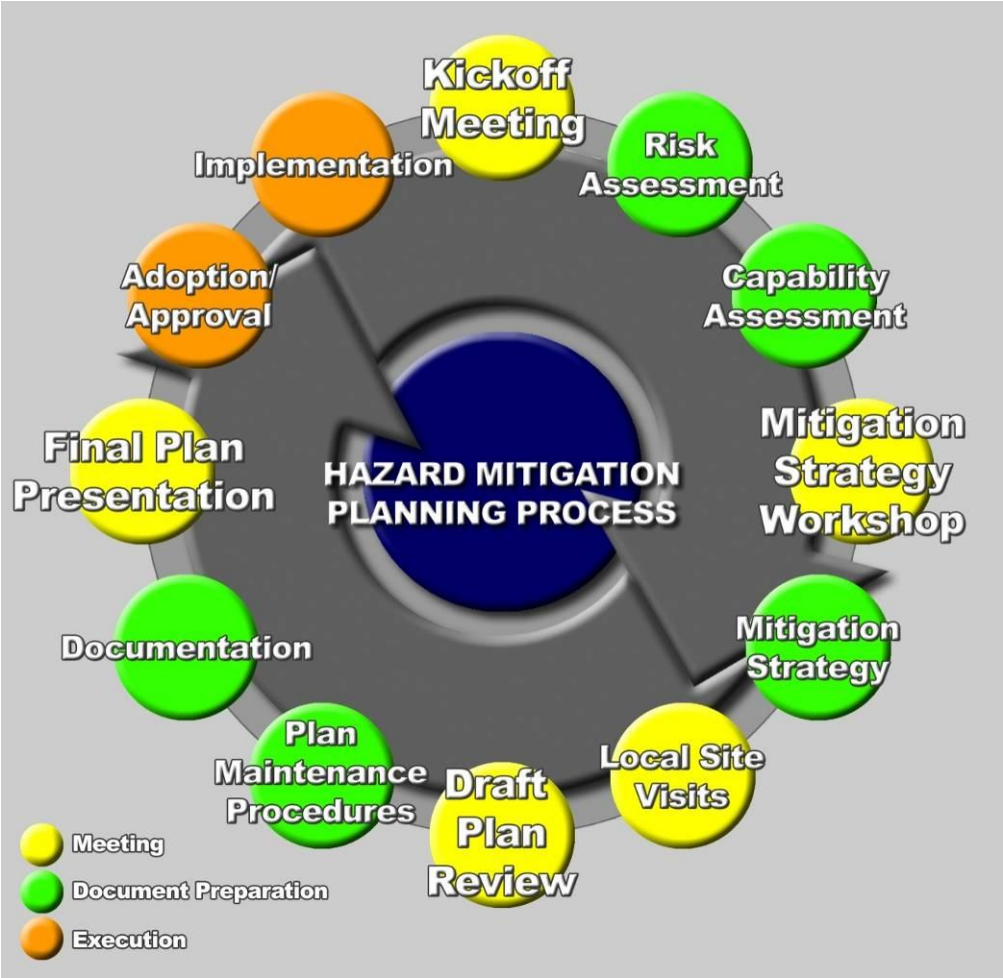
planning staff[1]. The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this Plan. These standards are based upon FEMA's Final 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 three 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 nine months beginning in May 2013. 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 Cleveland County upon request.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE CLEVELAND GASTON LINCOLN REGION



2.4 THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION COUNCIL

In order to guide the development of this Plan, the participating jurisdictions (Cleveland County, Gaston County, and Lincoln County and participating municipal jurisdictions) created the Cleveland Gaston Lincoln Regional Hazard Mitigation Council. The Regional Hazard Mitigation Council 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 June 2013, the Regional Hazard Mitigation Council 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 Council members included:

- participate in Regional Hazard Mitigation Council 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 *Cleveland Gaston Lincoln Regional Hazard Mitigation Plan*

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

TABLE 2.1: MEMBERS OF THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION COUNCIL

NAME	DEPARTMENT / AGENCY
Rodney Robinson	Cramertown Police Department (also represented McAdenville)
Tommy Almond*	Gaston County EM
Ben Blackburn	City of Cherryville
Quentin Cash	Cherryville Fire
Jeff Cash	Cherryville Fire
Eric Hendrix	Gaston County Fire Marshall's Office
Terry Revis	Mount Holly Fire
Jim Benfield	Mount Holly Police
Kevin Krouse	Bessemer City
Chris Henderson	Lincoln County Public Works
Margaret Royster	American Red Cross
Mark Carpenter	City of Lincolnton
Steve Jentsch	Gaston County Police
Craig Austin	Belmont Fire Department
Keith Watts	Gastonia Fire
Willie King Jr.	Gaston County
David Williams	Gaston County
Rob Boff	City of Lincolnton
David Kohler	Town of Dallas
Craig Moorehead	Cleveland County American Red Cross
Dewey C. Cook	Cleveland County EM
Perry Davis*	Cleveland County EM
Teresa Vassey	Cleveland County EM
Captain S. G. Bates	Lowell Police Department

NAME	DEPARTMENT / AGENCY
Rick McSwain	Lincoln Soil and Water Conservation District
Bobby Horton	Cleveland County EM (also represented Town of Patterson Springs)
Randy Williams	Lincoln County Planning
Joshua Grant*	Lincoln County Planning
Andrew C. Bryant	Lincoln County Planning
Martha Lide	Lincoln County Manager's Office
Steve Peeler	Lincolnton Public Works and Utilities
Laura Simmons	Lincolnton Planning Department
Erma Deen Hoyle	Lincoln County Parks and Recreation
Don Chamblee	Lincoln County Public Works

* Served as the County's main Point of Contact

2.4.1 Multi-Jurisdictional Participation

The Cleveland Gaston Lincoln Regional Hazard Mitigation Plan includes three 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.

[2] Copies of agendas, sign-in sheets, minutes, and handout materials for all meetings and workshops can be found in Appendix D.

July 9, 2013
First Regional Hazard Mitigation Council Meeting – Cherryville, NC

Mr. Slaughter, Project Manager from Atkins, led the meeting of the Regional Hazard Mitigation Council and began by having attendees introduce themselves. The 32 attendees included representatives from various departments and local jurisdictions within each of the three counties 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 three 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 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 November of 2013 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.

November 19, 2013
Mitigation Strategy Meeting – Cherryville Fire Station

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

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

- EXTREME HEAT. There has only been one recorded extreme heat event reported since 1999 that resulted in one injury. Additional significant heat waves were reported in 1980, 1998, 2000, 2007 and 2012. Future occurrences are possible.

- HAILSTORM. There have been 373 recorded events since 1962. Future occurrences are highly likely.

- LIGHTNING. There have been 53 recorded lightning events since 1993, causing twelve injuries, and $2.9 million in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 51 recorded tornado events reported in the region since 1956. $124.3 million in property damages. 5 deaths and 77 injuries have been reported. Future occurrences are likely.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 35 storm tracks have come within 75 miles of the Cleveland Gaston Lincoln Region since 1850. 13 of these events were tropical storms and 22 were tropical depressions. Future occurrences are possible.

- SEVERE THUNDERSTORM WINDS. There have been 522 severe thunderstorm events reported since 1955 with $2.7 million in reported property damages. 2 deaths and 10 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 151 recorded winter events in the Cleveland Gaston Lincoln Region since 1993 resulting in $64.1 million in reported property damages. Future occurrences are likely.

- EARTHQUAKES. There have been 28 recorded earthquake events in the Cleveland Gaston Lincoln Region since 1886. The strongest had a recorded magnitude of VII MMI. Future occurrences are possible.

- LANDSLIDE. There have been no recorded landslide events in the Cleveland Gaston Lincoln Region. Mr. Wiedenman asked the Regional Hazard Mitigation Council to provide local information on landslide events, if available. Future occurrences are possible.

- DAM FAILURE. There are 234 dams in the Cleveland Gaston Lincoln Region, 50 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 the previous County level plans but impacts are minimal. Future occurrences are possible.

- FLOOD. There have been 53 flood events recorded in the Cleveland Gaston Lincoln Region since 1993, resulting in $3.7 million in property damage. There have been 46 NFIP losses since 1978 and approximately $511,000 million in claims. Two repetitive loss properties in the region account for 5 of the recorded losses. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 21 reported hazardous materials events reported in the region. Only 1 was reported as a serious incident. Future occurrences are possible. A question was raised about why the buffers of 500 and 2500 meters were used for analysis. Meeting participants asked that buffers of ½ mile and a mile be used.

- WILDFIRE. There is an average of 160 fires per year reported in the Cleveland Gaston Lincoln Region. Future occurrences are likely but major events are not common.

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 Winter Storms and Freeze, followed by Severe Thunderstorm, Flood and Tornado. Wildfire was moved from a high risk hazard to a moderate 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 in the moderate range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and grant writers. 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.

Mr. Slaughter also 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, 291 responses had been received. Based on preliminary survey results, respondents felt that severe thunderstorms posed the greatest threat to their neighborhood, followed by tornado, severe winter/ice storms and flood. 80 percent of the respondents were interested in making their homes more resistant to hazards. However, 73 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Council 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 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 three existing county plans. The Regional Hazard Mitigation Council accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Cleveland, Gaston and Lincoln 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 December 13, 2013. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by December 13, 2013.

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 *Cleveland Gaston Lincoln 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 Cleveland, Gaston and Lincoln 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 Council 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 Cleveland, Gaston and Lincoln Counties 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 Council 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 291 survey responses were received, which provided valuable input for the Regional Hazard Mitigation Council to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 48 percent of survey respondents had been impacted by a disaster, mainly hurricanes, tornadoes, and winter storms.
- Respondents ranked Severe Thunderstorm/High Wind as the highest threat to their neighborhood (36 percent), followed by Tornado (28 percent), Flood (7 percent), Severe Winter/Ice Storm (7 percent), and Hurricane/Tropical Storm (5 percent).
- Approximately 24 percent of respondents have taken actions to make their homes more resistant to hazards and 80 percent are interested in making their homes more resistant to hazards.

- 73 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 Council 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Council 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 Cleveland Gaston Lincoln 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 County-specific annexes provide more detailed community profile information about each County

3.1 GEOGRAPHY AND THE ENVIRONMENT

The Cleveland Gaston Lincoln Region is located in the southern portion of Western North Carolina, just west of Charlotte. As the name implies, the Cleveland Gaston Lincoln Region includes Cleveland, Gaston, and Lincoln Counties as well as their respective municipalities. An orientation map is provided as **Figure 3.1**.

The Cleveland Gaston Lincoln Region is home to many scenic areas and tourist attractions including nearby Lake Norman which is located partially in Lincoln County, Crowders Mountain State Park located in Gaston County and the historic Herschell-Spillman carrousel located in the Shelby City Park located in Cleveland County. Residents of the region enjoy taking advantage of a wide variety of activities such as outdoor activities provided by the lakes and mountains. Mountain Island Lake and Lake Wylie are two popular waterway destinations. Residents are also able to enjoy the conveniences of being located near a major metropolitan area, but still enjoy the small-town feel of their communities.

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 AND TRIBE

County	Total Land Area
Cleveland County	469 square miles
Gaston County	364 square miles
Lincoln County	307 square miles

Source: US Census Bureau

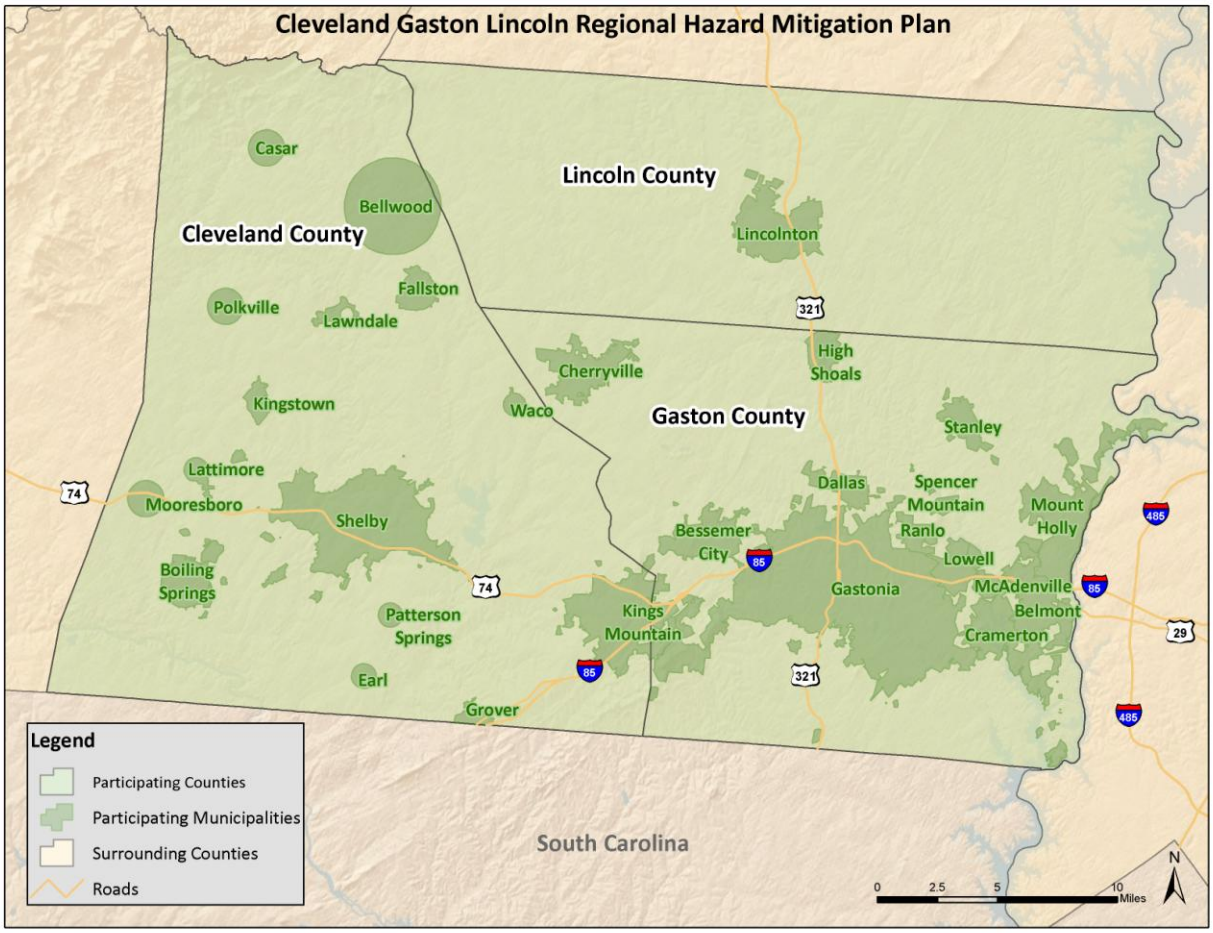
The Cleveland Gaston Lincoln Region enjoys a moderate climate that is characterized by mild winters and hot, humid summers; however, variation in elevation and topography can drastically affect local weather. In general, the spring months are marked by unpredictable weather and changes can occur rapidly with sunny skies yielding to rain in a just a few hours.

From March through May, temperatures have an average high in the mid-sixties and an average low in the lower forties. Typically, the weather is milder by late April and warm in May. In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the upper 80s in July and August.

September through mid-November is typified by clear skies and cooler weather that alternates between warm days and cool nights. Daytime highs are usually in the 70s and 80s during September but fall to the 50s and 60s by early November. The first frost often occurs in late September and the lows are near freezing by November. During these autumn months, there are only occasional rain showers making it the driest period of the year.

Winter in the Cleveland Gaston Lincoln Region is generally moderate but extremes do occur. Many days from mid-November through February have high temperatures of 50˚F or more and can even reach the 70s on occasion. However, winter lows are usually at or below freezing with temperatures dropping to the 20s at times. Snow is most common during January and February and snows of one inch or more sometimes occur several times per year.

FIGURE 3.1: CLEVELAND GASTON LINCOLN REGION ORIENTATION MAP



3.2 POPULATION AND DEMOGRAPHICS

Cleveland County is the largest participating county in the Region by land area, and Gaston County is the largest county by population. Between 2000 and 2010, all of the participating counties experienced population growth with Lincoln County having the most significant growth with a 22.7% increase. Population counts from the US Census Bureau for 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
Cleveland County	84,714	96,287	98,078	1.9%
Gaston County	175,093	190,365	206,086	8.3%
Lincoln County	50,319	63,780	78,265	22.7%

Source: US Census Bureau

Based on the 2010 Census, the median age of residents of the participating counties ranges from 39.1 to 40.4 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 75 percent 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)*
Cleveland County	75.6%	20.7%	0.2%	0.8%	0.0%	1.2%	1.7%	2.8%
Gaston County	78.2%	15.3%	0.4%	1.2%	0.0%	3.1%	1.8%	5.9%
Lincoln County	89.4%	5.5%	0.3%	0.5%	0.0%	2.7%	1.6%	6.7%

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

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the 2010 US Census, there were 165,700 housing units in the Cleveland Gaston Lincoln Region, the majority of which are single family homes or mobile homes. Housing information for the three participating counties is presented in **Table 3.4**. As shown in the table, Lincoln 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)
Cleveland County	40,317	43,373	0.7%	$104,300
Gaston County	73,936	88,686	0.3%	$124,300
Lincoln County	25,717	33,641	1.6%	$151,900

Source: US Census Bureau

3.3.2 Infrastructure

Transportation

There are three key roads that traverse the Cleveland Gaston Lincoln Region: Interstate 85, US 321, and US 74. Interstate 85 is an important interstate route extending east-west through unincorporated areas of Gaston County and Cleveland County as well as Belmont, Gastonia, Bessemer City, and Kings Mountain. I-85 also has an interchange with another major regional roadway, US 321. US 321, which offers additional access to other parts of the region, is an important north-south route through Gaston County and Lincoln County. US Route 74, another commercial and truck route, also extends through both Gaston County and Lincoln County.

Charlotte-Douglas International Airport is the largest airport in the state and is the primary airport used by residents of the Cleveland Gaston Lincoln Region. The airport currently offers non-stop commercial flights on nine airlines to cities around the country and the world. This airport is less than 50 miles from most areas in the region and served over 41 million passengers in 2012, nearly doubling the number of passengers it served in 2000. Three smaller airports that also serve the region are the Shelby-Cleveland County Regional Airport, Gastonia Municipal Airport, and Lincolnton-Lincoln County Regional Airport.

Utilities

Electrical power in the Cleveland Gaston Lincoln Region is provided by two public utilities and several electricity cooperatives. Duke Energy and Energy United provide service to all three counties. The electricity cooperatives servicing the region include Rutherford Electric Membership Corporation in both Lincoln and Gaston Counties. Southern Power, which is a wholesale energy provider to the NC Electric Membership Corporation and NC Municipal Power Agency Number 1, is located in Cleveland County.

Water and sewer service is provided by many of the towns in the Cleveland Gaston Lincoln Region as well as by Cleveland County Water which is a regional water supplier across the region except in Gaston County. Although parts of the region 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 Cleveland Gaston Lincoln Region. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 81 fire stations, 24 police stations, and 112 public schools located within the study area.

Twenty medical care facilities are located in the Cleveland Gaston Lincoln Region. The largest is Caromont Regional Medical Center, a 435-bed hospital located in the City of Gastonia. The Cleveland Regional Medical Center in Shelby and Carolinas Medical Center in Lincolnton are two additional short

term acute centers with 241 beds and 101 beds, respectively. There are several smaller hospitals located throughout the region as well, the largest of which is Kings Mountain Hospital.

In addition to Crowders Mountain State Park, the Cleveland Gaston Lincoln Region contains numerous local parks and recreation areas, including easy access to Lake Norman, Kings Mountain State Park (in SC), the Broad River, Mountain Island Lake, and Lake Wylie. These facilities offer recreational opportunities to area residents and many visitors each year.

3.3.3 Land Use

The Cleveland Gaston Lincoln Region is a rapidly developing region due to its proximity to the major metropolitan area of Charlotte. As shown in **Figure 3.1** above, there are many incorporated municipalities located throughout the study area which cover a great deal of the region's land area and 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 areas.

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

3.4 EMPLOYMENT AND INDUSTRY

The early modern economy in the Cleveland Gaston Lincoln Region was built around agricultural industries such as wheat, sweet potatoes, dairy, cotton, and textiles. Like many other towns in North Carolina, the jurisdictions in the Cleveland Gaston Lincoln Region have focused recent economic development efforts on cultural and natural heritage tourism.

According to the North Carolina Employment Security Commission, in 2012, Cleveland County had an average annual employment of 45,094 workers. In 2011, the Manufacturing industry employed 16.5 percent of the County's workforce followed by Retail Trade (11.5%); Educational Services (7.6%); and Accommodation and Food Services (7.3%). From 2007 to 2011, the average annual median household income in Cleveland County was $38,352 compared to $46,291 for the state of North Carolina.

In 2012, Gaston County had an average annual employment of 89,791 workers. In 2011, according to NCESC, the Manufacturing industry employed the most people, with 17.3 percent of the workforce, followed by Health Care and Social Assistance (17.1%); Retail Trade (13.8%); Accommodation and Food Services (8.7%); and Educational Services (8.3%). The average annual median household income in Gaston County was $43,052 from 2007 to 2011.

Lincoln County had an average annual employment of 35,460 workers in 2012. According to the NCESC, in 2011, the Manufacturing industry was again the largest employment sector with 21.8 percent of the County's workforce. The other leading industries were Retail Trade (13.9%); Accommodation and Food Services (8.6%); and Educational Services (8.3%). The average annual median household income in Lincoln County was $50,276 from 2007 to 2011.

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 jurisdictions in the Cleveland Gaston Lincoln Region 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln Region

[1] A complete list of disaster declarations for the Cleveland Gaston Lincoln 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 Council during the plan update process.

Lastly, **Table 4.4** provides a summary of the hazard identification and evaluation process noting that 16 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 Cleveland Gaston Lincoln regional planning area. Since 1974, seven presidential disaster declarations have been reported in the Cleveland Gaston Lincoln Region. This includes three storms related to winter storm events, two storms related to hurricanes and tropical storms, and two storms related to tornadoes.

TABLE 4.2: CLEVELAND GASTON LINCOLN REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Cleveland County	Gaston County	Lincoln County
1974	428	TORNADOES		X	X
1989	827	TORNADOES	X		X
1989	844	HURRICANE HUGO	X	X	X
1996	1087	BLIZZARD OF 96	X	X	X
1996	1103	WINTER STORM	X	X	X

Year	Disaster Number	Description	Cleveland County	Gaston County	Lincoln County
2002	1448	SEVERE ICE STORM	X	X	X
2004	1546	TROPICAL STORM FRANCES	X	X	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 US Forest Service National Avalanche Center web site • Review of the NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• There is no risk of avalanche events in North Carolina. 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 Cleveland Gaston Lincoln hazard mitigation plans.

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 the NC State Hazard Mitigation Plan • Review of the North Carolina Drought Monitor website • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• There are reports of drought conditions in each of the last 14 years in the Cleveland Gaston Lincoln Region, according to the North Carolina Drought Monitor. • Droughts are discussed in NC State Hazard Mitigation Plan as a lesser hazard. • Drought is included in all of the previous Cleveland Gaston Lincoln hazard mitigation plans.
Hailstorm	YES	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database • Review of previous hazard mitigation plans in the Cleveland Gaston Lincoln counties	• Hailstorm events are discussed in the state plan under the Severe Thunderstorm hazard. • NCDC reports 372 hailstorm events (3/4 inch size hail to 4.0 inches) for the Cleveland Gaston Lincoln Region between 1977 and 2012. For these events there were $2 million (2013 dollars) in property damages. • Although hail is not addressed as an individual hazard in the three previous hazard mitigation plans, it is addressed as a sub-item under thunderstorms. Given the frequency of the event, individual analysis is warranted.
Heat Wave	YES	• Review of NOAA NCDC Storm Events Database • Review of the North Carolina State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• NCDC reports 1 extreme heat event for the Cleveland Gaston Lincoln counties. • The NC State Hazard Mitigation Plan includes Heat Wave as a lesser hazard • Temperatures have reached as high as 107 degrees Fahrenheit at several points in the region • Heat wave was mentioned in two of the three previous hazard mitigation plans.

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 NC State Hazard Mitigation Plan • 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 • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Hurricane and tropical storm events are discussed in the state plan and are listed as a top hazard in the Piedmont 5 Region which includes the Cleveland Gaston Lincoln counties. • NOAA historical records indicate 35 hurricane or tropical storms/depressions have come within 75 miles of the Cleveland Gaston Lincoln Region since 1850. • Two out of seven disaster declarations in the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region is between 55-65 mph. • Hurricane and tropical storm hazard was addressed in all three previous Cleveland Gaston Lincoln plans.
Lightning	YES	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database, NOAA lightning statistics • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Lightning events are discussed in the state plan as part of the severe thunderstorm hazard. • NCDC reports 53 lightning events for the Cleveland Gaston Lincoln Region since 1950. These events have resulted in a recorded 12 injuries and $2.9 million (2013 dollars) in property damage. • Although lightning is addressed as an individual hazard in only one of the previous Cleveland Gaston Lincoln hazard mitigation plans, it is addressed under thunderstorms in the other two plans. Given the damage and reported death and injuries, individual analysis is warranted.

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 NOAA NCDC Storm Events Database • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Nor'easters are discussed in the state plan. The Piedmont 5 Region, which includes the Cleveland Gaston Lincoln Region, has a low vulnerability. • NCDC does not report any nor'easter activity for the Cleveland Gaston Lincoln 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. • Nor'easters were identified in two of the three previous Cleveland Gaston Lincoln hazard mitigation plans; however, they were found to pose low to negligible risk or were classified under winter storms.
Tornado	YES	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Tornado events are discussed in the NC State Hazard Mitigation Plan. • NCDC reports 51 tornado events in Cleveland Gaston Lincoln Region counties since 1973. These events have resulted in 5 recorded deaths and have caused 77 injuries and $125.3 million (2013 dollars) in property damage with the most severe being an F4. • Tornado events were addressed in all of the previous Cleveland Gaston Lincoln plans.

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 NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Severe thunderstorm events are discussed in the NC State Hazard Mitigation Plan. The Piedmont 5 Region, including the Cleveland Gaston Lincoln counties, has a high vulnerability. • NCDC reports 522 thunderstorm wind events in the Cleveland Gaston Lincoln Region counties between since 1950. These events have resulted in 6 deaths and 12 injuries and $2.7 million (2013 dollars) in property damage. • Severe thunderstorm events were addressed in all of the previous Cleveland Gaston Lincoln plans.
Winter Storm and Freeze	YES	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of historical presidential disaster declarations. • Review of NOAA NCDC Storm Events Database • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• 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 5 Region which includes the Cleveland Gaston Lincoln Region counties. • NCDC reports that the Cleveland Gaston Lincoln counties have been affected by 151 snow and ice events since 1993. These events resulted in over $64 million (2013 dollars) in damages but did not cause any deaths or injuries. • Three of the region's seven disaster declarations were directly related to winter storm events. • Winter storm events were addressed in all of the previous Cleveland Gaston Lincoln plans.

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 NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • USGS Earthquake Hazards Program web site • Review of the National Geophysical Data Center • Review of FEMA's Multi-Hazard Identification and Risk Assessment	• Earthquake events are discussed in the state plan and all of the participating counties in the Cleveland Gaston Lincoln Region are considered to be at moderate risk to an earthquake event (no counties are high risk). • All of the previous plans in the Cleveland Gaston Lincoln Region address earthquake. • 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. • 28 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a 7. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Cleveland Gaston Lincoln Region is approximately 3-4%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 NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of USDA Soil Conservation Service's Soil Survey • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Expansive soils are identified in the state plan; however Piedmont 5 Region does not identify expansive soils as a top hazard. • According to FEMA and USDA sources, the Cleveland Gaston Lincoln Region is located in an area that has a "little to no" clay swelling potential. • None of the previous Cleveland Gaston Lincoln hazard mitigation plans identify expansive soils as a potential hazard.
Landslide	YES	• Review of NC State Hazard Mitigation Plan • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Landslide/debris flow events are discussed in the state plan, and ranked as a hazard in the Piedmont 5 Region which includes the Cleveland Gaston Lincoln counties. • USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landsliding) is found in all counties. All counties also have areas of moderate incident with high susceptibility. • All of the previous Cleveland Gaston Lincoln hazard mitigation plans address landslides.

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 NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina; however none of these areas are located in Cleveland Gaston Lincoln counties. • The plan identifies the Cleveland Gaston Lincoln counties as having scored very low for the land subsidence hazard. • None of the previous Cleveland Gaston Lincoln hazard mitigation plans identifies land subsidence as a potential hazard.
Tsunami	NO	• Review of NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses).	• Tsunamis are discussed in the state plan and described as a "greater" hazard for the state. However, the Piedmont Region scored a zero for tsunami hazard risk. • None of the previous plans in the Cleveland Gaston Lincoln Region addresses tsunami. • 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. • 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.

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?
Volcano	NO	• Review of NC State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program web site	• 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 Cleveland Gaston Lincoln Region.
HYDROLOGIC HAZARDS			
Dam and Levee Failure	YES	• Review of NC State Hazard Mitigation Plan • Review of North Carolina Division of Land Management web site • Review of U.S. Army Corps of Engineers National Inventory of Dams database • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Dam failure is discussed in the state plan as a hazard of concern for the Cleveland Gaston Lincoln Region. The Piedmont 5 Region, which includes the Cleveland Gaston Lincoln counties, is listed as the highest area of concern in the state. • Of the 232 dams reported in the region in the National Inventory of Dams, 50 are high hazard (21.5%), (High hazard is defined as "where failure or mis-operation will probably cause loss of human life.") • Two of the previous Cleveland Gaston Lincoln hazard mitigation plans address dam failure.
Erosion	YES	• Review of NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• Erosion is discussed to some degree in 2 of the previous Cleveland Gaston Lincoln mitigation plans. • Riverine erosion has the potential to occur due to the existence of several rivers in the region • Coastal erosion is discussed in the state plan but is only applicable for coastal 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?
Flood	YES	• Review of NC State Hazard Mitigation Plan • Review of historical disaster declarations • Review of NOAA NCDC Storm Events Database • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS) • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• The flood hazard is thoroughly discussed in the state plan. • Two of seven Presidential Disaster Declarations were flood-related and caused by hurricane or tropical storm-related events. • NCDC reports that Cleveland Gaston Lincoln Region counties have been affected by 55 flood events since 1993. These events in total caused no reported deaths or injuries, but did cause an estimated $3.7 million (2013 dollars) in property damages. • Nearly 7.4% of the Cleveland Gaston Lincoln Region is located in an identified floodplain (100 or 500 year). • All of the counties and nearly all of the municipalities participate in the NFIP. • All of the previous plans in the Cleveland Gaston Lincoln Region address flood hazard.
Storm Surge	NO	• Review of NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • Review of NOAA NCDC Storm Events Database	• Storm surge is discussed in the state plan under the hurricane hazard and indicates that the Piedmont 5 Region has zero vulnerability to storm surge. • None of the previous hazard mitigation plans in the Cleveland Gaston Lincoln Region address storm surge. • No historical events were reported by NCDC • Given the inland location of the Cleveland Gaston Lincoln Region, storm surge would not affect the area.

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?
OTHER HAZARDS			
Hazardous Materials Incident	YES	• Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region	• All of the previous Cleveland Gaston Lincoln Region hazard mitigation plans make mention of hazardous materials to some degree.
Terror Threat	NO	• Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • Review of local official knowledge	• None of the previous hazard mitigation plans for the region included terrorism threat as a hazard. • There are few high profiles targets in the area.
Wildfire	YES	• Review of NC State Hazard Mitigation Plan • Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Division of Forest Resources website	• Wildfires are discussed in the state plan as a “greater” hazard of concern. • All of the previous plans in the Cleveland Gaston Lincoln Region addressed wildfire. • The state plan lists wildfire as a top hazard in the Piedmont 5 Region. • A review of SWRA data indicates that there are areas of elevated concern in the Cleveland Gaston Lincoln Region. • According to the North Carolina Division of Forest Resources, the Cleveland Gaston Lincoln Region experiences an average of 160 fires each year which burn a combined average of 154 acres each year. • Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases.

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?
Nuclear Accident	YES	• Review of previous county hazard mitigation plans in the Cleveland Gaston Lincoln Region • Review of IAEA list of fixed nuclear power stations in the United States • Discussion with local officials about location of nuclear power stations	• The McGuire Nuclear Power Station is located on Lake Norman near the border of Mecklenburg and Lincoln Counties. • The Catawba Nuclear Power Stations is located across the state border in York, South Carolina, and could impact the region • Although nuclear accidents are not identified in any previous plans, local officials expressed a desire to address them 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 McGuire and Catawba Nuclear Power Stations

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Conclusions on Hazard Risk
- 5.20 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council as it relates to unique historical or anecdotal hazard information for the counties in the Cleveland Gaston Lincoln 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

5.2 STUDY AREA

Table 5.1 provides a summary table of the participating jurisdictions within each of the three counties included in this plan. In addition, **Figure 5.1** provides a base map, for reference, of the Cleveland Gaston Lincoln Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLAN

Cleveland County	
Belwood	Lattimore
Boiling Springs	Lawndale
Casar	Mooresboro
Earl	Patterson Springs
Fallston	Polkville
Grover	Shelby
Kingstown	Waco
Kings Mountain	Unincorporated Cleveland County
Gaston County	
Belmont	Lowell
Bessemer City	McAdenville
Cherryville	Mount Holly
Cramerton	Ranlo
Dallas	Spencer Mountain
Gastonia	Stanley
High Shoals	Unincorporated Gaston County

Kings Mountain*	
Lincoln County	
Lincolnton	Unincorporated Lincoln County

*For the purposes of the hazard identification, risk assessment, and vulnerability assessment, the portion of Kings Mountain in Cleveland County and Gaston County were evaluated together and information is can be found under Cleveland County.

FIGURE 5.1: CLEVELAND GASTON LINCOLN REGION BASE MAP

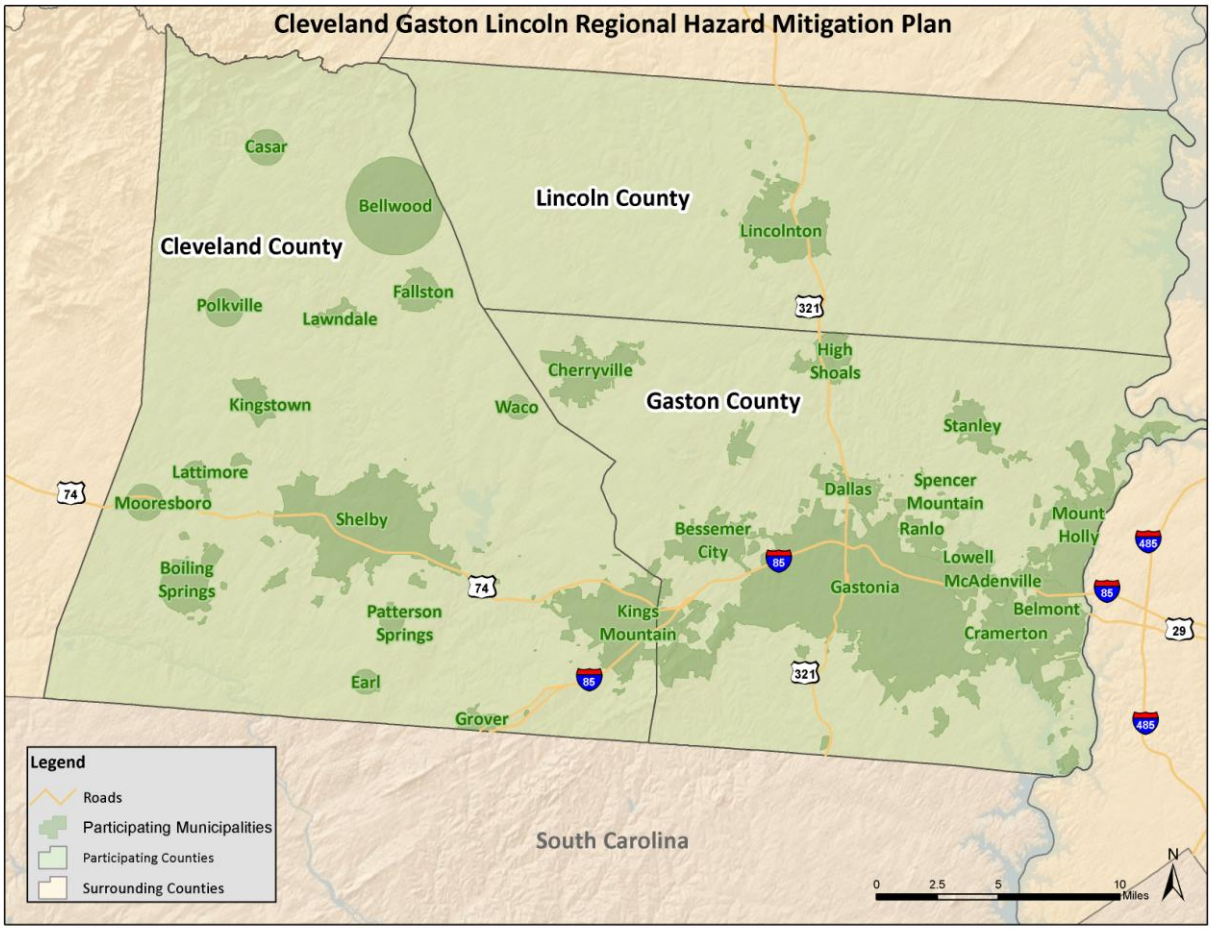


Table 5.2 lists each significant hazard for the Cleveland Gaston Lincoln Region and identifies whether or not it has been determined to be a specific hazard of concern for the twenty-nine municipal jurisdictions and each of the three county's unincorporated areas. This is the based on the best available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

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE CLEVELAND GASTON LINCOLN 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
Cleveland County																
Belwood	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Boiling Springs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Casar	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Earl	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fallston	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Grover	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Kings Mountain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Kingstown	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lattimore	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lawndale	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mooresboro	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Patterson Springs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Polkville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Shelby	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Waco	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gaston County																
Belmont	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Bessemer City	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Cherryville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Cramerton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dallas	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Gastonia	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
High Shoals	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lowell	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
McAdenville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mount Holly	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ranlo	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Spencer Mountain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stanley	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lincoln County																
Lincolnton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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

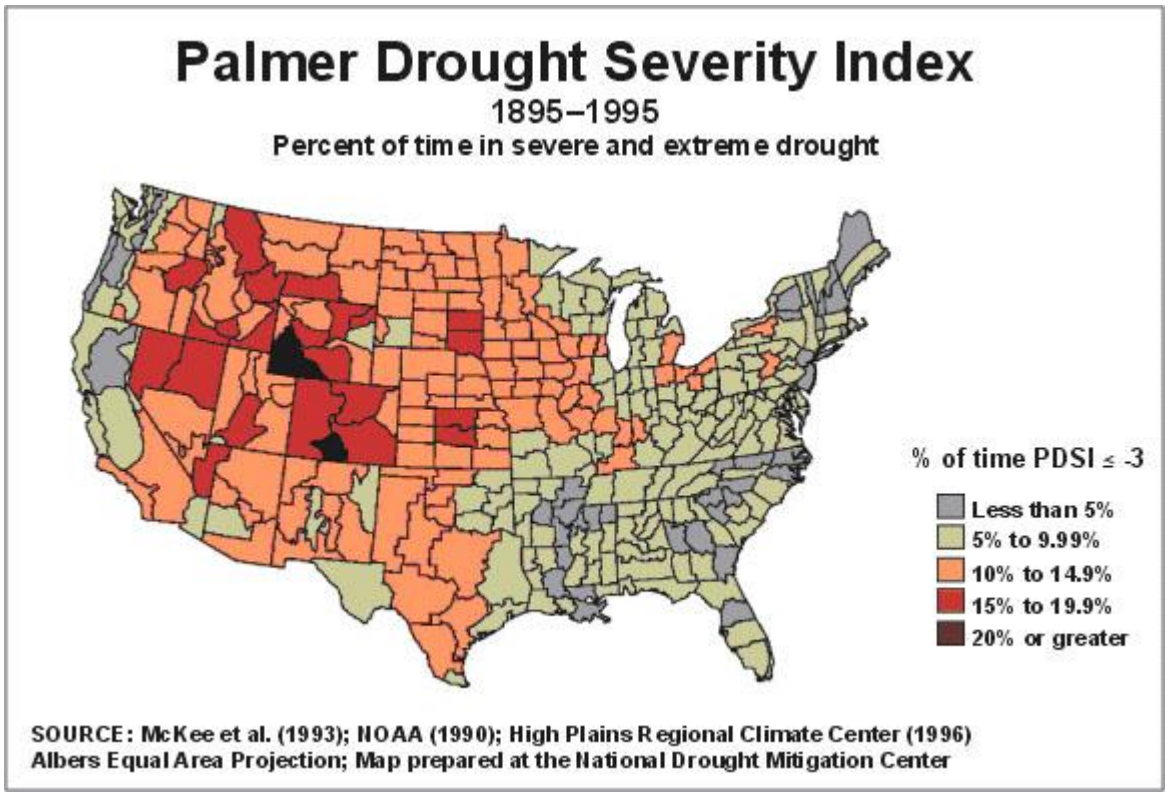
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural 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**), Western 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 CLEVELAND GASTON LINCOLN REGION

Location	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Cleveland County	14	3
Gaston County	14	3
Lincoln County	14	3

Source: North Carolina Drought Monitor (through July 2013)

5.3.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Cleveland Gaston Lincoln 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

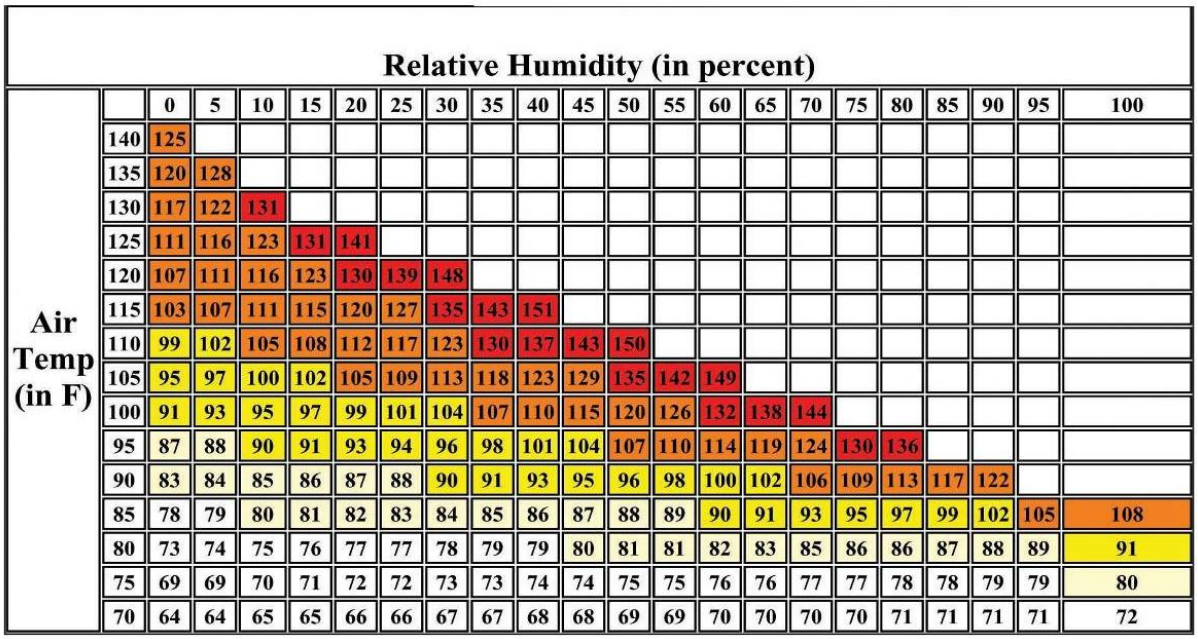
Extreme heat, like drought, poses little risk to property. However, extreme heat can have devastating effects on health. Extreme heat is often referred to as a "heat wave." According to the National Weather Service, there is no universal definition for a heat wave, but the standard U.S. definition is 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 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

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

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: NOAA

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, NOAA

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. One event was reported:

August 1, 1999 – *Excessive Heat* – Maximum temperatures reached around 100 degrees Fahrenheit and extremely high humidity caused at least one case of heat stroke.

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 1890. The recorded maximum for each county can be found below in **Table 5.6**:

TABLE 5.6: HIGHEST RECORDED TEMPERATURE IN THE CLEVELAND GASTON LINCOLN REGION

Location	Date	Temperature (°F)
Cleveland County	7/30/1952	107
Gaston County	6/27/1954	107
Lincoln County	7/29/1952	105
CLEVELAND GASTON LINCOLN REGION MAXIMUM	--	**107**

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 Lincolnton (Lincoln County). **Table 5.7** shows the average maximum temperatures from 1971 to 2000 at the Lincolnton observation station which can be used as a general comparison for the region.

TABLE 5.7: AVERAGE MAXIMUM TEMPERATURE IN LINCOLNTON, LINCOLN COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	50.0	55.0	63.4	72.2	78.7	85.1	88.5	86.8	81.1	71.8	61.5	52.5

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 Cleveland Gaston Lincoln 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
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	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 Cleveland Gaston Lincoln 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, 372 recorded hailstorm events have affected the Cleveland Gaston Lincoln Region since 1962.[2] **Table 5.9** is a summary of the hail events in the Cleveland Gaston Lincoln Region. Detailed information about each event that occurred in the region is provided in the jurisdiction-specific annexes. In all, hail occurrences resulted in over $2 million (2013 dollars) in property damages, most of which were reported in Lincoln County. Hail ranged in diameter from 0.75 inches to 4.5 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 Lincoln County 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 CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**124**	**0/0**	**$0**
Belwood	1	0/0	$0
Boiling Springs	7	0/0	$0
Casar	11	0/0	$0
Earl	2	0/0	$0
Fallston	5	0/0	$0
Grover	3	0/0	$0
Kings Mountain	16	0/0	$0
Kingstown	0	0/0	$0
Lattimore	2	0/0	$0
Lawndale	3	0/0	$0
Mooresboro	2	0/0	$0
Patterson Springs	5	0/0	$0
Polkville	8	0/0	$0
Shelby	19	0/0	$0
Waco	2	0/0	$0
Unincorporated Area	38	0/0	$0
Gaston County	**133**	**0/0**	**$403,175**
Belmont	6	0/0	$403,175
Bessemer City	7	0/0	$0
Cherryville	14	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 Cleveland Gaston Lincoln 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)
Cramerton	1	0/0	$0
Dallas	9	0/0	$0
Gastonia	25	0/0	$0
High Shoals	1	0/0	$0
Lowell	1	0/0	$0
McAdenville	1	0/0	$0
Mount Holly	9	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	3	0/0	$0
Unincorporated Area	56	0/0	$0
Lincoln County	**115**	**0/0**	**$1,640,629**
Lincolnton	36	0/0	$6,921
Unincorporated Area	79	0/0	$1,633,708
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**372**	**0/0**	**$2,043,804**

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 likely (10 to 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. All areas in the Cleveland Gaston Lincoln Region are equally susceptible to hurricane and tropical storms.

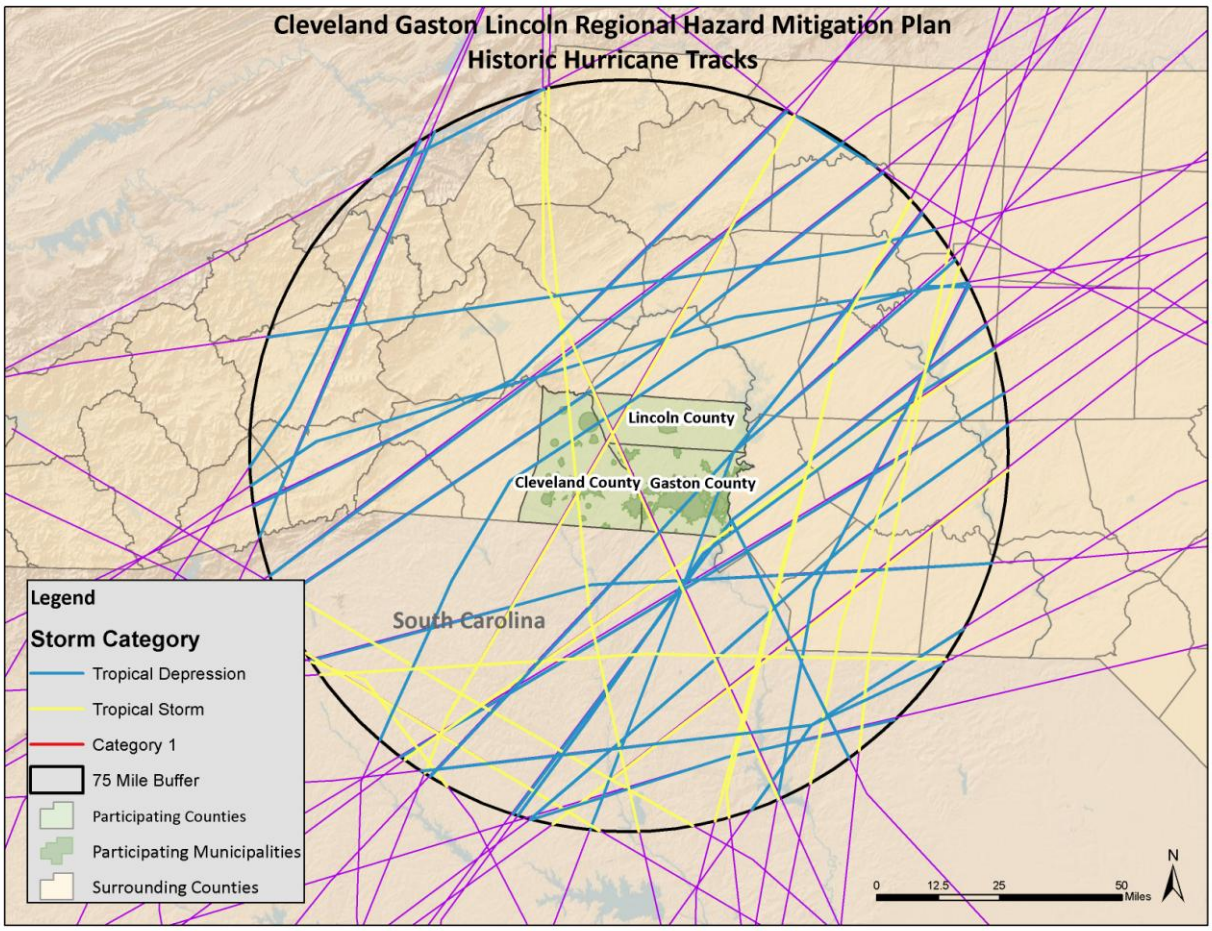
5.6.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 35 hurricane or tropical storm tracks have passed within 75 miles of the Cleveland Gaston Lincoln Region since 1850.[3] This includes thirteen tropical storms and twenty-two tropical depressions.

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

[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.

FIGURE 5.4: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CLEVELAND GASTON LINCOLN REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CLEVELAND GASTON LINCOLN REGION (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35	Tropical Storm
6/22/1886	NOT NAMED	31	Tropical Depression
9/24/1889	NOT NAMED	40	Tropical Storm
1891	NOT NAMED	-	Tropical Depression
7/13/1901	NOT NAMED	26	Tropical Depression
10/11/1902	NOT NAMED	31	Tropical Depression
9/18/1906	NOT NAMED	35	Tropical Storm
9/23/1907	NOT NAMED	31	Tropical Depression
8/31/1911	NOT NAMED	22	Tropical Depression
6/14/1912	NOT NAMED	31	Tropical Depression
9/4/1913	NOT NAMED	22	Tropical Depression
8/3/1915	NOT NAMED	31	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
7/15/1916	NOT NAMED	40	Tropical Storm
10/3/1927	NOT NAMED	31	Tropical Depression
8/11/1928	NOT NAMED	26	Tropical Depression
5/30/1934	NOT NAMED	22	Tropical Depression
8/18/1939	NOT NAMED	22	Tropical Depression
10/9/1946	NOT NAMED	26	Tropical Depression
8/28/1949	NOT NAMED	35	Tropical Storm
8/31/1952	NOT NAMED	40	Tropical Storm
9/30/1959	GRACIE	53	Tropical Storm
8/30/1964	CLEO	22	Tropical Depression
6/9/1968	CELESTE	22	Tropical Depression
9/8/1977	BABE	22	Tropical Depression
9/5/1979	DAVID	40	Tropical Storm
7/25/1985	ONE-C	40	Tropical Storm
8/18/1985	BOB	22	Tropical Depression
9/22/1989	HUGO	48	Tropical Storm
5/21/1990	NOT NAMED	26	Tropical Depression
7/21/1994	BERYL	13	Tropical Depression
8/17/1994	NOT NAMED	13	Tropical Depression
7/24/1997	DANNY	18	Tropical Depression
9/17/2004	IVAN	18	Tropical Depression
9/28/2004	JEANNE	18	Tropical Depression
7/7/2005	CINDY	18	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center did not report any events associated with a hurricane or tropical storm in the Cleveland Gaston Lincoln Region between 1950 and 2013. However, federal records indicate that two disaster declarations were made in 1989 (Hurricane Hugo) and 2004 (Tropical Storm Frances) for the region.[4]

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in the Cleveland Gaston Lincoln Region. However, winds can also be a concern in cases where a hurricane makes landfall in South Carolina, as was the case with Hurricane Hugo in 1989. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm. Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

[4] All of the participating counties were declared disaster areas for these storms particular storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across much of western North Carolina with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph in many areas and numerous trees were downed. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

5.6.4 Probability of Future Occurrences

Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. However, as Hurricane Hugo demonstrated, the region is not immune to a major hurricane strike. The probability of being impacted is less than coastal areas, but still remains a real threat to the Cleveland Gaston Lincoln Region due to induced events like flooding and landsliding. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas are equally exposed to this hazard. However, when the region is impacted, the damage could be catastrophic, threatening lives and property throughout the planning area.

5.7 LIGHTNING

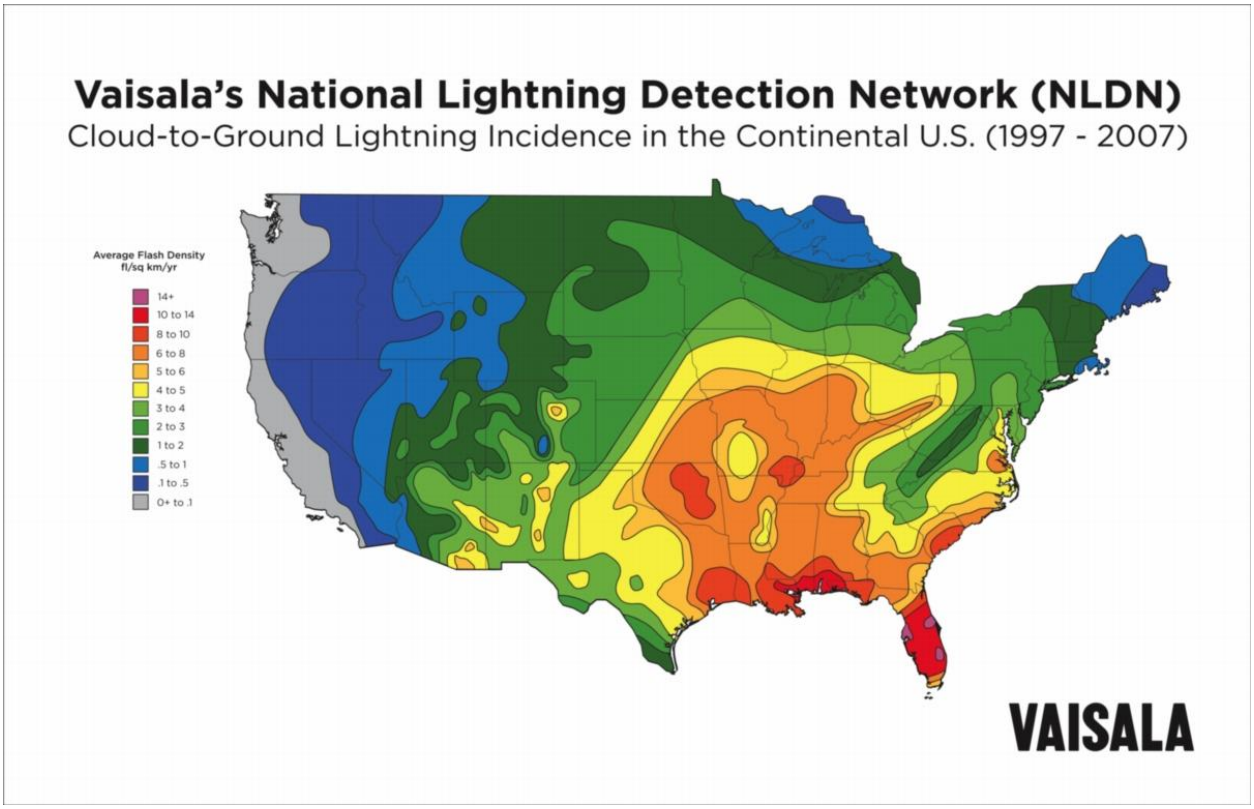
5.7.1 Background

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 1996-2000 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 U.S. 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 Cleveland Gaston Lincoln Region is uniformly exposed to lightning.

5.7.3 Historical Occurrences

According to the National Climatic Data Center, there have been a total of 53 recorded lightning events in the Cleveland Gaston Lincoln Region since 1993.[5] These events resulted in nearly $2.9 million (2013 dollars) in damages, as listed in summary **Table 5.13**. Furthermore, lightning caused 12 injuries throughout the Cleveland Gaston Lincoln Region. Detailed information on historical lightning events can be found in the jurisdiction-specific annexes**.**

It is certain that more than 53 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.

[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 Cleveland Gaston Lincoln 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.

TABLE 5.13: SUMMARY OF LIGHTNING OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**25**	**0/4**	**$973,384**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$10,609
Casar	1	0/0	$30,252
Earl	1	0/0	$38,003
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	4	0/1	$68,540
Kingstown	0	0/0	$0
Lattimore	2	0/0	$38,700
Lawndale	1	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	1	0/0	$122,987
Shelby	12	0/3	$357,044
Waco	1	0/0	$168,826
Unincorporated Area	1	0/0	$138,423
Gaston County	**18**	**0/7**	**$587,317**
Belmont	2	0/0	$13,048
Bessemer City	0	0/0	$0
Cherryville	2	0/1	$50,660
Cramerton	0	0/0	$0
Dallas	2	0/0	$10,050
Gastonia	10	0/6	$471,982
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	2	0/0	$41,577
Lincoln County	**10**	**0/1**	**$106,377**
Lincolnton	4	0/0	$40,001
Unincorporated Area	6	0/1	$66,376
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**53**	**0/12**	**$2,889,975**

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region 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 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 of three-quarters of an inch, 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 Cleveland Gaston Lincoln Region. Therefore, high winds are also reported 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

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

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 Cleveland Gaston Lincoln Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the Cleveland Gaston Lincoln 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 have not resulted in any disaster declarations in the Cleveland Gaston Lincoln Region.[7] According to NCDC, there have been 522 reported thunderstorm wind and high wind events since 1955 in the Cleveland Gaston Lincoln Region.[8] These events caused over $2.6 million (2013 dollars) in damages. There were reports of 10 injuries and 2 fatalities. **Table 5.14** 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 5.14: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**202**	**0/6**	**$1,043,327**
Belwood	4	0/0	$28,982
Boiling Springs	11	0/0	$158,728
Casar	12	0/0	$0
Earl	4	0/0	$0
Fallston	6	0/0	$26,878
Grover	7	0/0	$6,720
Kings Mountain	14	0/0	$1,344
Kingstown	0	0/0	$0
Lattimore	4	0/0	$11,941
Lawndale	4	0/0	$99,978

[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 Cleveland Gaston Lincoln 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)
Mooresboro	6	0/0	$110,243
Patterson Springs	5	0/0	$62,755
Polkville	8	0/6	$14,669
Shelby	37	0/0	$161,921
Waco	7	0/0	$71,643
Unincorporated Area	73	0/0	$287,525
Gaston County	**192**	**2/3**	**$809,028**
Belmont	11	0/0	$35,950
Bessemer City	9	0/0	$0
Cherryville	15	0/0	$6,921
Cramerton	5	0/0	$3,800
Dallas	11	0/0	$68,111
Gastonia	44	0/0	$213,514
High Shoals	1	0/0	$0
Lowell	2	0/0	$24,597
McAdenville	1	0/1	$0
Mount Holly	9	0/0	$140,623
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	3	0/0	$5,150
Unincorporated Area	80	2/2	$310,362
Lincoln County	**128**	**0/1**	**$811,494**
Lincolnton	43	0/1	$240,872
Unincorporated Area	85	0/0	$570,622
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**522**	**2/10**	**$2,663,849**

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

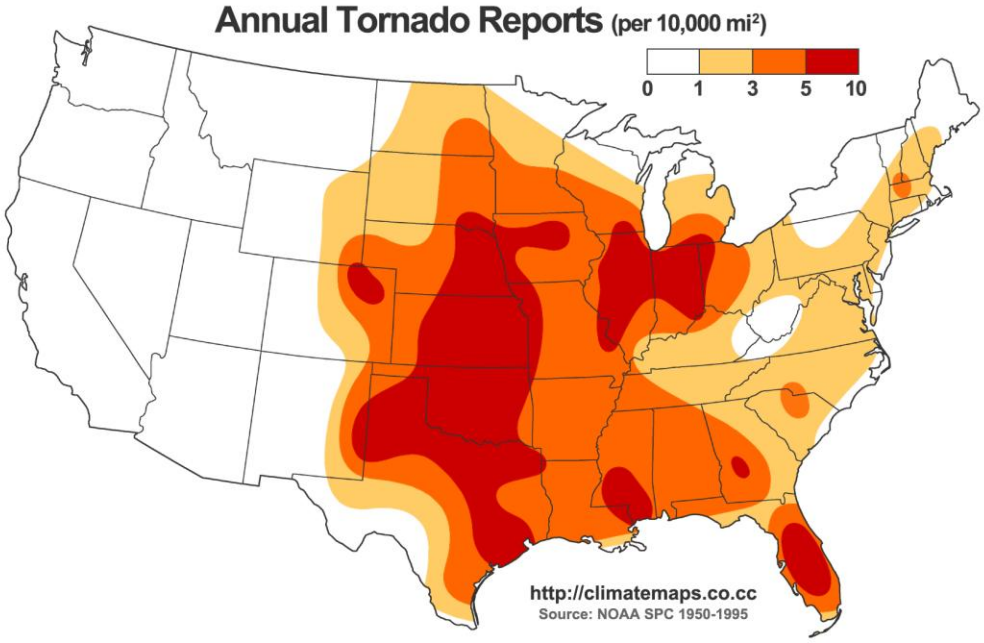
5.9.1 Background

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 10,000 square miles.

FIGURE 5.6: TORNADO ACTIVITY IN THE UNITED STATES



Source: National Oceanic and Atmospheric Administration

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 5.15**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.16**).

[10] NOAA, 2009.

TABLE 5.15: 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 5.16 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region is uniformly exposed to this hazard.

5.9.3 Historical Occurrences

Tornadoes have resulted in two disaster declarations in the Cleveland Gaston Lincoln Region in 1974 and 1989.[11] According to the National Climatic Data Center, there have been a total of 51 recorded tornado events in the Cleveland Gaston Lincoln Region since 1956 (**Table 5.17**), resulting in just over $125 million (2013 dollars) in property damages.[12] In addition, 5 deaths and 77 injuries were reported. The magnitude of these tornadoes ranges from F0 to F4 in intensity, although an 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 63 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 Cleveland Gaston Lincoln Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.17: SUMMARY OF TORNADO OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**19**	**0/36**	**$54,171,660**
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0
Earl	1	0/0	$852,283
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	1	0/0	$23,185
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	1	0/0	$65,239
Polkville	1	0/0	$13,439
Shelby	1	0/0	$1,609
Waco	2	0/0	$65,239
Unincorporated Area	12	0/36	$53,150,666
Gaston County	**13**	**1/11**	**$16,644,977**
Belmont	0	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$2,693,982
Cramerton	1	0/0	$61,494
Dallas	0	0/0	$0
Gastonia	4	0/0	$8,570,522
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	6	1/11	$5,318,979
Lincoln County	**19**	**4/30**	**$54,487,939**
Lincolnton	3	0/0	$67,196
Unincorporated Area	16	4/30	$54,420,743
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**51**	**5/77**	**$125,304,576**

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 Cleveland Gaston Lincoln Region experience a direct tornado strike. The probability of future tornado occurrences affecting the Cleveland Gaston Lincoln Region is possible (1 to 10 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. This includes snow storms in 1977 and 1993, the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002.[13] According to the National Climatic Data Center, there have been a total of 151 recorded winter storm events in the Cleveland Gaston Lincoln Region since 1993 (**Table 5.18**).[14] These events resulted in almost $61.4 million (2013 dollars) in damages. [15] Detailed information on the recorded winter storm events can be found in the jurisdiction-specific annexes.

TABLE 5.18: SUMMARY OF WINTER STORM EVENTS IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	54	0/0	$22,610,038
Gaston County	48	0/0	$22,832,181
Lincoln County	49	0/0	$15,929,196
CLEVELAND GASTON LINCOLN REGION TOTAL	**151**	**2/10**[16]	**$61,371,415**

Source: National Climatic Data Center

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

1996 Winter Storm
This storm left two feet of snow and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for up to four 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 for those individuals having to remain outdoors for a certain length of time and likely increased impact for the need of medical services, 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 lead 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 Cleveland Gaston Lincoln Region. In addition, the 151 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.

5.10.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the Cleveland Gaston Lincoln Region due to its location in the western part of the state. According to historical information, the Cleveland Gaston Lincoln Region generally experiences several winter storm events each year. Therefore, the annual probability is highly likely (100 percent).

Geologic Hazards

5.11 EARTHQUAKE

5.11.1 Background

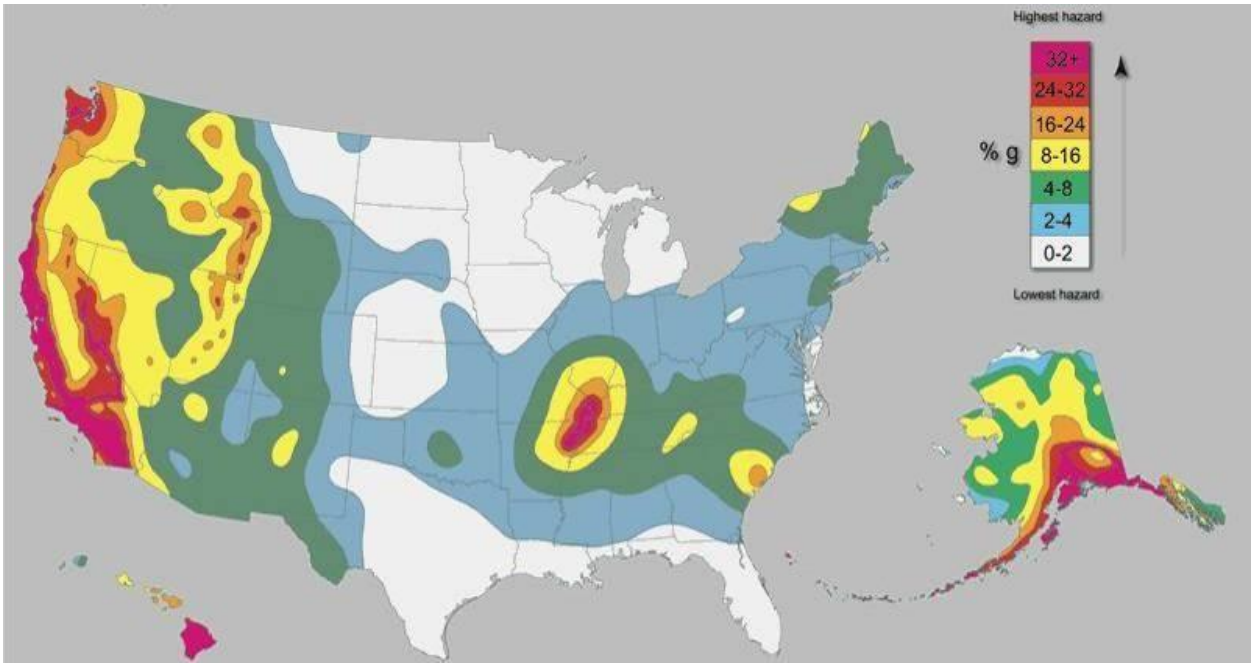
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured 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 5.7** shows relative seismic risk for the United States.

FIGURE 5.7: 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 5.19**). 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 5.20**.

TABLE 5.19: 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 5.20: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

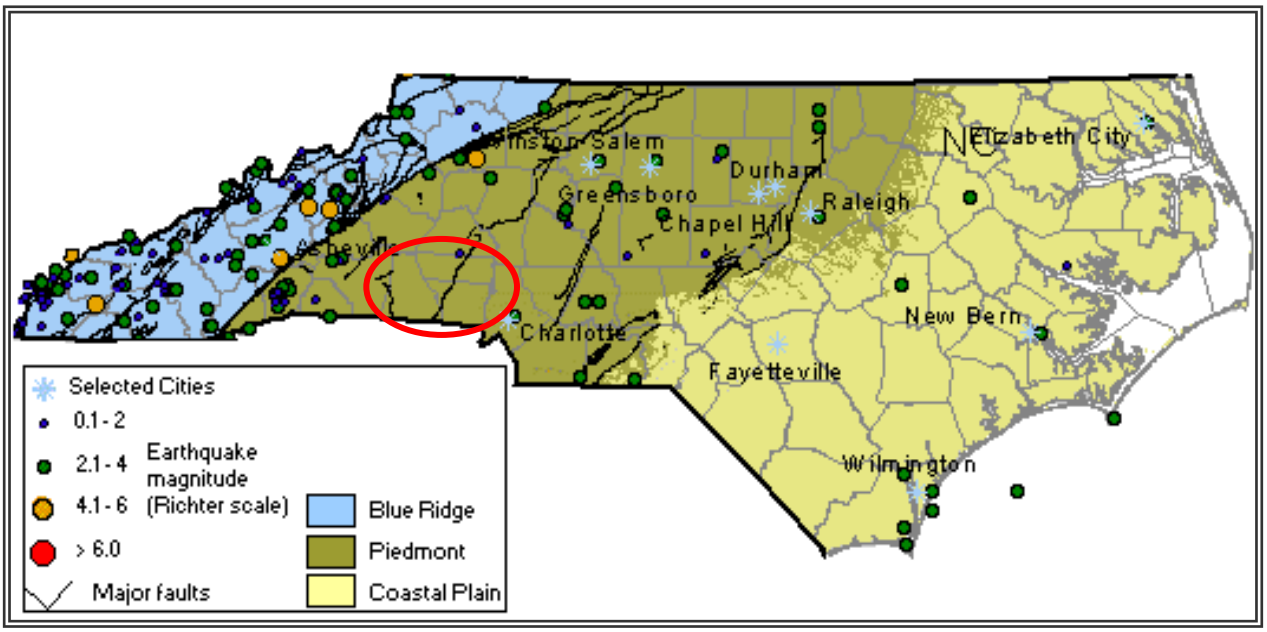
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church 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 5.8** is a map showing geological and seismic information for North Carolina.

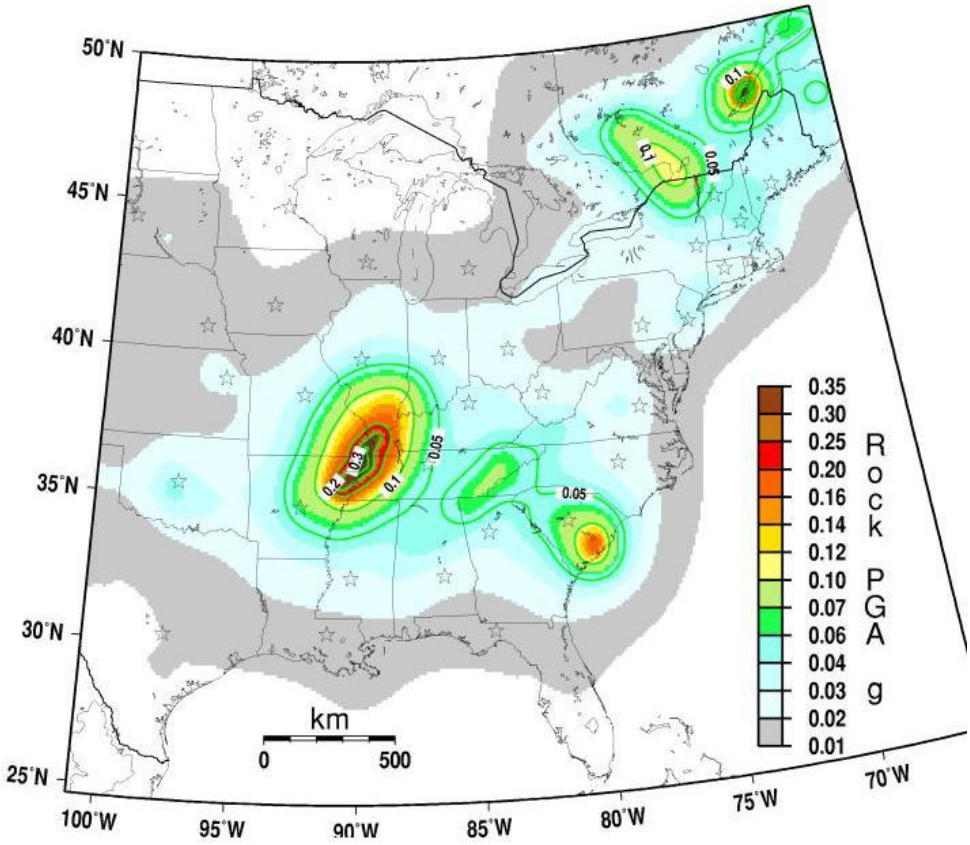
FIGURE 5.8: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.9 shows the intensity level associated with the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the region as a whole exists within an area of low to moderate seismic risk.

FIGURE 5.9: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

5.11.3 Historical Occurrences

At least 28 earthquakes are known to have affected the Cleveland Gaston Lincoln Region since 1886. The strongest of these measured a VII on the Modified Mercalli Intensity (MMI) scale. **Table 5.21** 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 5.21: SUMMARY OF SEISMIC ACTIVITY IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Cleveland County	**15**	**VI**	**< 5.4**
Belwood	1	IV	< 4.8
Boiling Springs	1	V	< 4.8
Casar	1	IV	< 4.8

[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
Earl	0	--	--
Fallston	1	IV	< 4.8
Grover	1	IV	< 4.8
Kings Mountain	2	VI	< 5.4
Kingstown	0	--	--
Lattimore	1	IV	< 4.8
Lawndale	0	--	--
Mooresboro	2	IV	< 4.8
Patterson Springs	0	--	--
Polkville	1	IV	< 4.8
Shelby	4	V	< 4.8
Waco	0	--	--
Unincorporated Area	0	--	--
Gaston County	**6**	**VII**	**< 6.1**
Belmont	0	--	--
Bessemer City	0	--	--
Cherryville	1	IV	< 4.8
Cramerton	0	--	--
Dallas	1	VII	< 6.1
Gastonia	2	III	< 4.8
High Shoals	1	V	< 4.8
Lowell	0	--	--
McAdenville	0	--	--
Mount Holly	1	III	< 4.8
Ranlo	0	--	--
Spencer Mountain	0	--	--
Stanley	0	--	--
Unincorporated Area	0	--	--
Lincoln County	**7**	**VI**	**< 5.4**
Lincolnton	5	VI	< 5.4
Unincorporated Area	2	V	< 4.8
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**28**	**VII**	**< 6.1**

Source: National Geophysical Data Center

In addition to those earthquakes specifically affecting the Cleveland Gaston Lincoln Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.22.**

TABLE 5.22: 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

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region is unlikely. However, it is possible 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 between 1 and 10 percent (possible).

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.

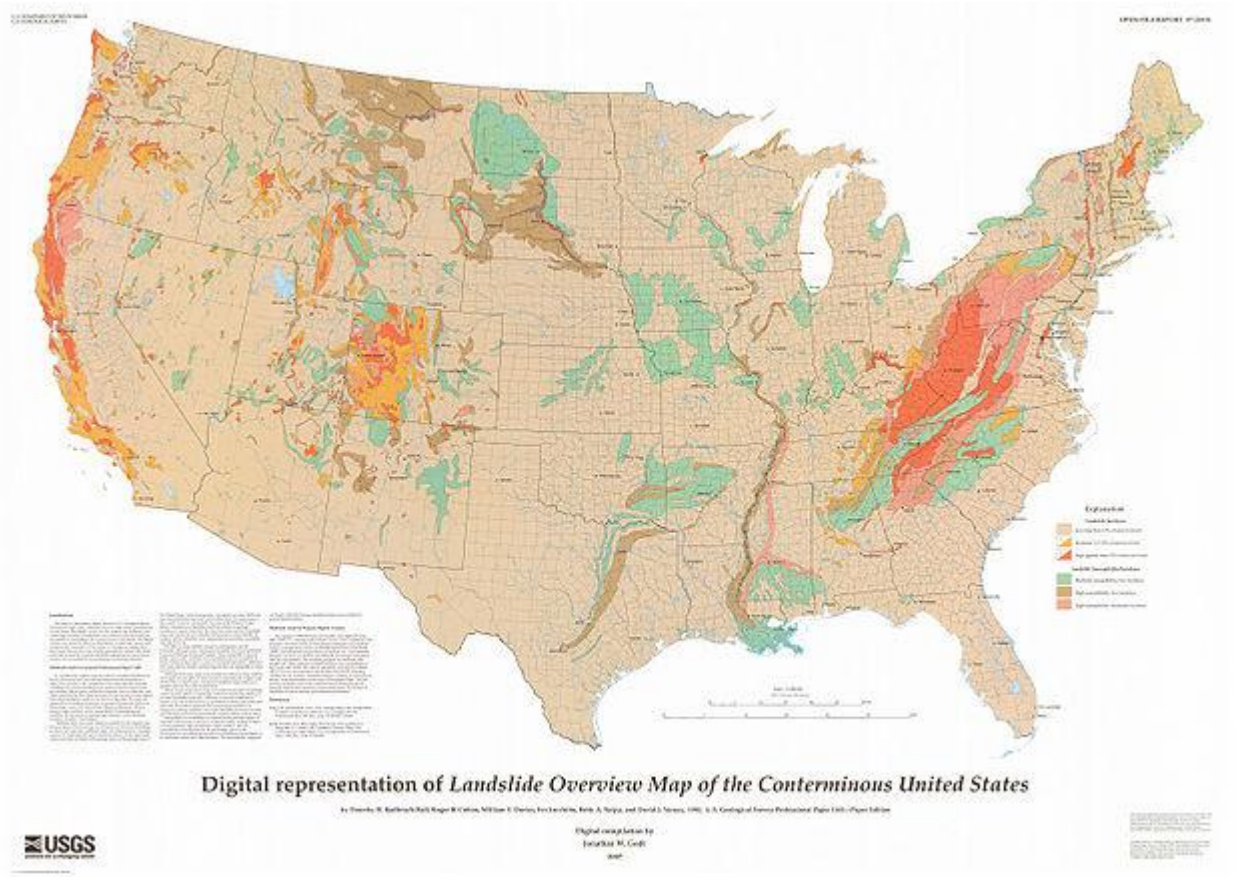
Among the most destructive types of debris flows are those that accompany volcanic eruptions. A spectacular example in the United States was a massive debris flow resulting from the 1980 eruptions of Mount St. Helens, Washington. Areas near the bases of many volcanoes in the Cascade Mountain Range of 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 5.10** 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 5.10: 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: USGS

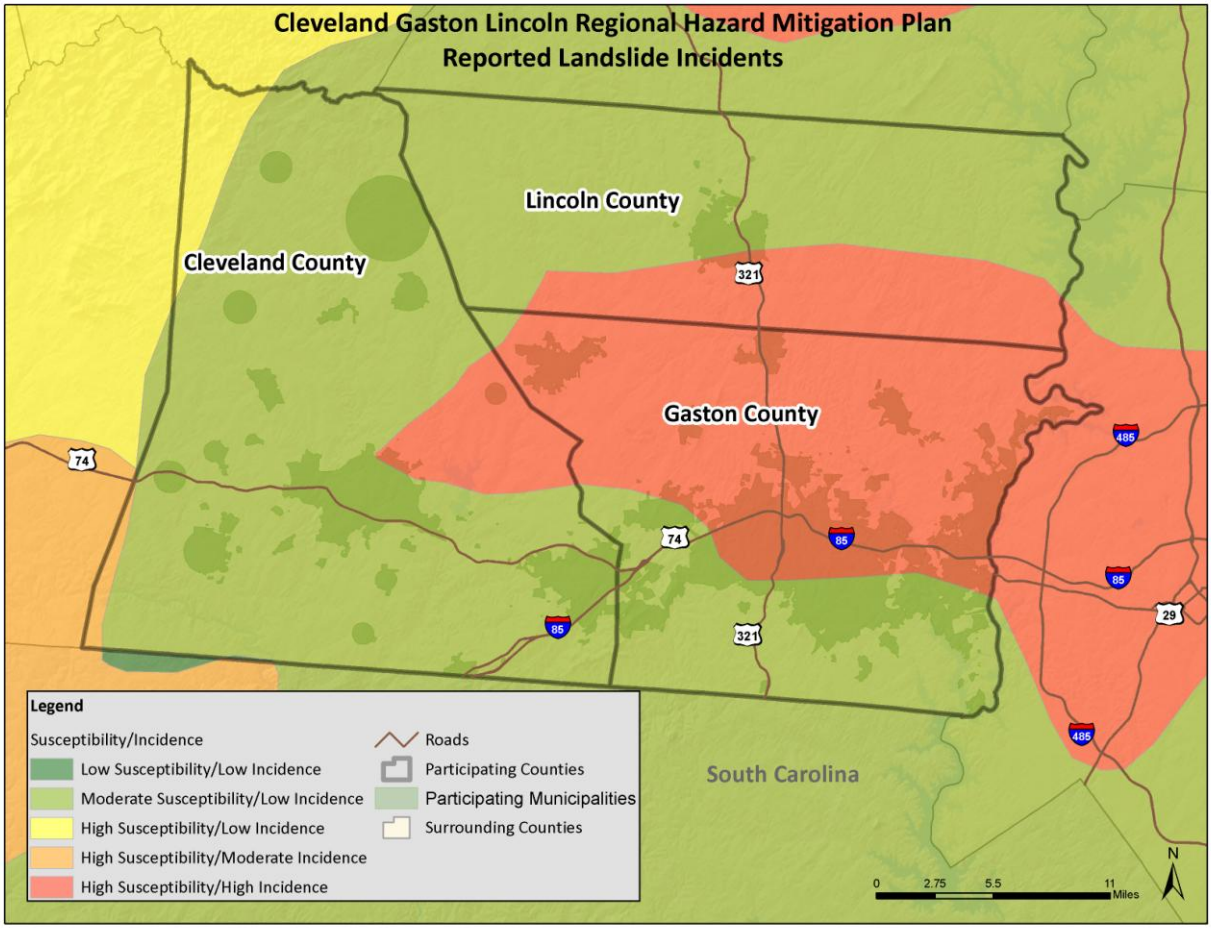
5.12.2 Location and Spatial Extent

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 Cleveland Gaston Lincoln 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 5.11** below, the majority of the region, has moderate landslide activity. However, there is a sizable portion of the region that has a high susceptibility, covering much of Gaston County as well as parts of Lincoln and Cleveland Counties.

FIGURE 5.11: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF THE CLEVELAND GASTON LINCOLN REGION



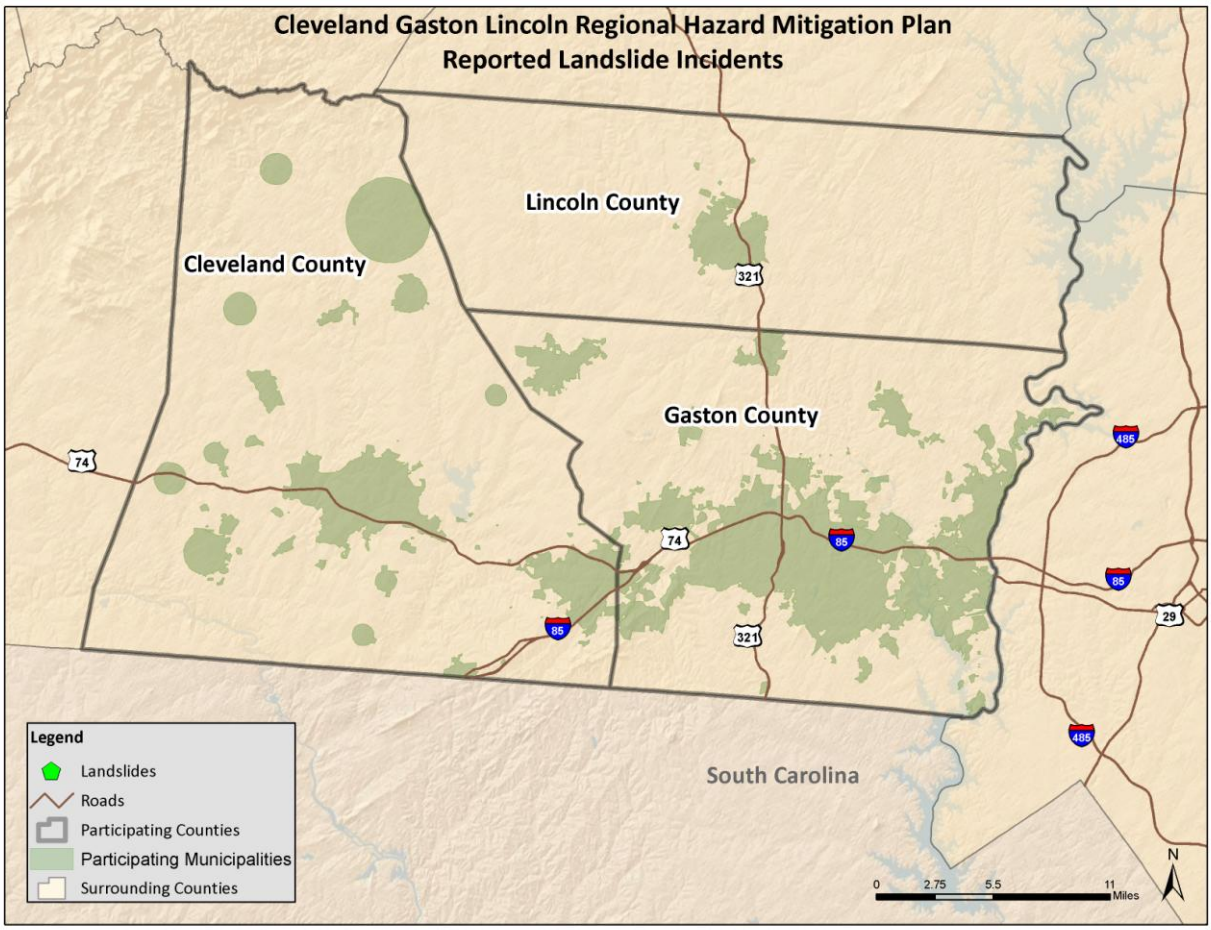
Source: USGS

5.12.3 Historical Occurrences

Steep topography in some areas of the Cleveland Gaston Lincoln Region makes the planning area 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. The locations of landslide events in and around the Cleveland Gaston Lincoln region as provided by the North Carolina Geological Survey are presented in **Figure 5.12.** There were no reported incidents in the region[21]. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Cleveland, Gaston, and Lincoln Counties.

[21] 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. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

FIGURE 5.12: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN THE CLEVELAND GASTON LINCOLN 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 possible (1 to 10 percent 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 the Cleveland Gaston Lincoln 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.

Cowans Ford Dam created Lake Norman, the largest manmade body of fresh water in North Carolina, when it dammed the Catawba River in 1963. Lake Norman is nearly as large as the other ten lakes on the Catawaba River combined, and it is located to the east of Lincoln County. Inundation by failure of the Cowans Ford Dam would cause catastrophic damage to the southeastern portion of Lincoln County and the eastern portion of Gaston County, including loss of life and injuries, especially to those areas located along the Catawba River. In addition to local devastation, the region as whole would be impacted.

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 5.23** explains these classifications.

TABLE 5.23: 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

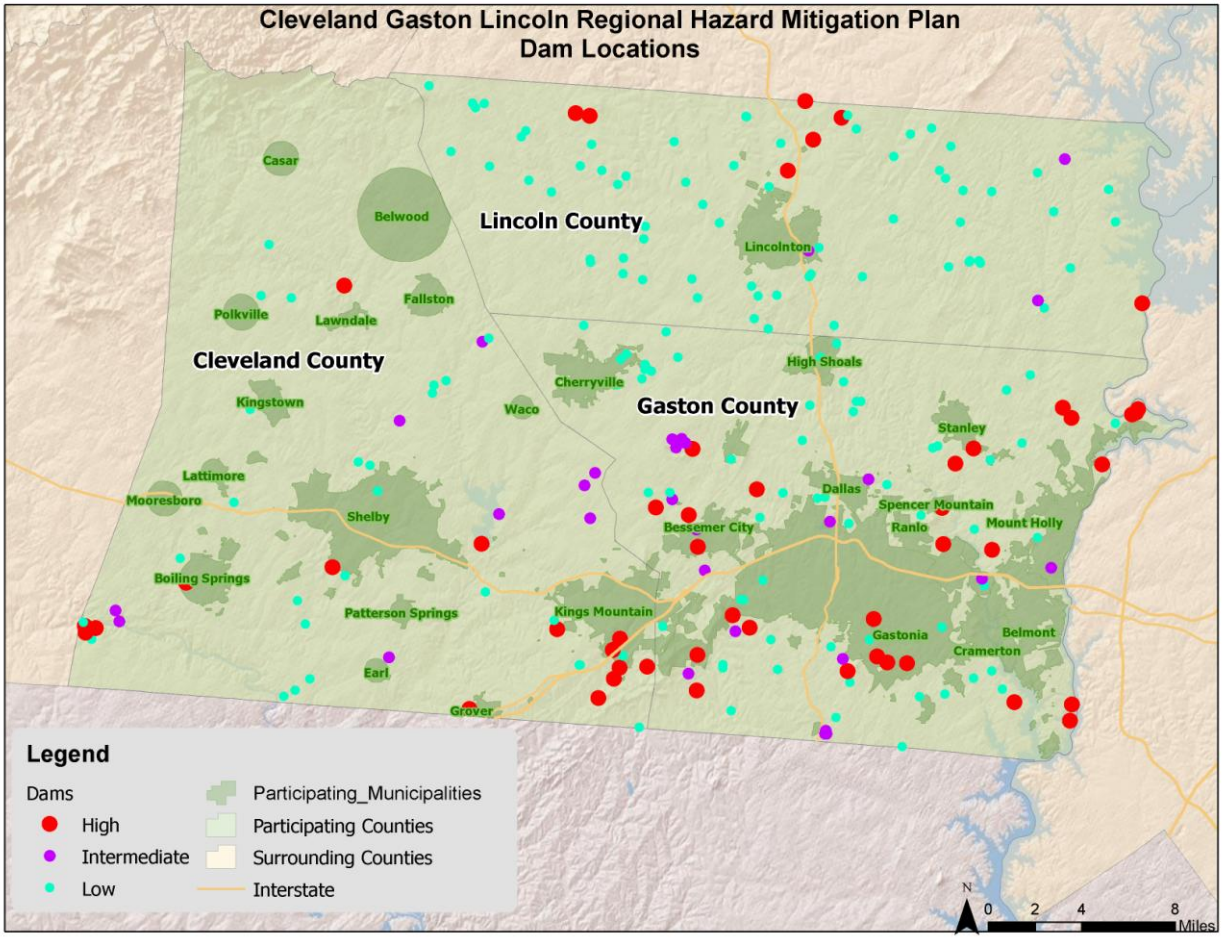
According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 232 dams in the Cleveland Gaston Lincoln Region.[22] **Figure 5.13** shows the dam location and the corresponding hazard ranking for each. Of these dams, 50 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.24** and more detailed information for each dam is listed in the jurisdiction-specific annexes.

TABLE 5.24: SUMMARY OF HIGH HAZARD DAM LOCATION

Location	Number High Hazard Dams
Cleveland County	15
Gaston County	28
Lincoln County	7
CLEVELAND GASTON LINCOLN REGION TOTAL	**50**

[22] The February 8, 2012 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 5.13: CLEVELAND GASTON LINCOLN REGION DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2012

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

According to the North Carolina Division of Land Resources, there have been a total of six dam breaches reported in the Cleveland Gaston Lincoln Region, including one in Cleveland County, five in Gaston County, and none in Lincoln County, though no additional information was available. Additionally, several breach scenarios in the region could be catastrophic.

The National Climatic Data Center also reported one dam failure event in Bessemer City (Gaston County) on May 4, 1997 when a small dam on a three-acre lake broke following several heavy rain episodes. Flooding was not severe but caused some damage to roads and resulted in the loss of a large number of fish. This resulted in $3,146 (2013 dollars) of property damage.

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

Cleveland County
There is no recorded history of dam failure occurring in Cleveland 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.

Gaston County
There has not been a significant dam failure and resulting flood along the Catawba River or South Fork of the Catawba. However, the potential does exist.

Lincoln County
No information on past dam failure events 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. Inundation by failure of the Cowans Ford Dam would cause catastrophic damage, including loss of life and injuries, especially to those areas located along the Catawba River. In addition to local devastation, the region as whole would be impacted.

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 Cleveland Gaston Lincoln Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Cleveland Gaston Lincoln soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the Cleveland Gaston Lincoln Region, particularly along the banks of rivers and streams, but it is not an extreme threat to any of the participating counties and jurisdictions. No areas of concern were reported by the mitigation council.

5.14.3 Historical Occurrences

Several sources were vetted to identify areas of erosion in the Cleveland Gaston Lincoln 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 Lincoln County hazard mitigation plan. Erosion was recognized in both the Cleveland and Gaston County plans, but there was no recorded history of significant erosion events and it was found to be hazard with a negligible potential impact.

5.14.4 Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region that are susceptible to flood events. Special flood hazard areas in the Cleveland Gaston Lincoln Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[23] 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 1,140 square miles that make up

[23] The county-level DFIRM data used for Cleveland and Lincoln Counties were updated in 2009 and the Gaston County data was updated in 2010.

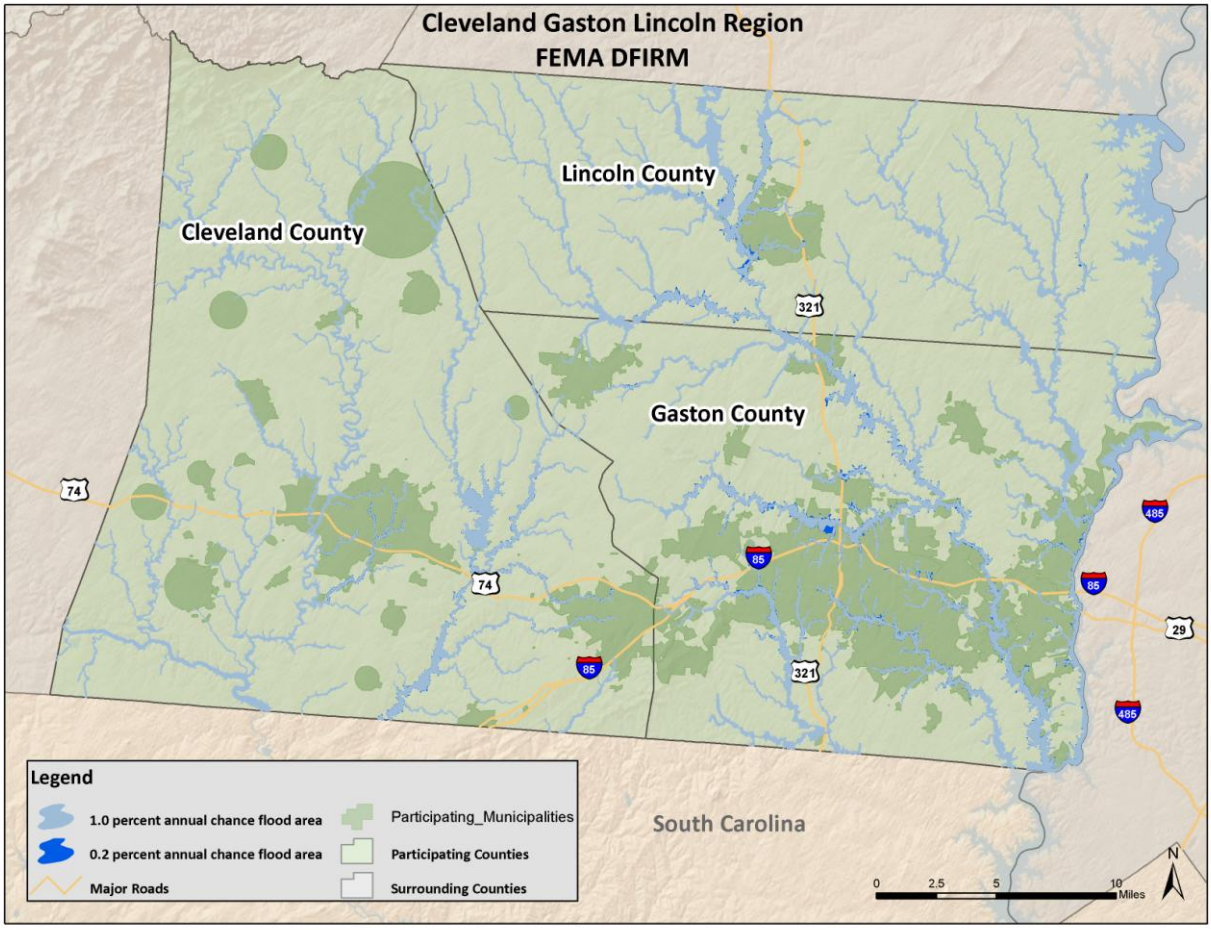
the Cleveland Gaston Lincoln Region (including the area of Cleveland County, Gaston County, and Lincoln County), there are 80.9 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 3.3 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.25**.

TABLE 5.25: SUMMARY OF FLOODPLAIN AREAS IN THE CLEVELAND GASTON LINCOLN REGION

Location	100-year area (square miles)	500-year area (square miles)
Cleveland County	24.2	0.7
Gaston County	29.0	2.0
Lincoln County	27.7	0.6
CLEVELAND GASTON LINCOLN REGION TOTAL	**80.9**	**3.3**

These flood zone values account for 7.4 percent of the total land area in the Cleveland Gaston Lincoln 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 5.14** illustrates the location and extent of currently mapped special flood hazard areas for the Cleveland Gaston Lincoln Region based on best available FEMA DFIRM data.

FIGURE 5.14: SPECIAL FLOOD HAZARD AREAS IN THE CLEVELAND GASTON LINCOLN 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

Information from the National Climatic Data Center was used to ascertain historical flood events. The National Climatic Data Center reported a total of 55 events throughout the Cleveland Gaston Lincoln Region since 1993.[24] A summary of these events is presented in **Table 5.26**. These events accounted for over $22.2 million (2013 dollars) in property damage throughout the region.[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.

[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 5.26: SUMMARY OF FLOOD OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**13**	**0/0**	**$74,266**
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0
Earl	0	0/0	$0
Fallston	1	0/0	$0
Grover	1	0/0	$0
Kings Mountain	1	0/0	$0
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	0	0/0	$0
Shelby	4	0/0	$10,927
Waco	0	0/0	$0
Unincorporated Area	6	0/0	$63,339
Gaston County	**20**	**0/0**	**$2,744,792**
Belmont	0	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$0
Cramerton	0	0/0	$0
Dallas	1	0/0	$0
Gastonia	6	0/0	$3,914
High Shoals	1	0/0	$53,045
Lowell	1	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	1	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	7	0/0	$2,687,833
Lincoln County	**22**	**0/0**	**$918,497**
Lincolnton	10	0/0	$57,776
Unincorporated Area	12	0/0	$860,721
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**55**	**0/0**	**$3,737,555**

Source: National Climatic Data Center

5.15.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of July 2013, there have been 46 flood losses reported in the Cleveland Gaston Lincoln Region through the National Flood Insurance Program (NFIP)

since 1978, totaling over $510,000 in claims payments. A summary of these figures for each Cleveland Gaston Lincoln county is provided in **Table 5.27**. 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 Cleveland Gaston Lincoln Region were either uninsured, denied claims payment, or not reported.

TABLE 5.27: SUMMARY OF INSURED FLOOD LOSSES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Flood Losses	Claims Payments
Cleveland County	**25**	**$402,571**
Belwood	0	$0
Boiling Springs	0	$0
Casar*	--	--
Earl*	--	--
Fallston*	--	--
Grover*	--	--
Kings Mountain	3	$11,804
Kingstown	0	$0
Lattimore*	--	--
Lawndale*	--	--
Mooresboro*	--	--
Patterson Springs*	--	--
Polkville	0	$0
Shelby	19	$361,473
Waco*	--	--
Unincorporated Area	3	$29,294
Gaston County	**21**	**$108,049**
Belmont	1	$8,067
Bessemer City	0	$0
Cherryville	0	$0
Cramerton	0	$0
Dallas	2	$12,879
Gastonia	12	$60,869
High Shoals	0	$0
Lowell	0	$0
McAdenville	0	$0
Mount Holly	2	$5,952
Ranlo	0	$0
Spencer Mountain	0	$0
Stanley	0	$0
Unincorporated Area	4	$20,282
Lincoln County	**0**	**$0**
Lincolnton	0	$0
Unincorporated Area	0	$0
CLEVELAND GASTON LINCOLN REGION TOTAL	**46**	**$510,620**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: FEMA, NFIP

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 October 2013), there are 2 non-mitigated repetitive loss properties located in the Cleveland Gaston Lincoln Region, which accounted for 5 losses and more than $34,000 in claims payments under the NFIP. The average claim amount for these properties is $6,830. Both of the properties are single family residential buildings. Without mitigation these properties will likely continue to experience flood loses. **Tables 5.28** presents a summary these figures for the Cleveland Gaston Lincoln Region. Detailed information on repetitive loss properties and NFIP claims and policies can be found in the jurisdiction-specific annexes.

TABLE 5.28: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Properties	Number of Losses	Total Payments
Cleveland County	**1**	**3**	**$8,610.47**
Belwood	0	0	$0
Boiling Springs	0	0	$0
Casar*	--	--	--
Earl*	--	--	--
Fallston*	--	--	--
Grover*	--	--	--
Kings Mountain	0	0	$0
Kingstown	0	0	$0
Lattimore*	--	--	--
Lawndale*	--	--	--
Mooresboro*	--	--	--
Patterson Springs*	--	--	--
Polkville	0	0	$0
Shelby	1	3	$8,610.47
Waco*	--	--	--
Unincorporated Area	0	0	$0
Gaston County	**1**	**2**	**$25,537.36**
Belmont	0	0	$0
Bessemer City	0	0	$0
Cherryville	0	0	$0
Cramerton	0	0	$0
Dallas	0	0	$0
Gastonia	1	2	$25,537.36
High Shoals	0	0	$0
Lowell	0	0	$0

Location	Number of Properties	Number of Losses	Total Payments
McAdenville	0	0	$0
Mount Holly	0	0	$0
Ranlo	0	0	$0
Spencer Mountain	0	0	$0
Stanley	0	0	$0
Unincorporated Area	0	0	$0
Lincoln County	**0**	**0**	**$0**
Lincolnton	0	0	$0
Unincorporated Area	0	0	$0
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**2**	**5**	**$34,147.83**

* 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. For example, Lawndale, Kings Mountain, Shelby, Cramerton, High Shoals, and McAdenville have more floodplain and thus a higher 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.

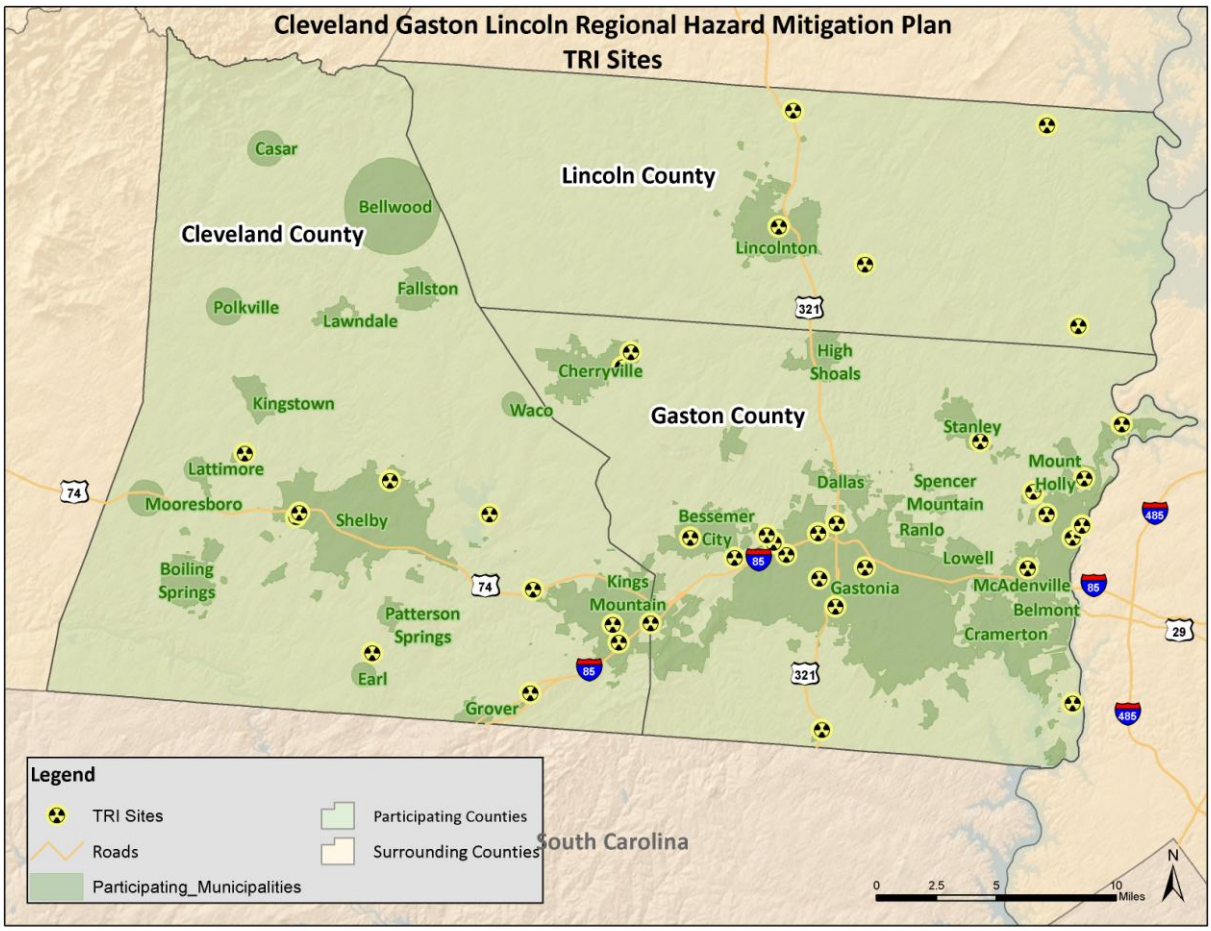
Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace 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 agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The Cleveland Gaston Lincoln Region has 41 TRI sites. These sites are shown in **Figure 5.15.**

[26] FEMA, 1997.

FIGURE 5.15: TOXIC RELEASE INVENTORY (TRI) SITES IN THE CLEVELAND GASTON LINCOLN 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 narrow and winding, making hazardous material transport in the area especially treacherous. 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.

Table 5.29 summarizes the HAZMAT incidents reported in the Cleveland Gaston Lincoln Region. Detailed information on these events is presented in the jurisdiction-specific annexes.

TABLE 5.29: SUMMARY OF HAZMAT INCIDENTS IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	**7**	**0/0**	**$0**
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0
Earl	0	0/0	$0
Fallston	0	0/0	$0
Grover*	0	0/0	$0
Kings Mountain	4	0/0	$0
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	0	0/0	$0
Shelby	3	0/1	$0
Waco	0	0/0	$0
Unincorporated Area	0	0/0	$0
Gaston County	**12**	**0/0**	**$0**
Belmont	1	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	10	0/0	$0
Cramerton	0	0/0	$0
Dallas	0	0/0	$0
Gastonia	0	0/0	$0
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Stanley	0	0/0	$0
Unincorporated Area	1	0/0	$0
Lincoln County	**2**	**0/0**	**$2,697**
Lincolnton	2	0/0	$2,697
Unincorporated Area	0	0/0	$0
CLEVELAND GASTON LINCOLN REGION TOTAL	**21**	**0/1**	**$2,697**

Source: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration

5.15.4 Probability of Future Occurrence

Given the location of 41 toxic release inventory sites in the Cleveland Gaston Lincoln Region and prior rail and roadway incidents it is possible that a hazardous material incident may occur in the region (between 1 and 10 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 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.

[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.

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.

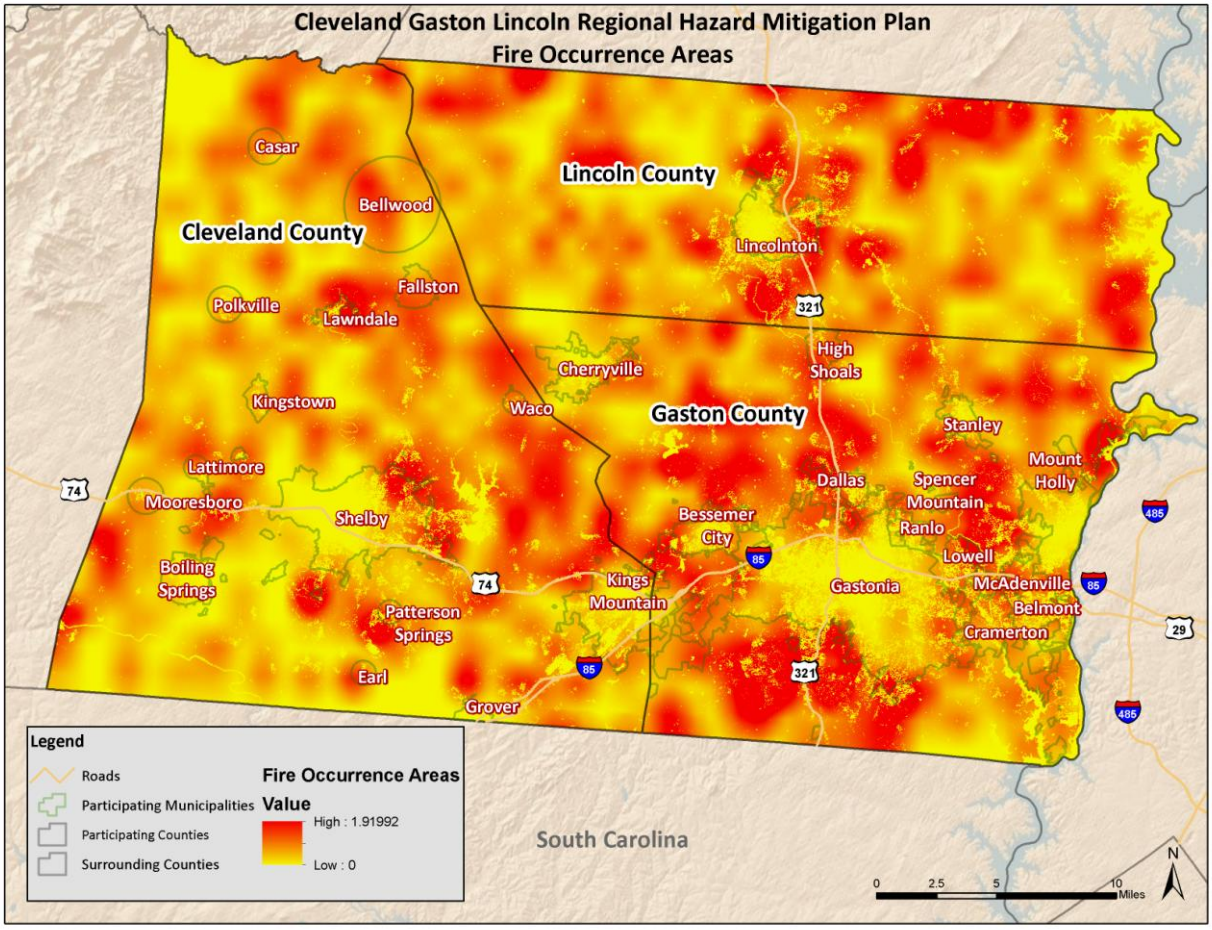
5.17.2 Location and Spatial Extent

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 5.16 shows the Fire Occurrence Areas (FOA) in the Cleveland Gaston Lincoln 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 5.16: HISTORIC WILDFIRE EVENTS IN THE CLEVELAND GASTON LINCOLN REGION



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, the Cleveland Gaston Lincoln Region experienced an average of 182 wildfires annually which burn a combined 178 acres, on average per year. The data indicates that most of these fires are small, averaging four acres per fire. **Table 5.30** provides a summary table for wildfire occurrences in the Cleveland Gaston Lincoln 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 5.30: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2003-2012)*

	Cleveland County	Gaston County	Lincoln County	CGL Region
Average Number of Fires per year	62	53	45	160
Average Number of Acres Burned per year	56	66	32	154
Average Number of Acres Burned per fire	1	1	1	1

Source: North Carolina Division of Forest Resources

5.17.4 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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.

McGuire Nuclear Station, which is the plant located closest to the Cleveland Gaston Lincoln Region, is a 2,258 megawatt power plan that began commercial operation in 1981. It uses uranium dioxide fuel and its reactor is a pressurized water reactor. The plant operates with a very high level of security.

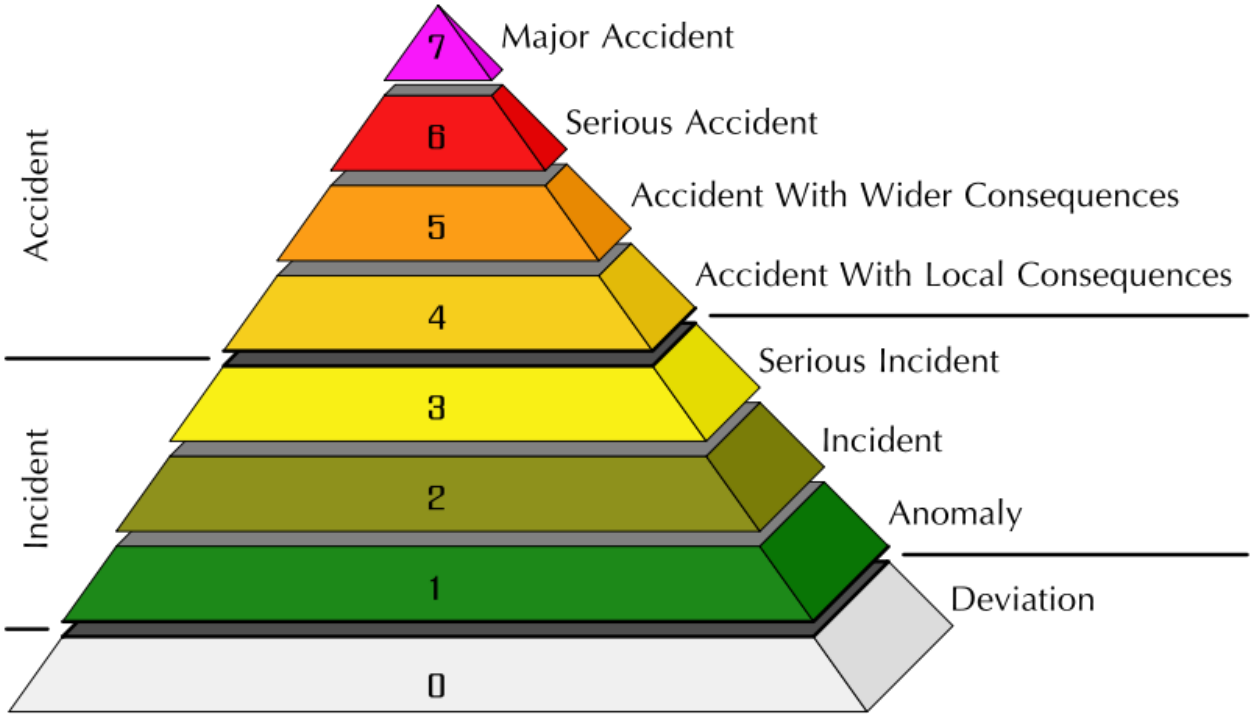
The region is also located within a close proximity to the Catawba Nuclear Station in South Carolina which houses two 1,129 megawatt pressurized water reactors. The plant was commissioned in 1985 and the second unit was added in 1986. It also operates with a very high level of security.

[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.

5.18.2 Location and Spatial Extent

The entire region is at risk to a nuclear incident. However, areas in the eastern part of the region are more susceptible due to their proximity to the McGuire 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 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 5.17**).

FIGURE 5.17: INTERNATIONAL NUCLEAR EVENT SCALE



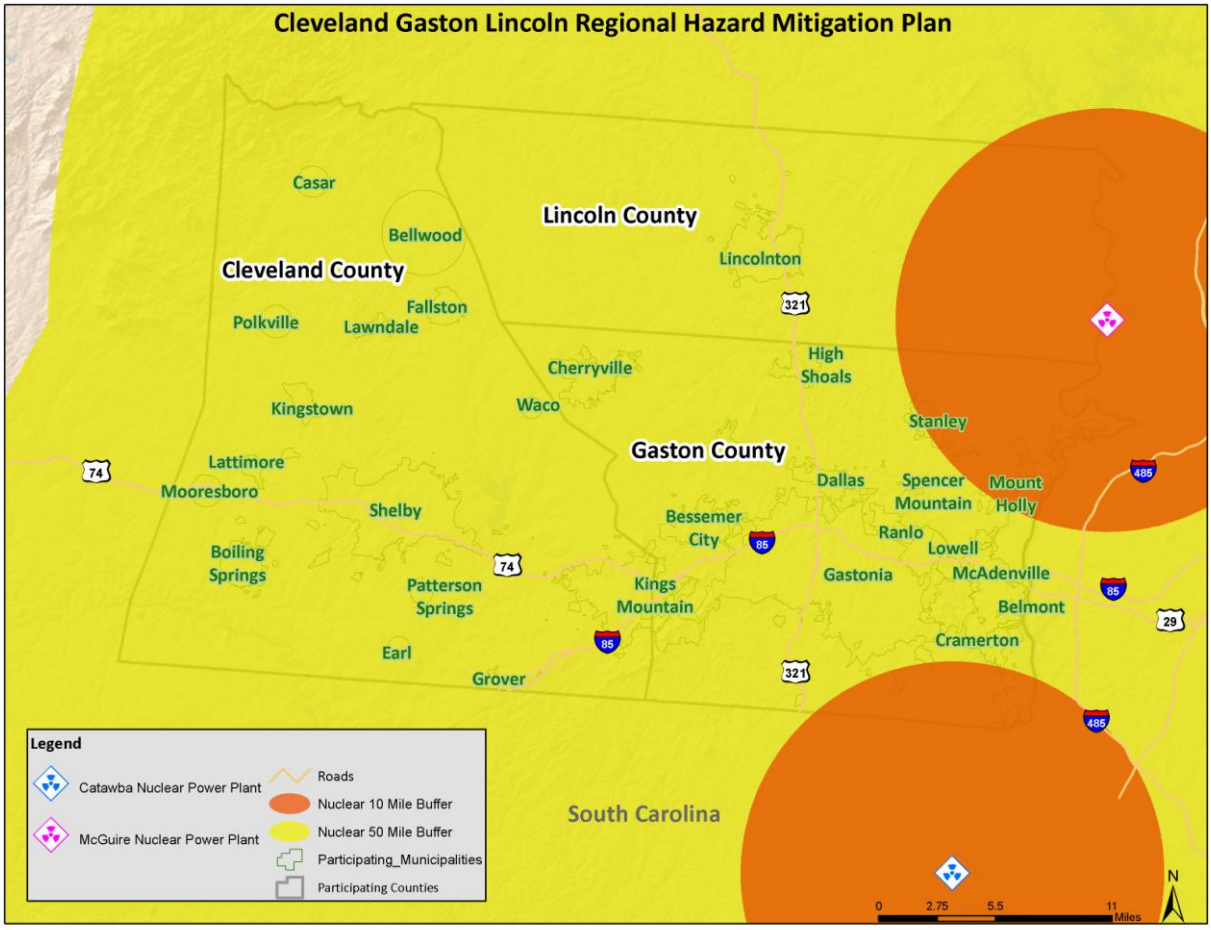
Source: International Atomic Energy Agency

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 5.18**). 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. All areas of the counties that are not located within the 10 mile radius are located within this 50 mile radius that is still considered to be at risk from a nuclear incident.

5.18.3 Historical Occurrences

Although there have been no major nuclear events at either the McGuire or Catawba 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.

FIGURE 5.18: MCGUIRE AND CATAWBA NUCLEAR POWER STATIONS INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

5.18.4 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).

5.19 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.

5.19.1 Hazard Extent

Table 5.31 describes the extent of each natural hazard identified for the Cleveland Gaston Lincoln Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.31 EXTENT OF CLEVELAND GASTON LINCOLN 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 (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 the Cleveland Gaston Lincoln Region is 107 degrees Fahrenheit (last reported on June 27, 1954). • Cleveland County: 107°F • Gaston County: 107°F • Lincoln County: 105°F
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Cleveland Gaston Lincoln Region was 4.5 inches (reported April 3, 1974). It should be noted that future events may exceed this. • Cleveland County: 2.75 inches • Gaston County: 4.50 inches • Lincoln County: 2.50 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 hurricanes to traverse directly through the Cleveland Gaston Lincoln Region was Hurricane Gracie in 1959 which reached a maximum wind speed of 53 knots in the region and Hurricane Hugo in 1989 which carried tropical force winds of 48 knots. Although the region is much more likely to be impacted by the remnants of a hurricane or tropical storm, these events demonstrate that Category 3 or 4 storms can and have impacted the region directly.
Lightning	According to the Vaisala flash density map (Figure 5.5), the majority of the Cleveland Gaston Lincoln Region 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 63-year history from the National Climatic Data Center, the strongest recorded wind event in the Cleveland Gaston Lincoln Region was reported on February 18, 1976 at 90 knots (approximately 104 mph). It should be noted that future events may exceed these historical occurrences. • Cleveland County: 60 knots • Gaston County: 65 knots • Lincoln County: 90 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 5.15 and 5.16). The greatest magnitude reported was an F4 (last reported on May 5, 1989). It should be noted that an F5 tornado is possible. • Cleveland County: F4 • Gaston County: F2 • Lincoln County: F4
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 15 inches on February 16, 1969. Due to extreme variations in elevation throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available. • Cleveland County: 14 inches • Gaston County: 15 inches • Lincoln County: 14.5 inches
Geologic Hazards	
Earthquake	Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from the Cleveland Gaston Lincoln Region. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the region was reported on September 1, 1886 with a MMI of VII (very strong) with a correlating Richter Scale measurement of approximately 6.1. • Cleveland County: VI • Gaston County: VII • Lincoln County: VI
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 between moderate and high. There is also susceptibility throughout 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 233 dams in Cleveland Gaston Lincoln Region, 50 are classified as high-hazard. • Cleveland County: 15 high hazard dams • Gaston County: 28 high hazard dams • Lincoln County: 7 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 Cleveland Gaston Lincoln 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 3.3 percent of the total land area in the Cleveland Gaston Lincoln Region.

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 region was reported on August 16, 1928. Water reached a discharge of 73,300 cubic feet per second and the stream gage height was recorded at 24.3 feet. Additional peak discharge readings and gage heights are in the table below.

Location/Jurisdiction	Date	Peak Discharge (cfs)	Gage Height (ft)
Cleveland County			
Broad River near Boiling Springs	8/16/1928	73,300	24.3
Gaston County			
South Fork Catawba River at Lowell	8/15/1940	34,000	21.3
Lincoln County			
Indian Creek near Laboratory	10/1929	9,920	--

Other Hazards

Hazardous Materials Incident

According to USDOT PHMSA, the largest hazardous materials incident reported in the region was 2,000 LGA released on the highway on February 5, 1998. It should be noted that larger events are possible.

- Cleveland County: 55 LGA
- Gaston County: 50 LGA
- Lincoln County: 2,000 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. ***Cleveland County*** • The greatest number of fires to occur in any year was 87 in 2003. • The greatest number of acres to burn in a single year occurred in 2010 when 96.3 acres were burned. ***Gaston County*** • The greatest number of fires to occur in any year was 79 in 2007. • The greatest number of acres to burn in a single year occurred in 2005 when 159.2 acres were burned. ***Lincoln County*** • The greatest number of fires to occur in any year was 69 in 2006. • The greatest number of acres to burn in a single year occurred in 2008 when 57.9 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 nuclear accident at the McGuire or Catawba Nuclear Stations, 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 McGuire or Catawba is possible.

5.19.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council in gaining consensus on the determination of those hazards that pose the most significant threat to the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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[29], as summarized in **Table 5.32**. 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 Cleveland Gaston Lincoln Region, the highest PRI value is 3.0 (winter storm and freeze, flood, 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 Council.

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

TABLE 5.32: PRIORITY RISK INDEX FOR THE CLEVELAND GASTON LINCOLN 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	

5.19.3 Priority Risk Index Results

Table 5.33 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 Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.33: SUMMARY OF PRI RESULTS FOR THE CLEVELAND GASTON LINCOLN 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	Possible	Minor	Large	More than 24 hours	Less than 1 week	**2.1**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Possible	Critical	Large	More than 24 hours	Less than 24 hours	**2.6**
Lightning	Highly Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	**2.5**
Thunderstorm / High Wind	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.0**
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Landslide	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	**2.1**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	Less than 6 hours	Less than 24 hours	**2.3**
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	**2.7**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	More than 1 week	**2.4**
Nuclear Accident	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**

5.20 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Cleveland Gaston Lincoln Region, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.34**). 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 Cleveland Gaston Lincoln 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 5.34: CONCLUSIONS ON HAZARD RISK FOR THE CLEVELAND GASTON LINCOLN REGION

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

SECTION 6
VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the jurisdictions within the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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
- Hailstorm
- Lightning
- Thunderstorm Wind
- Tornado
- Winter Storm and Freeze
- Nuclear Accident

With the exception of Dam Failure, Erosion, and a Nuclear Accident, 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 Cleveland Gaston Lincoln 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, Cleveland Gaston Lincoln 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, and erosion, 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 6.13**.

[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, 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

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the Cleveland Gaston Lincoln 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. Unfortunately, due to the large scale of census tracts, the results are limited, but will be revised as population by census block becomes available for all areas in the region. 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

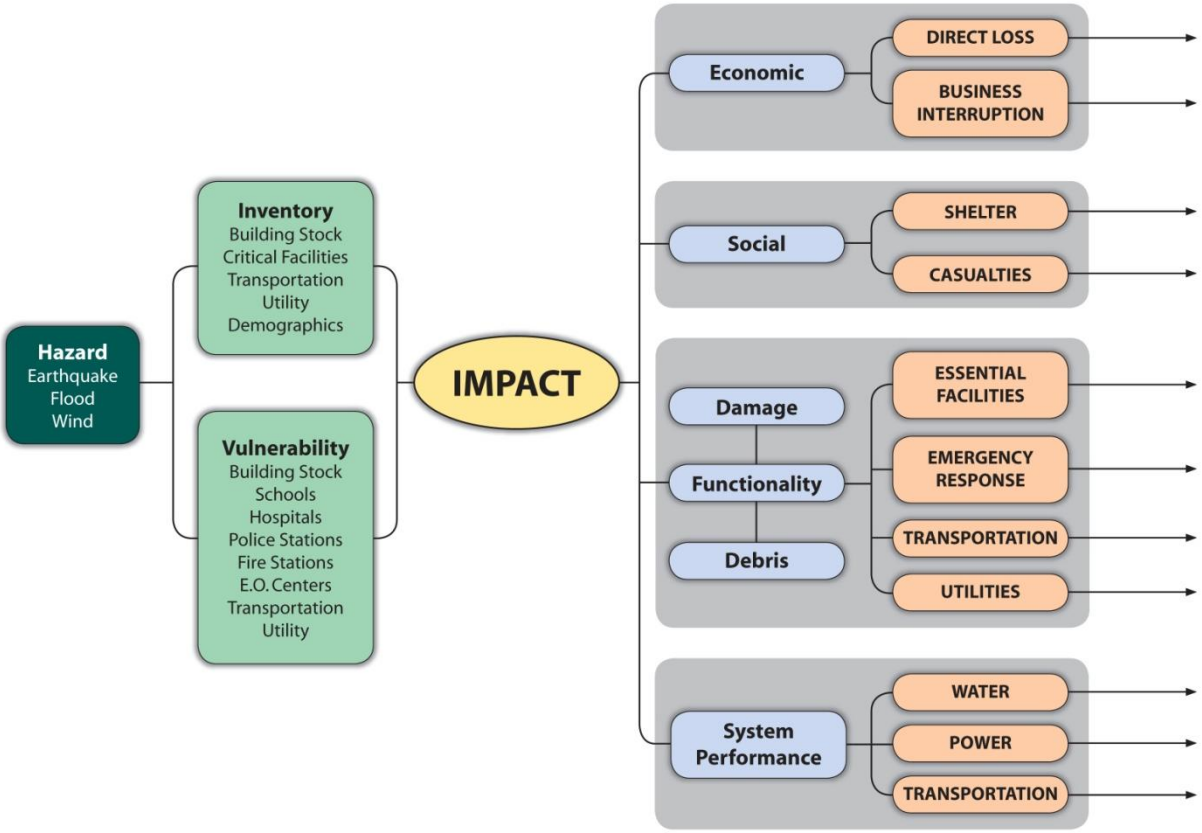
Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and 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 Cleveland Gaston Lincoln 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.

Hazard Prioritization

When it comes to evaluating hazards and determining which hazards a jurisdiction should spend the most time and effort addressing, a number of factors affect the prioritization. As discussed in *Section 5: Hazard Profiles,* the risk (magnitude, probability, location) of a hazard is one of the primary driving forces that helps determine the relative importance of addressing the potential impacts of a hazard. However, the assessment of a hazard's risk is generally focused on the hazard itself and how severe or likely it could be within geographic scope of the study area. This assessment does not necessarily analyze the potential effects of that hazard on humans and the built environment. This is a critical component of planning for hazards since a hazard that does not impact human life, safety, or welfare is typically not considered as important to address through mitigation. The analysis that follows attempts to bring this consideration into the planning process by estimating the impacts on humans and the built environment and prioritizing hazards accordingly.

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 Cleveland Gaston Lincoln Region. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 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.

Wildfire

The data used to determine vulnerability to wildfire in the Cleveland Gaston Lincoln 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.

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within Cleveland Gaston and Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region according to local parcel data provided by the 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 are 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region (study area of vulnerability assessment).[3]

TABLE 6.1: IMPROVED PROPERTY IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Cleveland County[4]	**57,632**	**$6,704,174,137**	**36,044**	**$4,488,000,411**
Belwood	686	$58,289,861	414	$30,592,037
Boiling Springs	1,687	$296,274,322	1,314	$239,387,733
Casar	231	$16,363,619	154	$12,305,479
Earl	154	$8,881,215	98	$6,713,199
Fallston	437	$36,167,955	298	$27,973,608
Grover	404	$26,859,550	304	$22,496,439
Kings Mountain	4,975	$590,287,912	3,988	$466,349,108
Kingstown	345	$17,857,330	252	$15,131,648
Lattimore	178	$17,141,404	130	$12,011,781
Lawndale	377	$13,918,239	268	$10,636,366
Mooresboro	215	$14,717,469	155	$9,425,427
Patterson Springs	220	$14,397,719	179	$11,094,782
Polkville	376	$25,096,652	236	$19,017,096
Shelby	10,735	$1,537,443,376	8,513	$1,127,560,219
Waco	167	$10,972,473	130	$7,903,750
Unincorporated Area	36,898	$4,078,343,437	23,599	$2,517,019,362
Gaston County	**101,953**	**$13,082,073,441**	**79,766**	**$9,417,852,944**
Belmont	4,991	$894,136,569	3,802	$647,702,940
Bessemer City	3,002	$228,322,683	2,231	$181,177,915

[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] Number of buildings 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
Cherryville	3,037	$284,917,965	3,462	$225,921,967
Cramerton	2,142	$354,674,994	1,744	$270,164,399
Dallas	1,993	$193,197,225	1,629	$142,049,566
Gastonia	29,769	$4,541,200,695	24,830	$3,393,344,264
High Shoals	362	$20,641,312	257	$15,077,370
Lowell	1,749	$199,084,760	1,449	$143,297,849
McAdenville	322	$53,447,501	228	$40,372,702
Mount Holly	6,631	$896,498,584	5,311	$687,024,307
Ranlo	1,466	$144,425,144	1,315	$113,366,274
Spencer Mountain	5	$50,843	2	$5,625
Stanley	1,694	$200,801,259	1,330	$150,069,165
Unincorporated Area	44,790	$5,070,673,907	32,176	$3,408,278,601
Lincoln County	**46,886**	**$6,700,165,011**	**29,512**	**$4,391,881,749**
Lincolnton	4,574	$999,657,332	3,564	$476,809,193
Unincorporated Area	42,312	$5,700,507,679	25,948	$3,915,072,556
CLEVELAND GASTON LINCOLN REGION TOTAL	**206,471**	**$26,486,412,589**	**145,322**	**$18,297,735,104**

Table 6.2 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region. **Table 6.14**, 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.

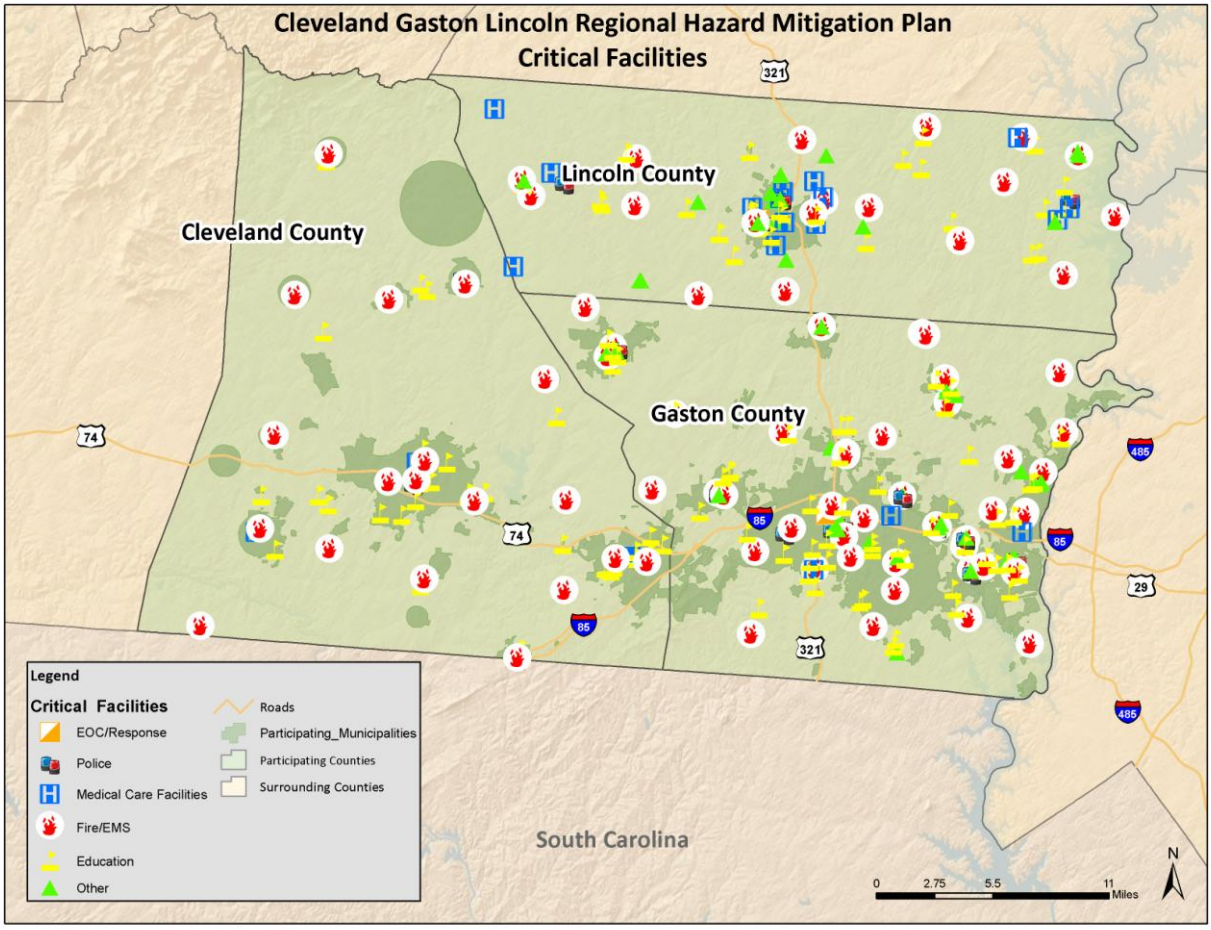
TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE CLEVELAND GASTON LINCOLN REGION

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Cleveland County	**19**	**5**	**3**	**0**	**32**	**0**
Belwood	0	0	0	0	0	0
Boiling Springs	1	0	1	0	1	0
Casar	1	0	0	0	1	0
Earl	0	0	0	0	0	0
Fallston	1	1	0	0	1	0
Grover	1	1	0	0	1	0
Kingstown	0	0	0	0	0	0
Kings Mountain	2	1	1	0	7	0
Lattimore	1	0	0	0	0	0
Lawndale	1	0	0	0	0	0
Mooresboro	0	0	0	0	0	0
Patterson Springs	0	0	0	0	0	0

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Polkville	1	0	0	0	0	0
Shelby	4	2	1	0	10	0
Waco	1	0	0	0	0	0
Unincorporated Area	5	0	0	0	11	0
Gaston County	**43**	**14**	**3**	**1**	**52**	**41**
Belmont	1	1	0	0	4	4
Bessemer City	2	1	0	0	4	2
Cherryville	2	1	0	0	4	3
Cramerton	2	1	0	0	2	1
Dallas	3	1	0	0	1	3
Gastonia	10	3	2	1	16	15
High Shoals	1	0	0	0	0	1
Lowell	2	1	0	0	1	2
McAdenville	2	1	0	0	2	1
Mount Holly	5	0	1	0	4	4
Ranlo	1	2	0	0	0	1
Spencer Mountain	0	0	0	0	0	0
Stanley	1	2	0	0	3	3
Unincorporated Area	11	0	0	0	11	1
Lincoln County	**19**	**5**	**14**	**1**	**28**	**25**
Lincolnton	2	1	4	1	8	12
Unincorporated Area	17	4	10	0	20	13
CLEVELAND GASTON LINCOLN REGION TOTAL	**81**	**24**	**20**	**2**	**112**	**66**

Source: Local Governments, Hazus-MH

FIGURE 6.2: CRITICAL FACILITY LOCATIONS IN THE CLEVELAND GASTON LINCOLN REGION



Source: Local Governments, Hazus-MH 2.1

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 Cleveland Gaston Lincoln Region that are potentially at risk to these hazards.

Table 6.3 lists the population by jurisdiction according to U.S. Census 2010 population estimates. Unfortunately, estimates were not available at the census block level, limited the results to county-wide estimates. The total population in the Cleveland Gaston Lincoln Region according to Census data is 382, 429 persons. Additional population estimates are presented in Section 3: *Community Profile*.

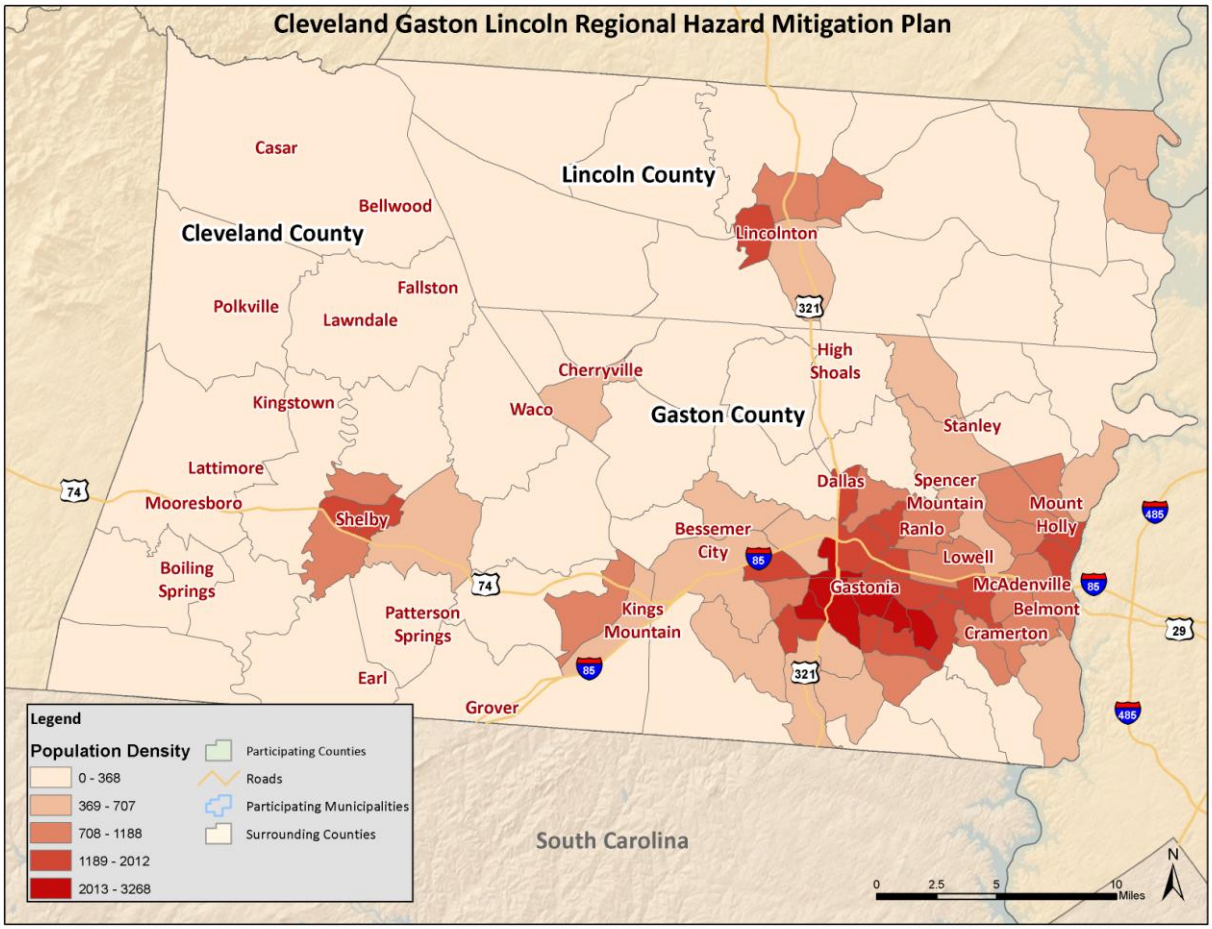
TABLE 6.3: TOTAL POPULATION IN THE CLEVELAND GASTON LINCOLN REGION

Location	Total 2010 Population
Cleveland County	98,078
Gaston County	206,086
Lincoln County	78,265
CLEVELAND GASTON LINCOLN REGION TOTAL	**382,429**

Source: U.S. 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.[5]

FIGURE 6.3: POPULATION DENSITY IN THE CLEVELAND GASTON LINCOLN REGION



Source: U.S. Census Bureau, 2010

[5] Population by census block was not available at the time this plan was completed.

6.4.3 Development Trends and Changes in Vulnerability

Since the previous county hazard mitigation plans were approved (in 2010 and 2011), the Cleveland Gaston Lincoln Region has experienced limited growth and development. **Table 6.4** shows the number of building units constructed since 2010 according to the US Census American Community Survey.

TABLE 6.4: BUILDING COUNTS FOR THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Total Housing Units (2012)	Units Built 2010 or later	% Building Stock Built Post-2010
Cleveland County	**43,321**	**90**	**0.2%**
Belwood	511	0	0.0%
Boiling Springs	1,400	0	0.0%
Casar	182	0	0.0%
Earl	105	0	0.0%
Fallston	268	1	0.4%
Grover	311	0	0.0%
Kingstown	308	0	0.0%
Kings Mountain	4,634	16	0.3%
Lattimore	131	0	0.0%
Lawndale	331	7	2.1%
Mooresboro	212	1	0.5%
Patterson Springs	281	0	0.0%
Polkville	207	0	0.0%
Shelby	9,615	0	0.0%
Waco	153	0	0.0%
Unincorporated Area	24,672	65	0.3%
Gaston County	**88,675**	**231**	**0.3%**
Belmont	4,646	15	0.3%
Bessemer City	2,107	0	0.0%
Cherryville	2,766	0	0.0%
Cramerton	1,939	0	0.0%
Dallas	1,999	9	0.5%
Gastonia	30,615	103	0.3%
High Shoals	276	0	0.0%
Lowell	1,551	0	0.0%
McAdenville	291	0	0.0%
Mount Holly	6,035	31	0.5%
Ranlo	1,473	10	0.7%
Spencer Mountain	8	0	0.0%
Stanley	1,671	0	0.0%
Unincorporated Area	33,298	63	0.2%
Lincoln County	**33,510**	**93**	**0.3%**
Lincolnton	4,796	0	0.0%
Unincorporated Area	28,714	93	0.3%
CLEVELAND GASTON LINCOLN REGION TOTAL	**165,506**	**414**	**0.3%**

Source: US Census Bureau

Table 6.5 shows population growth estimates for the region from 2010 to 2012 based on the US Census Annual Estimates of Resident Population.

TABLE 6.5: POPULATION GROWTH FOR THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Population Estimates (as of July 1)*			% Change 2010-2012
	2010	2011	2012	
Cleveland County	**98,030**	**97,581**	**97,474**	**-0.6%**
Belwood	949	943	940	-0.9%
Boiling Springs	4,641	4,619	4,618	-0.5%
Casar	297	296	295	-0.7%
Earl	260	259	259	-0.4%
Fallston	606	604	604	-0.3%
Grover	707	705	704	-0.4%
Kingstown	10,655	10,639	10,648	-0.1%
Kings Mountain	488	486	486	-0.4%
Lattimore	606	601	599	-1.2%
Lawndale	311	310	309	-0.6%
Mooresboro	621	617	614	-1.1%
Patterson Springs	545	542	542	-0.6%
Polkville	20,298	20,232	20,270	-0.1%
Shelby	321	319	319	-0.6%
Waco	98,030	97,581	97,474	-0.6%
Gaston County	**206,150**	**206,918**	**208,049**	**0.9%**
Belmont	10,252	10,274	10,302	0.5%
Bessemer City	5,342	5,367	5,386	0.8%
Cherryville	5,761	5,786	5,804	0.7%
Cramerton	4,168	4,187	4,201	0.8%
Dallas	4,492	4,511	4,526	0.8%
Gastonia	71,757	71,980	72,723	1.3%
High Shoals	695	699	702	1.0%
Lowell	3,527	3,542	3,554	0.8%
McAdenville	650	654	654	0.6%
Mount Holly	13,662	13,728	13,776	0.8%
Ranlo	3,436	3,450	3,460	0.7%
Spencer Mountain	37	37	37	0.0%
Stanley	3,558	3,577	3,589	0.9%
Lincoln County	**78,400**	**78,831**	**79,313**	**1.2%**
Lincolnton	10,503	10,570	10,640	1.3%
CLEVELAND GASTON LINCOLN REGION TOTAL	**382,580**	**383,330**	**384,836**	**0.6%**

*2013 estimates are currently unavailable at the municipal-level.
Source: US Census Bureau

Based on the data above, there has been a low rate of residential development and population growth in the region since 2010. Therefore, changes in development have not impacted the region's vulnerability since the previous county hazard mitigation plans were approved and there has been little

change in the overall vulnerability. However, it is 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, high landside susceptibility areas, high wildfire risk areas, primary and secondary TRI site buffers, or McGuire 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, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). 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 6.13.**

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

6.5.1 Hurricane and Tropical Storm

Historical evidence indicates that the Cleveland Gaston Lincoln Region has a significant risk to the hurricane and tropical storm hazard. There have been three disaster declarations due to hurricanes (Hurricane Hugo, Tropical Storm Frances, and Hurricane Katrina Evacuation) in the region. Several tracks have come near or traversed through the Cleveland Gaston Lincoln 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
Cleveland County	$339,000
Gaston County	$805,000
Lincoln County	$233,000
CLEVELAND GASTON LINCOLN REGION TOTAL	**$1,377,000**

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
Cleveland County	**61**	**71**	**90**	**97**
Belwood	58	68	87	94
Boiling Springs	58	68	87	93
Casar	57	67	86	93
Earl	59	69	88	95
Fallston	58	68	87	94
Grover	60	70	88	96
Kingstown	61	71	90	97
Kings Mountain	58	68	86	93
Lattimore	58	68	86	93
Lawndale	58	68	87	94
Mooresboro	58	68	86	93
Patterson Springs	59	69	88	95
Polkville	57	67	86	93
Shelby	60	70	88	96
Waco	59	69	88	96
Unincorporated Area	61	71	80	90
Gaston County	**62**	**72**	**91**	**98**
Belmont	62	72	91	98
Bessemer City	60	70	89	97
Cherryville	60	70	88	97
Cramerton	62	72	91	98
Dallas	61	70	90	97
Gastonia	62	72	91	99
High Shoals	60	70	89	96
Lowell	62	71	91	98
McAdenville	62	71	91	98
Mount Holly	62	71	91	98
Ranlo	61	71	90	97
Spencer Mountain	61	71	90	97
Stanley	61	70	90	96
Unincorporated Area	62	71	90	98
Lincoln County	**62**	**72**	**91**	**99**
Lincolnton	60	70	89	96
Unincorporated Area	62	72	91	99
MAXIMUM WIND SPEED REPORTED	**62**	**72**	**91**	**99**

Source: Hazus-MH 2.1

Social Vulnerability

Given some equal susceptibility across the entire Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 6.14** 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 Cleveland Gaston Lincoln 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
Cleveland County	$40,000
Gaston County	$79,000
Lincoln County	$25,000
CLEVELAND GASTON LINCOLN REGION TOTAL	**$144,000**

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 6.14**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 data, and GIS analysis. **Table 6.9** presents the potential at-risk property where available. All areas of the Cleveland Gaston Lincoln Region are identified as moderate or high incidence areas by the USGS landslide data. The incidence levels (high and moderate) were 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 Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Cleveland County	52,122	6,366	36,230	4,016	$4,124,602,499	$445,599,829
Belwood	686	0	414	0	$30,592,037	$0
Boiling Springs	1,687	0	1,314	0	$239,387,733	$0
Casar	231	0	154	0	$12,305,479	$0
Earl	154	0	98	0	$6,713,199	$0
Fallston	437	0	298	0	$27,973,608	$0
Grover	404	0	304	0	$22,496,439	$0
Kingstown	345	0	252	0	$15,131,648	$0
Kings Mountain	4,975	0	3,988	0	$466,349,108	$0
Lattimore	178	0	130	0	$12,011,781	$0
Lawndale	377	0	268	0	$10,636,366	$0
Mooresboro	215	0	155	0	$9,425,427	$0
Patterson Springs	220	0	179	0	$11,094,782	$0
Polkville	376	0	236	0	$19,017,096	$0
Shelby	10,327	453	8,266	269	$1,093,356,031	$395,705,084
Waco	0	167	0	130	$0	$41,990,995
Unincorporated Area	31,510	5,746	20,174	3,617	$2,148,111,765	$7,903,750
Gaston County	33,708	68,245	26,004	52,762	$3,429,210,347	$5,988,642,597
Belmont	2,396	2,595	1,693	2,109	$290,612,888	$357,090,052
Bessemer City	2,279	723	1,683	548	$125,672,330	$55,505,585
Cherryville	0	3,037	0	2,462	$0	$225,921,967
Cramerton	1,886	256	1,512	232	$244,601,175	$25,563,224
Dallas	0	1,993	0	1,629	$0	$142,049,566
Gastonia	10,162	19,607	8,618	16,212	$1,416,768,429	$1,976,575,835
High Shoals	0	362	0	257	$0	$15,077,370
Lowell	0	1,749	0	1,449	$0	$143,297,849
McAdenville	0	322	0	228	$0	$40,372,702
Mount Holly	0	6,631	0	5,311	$0	$687,024,307
Ranlo	0	1,466	0	1,315	$0	$113,366,274
Spencer Mountain	0	5	0	2	$0	$5,625
Stanley	0	1,694	0	1,330	$0	$150,069,165
Unincorporated Area	16,985	27,805	12,498	19,678	$1,351,555,525	$2,056,723,076

Location	Number of Parcels At Risk		Number of Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Lincoln County	34,614	12,272	23,387	8,248	$5,132,000,897	$1,568,164,114
Lincolnton	3,939	635	3,228	469	$890,710,878	$108,946,454
Unincorporated Area	30,675	11,637	20,159	7,779	$4,241,290,019	$1,459,217,660
CLEVELAND GASTON LINCOLN REGION TOTAL	**120,444**	**86,883**	**85,621**	**65,026**	**$12,685,813,743**	**$8,002,406,540**

Source: USGS; County Tax Assessor Data

Social Vulnerability

Given moderate to high susceptibility across the entire Cleveland Gaston Lincoln Region, it is assumed that the total population is at risk.

Critical Facilities

Several critical facilities are located in a high susceptibility area, though the majority in both Cleveland and Lincoln County are located in an area of moderate susceptibility. Gaston County has the most critical facilities (119) located within a high susceptibility area. Of note, critical facilities in high susceptibility areas of Gaston County tend to be located in the municipalities rather than the unincorporated county as is the case in Cleveland and Lincoln Counties. Indeed, Cleveland and Lincoln Counties respectively have only 2 and 13 critical facilities located in a high susceptibility area. The remaining critical facilities in the region are located in the moderate susceptibility area. A list of specific critical facilities and their associated risk can be found in **Table 6.14** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in the Cleveland Gaston Lincoln Region, 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Region is susceptible to flood events. A total of 55 flood events have been reported by the National Climatic Data Center resulting in $3.7 million dollars in damages, but no injuries or fatalities. On an annualized level, these damages amounted to just over $200,000 for the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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

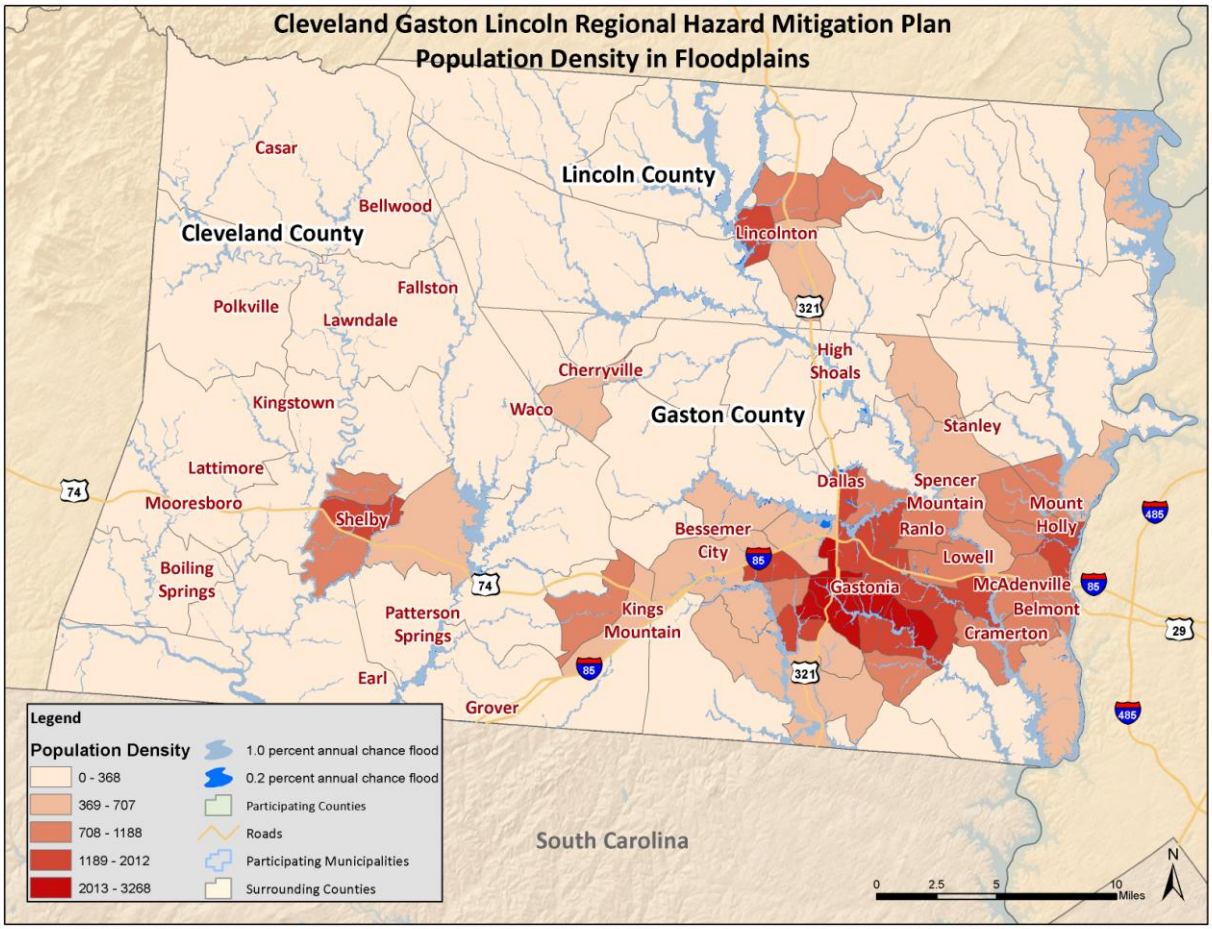
Location	1.0-percent ACF			0.2-percent ACF		
	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
Cleveland County	**4,167**	**2,264**	**$436,220,849**	**254**	**192**	**$39,952,798**
Belwood	79	48	$2,816,461	0	0	$0
Boiling Springs	16	12	$2,966,018	0	0	$0
Casar	1	0	$0	0	0	$0
Earl	0	0	$0	0	0	$0
Fallston	0	0	$0	0	0	$0
Grover	0	0	$0	0	0	$0
Kings Mountain	107	65	$28,481,646	4	3	$123,860
Kingstown	3	3	$125,922	0	0	$0
Lattimore	0	0	$0	0	0	$0
Lawndale	0	12	$216,229	0	0	$0
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	8	2	$230,601	0	0	$0
Shelby	589	383	$96,886,489	58	39	$10,318,458
Waco	7	6	$584,665	0	0	$0
Unincorporated Area	3,364	1,735	$314,873,436	192	150	$29,510,480
Gaston County	**7,673**	**4,550**	**$1,008,803,086**	**578**	**441**	**$54,447,737**
Belmont	230	125	$53,933,676	30	21	$4,143,973
Bessemer City	31	19	$1,513,543	4	2	$131,179
Cherryville	52	35	$6,167,691	0	0	$0
Cramerton	251	154	$29,057,672	34	30	$3,336,691
Dallas	119	88	$5,734,219	62	53	$2,278,722
Gastonia	2,277	1,511	$396,883,714	213	182	$27,373,513
High Shoals	40	26	$2,180,957	1	1	$116,555
Lowell	5	0	$0	19	9	$1,146,072
McAdenville	32	14	$3,507,098	5	4	$551,697
Mount Holly	586	360	$75,146,873	46	39	$3,385,868
Ranlo	47	31	$3,050,651	0	0	$0
Spencer Mountain	4	2	$5,625	0	0	$0
Stanley	6	1	$135,825	0	0	$0
Unincorporated Area	3,993	2,184	$431,485,542	164	100	$11,983,467
Lincoln County	**5,220**	**2,986**	**$740,262,464**	**98**	**60**	**$10,819,720**
Lincolnton	275	178	$39,295,831	31	37	$8,748,177
Unincorporated Area	4,945	2,808	$700,966,633	67	23	$2,071,543
CLEVELAND GASTON LINCOLN REGION TOTAL	**17,060**	**9,800**	**$2,185,286,399**	**930**	**693**	**$105,220,255**

Source: FEMA DFIRM

Social Vulnerability

Since 2010 population was available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure 6.4** is presented to gain a better understanding of at risk population.

FIGURE 6.4 : POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, U.S. Census 2010

Critical Facilities

The critical facility analysis revealed that there is only one critical facility located in the Cleveland Gaston Lincoln Region 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.) This facility is a fire station that is located in Gaston County. There are no critical facilities in a floodplain in Cleveland and Lincoln Counties. A list of specific critical facilities and their associated risk can be found in **Table 6.14** 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 Cleveland Gaston Lincoln 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

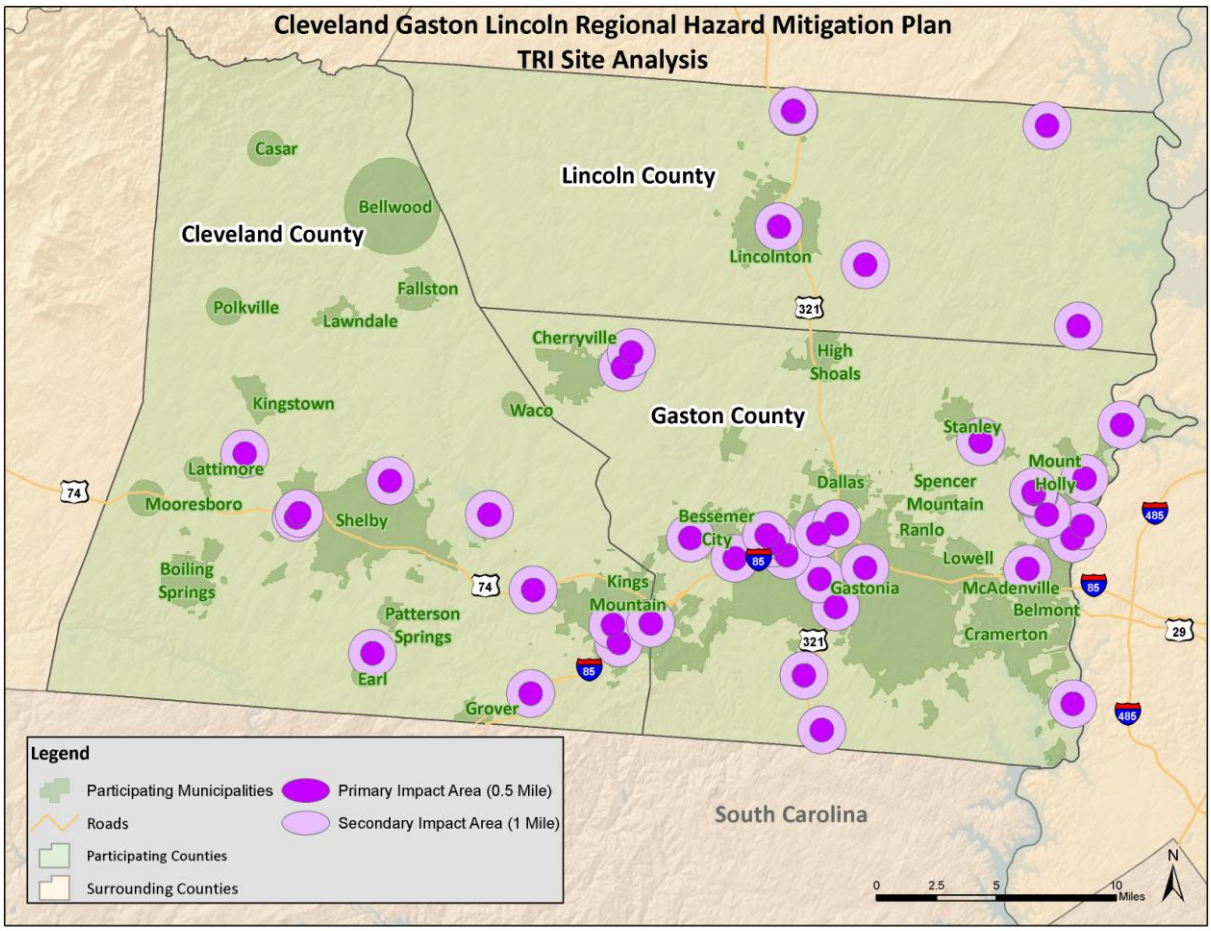
Although historical evidence and existing Toxic Release Inventory sites indicate that the Cleveland Gaston Lincoln Region is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. It is assumed that while 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 the Cleveland Gaston Lincoln 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.[6] In both scenarios, two sizes of buffers—0.5 mile and 1 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 Cleveland Gaston Lincoln 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 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).[7]

[6] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an actual event).
[7] Note that parcels included in the 1 mile analysis are also included in the 0.5 mile analysis.

FIGURE 6.5 : TOXIC RELEASE INVENTORY SITES WITH BUFFERS IN THE CLEVELAND GASTON LINCOLN REGION



Source: EPA

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

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Cleveland County	**1,633**	**1,095**	**$234,225,793**	**6,215**	**4,518**	**$1,014,557,943**
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	1	1	$94,432	86	49	$3,504,372
Fallston	0	0	$0	0	0	$0
Grover	0	0	$0	0	0	$0
Kingstown	0	0	$0	0	0	$0
Kings Mountain	494	371	$63,862,476	2,139	1,726	$270,093,406
Lattimore	0	0	$0	0	0	$0
Lawndale	0	0	$0	0	0	$0
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	0	0	$0	0	0	$0
Shelby	501	289	$56,919,672	1,516	1,080	$380,734,087
Waco	0	0	$0	0	0	$0
Unincorporated Area	637	434	$113,349,213	2,474	1,663	$360,226,078
Gaston County	**7,793**	**5,796**	**$755,628,193**	**27,351**	**21,303**	**$2,431,215,678**
Belmont	120	102	$27,307,300	437	361	$72,631,847
Bessemer City	728	420	$38,690,804	2,030	1,464	$113,792,742
Cherryville	180	123	$14,393,093	474	351	$38,391,462
Cramerton	0	0	$0	0	0	$0
Dallas	0	0	$0	15	15	$1,876,762
Gastonia	3,651	2,957	$290,660,503	12,547	10,229	$1,086,269,719
High Shoals	0	0	$0	0	0	$0
Lowell	0	0	$0	0	0	$0
McAdenville	0	0	$0	0	0	$0
Mount Holly	1,486	1,033	$144,083,324	4,773	3,789	$467,878,845
Ranlo	0	0	$0	0	0	$0
Spencer Mountain	0	0	$0	0	0	$0
Stanley	239	152	$28,997,699	609	419	$70,046,774
Unincorporated Area	1,389	1,009	$211,495,470	6,466	4,675	$580,327,527
Lincoln County	**1,116**	**811**	**$450,040,572**	**4,274**	**3,039**	**$967,277,274**
Lincolnton	344	248	$158,188,767	1,635	1,292	$411,028,229
Unincorporated Area	772	563	$291,851,805	2,639	1,747	$556,249,045
CLEVELAND GASTON LINCOLN REGION TOTAL	**10,542**	**7,702**	**$1,439,894,558**	**37,840**	**28,860**	**$4,413,050,895**

FIGURE 6.6 : MOBILE HAZMAT BUFFERS IN THE CLEVELAND GASTON LINCOLN REGION

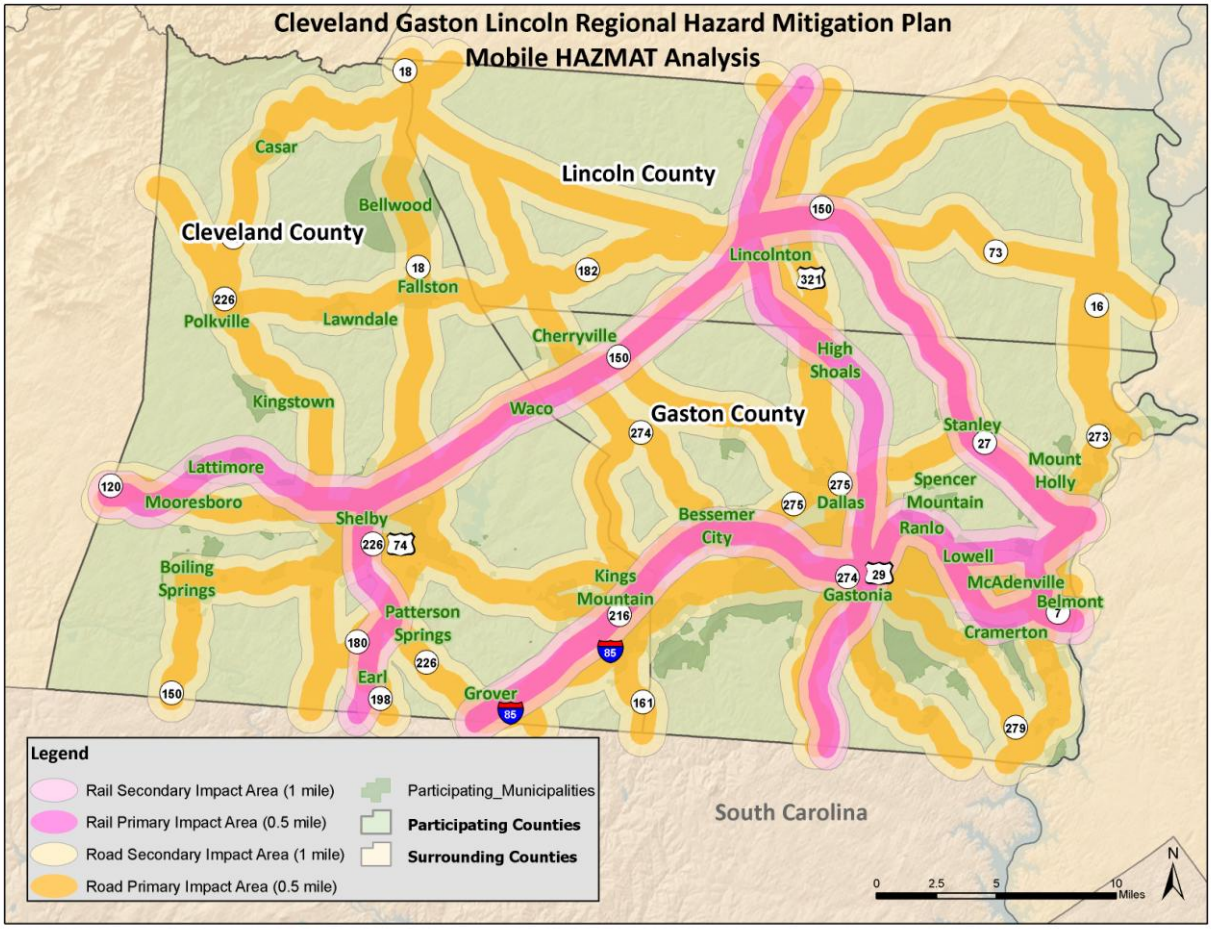


TABLE 6.12: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Cleveland County	**31,548**	**22,892**	**$2,692,273,219**	**42,392**	**30,011**	**$3,473,154,346**
Belwood	297	194	$14,927,335	471	304	$23,461,639
Boiling Springs	857	659	$136,550,386	1,316	1,031	$190,184,269
Casar	225	149	$11,811,644	231	154	$12,305,479
Earl	154	98	$6,713,199	154	98	$6,713,199
Fallston	425	287	$27,190,992	437	298	$27,973,608
Grover	404	304	$22,496,439	404	304	$22,496,439
Kingstown	2	2	$111,465	66	39	$2,130,556
Kings Mountain	4,523	3,661	$432,219,367	4,975	3,988	$466,349,108
Lattimore	0	0	$0	27	21	$1,958,976
Lawndale	375	267	$10,600,956	377	268	$10,636,366
Mooresboro	194	141	$8,792,187	215	155	$9,425,427
Patterson Springs	220	179	$11,094,782	220	179	$11,094,782
Polkville	373	235	$18,923,714	376	236	$19,017,096
Shelby	9,419	7,477	$988,476,300	10,674	8,458	$1,112,699,524
Waco	167	130	$7,903,750	167	130	$7,903,750
Unincorporated Area	13,913	9,109	$994,460,703	22,282	14,348	$1,548,804,128
Gaston County	**59,998**	**46,773**	**$5,768,910,594**	**83,983**	**65,343**	**$7,939,422,690**
Belmont	3,221	2,570	$451,174,397	4,606	3,569	$612,150,561
Bessemer City	2,681	1,982	$156,954,306	3,002	2,231	$181,177,915
Cherryville	2,642	2,143	$188,375,147	3,035	2,461	$225,836,206
Cramerton	1,019	851	$117,799,977	1,859	1,518	$235,897,950
Dallas	1,809	1,487	$134,992,881	1,993	1,629	$142,049,566
Gastonia	20,429	16,902	$2,304,367,155	27,159	22,481	$3,015,156,394
High Shoals	317	247	$14,022,949	362	257	$15,077,370
Lowell	1,225	971	$90,558,446	1,591	1,311	$124,957,609
McAdenville	316	225	$34,147,043	322	228	$40,372,702
Mount Holly	4,650	3,733	$408,482,658	6,074	4,884	$612,785,487
Ranlo	440	403	$31,458,818	1,403	1,259	$108,807,423
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,562	1,217	$137,318,458	1,694	1,330	$150,069,165
Unincorporated Area	19,687	14,042	$1,699,258,359	30,883	22,185	$2,475,084,342
Lincoln County	**22,293**	**15,585**	**$3,606,722,929**	**32,645**	**22,442**	**$4,854,971,146**
Lincolnton	4,228	3,411	$927,450,041	4,563	3,686	$997,156,902
Unincorporated Area	18,065	12,174	$2,679,272,888	28,082	18,756	$3,857,814,244
CLEVELAND GASTON LINCOLN REGION TOTAL	**113,839**	**85,250**	**$12,067,906,742**	**159,020**	**117,796**	**$16,267,548,182**

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

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Cleveland County	**10,820**	**8,061**	**$986,936,431**	**18,306**	**13,808**	**$1,637,044,986**
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	141	96	$6,643,896	154	98	$6,713,199
Fallston	0	0	$0	0	0	$0
Grover	293	232	$18,103,548	402	302	$22,403,159
Kingstown	0	0	$0	0	0	$0
Kings Mountain	2,682	2,265	$210,689,081	3,917	3,306	$355,717,859
Lattimore	157	116	$10,946,203	178	130	$12,011,781
Lawndale						
Mooresboro	194	140	$8,181,587	215	155	$9,425,427
Patterson Springs	204	165	$10,000,711	220	179	$11,094,782
Polkville	0	0	$0	0	0	$0
Shelby	4,021	3,000	$387,305,638	7,051	5,485	$659,615,537
Waco	116	90	$5,196,587	167	130	$7,903,750
Unincorporated Area	3,012	1,957	$329,869,180	6,002	4,023	$552,159,492
Gaston County	**31,905**	**25,160**	**$2,867,655,157**	**52,439**	**41,262**	**$4,604,104,623**
Belmont	2,858	2,219	$373,616,253	3,949	3,111	$504,148,709
Bessemer City	2,314	1,671	$131,026,033	2,907	2,148	$174,317,624
Cherryville	1,967	1,611	$152,500,703	2,632	2,141	$191,130,724
Cramerton	1,280	1,099	$115,174,114	1,817	1,505	$216,673,389
Dallas	520	386	$21,278,686	1,175	939	$62,866,952
Gastonia	8,811	7,199	$835,180,254	15,123	12,309	$1,409,836,737
High Shoals	326	223	$12,857,053	362	257	$15,077,370
Lowell	1,358	1,139	$108,709,392	1,749	1,449	$143,297,849
McAdenville	35	27	$11,142,966	250	184	$37,284,381
Mount Holly	3,082	2,512	$275,613,675	4,729	3,923	$434,823,289
Ranlo	1,155	1,037	$95,590,838	1,450	1,300	$112,220,627
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,442	1,116	$127,601,921	1,656	1,292	$145,450,939
Unincorporated Area	6,757	4,921	$607,363,269	14,640	10,704	$1,156,976,033
Lincoln County	**7,293**	**5,465**	**$1,396,547,408**	**11,308**	**8,275**	**$2,018,523,570**
Lincolnton	3,434	2,812	$800,368,350	4,277	3,461	$953,902,234
Unincorporated Area	3,859	2,653	$596,179,058	7,031	4,814	$1,064,621,336
CLEVELAND GASTON LINCOLN REGION TOTAL	**50,018**	**38,686**	**$5,251,138,996**	**82,053**	**63,345**	**$8,259,673,179**

Social Vulnerability

Given high susceptibility across the entire Cleveland Gaston Lincoln 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 69 facilities located in a HAZMAT risk zone. The primary impact zone includes 14 facilities, including 1 school in Cleveland County, 2 fire stations, 3 schools, and 2 other facilities in Gaston County, and 2 medical care facilities, 1 school, 1 fire station, and two others in Lincoln County. The remaining facilities are in the secondary, 1 mile zone. A list of specific critical facilities and their associated risk can be found in **Table 6.14** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors revealed that there are 282 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and railroads. Notably, there are only twenty-three critical facilities in all three counties combined that are not located in the 1 mile buffer area for either road or rail. Although this is a worst case scenario model, it indicates that most of the critical facilities in the Cleveland Gaston Lincoln region are vulnerable to a potential mobile HAZMAT incident. Additionally, there are 237 critical facilities located in the 0.5 mile buffer area, accounting for over 75 percent of the total number of critical facilities in the region. This may be the result of many critical facilities being located near major roadways for ease of access, but it is nonetheless important to recognize what a large percentage of critical facilities in the region are located in the smaller buffer area. A list of specific critical facilities and their associated risk can be found in **Table 6.14** 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 Cleveland Gaston Lincoln 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.

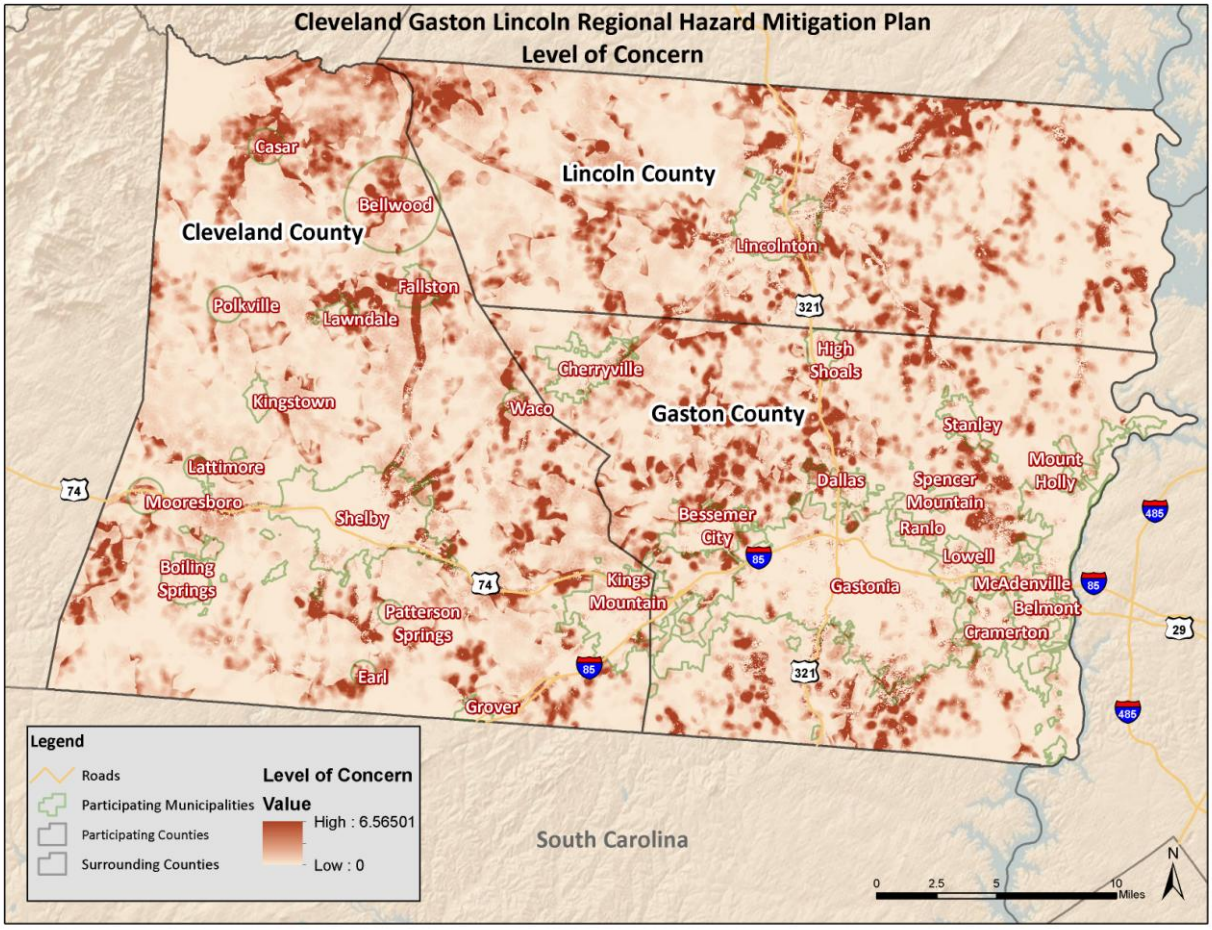
6.5.6 Wildfire

Although historical evidence indicates that the Cleveland Gaston Lincoln Region is susceptible to wildfire events, there are few reports of 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 to 100 with higher values being most severe (as noted previously, this is only a measure of relative risk). Six was the highest level recorded in the Cleveland Gaston Lincoln planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The region contains some lands where the value falls into the at-risk category, though the region has somewhat less land labeled as at-risk compared to other regions of North Carolina. Since all of this land area is on the lower tenth of the overall LOC scale, there is likely considerably less risk in the region than in other areas of the country.

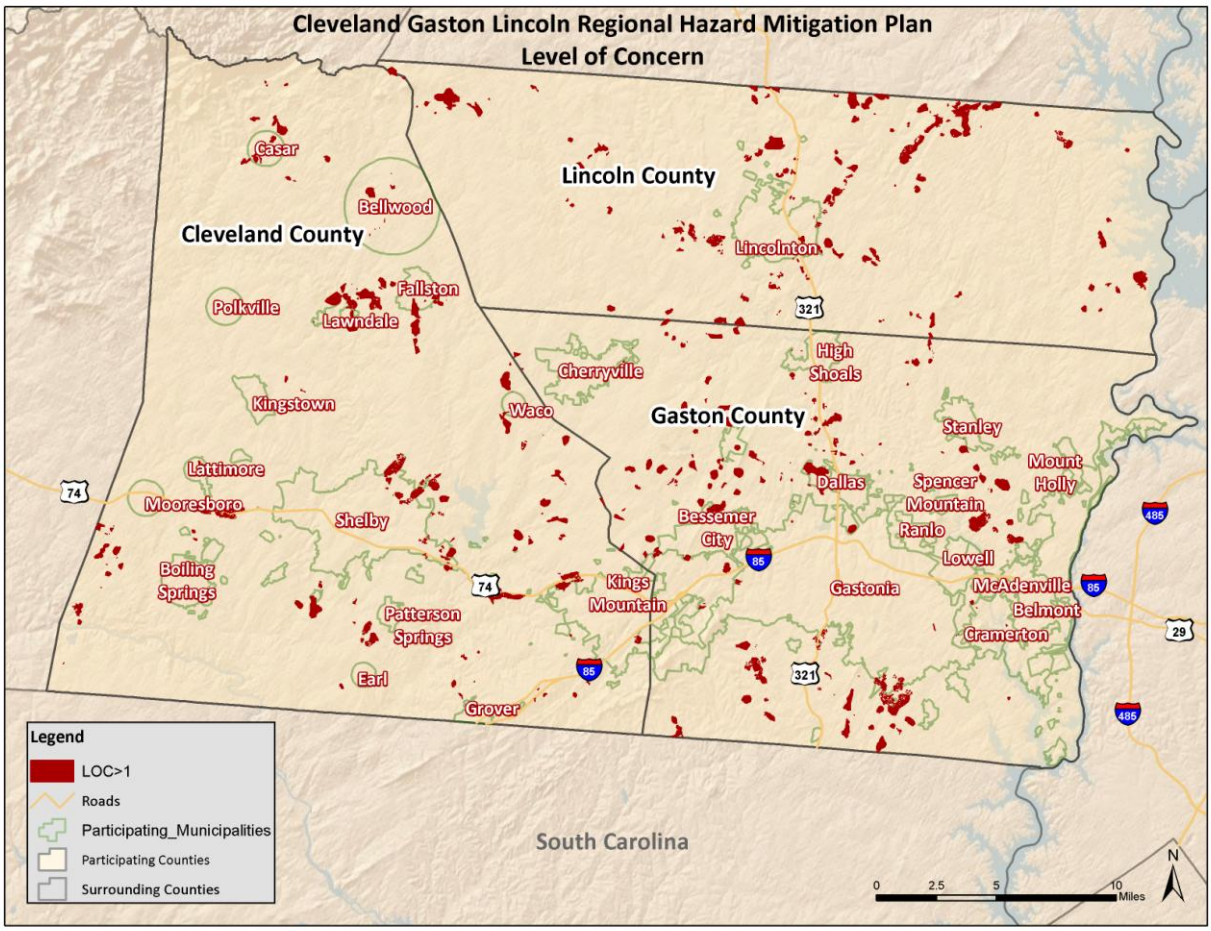
Table 6.14 shows the results of the analysis.

FIGURE 6.7: WILDFIRE RISK AREAS IN THE CLEVELAND GASTON LINCOLN REGION



Source: Southern Wildfire Risk Assessment Data

FIGURE 6.8: WILDFIRE RISK AREAS IN THE CLEVELAND GASTON LINCOLN REGION



Source: Southern Wildfire Risk Assessment Data

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

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value**
Cleveland County	1,888	1,272	$196,958,036
Belwood	53	32	$2,928,213
Boiling Springs	0	0	$0
Casar	47	34	$7,136,006
Earl	12	10	$554,341
Fallston	35	25	$1,787,318
Grover	0	0	$0
Kingstown	0	0	$0
Kings Mountain	11	7	$169,637
Lattimore	12	9	$963,841
Lawndale	29	21	$1,474,674
Mooresboro	0	0	$0

Location	HIGH WILDFIRE RISK AREA		
	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Patterson Springs	0	0	$0
Polkville	0	0	$0
Shelby	331	233	$73,528,366
Waco	12	11	$892,319
Unincorporated Area	1,346	890	$107,523,321
Gaston County	2,637	1,966	$264,540,492
Belmont	31	26	$7,870,009
Bessemer City	19	16	$9,913,893
Cherryville	0	0	$0
Cramerton	10	8	$2,931,535
Dallas	5	3	$951,400
Gastonia	80	62	$17,604,741
High Shoals	0	0	$0
Lowell	0	0	$0
McAdenville	0	0	$0
Mount Holly	1	0	$0
Ranlo	0	0	$0
Spencer Mountain	0	0	$0
Stanley	0	0	$0
Unincorporated Area	2,491	1,851	$225,268,914
Lincoln County	2,145	1,538	$436,479,105
Lincolnton	33	29	$5,895,898
Unincorporated Area	2,112	1,509	$430,583,207
CLEVELAND GASTON LINCOLN REGION TOTAL	**6,670**	**4,776**	**$897,977,633**

Social Vulnerability

Although not all areas have equal vulnerability, there is some susceptibility across the entire Cleveland Gaston Lincoln 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 8 schools (2 in Cleveland, 3 in Gaston, and 3 in Lincoln), 2 fire stations (Lincoln County), and 1 medical care facility (Lincoln County) located in wildfire areas of concern. This reflects the slightly elevated risk in Lincoln County for critical facilities to wiildfire. 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 6.14** 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 Cleveland Gaston Lincoln Region.

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 6.15 presents a summary of annualized loss for each hazard in the Cleveland Gaston Lincoln 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 6.15: ANNUALIZED LOSS FOR THE CLEVELAND GASTON LINCOLN REGION

Event	Cleveland County	Gaston County	Lincoln County	Total
Dam Failure	Negligible	$197	Negligible	$197
Drought	Negligible	Negligible	Negligible	Negligible
Extreme Heat	Negligible	Negligible	Negligible	Negligible

Event	Cleveland County	Gaston County	Lincoln County	Total
Erosion	Negligible	Negligible	Negligible	Negligible
Hail	Negligible	$26,878	$32,380	$59,258
Hurricane & Tropical Storm	$339,000	$805,000	$233,000	$1,377,000
Landslide	Negligible	Negligible	Negligible	Negligible
Lightning	$113,416	$38,033	$106,377	$257,826
Thunderstorm Wind/High Wind	$73,813	$35,104	$23,393	$132,310
Tornado	$1,394,197	$1,442,814	$1,216,069	$4,053,080
Winter Storm & Freeze	$1,130,502	$1,141,609	$796,460	$3,207,036
Flood	$3,774	$161,132	$46,246	$211,151
Earthquake	$40,000	$79,000	$25,000	$144,000
HAZMAT Incident	Negligible	Negligible	Negligible	Negligible
Wildfire	Negligible	Negligible	Negligible	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, 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 6.16** 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 6.16: AT-RISK CRITICAL FACILITIES

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
CLEVELAND COUNTY																				
Police Station	Police	X	X	X	X	X	X	X	X		X						X			
FALLSTON ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
Fallston Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Polkville Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Lawndale Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Waco Fire Station	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
Lattimore Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X		X	X	
Hospital	Medical	X	X	X	X	X	X	X	X		X				X		X		X	
Police Station	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
NORTH ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X		X	
EAST ELEMENTARY	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
WEST ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
KINGS MOUNTAIN HIGH	Education	X	X	X	X	X	X	X	X		X						X		X	
KINGS MOUNTAIN MIDDLE	Education	X	X	X	X	X	X	X	X		X						X		X	
DAVIDSON SCHOOL	Education	X	X	X	X	X	X	X	X		X						X		X	
CCS BUSINESS OFFICES	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Kings Mountain Fire Station #2	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Kings Mountain Fire Station #1	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Hospital	Medical	X	X	X	X	X	X	X	X		X					X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
Police Station	Police	X	X	X	X	X	X	X	X		X						X	X	X	
Police Station	Police	X	X	X	X	X	X	X	X		X						X	X	X	
JEFFERSON ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
GRAHAM ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X		X		X	
ELIZABETH INTERMEDIATE	Education	X	X	X	X	X	X	X	X		X						X			
JAMES LOVE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
MARION ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X		X	
NORTH SHELBY SCHOOL	Education	X	X	X	X	X	X	X	X		X				X	X	X		X	
SHELBY HIGH	Education	X	X	X	X	X	X	X	X		X						X	X	X	
SHELBY MIDDLE	Education	X	X	X	X	X	X	X	X		X						X		X	
CCS ADMINISTRATIVE OFFICES	Education	X	X	X	X	X	X	X	X		X						X			
CCS INSTRUCTIONAL OFFICES	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Cleveland Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Shelby #1 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Shelby #2 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X		X	
Shelby #3 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Hospital	Medical	X	X	X	X	X	X	X	X		X						X			
BOILING SPRINGS ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
Boiling Springs Rural Station #1	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Police Station	Police	X	X	X	X	X	X	X	X		X					X	X	X	X	
GROVER ELEMENTARY	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
Grover Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
CASAR ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
Casar Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
UNION ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
WASHINGTON ELEMENTARY	Education	X	X	X	X	X	X	X	X	X										
SPRINGMORE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X									
BETHWARE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X			X	X		X			
TOWNSHIP 3 ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X		X	X	X	
BURNS HIGH	Education	X	X	X	X	X	X	X	X		X						X			X
BURNS MIDDLE	Education	X	X	X	X	X	X	X	X		X						X			X
CREST MIDDLE	Education	X	X	X	X	X	X	X	X		X					X				
KINGS MOUNTAIN INTERMEDIATE	Education	X	X	X	X	X	X	X	X		X						X			
SCHOOL BUS GARAGE	Education	X	X	X	X	X	X	X	X		X						X			
CREST HIGH	Education	X	X	X	X	X	X	X	X		X									
Oak Grove Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X									
Shanghai Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Boiling Springs Rural Fire Station #2	Fire/EMS	X	X	X	X	X	X	X	X		X									
Number 3 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Bethlehem Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X									
Gaston County																				
CRAMERTON VFD #41	Fire/EMS	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
CRAMERTON TOWN HALL & PD	Police	X	X	X	X	X	X	X	X		X					X	X	X	X	
SOUTHPOINT RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
USPS CRAMERTON	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
STUART W. CRAMER HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
CRAMERTON MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
LIBRARY	Other	X	X	X	X	X	X	X	X	X							X		X	
SHIELD MUSEUM	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
GFS #6	Fire/EMS	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
RADIO SHOP	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GCPD	Police	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
CHESTER ST COMPLX	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GASTONIA POLICE DEPT	Police	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
HUMAN SERVICES BLDG.	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
COURTHOUSE	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
WATER PLANT	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
JAIL ANNEX	Other	X	X	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	X	X	
ERWIN PARK	Other	X	X	X	X	X	X	X	X	X							X		X	
EMERGENCY SERVICES	EOC/Response	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
ADMINISTRATION BUILDING	Other	X	X	X	X	X	X	X	X	X					X		X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
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GFS #5	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
HEALTH DEPT	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	
GFS #7	Fire/EMS	X	X	X	X	X	X	X	X		X									
NCHP STATION	Police	X	X	X	X	X	X	X	X	X							X			
GFS #1	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X		X	
GFS #8	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
GASTONIA LIFE SAVING	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GFS #3	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GFS #4	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
GASTONIA CITY HALL	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GARLAND CENTER	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
USPS GASTONIA (MAIN)	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
USPS ANNEX	Other	X	X	X	X	X	X	X	X	X							X			
GFD #2	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X		X	
GASTON MEMORIAL HOSPITAL	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
ASHBROOK HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
HUNTER HUSS HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
YORK CHESTER MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X		X	
GRIER MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
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SOUTHWEST MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
BROOKSIDE ELEMENTARY	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
WOODHILL ELEMENTARY	Education	X	X	X	X	X	X	X	X	X							X		X	
RHYNE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X		X	
ROBINSON ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X					X	X			
GARDNER PARK ELEMENTARY	Education	X	X	X	X	X	X	X	X	X							X			
FOREST HEIGHTS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
EDWARD D SADLER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X				X		X			
PLEASANT RIDGE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X			
LINGERFELDT ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X		X		X	
SHERWOOD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
HAWKS NEST ELEEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
HIGH SHOALS VFD #21	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
HIGH SHOALS CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE VFD # 73	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE RESCUE & GEMS #6	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS CHERRYVILLE	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
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CHERRYVILLE LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
JOHN CHAVIS MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE ELEMENTARY	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
W B BEAM INTERMEDIATE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY CD RESCUE & GEMS #8	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
STANLEY LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY VFD #22	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY TOWN HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS STANLEY	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
STANLEY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
KISER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
SPRINGFIELD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
MOUNT HOLLY FD # 35	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X			
EAST GASTON VFD # 30	Fire/EMS	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
FD #34	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
OLD POLICE	Other	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
OLD CITY HALL	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
LIBRARY	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GEMS #7	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
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FD #33	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS MOUNT HOLLY	Other	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
CAROLINAS REHABILITATION	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
MT HOLLY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
CATAWBA HEIGHTS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
IDA RANLIN ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
PINEWOOD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X		X			
DALLAS PD	Police	X	X	X	X	X	X	X	X	X							X		X	
DALLAS TOWN HALL	Other	X	X	X	X	X	X	X	X	X							X		X	
USPS DALLAS	Other	X	X	X	X	X	X	X	X	X							X			
DALLAS LIBRARY	Other	X	X	X	X	X	X	X	X	X							X		X	
NEW- DALLAS VFD	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
DALLAS VFD #	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
CARR ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
BESSEMER CITY VFD # 62	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
CITY HALL & POLICE	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY LIBRARY	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BC RESCUE, GEMS & FIRE	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
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USPS BESSEMER CITY	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
BESSEMER CITY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY PRIMARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	X
BESSEMER CITY CENTRAL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	X
RANLO VFD # 19	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RANLO RESCUE	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RANLO TOWN HALL	Other	X	X	X	X	X	X	X	X	X							X		X	
RANLO POLICE	Police	X	X	X	X	X	X	X	X	X							X		X	
LOWELL VFD # 17	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL TOWN HALL & GEMS #5	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS LOWELL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
HOLBROOK MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
GEMS STATION #4	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
McADENVILLE VFD # 40	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
McADENVILLE TOWN HALL & PD	Police	X	X	X	X	X	X	X	X	X							X		X	
USPS McADENVILLE	Other	X	X	X	X	X	X	X	X	X							X		X	
MCADENVILLE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
LOWELL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
POLICE	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT PLANNING	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS BELMONT 28012	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT VFD # 43	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
SOUTH POINT HIGH SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
BELMONT MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
PAGE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
BELMONT CENTRAL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
UNION VFD #51	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
CROWDERS MTN VFD & RESCUE #53	Fire/EMS	X	X	X	X	X	X	X	X		X									
CHESTNUT RIDGE VFD # 71	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
SPENCER MTN VFD	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
ALEXIS VFD #20	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
LUCIA RIVER BEND VFD # 31	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
COMMUNITY VFD # 32	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
SOUTHPOINT VFD	Fire/EMS	X	X	X	X	X	X	X	X		X				X		X			
NEW HOPE VFD # 50	Fire/EMS	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER							
FACILITY NAME	FACILITY TYPE	Drought	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
UNION RD. LIBRARY	Other	X	X	X	X	X	X	X	X		X						X			
AG CENTER VFD # 61	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
TRYONOTA VFD # 70	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
HUGHS POND VFD #72	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
EAST GASTON HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X										
FORESTVIEW HIGH SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
NORTH GASTON HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
W C FRIDAY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
TRYON ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
COSTNER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
HH BEAM ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X		X	
CHAPEL GROVE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X									
NEW HOPE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
W A BESS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			X
NORTH BELMONT ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
Lincoln County																				
Gaston College	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
CARILLON ASSISTED LIVING OF LINCOLNTON	Medical Care Facilities	X	X	X	X	X	X	X	X		X					X	X	X	X	
Community Service Work Program	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
City of Lincolnton Police Department	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Social Services	Other	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Board of Education	Other	X	X	X	X	X	X	X	X		X						X		X	
BRIAN CENTER HEALTH AND RETIREMENT - LINCOLNTON	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
Lincolnton	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
James W. Warren Citizens Center	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Transportation Lincoln County	Other	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
CARDINAL HEALTHCARE AND REHABILITATION CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X					X	X	X	X	
Registry of Deeds	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Mental Health	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
J D Kiser	Education	X	X	X	X	X	X	X	X		X						X		X	
G.E. Massey	Education	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Lincoln Economic Development Association	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Appraisal Office	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Battleground	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Health Department	Other	X	X	X	X	X	X	X	X		X					X	X		X	
Environmental Health / Planning Inspections	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
LINCOLN NURSING CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Rescue Squad	EOC/Response	X	X	X	X	X	X	X	X		X					X	X	X	X	
LINCOLNTON 2	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
LINCOLNTON / MEDIC 1 & 11	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Lincoln County Court House	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
School of Technology	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
S Ray Lowder	Education	X	X	X	X	X	X	X	X		X						X		X	
Asbury	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
East Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
CROUSE	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
Saint James	Education	X	X	X	X	X	X	X	X		X									
Lincoln County Police/Sheriff	Police	X	X	X	X	X	X	X	X		X						X			
AMAZING GRACE REST HOME	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
Norris S Childers	Education	X	X	X	X	X	X	X	X		X						X			
HEATH HOUSE	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
Catawba Springs	Education	X	X	X	X	X	X	X	X	X							X			
Lincoln Charter	Education	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
BOGER CITY	Fire/EMS	X	X	X	X	X	X	X	X		X						X		X	
LAKEWOOD CARE CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
Lincoln County Schools Maintance	Other	X	X	X	X	X	X	X	X		X						X		X	
PUMPKIN CENTER VFD MEDIC 8	Fire/EMS	X	X	X	X	X	X	X	X		X						X			X
BOGER CITY REST HOME	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
SHIPLEY	Fire/EMS	X	X	X	X	X	X	X	X		X									
East Lincoln	Education	X	X	X	X	X	X	X	X	X							X			
HOWARDS CREEK VFD	Fire/EMS	X	X	X	X	X	X	X	X		X						X			X
North Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
Lincolnton	Education	X	X	X	X	X	X	X	X		X									
SOUTH FORK	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
MEDIC 2 & 12	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	
Pumpkin Center	Education	X	X	X	X	X	X	X	X		X									
West Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
EAST LINCOLN	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
DENVER 2	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
AIRPORT	Fire/EMS	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
Car Farm Convenience Site	Other	X	X	X	X	X	X	X	X		X									
Lincoln County Sherriffs Department	Police	X	X	X	X	X	X	X	X		X						X			
Love Memorial	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
ALEXIS 2 MEDIC 17	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
ESL Center	Other	X	X	X	X	X	X	X	X		X						X		X	
Tin Mine Convenience Site	Other	X	X	X	X	X	X	X	X	X							X			
NORTH BROOK SUB STATION	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
UNION VFD / MEDIC 6	Fire/EMS	X	X	X	X	X	X	X	X		X									
DENVER 3	Fire/EMS	X	X	X	X	X	X	X	X		X									
Optimist Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
Crouse Convenience Site	Other	X	X	X	X	X	X	X	X	X										
Pumpkin Center	Education	X	X	X	X	X	X	X	X		X						X			
North Brook	Education	X	X	X	X	X	X	X	X		X						X			
Union	Education	X	X	X	X	X	X	X	X		X									X
Iron Station	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X
NORTH BROOK	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Rock Springs	Education	X	X	X	X	X	X	X	X		X				X		X			X
Lincoln County Public Works Office	Other	X	X	X	X	X	X	X	X		X						X			
Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
Airport Convenience Site	Other	X	X	X	X	X	X	X	X		X						X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
CMC Lincoln	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	
MEDIC 3	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
NC 27	Police	X	X	X	X	X	X	X	X		X						X			
Animal Services	Other	X	X	X	X	X	X	X	X		X						X		X	
Owls Den Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
NC 16	Police	X	X	X	X	X	X	X	X		X						X			
North Brook Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
Lincoln Charter Denver	Education	X	X	X	X	X	X	X	X		X						X			
MEDIC 4 & 14	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
West Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
DENVER / MEDIC 5 & 15	Fire/EMS	X	X	X	X	X	X	X	X		X			X	X		X			
East Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
ALEXIS	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
LANDFILL	Other	X	X	X	X	X	X	X	X	X										
WEXFORD HOUSE	Medical Care Facilities	X	X	X	X	X	X	X	X		X			X	X		X			
Webs Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
NORTH 321	Fire/EMS	X	X	X	X	X	X	X	X		X				X		X			
NORTH BROOK REST HOME INCORPORATED	Medical Care Facilities	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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 for the jurisdictions within Cleveland Gaston and Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council.

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

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

regulate how land is developed and structures are built; as well as protecting environmental, historic, and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for the jurisdictions in the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
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	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
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																

TABLE 7. 1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS (CONT.)

Planning / Regulatory Tool	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
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																

Planning / Regulatory Tool	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
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	✓															

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 Cleveland Gaston Lincoln 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 three 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.

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. They 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.

- Cleveland County, Gaston County, and Lincoln each maintain emergency operations plans through their respective Emergency Management Departments.
- The Gaston County emergency operation plan includes all of the municipalities in the county except Spencer Mountain.
- Lincolnton is covered by the Lincoln County emergency operations plan.

Continuity of Operations Plan: A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event. In addition to general preparedness, communities can realize a number of benefits from having a COOP in place. For example, communities will have a greater capability to adapt to rapid changes in the operational environment and improve the overall effectiveness of their governance by identifying essential functions, processes, and communication methods among various agencies and people within the governing structure.

- None of the counties or municipalities participating in this multi-jurisdictional plan have adopted a continuity of operations plan.

Coordination Across Emergency Management Programs: All three counties have Emergency Managers and Emergency Management programs that have worked together across jurisdictional boundaries in the past to positive effects. These counties have recognized that hazards generally do not respect man-made jurisdictional boundaries and that it is often critical to coordinate with one another during disaster events. All three counties will continue to foster the relationships that they have built in the past during emergencies and will attempt to increase coordination in the future to improve the overall service they can provide to their citizens.

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 Cleveland Gaston Lincoln 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.

- Cleveland County has adopted a land use plan. The plan's coverage includes all areas outside of the planning jurisdictions of Boiling Springs, Kings Mountain, and Shelby.
- Gaston County has adopted a comprehensive plan. Each of the participating municipalities in the county has also adopted a land use or comprehensive plan except High Shoals, McAdenville, Ranlo, and Spencer Mountain.
- Lincoln County and Lincolnton have each adopted a land use plan.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future

development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Cleveland County, Boiling Springs, Kings Mountain, and Shelby have capital improvement plans in place.
- Gaston County, Belmont, Bessemer City, Cherryville, Cramerton, Dallas, Gastonia, and Mount Holly have capital improvement plans in place.
- Lincoln County and Lincolnton 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, although Lincoln County has already taken many steps towards creating 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.

- Cleveland County administers zoning for the county as well as Belwood, Grover, and Mooresboro. Boiling Springs, Shelby, and Kings Mountain administer their own zoning ordinances.
- Gaston County and all of its municipalities except Spencer Mountain have adopted and enforce separate zoning ordinances.
- Lincoln County and Lincolnton both have zoning ordinances in place.

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.

- Cleveland County administers subdivision regulations for the county, Belwood, Casar, Earl, Fallston, Grover, and Mooresboro. Boiling Springs, Shelby, and Kings Mountain administer their own subdivision regulations.
- Gaston County and all of its municipalities except McAdenville and Spencer Mountain have adopted and enforce separate subdivision regulations.
- Lincoln County and Lincoln both have subdivision regulations in place.

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.
- Cleveland County provides building code enforcement for the county and all of its municipalities except Shelby and Kings Mountain, which administer their own building code enforcement.
- Gaston County provides building code inspections and enforcement to all municipalities within the county, with the exception of Gastonia, which enforces buildings codes within its jurisdiction.
- Lincoln County enforces the building code within county and the City of Lincolnton.

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.

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.

[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.

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 Cleveland Gaston Lincoln 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
CLEVELAND COUNTY†	10/23/95	07/02/08	18	$4,290,800	3	$29,294
Belwood	05/24/12	07/02/08	0	$0	0	$0
Boiling Springs	03/21/13	07/02/08	0	$0	0	$0
Casar*	--	--	--	--	--	--
Earl*	--	--	--	--	--	--
Fallston*	--	--	--	--	--	--
Grover*	--	--	--	--	--	--
Kings Mountain	04/30/86	07/02/08(M)	6	$870,000	3	$11,804
Kingstown	10/03/12	07/02/08	0	$0	0	$0
Lattimore*	--	--	--	--	--	--
Lawndale*	--	--	--	--	--	--
Mooresboro*	--	--	--	--	--	--
Patterson Springs*	--	--	--	--	--	--
Polkville	03/22/12	02/20/08	0	$0	0	$0
Shelby	04/03/78	07/02/08	32	$8,180,900	19	$361,473
Waco*	--	--	--	--	--	--
GASTON COUNTY†	05/01/80	11/04/09	58	$15,074,500	4	$20,282
Belmont	11/01/79	11/04/09	16	$3,317,300	1	$8,067

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Bessemer City	03/03/03	11/04/09	3	$428,000	0	$0
Cherryville	05/15/07	11/04/09	3	$875,000	0	$0
Cramerton	05/21/92	11/04/09	22	$4,488,400	0	$0
Dallas	05/01/94	11/04/09	9	$1,214,000	2	$12,879
Gastonia	02/01/78	11/04/09	142	$28,659,500	12	$60,869
High Shoals	05/20/10	11/04/09	0	$0	0	$0
Lowell	03/05/90	11/04/09	1	$280,000	0	$0
McAdenville	06/01/87	11/04/09	2	$2,000,000	0	$0
Mount Holly	09/28/79	11/04/09	54	$12,091,200	2	$5,952
Ranlo	03/03/03	11/04/09	1	$350,000	0	$0
Spencer Mountain	05/10/10	11/04/09	0	$0	0	$0
Stanley	08/27/10	11/04/09	1	$350,000	0	$0
LINCOLN COUNTY†	12/01/81	03/02/09	83	$23,854,700	0	$0
Lincolnton	12/01/81	03/02/09	16	$3,288,300	0	$0

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
(M) – No Elevation Determined, all Zone A, C and X
Source: NFIP Community Status information as of 7/22/13; NFIP claims and policy information as of 5/31/13

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.

- Gaston County is the only jurisdiction that currently participates in the CRS. Participation in the CRS program should be considered as a mitigation action by the other counties and municipalities. The program would be most beneficial to the City of Gastonia, Lincoln County, and the City of Mount Holly, which have 142, 83, and 54 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 Casar, Earl, Fallston, Grover, Lattimore, Lawndale, Mooresboro, Patterson Springs, and Waco, also participate in the NFIP and they all have adopted flood damage prevention regulations.

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.

- The Carolina Thread Trail is a regional network of greenways and trails. Master plans have been developed for each participating county, and all of the participating municipalities except Casar, Fallston, Lattimore, High Shoals, Spencer Mountain, and Stanley have signed resolutions of support to work with neighboring communities and with the Carolina Thread Trail to plan, design, and build trails to connect communities.

- Although Gaston County has not adopted an open space management plan, the county's unified development ordinance promotes green space and open space and its subdivision ordinances includes a provision requiring that major subdivision tie into existing neighboring trails for connectivity purposes. In addition, Gastonia has adopted a city Parks and Recreation Long Range Plan while Mount Holly has adopted a city Parks and Recreation Master Plan.

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: Cleveland County, Boiling Springs, Kings Mountain, Shelby, Gaston County, Belmont, Gastonia, Lincoln County, and Lincolnton.

7.3.6 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 Cleveland Gaston Lincoln 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	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
Planners with knowledge of land development / land management practices	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Staff / Personnel Resource	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
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																

TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES (CONT.)

Staff / Personnel Resource	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
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	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
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.

7.3.7 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 Cleveland Gaston Lincoln 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	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Fiscal Tool / Resource	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
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: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

TABLE 7.5: RELEVANT FISCAL RESOURCES (CONT.)

Fiscal Tool / Resource	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Fiscal Tool / Resource	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
Other: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.8 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 Cleveland Gaston Lincoln 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, sedimentation and erosion control, watershed protection, zoning, and subdivision.
- Cleveland 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 Cleveland County Board of Commissioners, the professional staff and the citizens of the county are continually striving to make Cleveland 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.
- Gaston County is currently a participant in the NFIP and has adopted the required flood hazard ordinance, a sedimentation and erosion control ordinance, and surface water supply watershed ordinance. The County also participates in the CRS. This demonstrates to some extent both favorable political support and a willingness to adopt hazard mitigation efforts in an active manner.
- Lincoln County is a participant in the NFIP and has adopted the required flood damage prevention ordinance. Additionally, the county has adopted a water supply watershed protection ordinance, a sedimentation and erosion control ordinance, and streamside buffer regulations. These efforts show to some extent both favorable political support and a willingness to adopt hazard mitigation efforts in an active manner.

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 Cleveland Gaston Lincoln 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 limited to moderate range. There is also variation in the administrative and technical capability among the jurisdictions with larger jurisdictions generally having greater staff and technical resources. Almost all of jurisdictions are in the limited 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 27.38, which falls into the moderate capability ranking.

TABLE 7.6: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CLEVELAND COUNTY	42	High
Belwood	26	Moderate
Boiling Springs	33	Moderate
Casar	17	Limited
Earl	18	Limited
Fallston	17	Limited
Grover	19	Limited
Kings Mountain	32	Moderate
Kingstown	24	Moderate
Lattimore	16	Limited
Lawndale	17	Limited
Mooresboro	19	Limited
Patterson Springs	17	Limited
Polkville	24	Moderate
Shelby	34	Moderate
Waco	17	Limited

Jurisdiction	Overall Capability Score	Overall Capability Rating
GASTON COUNTY	45	High
Belmont	34	Moderate
Bessemer City	35	Moderate
Cherryville	32	Moderate
Cramerton	32	Moderate
Dallas	33	Moderate
Gastonia	38	Moderate
High Shoals	23	Moderate
Lowell	33	Moderate
McAdenville	22	Moderate
Mount Holly	33	Moderate
Ranlo	23	Moderate
Spencer Mountain	19	Limited
Stanley	25	Moderate
LINCOLN COUNTY	41	High
Lincolnton	36	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 Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Cleveland Gaston Lincoln Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln Region
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the communities in the Cleveland Gaston Lincoln Region 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 Cleveland Gaston Lincoln 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 Cleveland Gaston and Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional plan, the Regional Hazard Mitigation Council members were tasked with establishing a priority for each action at the second Regional Hazard Mitigation Council meeting (November 19, 2013). 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

[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.

- Continued compliance with the NFIP

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, Cleveland Gaston and Lincoln counties and the participating municipalities have developed five goal statements for local hazard mitigation planning in the region. In developing these goals, the previous three county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the three 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 Council 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 Cleveland Gaston Lincoln 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

		Former Plan Reference		
	Proposed Goal	Cleveland County	Gaston County	Lincoln County
Goal #1	Protect the health, safety, and welfare of residents and visitors.	Goal 1, 4	Goal 1	Goal 1
Goal #2	Protect buildings, critical facilities, and infrastructure through cost-effective mitigation actions.	Goal 4	Goal 2	Goal 2
Goal #3	Increase public awareness of hazards and mitigation.	Goal 1	Goal 3	Goal 3
Goal #4	Enhance capabilities of local governments to reduce future impacts and improve effectiveness of mitigation actions.	Goal 2	Goal 4	Goal 4
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.	Goal 3		

TABLE 8.2: CLEVELAND GASTON LINCOLN REGIONAL MITIGATION GOALS

	Goal
Goal #1	Protect the health, safety, and welfare of residents and visitors.
Goal #2	Protect buildings, critical facilities, and infrastructure through cost-effective mitigation actions.
Goal #3	Increase public awareness of hazards and mitigation.
Goal #4	Enhance capabilities of local governments to reduce future impacts and improve effectiveness of mitigation actions.
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.

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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council meetings. In general, all activities considered by the Regional Hazard Mitigation Council 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 CLEVELAND GASTON LINCOLN REGION

In order to determine the most appropriate mitigation techniques for the communities in the Cleveland Gaston Lincoln Region, the Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 20 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
Cleveland County	**9:3**	**17**
Belwood	9:9	10
Boiling Springs	9:12	7
Casar	9:14	8
Earl	9:16	8
Fallston	9:19	8
Grover	9:21	12
Kings Mountain	9:25	37
Kingstown	9:35	7
Lattimore	9:37	7
Lawndale	9:39	7
Mooresboro	9:41	12
Patterson Springs	9:45	7
Polkville	9:47	7
Shelby	9:49	16
Waco	9:55	7
Gaston County	**9:57**	**46**
Belmont	9:73	21
Bessemer City	9:79	22
Cherryville	9:85	22
Cramerton	9:91	16
Dallas	9:96	19
Gastonia	9:102	29
High Shoals	9:110	4
Lowell	9:113	20
McAdenville	9:119	18
Mount Holly	9:125	22
Ranlo	9:132	19
Spencer Mountain	9:138	7
Stanley	9:141	20
Lincoln County	**9:147**	**37**
Lincolnton	9:155	37

Cleveland 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	County Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	Emergency Management	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the UDO-Article XIII (Floodplains) to raise the reference level for all residential and non-residential construction.	Flood	Medium	County Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. This action will be removed in the next update.
P-4	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the County Code to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	County Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the County. The County participates in remapping efforts as requested and will do so when the state updates the maps next. The current effective date for Cleveland County's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Utility Provider	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	County Planning	Local	Completed	The County joined the NFIP in October 3, 1995. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	County Planning	Local	2017	There is only 1 property in the County that is considered a repetitive loss property under the qualification of the NFIP. The County will annually monitor the repetitive loss list and work to determine if mitigation is a feasible solution for those properties.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Emergency Management	Local	Completed	Action complete. The County has identified the Cleveland County Fire Training Center as the alternate EOC. This action will be removed in the next update.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Belwood 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the UDO to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	Action completed. The Town joined the NFIP 05/24/12 and continues to implement flood damage prevention regulations. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	EM	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Boiling Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	Joined the NFIP on 03/21/13 and continues to implement flood damage prevention regulations. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Casar 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 Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	These regulations have not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2017	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	Action complete. The County has identified the Cleveland County Fire Training Center as the alternate EOC. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Earl 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 the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	County Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2019	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Fallston 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 Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Subdivision regulations with Mitigation Objectives. This is to be completed at the next update of the subdivision regulations pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Grover 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the UDO to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Emergency Management	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-7	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2017	The Town has not yet joined the NFIP, but it is still considering doing so. The town has not had the staff time to implement this activity in the past.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

City of Kings Mountain 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	City Planning	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Medium	City Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. The county will continue to evaluate this action as changes may be required in the future. This action will be removed in the next update.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	City Planning	Local	2017	Cluster Development is permitted in the Thoroughfare Protection District, so this action is partially completed. The ordinance will continue to be reviewed going forward to determine if other areas should allow cluster development.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the City. The City participates in remapping efforts as requested. The current effective date for City's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	City Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	City Planning	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	City Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The City joined the NFIP in 1986 and continues to enforce the Flood Damage Prevention Ordinance. The county will review and update annually if changes are needed. This action will be removed in the next update
P-11	Implement existing Water Restriction Ordinance, when warranted.	Drought/Heat Wave	Low	COKM-Water Resources Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed.	Five levels of water shortage response are outlined in the Water and Sewer Ordinance. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Continue research and development of an additional water supply reservoir.	Drought/Heat Wave	Medium	COKM-Water Resources Dept. & COKM Planning Dept	Local Funding and/or Grants, Relief Funds, etc. as available.	2018	No work has been done on this through 2014. To be located by 2018 with development pending funding, staff resources and political will.
P-13	Maintain an up-to-date snow removal plan.	Winter Storm and Freeze	High	COKM-Public Works Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The existing plan is maintained and kept up to date. The plan is generally reviewed annually and updates are made as necessary. This action will be removed in the next update.
P-14	Continue to implement tree trimming policies around City owned power lines. Increase the number of tree trimming crews.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	COKM-Electric Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	Tree trimming policies are implemented and the number of tree trimming crews are increased as funding allows. Tree trimming activities have occurred many times over the past 5 years, on a sub-annual basis. This action will be removed in the next update.
P-15	Discourage the planting of canopy trees where they may grow into power lines; Implement project "Evergreen" encouraging plantings of under lower story trees.	Winter Storm and Freeze	Medium	COKM-Electric and Codes Administration Departments	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Existing Plan which is to be reviewed and updated annually	Project Evergreen is a new initiative that is part of this plan and it will be implemented going forward. This plan will be reviewed and updated annually to determine if new initiatives like this are needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Continue the partnership between the Codes Administration Department and the City Fire Department.	Wildfire	High	COKM-Codes Administration and Fire Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2015	The Codes Administration Department and City Fire Department have an continuing partnership. These two groups have met many times over the past several years to discuss fire codes and will continue to do so annually.
P-17	Continue to enforce zoning ordinances.	Hurricane, Tornado, Thunderstorm	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Zoning Enforcement Officer is responsible for enforcing the City's zoning ordinances and over the past 5 years the officer has enforced all zoning codes. This action will be removed in the next update.
P-18	Continue to enforce the City's Flood Damage Prevention Ordinance.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administration is responsible for enforcing the Flood Damage Prevention Ordinance and has done so over the past 5 years. This action will be removed in the next update.
P-19	Continue to identify areas within the flood zone, and/or who have had repetitive damage due to flooding, and develop mitigation strategies on a case-by-case basis.	Flood	Medium	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2017	Areas of flood risk have been identified over the past 5 years, but this will continually need to be completed/evaluated in the future pending funding, staff resources and political will.
P-20	Pursue funding to implement mitigation strategies in identified area.	Flood	Medium	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Deleted	No funding has been applied for in the past and this action was deemed very general so it will be deleted in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-21	Continue to inspect buildings and implement pursuant to the Flood Management Ordinance.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2016	The designated Floodplain Administration is responsible for enforcing the Flood Damage Prevention Ordinance including inspection of buildings. This has been done consistently over the last 5 years and will continue to be done annually.
P-22	Continue to enforce the Stormwater Code for control of the 2yr, 10yr and 25yr storms.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The Soil Erosion and Sediment Control Ordinance includes provisions for control of 2-, 10-, and 25-year storms. This ordinance has been enforced over the past 5 years. This action will be removed in the next update.
P-23	Develop and implement the City's own Erosion Control Plan.	Erosion	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The City maintains a Stormwater Management Plan to comply with NPDES Phase II Permit and has implemented it over the past 5 years. This action will be removed in the next update.
P-24	Continue to inspect and investigate possible sinkhole locations, and make repairs as needed.	Sinkhole	High	COKM-Public Works Department	Local Funding and/or Grants, Relief Funds, etc. as available.	2015	To be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-25	Should a dam be built that would impact Gaston County Residents, then our current inspection and maintenance plan that we have for our Cleveland County locations would apply immediately upon construction.	Dam Failure	Currently Low	COKM-Water Department and Risk Management Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The existing inspection and maintenance plan is applied to all new dams upon construction. No significant dams have been constructed in the past 5 years. This action will be removed in the next update.
Property Protection							
PP-1	Continue to enforce the NC building, housing, and fire codes.	Wildfire, Hurricane, Flood, Earthquake, Landslide, Erosion, Sinkhole	High	COKM-Codes Administration and Fire Departments.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City's Codes Administration and Engineering Standards Department is responsible for enforcing the building codes and performs minimum housing inspections. The fire code is enforced by the Bureau of Fire Prevention in the Fire Department. These departments have enforced these codes over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
ES-5	Maintain and/or purchase emergency generators for Critical Service Departments.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	COKM-Public Work, Fire and Police Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2017	To be completed in the future pending funding, staff resources and political will. The city has not applied for any mitigation funding over the past 5 years.
ES-6	Maintain the City's Emergency Operations Plan, including creating and maintaining emergency equipment lists and contacts.	Winter Storm and Freeze, Hurricane, Tornado, Landslide, Earthquake, Sinkhole, Thunderstorm	High	COKM-Each Department for equipment list. Risk Management maintains the emergency contact list.	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Existing Plan which will be reviewed and updated annually	Review and update of the EOP takes place annually and will continue to be carried out on an annual basis. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Maintain existing interconnects.	Drought/Heat Wave	High	COKM-Water Resources Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Interconnects have been maintained and this action will continue to be reviewed and updated annually. This action will be removed in the next update.
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/Heat Wave	High	COKM-Water Resources Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. Opportunities for additional interconnects have not been available over the past several years.
S-3	Encourage buried utilities where technologically and economically feasible.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Low	COKM-Electric and Codes Administration Departments	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.
PEA-2	Encourage fire suppression systems.	Wildfire	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Annually review and update	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.

Town of Kingstown Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on 10/03/12. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Lattimore Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2018	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Lattimore and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Lawndale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Lawndale and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Mooresboro 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporating hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Emergency Management	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-7	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Mooresboro and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Patterson Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2015	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Deleted	The Town has not yet joined the NFIP because there is no SFHA per the flood maps. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Patterson Springs and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Polkville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 2/20/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP in 2012. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Polkville and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

City of Shelby 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	City Planning	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Medium	City Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. The county will continue to evaluate this action as changes may be required in the future. This action will be removed in the next update.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	City Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the City. The City participates in remapping efforts as requested. The current effective date for City's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	City Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	City Planning	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	PZ	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	City Planning	Local	Completed	The City joined the NFIP in 1978 and continues to enforce the flood damage prevention ordinance. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	City Planning	Local	2017	There is one repetitive loss property in the City. The City will continue to monitor the repetitive loss list and work to determine if mitigation is feasible for those properties.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the City of Shelby and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Waco Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Waco and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Gaston 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	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Emergency Management, Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Public Works	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	Planning & Development Services	Local	2014, Completed	Completed. Mapping of critical facilities occurred during this plan update.
P-4	Require underground utilities and suggest removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Planning, Emergency Management Fire Marshall, Building Inspections	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Institute and maintain a regional communicable disease surveillance system.	All Hazards	High	Health Dept, State	Local Funding & State Funding	Completed	Active and On-Going. Communication and monitoring occurs with the NCHAN (North Carolina Health Alert Network) System. It is a state-wide surveillance system. This action will be removed from the next update.
P-6	Institute and maintain a County-wide communicable disease plan that includes a surveillance system to readily detect and isolate communicable diseases.	All Hazards	High	Health Dept, State	Local Funding & State Funding	Completed	Active and On-Going. The Preparedness Coordinator communicates and monitors the NCHAN (North Carolina Health Alert Network) System with the state. Communication to the public is thru media, social media, fax, email, and reverse 911. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Implement restrictions on animal contact to prevent disease transfer when necessary.	All Hazards	High	Health Dept, State, Animal Control	Local Funding & State Funding	This will be implemented when there is an event	For day to day operations, the County follows the state laws/rules regarding domestic pets and vaccination requirements such as rabies, bite quarantines, etc. In addition, the county has access to portable kennels should the need to open a shelter arises as a result of an evacuation of a particular area due to flooding, and domestic pets were loose and eventually captured by animal control. The pets would be housed separate from the human shelter and would be used for holding the pets until owners are reunited.
P-8	Determine Alternative Water Sources. Alternatives may include industrial sources, additional surface intakes, additional impoundments, wells, recycling, etc pending local requirements and conditions.	Drought/Heat Wave	Low	Public Works	Local Funding, Grants, as available	2017	The county is not a water provider, but collaboration with municipalities is currently viable and will be implemented. Some alternatives have been identified over the past 5 years, but more will need to be identified going forward.
P-9	Identify programs to provide financial and physical assistance to citizens who experience dry wells for both residential and animal locations.	Drought/Heat Wave	Low	Grants	Local Funding, Grants, as available	Start at Adoption of this plan; complete by 2019	Pending, the governing board would likely pursue grant opportunities during severe drought period to aid citizens in the rural areas.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Update countywide land use plan.	Drought/Heat Wave	Medium	Planning, County Commission	Local Funding	Comp Plan in place, Future update year is uncertain but aim is for 2018	Discussions and strategic planning for a future update is active and on-going pending funding staff resources and political will. Last update of comp plan was in 2002.
P-11	Implement County-wide water system.	Drought/Heat Wave	Low	Gaston County Commission	Local Funding, Grants, as available	2019	Gaston County has created a Water & Sewer District for the un-incorporated areas of the County (1999), however, no construction has taken place to date. This will continue to be a goal.
P-12	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Codes, Municipalities	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-14	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Fire Marshall, Municipalities	Local Funding, as available	Review and update annually	Reviewed and updated participation in State and County Mutual Aid agreements. These agreements will be re-evaluated and updated regularly..
P-15	Establish elevation markers, (flood levels markers) along bridges and other structures to indicate the rise of water levels along creeks and rivers in potential flood prone areas.	Flood	Medium	Emergency Management, DOT	Local Funding, State, Grants ,as available	Pending DOT & Funding, maybe 2018	Attempting to work with DOT on allowing County Building Inspections to enforce state building code within flood hazard areas based upon state building code. Will then seek funding to complete addition of elevation markers. Over the past 5 years, this has not been implemented.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Codes	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-17	Ensure communications with operators of major dams (Duke Power).	Dam Failure	High	Emergency Management, Communications	Local Funding, Grants	Completed	Plan is in place with Duke Energy's Dam Operators to make contact if and when certain conditions are detected. This would be thru the 704-866-3300 land line to our County's 911 Center. This action will be removed from the next update.
P-18	Identify areas of closed or abandon mines or other sites where sinkholes are possible.	Earthquake, Landslide, Sinkhole	Medium	Planning/Land Records	Local Funding	2019	Aware of seven (7) mines in County per NCDENR and assessing data from US Mining. Will look for more as time/funding allow.
P-19	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Medium	Planning/Land Records	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-20	Strengthen building codes so structures are "survivable". 'Safe Rooms may be included.	Tornado, Thunderstorm	Low	Emergency Management, Codes, Inspections	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-21	Require underground utilities for new subdivision construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Planning, Codes, Building Inspections	Local Funding	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-22	Emergency Management (EM) will coordinate the collection of storm damage assessment data in GIS format for each natural hazard event, which causes death, injury and or property damage. Data will be stored within the County's GIS system, allowing multiple access and retrieval. RSDE and other software to be used.	All Hazards	High	Emergency Management, Planning, Tax	Local Funding	2017	A Damage Assessment plan is in place in the County to access if and when needed. EM and GIS have worked together on several events over the past 5 years to collect damage assessment data and map it.
P-23	County to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding and other Disasters	High	Planning	Local Funding	2015	Active and on-going. Community Participant in NFIP, and annual participant in Community Rating System (CRS), which is not mandated, but voluntary. Local information is provided through brochures in the County Administrative Building, and a flood section of information is found on the County Website. The county will annually participate in CRS visits and reviews of the program to improve it.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-24	Determine locations and post signage defining inundation limits resulting from failure of Cowan's Ford Dam and /or Mountain Island Lake Dam.	Flooding Due to Dam Failure	High	Emergency Management w/ Belmont & Mount Holly	Local Funding, Grants as available	Completed	GIS maps are in hand to show these areas and are shared with Mt. Holly and Belmont. Install of signage will be pending funding and other cities will.
Natural Resource Protection							
NRP-1	Enforce forestry laws, regulations and programs.	Wildfire	Medium	County Forester	Local Funding	Completed	Pending funding, staff resources and political will. All forestry laws have been enforced over the past 5 years. This action will be removed in the next update
NRP-2	Continue to sample and study potentially contaminated areas.	All Hazards	Medium	Health Dept.	Local Funding as available	Completed	On-going monitoring from State Level-DWQ-Public Water Supply Branch. Samples conducted regularly and reported to locals. Sites prioritized for potential state funding. This action will be removed in the next update
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	EM	Private	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Assist in construct of additional interconnects and extensions to facilitate water interchange between municipal systems as needed.	Drought/Heat Wave	Medium	Public Works, Municipalities	Local Funding, Grants, as available	2017	From time to time will assist financially and technically with interconnects and with elevated storage tanks. Over the past 5 years, this has not happened very frequently, but has occurred on occasion. The county will continue to try to identify additional areas for interconnects or extensions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Emergency Management	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Emergency Management	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-3	Educate citizens to maintain 72-hour self-preservation capabilities. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze, Hurricane	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Educate citizens as to dangers of cold and to properly maintain and vent heating systems. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-5	Educate public as to potential risks of ground water contamination. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	Medium	Health Public Information Officer, Health Dept., Natural Resources, Cooperative Extension, COG	Local Funding as Available	2015 with Annual review and update	Pending funding. Hand delivery of notice(s) occurs, use of the media, use of the Government Access Channel partner with Public Information Officer, and other appropriate agencies when required. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Educate the general public as to the potential for dam failure and flash flooding. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Flood, Dam Failure	Low	Emergency Management	Local Funding as Available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-7	Educate the public as to health hazards and risks associated with extreme heat. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Drought/Heat Wave	High	Emergency Management	Local Funding as Available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	Notify all property owners having construction in the 100-year flood zone of the benefits of flood insurance. Will require mass mailing to all property owners within flood hazard areas.	Flood	Low	Planning	Local Funding or grants as available	2017	Pending funding. Advisement to insurance occurs during permit phase. Provisions are not in place to conduct mass mailings pertaining to flood hazard areas. Will look for funding in the future to carry out mass mailings. Combine with other PEA actions in next update.
PEA-9	Educate Citizens as to potential for an Earthquake and Educate citizens to maintain 72-hour self-preservation capabilities. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Earthquake	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-10	Educate public to the potential need to reduce electrical consumption, to avoid brown outs and black outs in time of extreme heat and/or drought. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Drought/Heat Wave	High	Emergency Management	Local Funding as available, partnership with Electric Companies possible	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-11	Encourage Best Land use Practices. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Erosion	Medium	Natural Resources, Development Services	Local Funding as available	2015 with Annual review and update	Pending funding. Including outreach to schools, conduct annual training workshops, and provide other public information. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-12	Encourage removal of trees that would down power lines in the event of High Winds and or Snow & Ice. Education can take form of Public Service Messages on government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze, Tornado	High	Emergency Management, Fire Marshall, Development Services	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-13	Educate residents downstream of dams, of potential situations that could result in harm to them. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Dam Failure	Medium	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-14	Develop and promulgate public education initiatives for prevention and transfer of diseases such as rabies prevention, flue, west Nile Virus, and other naturally occurring biological health hazards including pandemics. Education can take form of Public Service on Government Access TV Channel, Posters and Fliers.	Biological	High	Public Information Officer, Health Dept.	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-15	Notifications about Flood Hazards, Flood Insurance and flood protection to residents in Special Flood Hazard Areas.	Flood	Low to Medium	Planning	Local Funding, Grants as available	2017	Active and on-going. Community Participant in NFIP, and annual participant in Community Rating System (CRS), which is not mandated, but voluntary. Local information is provided through brochures in the County Administrative Office, and a section designated to flood information is found on the County Website. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-16	Enhance the ability of government to notify citizens by phone within a given geographic area with the use of the Reverse 911 call system, by allowing residents to input their telephone number (land line or cell) and location into the system to help ensure that they can be notified of a local emergency or hazard. This is an enhancement of the current City Watch System used by the County.	All	Low to Medium	Emergency Management	Local Funding, Grants if available	2017	Local funding to support a reverse call system has been lost. Until funding is once again obtained we use emergency vehicles with PA to alert as can. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

City of Belmont Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Belmont	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Belmont	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Belmont	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Belmont	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flooding	High	Codes, Belmont	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Belmont	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-9	Require underground utilities for new construction.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	Gaston County Planning, Codes and Building Inspections, Belmont	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-10	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Belmont	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.
P-11	Belmont to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding	High	Belmont Planning Dept.	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Strengthen Flood Damage Prevention Ordinance to include unstudied streams, CLOMR requirements and other measures to mitigate flood damages.	Flooding	Medium	Belmont Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
P-13	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Planning, Belmont	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Combine with P-9 in next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Belmont City Council	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Belmont	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Belmont	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate. This action will be removed in the next update
Structural Projects							
S-1	Reinforce and strengthen City's raw water intake facility and structure(s) in/at the Catawba River.	Flood, Hurricane	High	Belmont Public Works	Local, State, Federal Funding and/ or Grants, as available	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Belmont	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Belmont Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Belmont Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Bessemer 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	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Maintain inventory of water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Bessemer City	Local Funding as available	2017	Pending funding and staff time. These have not been inventoried over the past 5 years.
P-4	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Bessemer City	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Continue to enforce uniform water use restriction ordinances and criteria when to enact these.	Drought/Heat Wave	Medium	Bessemer City	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-6	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Bessemer City	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-7	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Bessemer City	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-9	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Bessemer City	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-10	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-11	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Bessemer City	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-12	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Bessemer City	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Bessemer City to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding	High	Bessemer City Planning Dept.	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-14	Enhance Flood Damage Prevention Regulations to better control development in flood prone areas. Such to include unstudied streams, CLOMR requirements. Also review potential of future conditions FIRMs in future updates.	Flooding	Medium	Bessemer City Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Bessemer City	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Bessemer City	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Maintain interconnects to facilitate water interchange between municipal systems.	Drought/Heat Wave	Medium	Gaston County Public Works, Bessemer City	Local Funding	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Bessemer City	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Bessemer City Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Bessemer City Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Cherryville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Emergency Management, Code Enforcement,	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Maintain water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Public Works, City of Cherryville	Local Funding and/ or Grants, as available	2018	Interchange water connection previously established with Lincoln County Complete and studying agreements with other local municipalities to determine if additional interconnects are possible.
P-3	Maintain Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Emergency Management, City of Cherryville	Local Funding as available	Completed	Critical facilities have generators including one at the Cherryville FD (Emergency Operations Center) capable of supplying the entire primary fire district. This action will be removed in the next update.
P-4	To trim tree limbs and keep water, sewer, and electrical rights of ways clear and free from obstructions.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	City of Cherryville	Local Funding, Grants, as available	Completed	City Public Works continually monitors. The City also has contracted services for regular tree trimming for electrical lines. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Enforce uniform water use restriction ordinances and criteria when to enact these. Create a drought committee to monitor conditions as needed.	Drought/Heat Wave	Medium	City of Cherryville	Local Funding	Completed	City has an ordinance in place for water restriction use. A committee including City Manager, Public Works Director, Water Dept. Superintendent, and Fire Chief. This ordinance has been enforced over the past 5 years and is constantly evaluated for necessary updates. This action will be removed in the next update.
P-6	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Codes, City of Cherryville	Local Funding, Grants, as available	Completed	On-going through the City Planning and Zoning Director and Fire Marshal. This action will be removed from the next update.
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Emergency Management, Fire Chief, City of Cherryville	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-8	Train city employees to the proper level of training to comply with the National Incident Management System (NIMS).	All Hazards	High	City of Cherryville	Local Funding	Completed	Appropriate City employees are trained through the Fire Dept. in compliance with NIMS.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Develop partnerships with Gaston County Emergency Management, State Emergency Management and FEMA as well as other local organizations to promote disaster mitigation and preparedness strategies.	All Hazards	High	Emergency Management, City of Cherryville	Local Funding and Grants	Completed	Continue to foster relationships with the county, state, and federal organizations with the Fire Dept. being the lead agency. Over the past 5 years, the city has coordinated with county, state, and federal partners on a number of projects. This action will be removed from the next update.
P-10	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Codes, Cherryville	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-11	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Emergency Management, Cherryville	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Emergency Management, Cherryville	Local Funding, Grants, as available	Completed	The Fire Dept. has identified locations that will be open during times of Tornado Watches with the Fire Dept. and First Baptist Church Community Outreach Center. This action will be removed in the next update.
P-13	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Emergency Management, Belmont	Local Funding, Grants, as available	Completed	The Fire Dept. and Public Works have identified a personnel pool with four wheel drive capability for ice/snow events. This action will be removed in the next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	All Hazards	Medium	EM	City of Cherryville	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Public Works, Cherryville	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Chief	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-5	Equip new fire facility with an emergency operations center for emergencies within the City of Cherryville jurisdiction.	All Hazards	High	City of Cherryville	Local Funding	Completed	The Fire Dept. is already equipped and serves as the emergency operations center for the City. This action will be removed in the next update
Structural Projects							
S-1	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Cherryville	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City of Cherryville Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City of Cherryville Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-3	Establish a relationship with local radio stations to distribute public information messages regarding preparedness and mitigation and to provide "official" emergency information.	All Weather Related Hazards	High	City of Cherryville Fire Dept	Local Funding, Grants	Completed	The Fire Dept. has previously developed relationships with local radio stations to distribute "official" emergency information and will continue to maintain these relationships. This action will be removed in the next update

Town of Cramerton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Cramerton	Local Funding as available	2015, Annual review and update	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but there will always be a need to re-evaluate and monitor.
P-2	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	2015, annually	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
P-3	Determine Alternative Water Sources. Alternatives may include industrial sources, additional surface intakes, additional impoundments, wells, recycling, etc pending local requirements and conditions.	Drought/Heat Wave	Low	Gaston County Public Works, Cramerton	Local Funding, Grants, as available	2017	Not a water provider, but collaboration with municipalities is currently viable. Some alternatives have been identified over the past 5 years, but more will need to be identified going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop uniform water use restriction ordinances and criteria when to enact these.	Drought/Heat Wave	Medium	Gaston County Planning, Cramerton	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Cramerton	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Cramerton	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-8	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Cramerton	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.
P-9	Enhance Flood Damage Prevention Regulations to better control development in flood prone areas. Such to include unstudied streams, CLOMR requirements. Also review potential of future conditions FIRMs in future updates.	Flood	Medium	Gaston County Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Cramerton	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major county buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
ES-3	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Cramerton	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Maintenance of water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Gaston County Public Works, Cramerton	Local Funding and/ or Grants, as available	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Cramerton	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Cramerton Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Cramerton Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Dallas Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Dallas	Local Funding as available	2017	Pending funding and staff time. These have not been inventoried over the past 5 years.
P-3	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Dallas	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Dallas	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-5	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-6	Actively participate in mutual aid programs to strengthen suppression capabilities.	Fire	High	Gaston County Emergency Management, Fire Marshal, Dallas	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly..

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Dallas	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-8	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-9	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Dallas	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-10	Continue to require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Dallas	Local Funding, Grants, as available	Completed	Pending funding, staff resources and political will. Underground utilities have been required over the past 5 years, and have been implemented in cases of new construction. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Enhance Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Gaston County Planning	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	N/A	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Dallas, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Dallas	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Dallas	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional projects.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Dallas Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Dallas Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Gastonia Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Implement existing Water Restriction Ordinance, when warranted.	Drought/Heat Wave	Low	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Emergency Water Conservation Regulations are part of the City Utility Ordinance and are implemented when a water shortage is declared. These regulations have been updated regularly throughout the past 5 years and will continue to be updated going forward. This action will be removed in the next update.
P-2	Implement "Maximizing Raw Water Availability" Improvement Program.	Drought/Heat Wave	Low	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Pending funding, staff resources and political will. The MRWA program was implemented over the past 5 years and will continue to be implemented going forward. This action will be removed in the next update.
P-3	Member of the Catawba-Wateree Drought Management Group which coordinates drought response among municipalities.	Drought/Heat Wave	Medium	COG – Utility Dept.	Local Funding	2015, At least annual meetings	Continues to participate as a member. The group met several times over the past 5 years to discuss coordinated drought response.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to maintain an up-to date snow removal plan; install GPS units in PWU vehicles used for disaster management.	Winter Storm and Freeze,	High	COG – Public Works Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The existing plan is maintained and kept up to date. GPS units are installed as funding allows. The plan has been updated several times over the past 5 years. This action will be removed in the next update.
P-5	Continue to implement tree trimming policies around City owned power lines. Increase the number of tree trimming crews.	Winter Storm and Freeze, Hurricane, Tornado	Medium	COG – Electrical Dept, Code Enforcement & Public Works	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Tree trimming policies are implemented and the number of tree trimming crews are increased as funding allows. Tree trimming crews over the past 5 years have been added when needed, but generally remained constant. This action will be removed in the next update.
P-6	Discourage the planting of canopy trees where they may grow into power lines; Implement project "Evergreen" encouraging plantings of under lower story trees.	Winter Storm and Freeze,	Medium	COG – Code Enforcement & Electrical	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. This project has not been implemented over the last 5 years.
P-7	Maintain partnership between the building inspectors and the City Fire Department.	Wildfire	Medium	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City building inspectors and Fire Department have an continuing partnership. Over the past 5 years, these groups have worked together and met several times to build this partnership. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Continue implementation of the Flood Plain Management Plan.	Flood	High	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Review and update annually	This plan has been reviewed and updated on an annual basis. Will continue to implement and update the Floodplain Management Plan as necessary.
P-9	Continue to identify areas within the flood zone, and/or who have had repetitive damage due to flooding, and develop mitigation strategies on a case-by-case basis.	Flood	Medium	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding, staff resources and political will. Many areas have been identified that are prone to flooding over the past 5 years. This will continue to be evaluated and updated as more information become available and maps are updated
P-10	Pursue funding to implement mitigation strategies in identified vulnerable areas.	Flood	Medium	COG – Public Works and Utilities Engineering, & Planning	Local Funding and/or Grants, Relief Funds, etc. as available	Annually as funding is available in conjunction with NCEM	To be completed in the future pending funding, staff resources and political will. Areas have been identified, but in the past 5 years, no mitigation grant funding was awarded.
P-11	Continue with Clean Sweep program for streams within the City.	Flood	Medium	COG – Keep Gastonia Beautiful & Zoning	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Big Sweep national waterway cleanup takes place on the first Saturday in October and has for the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Continue to enforce the Flood Management Ordinance.	Flood	High	COG – Public Works and Utilities Zoning, Engineering, & Planning	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administrator is responsible for enforcing the Flood Management Ordinance and has enforced it over the past 5 years. This action will be removed in the next update.
P-13	Continue to implement and enforce the Stormwater Management Plan.	Flood	High	COG – Public Works and Utilities & Engineering	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City maintains its Stormwater Drainage Improvement Policy and has enforced it over the past 5 years. This action will be removed in the next update.
P-14	Continue to enforce stormwater detention requirements.	Flood	High	COG – Planning, Engineering, & Public Works and Utilities	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Stormwater detention requirements are included in the UDO General Provisions which have been enforced over the past 5 years. This action will be removed in the next update.
P-15	Continue to enforce planning and zoning ordinances.	Hurricane, Tornado	High	COG –Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Unified Development Administrator is responsible for administration and enforcement of the UDO. The Administrator has enforced this ordinance over the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Continue to enforce water impoundment ordinance.	Dam Failure	Medium	COG –Public Works and Utilities; Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Stormwater detention requirements are included in the UDO General Provisions. These have been enforced over the past 5 years. This action will be removed in the next update.
Property Protection							
PP-1	Continue to enforce the NC building, housing, and fire codes.	Wildfire	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	City Building Permits and Inspections enforces building codes, the Code Enforcement Division of Development Services enforces minimum housing standards, and the Bureau of Fire Prevention in the City Fire Department enforces the fire code. These codes have been enforced over the past 5 years. This action will be removed in the next update.
PP-2	Encourage fire suppression systems.	Wildfire	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. During the past 5 years, outreach efforts have been implemented to encourage fire suppression systems, but more efforts will need to be made to include these in buildings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Continue to enforce NC State building and Minimum Housing codes.	Flood, Hurricane, Tornado, Earthquake, Sinkhole, Landslide	High	COG - Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	City Building Permits and Inspections enforces building codes, the Code Enforcement Division of Development Services enforces minimum housing standards. These codes have all been enforced over the past 5 years. This action will be removed in the next update.
PP-4	Continue to inspect buildings and implement the Flood Damage Prevention Ordinance.	Flood	High	COG - Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administrator is responsible for enforcing the Flood Damage Prevention Ordinance. The FDPO has been implemented and enforced over the past 5 years. This action will be removed in the next update.
Natural Resource Protection							
NRP-1	Implement the EPA Phase II Stormwater regulation as applicable	Flood	High	COG – Engineering, & Public Works	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City maintains its Stormwater Drainage Improvement Policy and has implemented it over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Maintain the City's Emergency Operations Plan, including creating and maintaining emergency equipment lists and contacts.	All Hazards	High	COG – Each Dept. and is compiled to a central list by the Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Annual update and review required	To be completed at the next update of the Emergency Operations Plan – contingent on funding. The plan has been updated regularly over the past 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Install SCADA System in City Electric Department for power outage response coordination.	Winter Storm and Freeze, Tornado, Earthquake, Landslide, Sinkhole	High	COG - Electric Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding, staff resources and political will. This system was not installed in the past 5 years.
ES-3	Pursue standard connections throughout City Departments for emergency generators.	All Hazards	Medium	COG – Public Works & Utilities, Police, Fire, & Technology Services	Local Funding and/or Grants, Relief Funds, etc. as available	2018	Pending funding, staff resources and political will. Some standardization of connections has been enacted over the past 5 years, but this task still needs to be completed.
ES-4	Maintain permanent Emergency Operations Center to coordinate services during natural disasters.	Hurricane, Tornado Earthquake, Landslide, Sinkhole	High	Police Department	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding. There is a current EOC area maintained, but a permanent area has not been established. The city will continue to look to do this in the future.
Structural Projects							
S-1	Maintain existing interconnects.	Drought/Heat Wave	High	COG – Utility Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Pending funding, staff resources and political will. The city has maintained existing interconnects over the past 5 years. This action will be removed in the next update.
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/Heat Wave	High	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2018	Pending funding, staff resources and political will. The city has added some additional interconnects over the past 5 years, but more are still needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
S-4	Encourage buried utilities where technologically and economically feasible.	Winter Storm and Freeze, Hurricane, Tornado	Low	COG – Electrical & Planning Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.
S-5	Continue to implement stream management activities, i.e., culvert/bridge management, and other applicable procedures.	Flood	High	COG – Public Works & Utilities & Zoning	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Annual reviews	Pending funding. The city has managed bridge and culvert management activities over the past 5 years in several cases and will continue to do so going forward by annually performing evaluations on culverts and bridges

City of High Shoals Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Join Community Rating System (CRS) to make citizens and politicians aware of the benefits of reducing flood insurance rates by having stricter regulations and reduce damages of flooding.	Flood	Medium	High Shoals City Council	N/A	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-2	Adopt changes to County Flood Damage Regulations to mirror County's more restrictive ordinance, as per the interlocal for administration of flood damage ordinance by Gaston County.	Flood	Medium	High Shoals City Council	N/A	2018	No work has been completed on this as of 2014, but this is still a goal going forward.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	High Shoals Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	High Shoals Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Kings Mountain Mitigation Action Plan

All Mitigation Actions for the City of Kings Mountain can be found in the Cleveland County portion of the Mitigation Action Plan and in the Cleveland County Annex.

City of Lowell Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Lowell	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Lowell	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and review criteria when to enact these, as needed.	Drought/Heat Wave	Medium	Lowell	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Lowell	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Lowell	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly.
P-9	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Lowell	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-10	Continue to require underground utilities for new construction.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	Gaston County Planning, Lowell	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-11	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Amend current Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Gaston County Planning	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Lowell, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	Provide water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	2018	Continuation, on-going initiative pending funding and staff time. Water system connections to some facilities were installed over the past 5 years, but more still remain to be done.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Require underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Lowell	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Unground utilities have not been required over the past 5 years, but have been implemented in some cases.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Lowell	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City Planner	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City Planner	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of McAdenville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, McAdenville	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, McAdenville	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Gaston County Fire Marshal, McAdenville	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, McAdenville	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, McAdenville	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-9	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	McAdenville	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-10	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-11	Amend current Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Manager	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in 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	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	McAdenville, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, McAdenville	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Require underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, McAdenville	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Unground utilities have not been required over the past 5 years, but have been implemented in some cases.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	McAdenville	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	McAdenville Police and Fire	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	McAdenville Police and Fire	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Mount Holly Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Mount Holly	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Maintain monitors at the City's Mountain Island Lake water intake, in order to monitor lake and intake conditions continually. Mount Holly is responsible and the project is short term and on-going after installation. Project is low cost with potentially high benefits and is considered to have a high priority.	All Hazards	High	Police	Local Funding	Completed	Pending funding. Over the past 5 years, the city has enacted this monitoring of water intake and will continue to do so going forward. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and evaluate criteria as needed.	Drought	Medium	Mount Holly	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Mount Holly	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Mount Holly	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly.
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Mount Holly	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Mount Holly	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Mount Holly	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flood	High	Mount Holly Planning Dept.	Local Funding	2016	Pending funding, staff resources and political will. The ordinance has not been enforced over the past 5 years and will need to be re-examined to determine effectiveness.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Mount Holly, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Mount Holly	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
ES-4	With the assistance a grant from Duke Energy, install two (2) generators as emergency backup for water pumps supplying water to the City and the Town of Stanley. Project cost is High to Medium with potentially high benefits. Project is short term with a high priority.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Public Works, Mount Holly	Local Funding, Duke Energy and/ or Grants, as available	2019	Pending funding and staff resources. The project has not been completed over the past 5 years, but the town hopes to implement over the next 5 years.
ES-5	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Mount Holly	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Mount Holly	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional projects.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Ranlo Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Ranlo	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Ranlo	Local Funding as available	2015, Annual review and update	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but there will always be a need to re-evaluate and update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce uniform water use restrictions as needed and continue to evaluate criteria when to enact these regulations.	Drought	Medium	Ranlo Manager	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Ranlo	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Ranlo	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Ranlo	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Ranlo	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Ranlo	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flood	High	Ranlo Planning Dept.	Local Funding	2016	Pending funding, staff resources and political will. The ordinance has not been enforced over the past 5 years and will need to be re-examined to determine effectiveness.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Ranlo, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Ranlo	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Ranlo	Local Funding, Grants ,as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Spencer Mountain Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Spencer Mountain	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Spencer Mountain to adopt and enforce regulatory ordinances for future growth.	All Hazards	High	Spencer Mountain Town Council	Local Funding, Grants, as available	2017	Pending funding, staff resources and political will. The town has adopted some regulatory ordinances over the past 5 years as per the county, however, more will be evaluated and potentially adopted going forward.
P-3	Amend current Flood Damage Prevention Ordinance to tighten restrictions on development in flood Prone Areas. Specifically to mirror County ordinance which is more restrictive and includes provisions for un-studied streams.	Flood	High	Spencer Mountain Town Council	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Spencer Mountain	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Stanley Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Stanley	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Stanley	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Identify programs to provide financial and physical assistance to citizens who experience dry wells for both residential and animal locations.	Drought	Low	Grants, Stanley	Local Funding, Grants, as available	Start at Adoption of this plan; complete by 2019	Pending, the governing board would likely pursue grant opportunities during severe drought period to aid citizens in the rural areas.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and evaluate criteria as needed.	Drought	Medium	Stanley	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Stanley	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Stanley	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly,.
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Stanley	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Stanley	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Stanley	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Stanley, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Stanley	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Stanley	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Stanley	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Stanley	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Lincoln 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	Encourage developers not to modify flood plain and the work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	This action has been completed and is continuously implemented through the enforcement of the County's Streamside Buffer Ordinance.
P-2	Post areas in parks that are subject to the inundation of flood water that warn people of the potential dangers.	Flood	Medium	Recreation	Local	Completed	This action has been implemented in existing County parks and continues to be implemented as new parks are built.
P-3	Develop working relationship with local, state and federal agencies with interests related to emergency management and hazard mitigation, with technologies from which we can all benefit.	All	High	Emergency Management	Local	Completed	This action takes place through County staff's participation in meetings and trainings. One example of implementation is through the County's participation in the development of this regional hazard mitigation plan. Other opportunities for implementation will be monitored and executed pending funding, staff resources and political will.
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2019	LEDA continues to examine this policy. It will be implemented in the future if it is determined to be needed/feasible. It will be reviewed on an annual basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	GIS	Local	Completed	This action has been completed. All areas have been identified and mapped, but the action will remain in the plan since updates will be necessary in future updates.
P-6	Maintain inventory of all water and sewer facilities.	All	High	Public Works	Local	Completed	This action has been completed and continues to be implemented as new water/sewer facilities are built. The facilities are inventoried using GIS w/ use of iPads.
P-7	Designate sites for the disposal of debris.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Public Works, Emergency Management	Local	2017	This is a goal of the department going forward. No new debris sites were identified during the last 5 years.
P-8	Annual meetings with critical services, agencies and utilities.	All	High	Emergency Management	Local	2015, Bi-annually	Emergency Management staff holds meetings twice a year with critical services, agencies and utilities and have done so over the past 5 years.
P-9	Determine alternative water sources.	Drought	High	Public Works	Local, Grants	2018	Over the past 5 years, some alternative water sources were identified. The County has interconnections w/ City of Lincolnton, but more should be identified.
P-10	Enforce building codes.	Earthquake	High	P&ID	Local	Completed	The County continues to enforce building codes on a daily basis. The County has hired 2 new inspectors that will come on board within the year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Identify and map areas of steep slopes in the county.	Landslide	High	GIS	Local	Completed	Map created
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Landslide	High	P&ID	Local	2019	Pending funding and staff time. This is a goal of the department. Over the past 5 years, these regulations were not developed.
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All	High	Emergency Management, GIS	Local, Grants	2019	Pending funding and staff time. Requires further data Mining/Digitizing. Over the past 5 years, tracking hazards was done to some extent, but more work is needed to complete.
P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flood	Medium	P&ID	Local	2017	Pending funding and staff time. This is a goal of the department. Implement through Regional Planning Process. Over the past 5 years, this was not achieved
P-15	Organize regular meetings with local fire officials and the North Carolina Division of Forest Resources.	Wildfire	High	Emergency Management, County Forester	Local	2015, Annually	Pending funding and staff time. The County EM holds monthly meetings with local fire officials and NC Div of Forest Resources staff.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans	All	High	County Planning, All Departments	Local	2017	Implementing this action is a goal of the LEPC. Over the past 5 years, some references have been made to mitigation in public policy documents, but much more is necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-17	Increase the number of USGS streamflow gages in the county.	Flood	Medium	USGS	Grants, Federal	2018	USGS continues to try to install additional streamflow gages across the state but no new gages in Lincoln County over the past 5 years.
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Works	Local, Grants	2018	Incomplete, little progress over the past 5 years, pending funding. Currently not funded, but we will continue to pursue funding.
P-19	Solicit the support of local representatives to advocate for the support of the General Assembly to include drought as a declarable natural hazard under the Stafford Act.	Drought	Medium	County	Local	2017	Implementing this action is a goal of the LEPC. The LEPC has been advocating this over the past 5 years, but no change has been made yet.
Property Protection							
PP-1	Purchase property located in repetitively flooded areas.	Flood	Low	County	PDM, HMGP Grants	2018	Potential Soil & Water. Over the past 5 years, the county has attempted to acquire funding from NCEM for purchase of property in the floodplain but it has generally not been available.
PP-2	Locate future facilities outside of identified hazard areas.	Flood, Landslide	High	All Departments	Local	Completed	Complete through the enforcement of County Ordinances/Policies.. As of 2014, this action is complete, but it will need to be updated going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Continue to prohibit construction in the 100-year flood plain.	Flood	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
PP-4	Encourage the dedication areas that are a part of subdivisions and located in Special Flood Hazard Areas or contain steep slopes to be dedicated as Common Open Space.	Flood, Landslide	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be continued going forward.
Natural Resource Protection							
NRP-1	Enforce forestry laws, regulations and programs.	Wildfire	High	County Forester	State	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially near critical facilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	NCDOT	Local	Implement directly after storm event	Implemented through existing NCDOT policies and procedures. NCDOT initiates road clearing efforts as early as possible and plans to continue to do so.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Assist in development of plans for backup fuel and power generation	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2019	Implemented through an existing Generator Agreement w/ State and Local vendors. No additional updates to agreement over past 5 years. A Fuel Plan is being developed by County Manager's Office pending staff time. Fuel plan should be completed by 2019.
Structural Projects							
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flood	Medium	NCDOT	State	2015, Apply annually for funding to complete projects	Pending funding. Although funding is not always available, NCDOT continues to attempt to address repetitive problem areas and has done so in some cases over the past 5 years.
S-2	Require underground utilities be installed in all new subdivisions.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	P&ID	Local	Completed	Action completed County Ordinance requires utilities in new subdivisions be located underground.
S-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2017	As of 2014, currently active w/ City of Lincolnton, exploring other opportunities going forward.
Public Education and Awareness							
PEA-1	Educate property owners whose property lies within Special Flood Hazard Areas of the dangers of modification of those areas.	Flood	Medium	P&ID	Local, Grants	2016, Re-educate as new maps are produced	Completed, but this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Notify all property owners with structures located in the 100-year flood plain of the importance of flood insurance.	Flood	Low	P&ID	Local, Grants	2016, Re-educate as new maps are produced ing	Completed, this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.
PEA-3	Encourage purchase of Weather Alert Radios.	All	Medium	Emergency Management	Local, Grants	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-4	Educate citizens of the dangers of flash flooding on their property and along roadways.	Flood	Medium	Emergency Management	Local	Completed	Education Outreach Annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet.
PEA-5	Educate citizens about the importance of water conservation and the methods which are most effective.	Drought	High	Public Works	Local	Completed	Pending funding Clean Water Management Trust Fund, New Rate Structure, Website information. Outreach has been performed through a number of mediums including TV, radio, print, and internet.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Encourage the removal or trees and branches that could down power lines.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding Local Power Companies conduct survey of all power lines annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-7	Publicize and properly sign the location of emergency shelters.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding All shelter locations are responsibility of the Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-8	Educate public of road clearing priorities through use of a map.	Winter Storm and Freeze	Medium	NCDOT	State	2018	Pending funding Although a map is not available, an explanation of how prioritization works is available on NCDOT's website. Outreach has been performed through a number of mediums including TV, radio, print, and internet. A map is in the works.

City of Lincolnton 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 developers not to modify flood plain and to work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	This action has been completed and is continuously implemented through the enforcement of the County's Streamside Buffer Ordinance.
P-2	Post areas in parks that are subject to the inundation of flood water that warn people of the potential dangers.	Flood	Medium	Recreation	Local	Completed	This action has been implemented in existing County parks and continues to be implemented as new parks are built.
P-3	Develop working relationship with local, state and federal agencies with interests related to emergency management and hazard mitigation, with technologies from which we can all benefit.	All	High	Emergency Management	Local	Completed	This action takes place through County staff's participation in meetings and trainings. One example of implementation is through the County's participation in the development of this regional hazard mitigation plan. Other opportunities for implementation will be monitored and executed pending funding, staff resources and political will.
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2019	LEDA continues to examine this policy. It will be implemented in the future if it is determined to be needed/feasible. It will be reviewed on an annual basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	GIS	Local	Completed	This action has been completed. All areas have been identified and mapped, but the action will remain in the plan since updates will be necessary in future updates.
P-6	Maintain inventory of all water and sewer facilities.	All	High	Public Works	Local	Completed	This action has been completed and continues to be implemented as new water/sewer facilities are built. The facilities are inventoried using GIS w/ use of iPads.
P-7	Designate sites for the disposal of debris.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Public Works, Emergency Management	Local	2017	This is a goal of the department going forward. No new debris sites were identified during the last 5 years.
P-8	Annual meetings with critical services, agencies and utilities.	All	High	Emergency Management	Local	2015, Bi-annually	Emergency Management staff holds meetings twice a year with critical services, agencies and utilities and have done so over the past 5 years.
P-9	Determine alternative water sources.	Drought	High	Public Works	Local, Grants	2018	Over the past 5 years, some alternative water sources were identified. The County has interconnections w/ City of Lincolnton, but more should be identified.
P-10	Enforce building codes.	Earthquake	High	P&ID	Local	Completed	The County continues to enforce building codes on a daily basis. The County has hired 2 new inspectors that will come on board within the year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Identify and map areas of steep slopes in the county.	Landslide	High	GIS	Local	Completed	Map created
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Landslide	High	P&ID	Local	2019	Pending funding and staff time. This is a goal of the department. Over the past 5 years, these regulations were not developed.
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All	High	Emergency Management, GIS	Local, Grants	2019	Pending funding and staff time. Requires further data Mining/Digitizing. Over the past 5 years, tracking hazards was done to some extent, but more work is needed to complete.
P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flood	Medium	P&ID	Local	2017	Pending funding and staff time. This is a goal of the department. Implement through Regional Planning Process. Over the past 5 years, this was not achieved
P-15	Organize regular meetings with local fire officials and the North Carolina Division of Forest Resources.	Wildfire	High	Emergency Management, County Forester	Local	2015, Annually	Pending funding and staff time. The County EM holds monthly meetings with local fire officials and NC Div of Forest Resources staff.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans.	All	High	County	Local	2017	Implementing this action is a goal of the LEPC. Over the past 5 years, some references have been made to mitigation in public policy documents, but much more is necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-17	Increase the number of USGS streamflow gages in the county.	Flood	Medium	USGS	Grants, Federal	2018	USGS continues to try to install additional streamflow gages across the state but no new gages in Lincoln County over the past 5 years.
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Works	Local, Grants	2018	Incomplete, little progress over the past 5 years, pending funding. Currently not funded, but we will continue to pursue funding.
P-19	Solicit the support of local representatives to advocate for the support of the General Assembly to include drought as a declarable natural hazard under that Stafford Act.	Drought	Medium	County	Local	2017	Implementing this action is a goal of the LEPC. The LEPC has been advocating this over the past 5 years, but no change has been made yet.
Property Protection							
PP-1	Purchase property located in repetitively flooded areas	Flood	Low	County	Grants	2018	Potential Soil & Water. Over the past 5 years, the county has attempted to acquire funding from NCEM for purchase of property in the floodplain but it has generally not been available.
PP-2	Locate future facilities outside of identified hazard areas.	Flood, Landslide	High	All Departments	Local	Completed	Complete through the enforcement of County Ordinances/Policies.. As of 2014, this action is complete, but it will need to be updated going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Continue to prohibit construction in the 100-year flood plain.	Flood	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
PP-4	Encourage the dedication areas that are a part of subdivisions and located in Special Flood Hazard Areas or contain steep slopes to be dedicated as Common Open Space.	Flood, Landslide	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be continued going forward.
Natural Resource Protection							
NRP-1	Enforce forestry laws, regulations and programs.	Wildfire	High	County Forester	State	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially near critical facilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	NCDOT	Local	Implement directly after storm event	Implemented through existing NCDOT policies and procedures. NCDOT initiates road clearing efforts as early as possible and plans to continue to do so.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Assist in development of plans for backup fuel and power generation.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2019	Implemented through an existing Generator Agreement w/ State and Local vendors. No additional updates to agreement over past 5 years. A Fuel Plan is being developed by County Manager's Office pending staff time. Fuel plan should be completed by 2019.
Structural Projects							
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flood	Medium	NCDOT	State	2015, Apply annually for funding to complete projects	Pending funding. Although funding is not always available, NCDOT continues to attempt to address repetitive problem areas and has done so in some cases over the past 5 years.
S-2	Require underground utilities be installed in all new subdivisions.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	P&ID	Local	Completed	Action completed County Ordinance requires utilities in new subdivisions be located underground.
S-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2017	As of 2014, currently active w/ City of Lincolnton, exploring other opportunities going forward.
Public Education and Awareness							
PEA-1	Educate property owners whose property lies within Special Flood Hazard Areas of the dangers of modification of those areas.	Flood	Medium	P&ID	Local, Grants	2016, Re-educate as new maps are produced	Completed, but this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Notify all property owners with structures located in the 100-year flood plain of the importance of flood insurance.	Flood	Low	P&ID	Local, Grants	2016, Re-educate as new maps are produced ing	Completed, this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.
PEA-3	Encourage purchase of Weather Alert Radios.	All	Medium	Emergency Management	Local, Grants	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-4	Educate citizens of the dangers of flash flooding on their property and along roadways.	Flood	Medium	Emergency Management	Local	Completed	Education Outreach Annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet.
PEA-5	Educate citizens about the importance of water conservation and the methods which are most effective.	Drought	High	Public Works	Local	Completed	Pending funding Clean Water Management Trust Fund, New Rate Structure, Website information. Outreach has been performed through a number of mediums including TV, radio, print, and internet.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Encourage the removal or trees and branches that could down power lines.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding Local Power Companies conduct survey of all power lines annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-7	Publicize and properly sign the location of emergency shelters.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding All shelter locations are responsibility of the Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-8	Educate public of road clearing priorities through use of a map.	Winter Storm and Freeze	Medium	NCDOT	State	2018	Pending funding Although a map is not available, an explanation of how prioritization works is available on NCDOT's website. Outreach has been performed through a number of mediums including TV, radio, print, and internet. A map is in the works.

SECTION 10
PLAN MAINTENANCE

This section discusses how the Cleveland Gaston Lincoln 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

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 three plans were adopted (Lincoln County in 2010 and Cleveland and Gaston Counties in 2011), 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 three 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.

Cleveland County
The Cleveland County Hazard Mitigation Plan (2011) included an annual review process and progress report on the plan. This review process was carried out by the Cleveland County Emergency Management Coordinator every year since the previous plan was approved. During this annual review process, the EM Coordinator developed a progress report on the plan and presented it to the HMP Advisory Committee for review. The plan was also open to comments from the general public during this timeframe.

Moreover, the Planning Board 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 HMP 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.

Gaston County

The Gaston County Hazard Mitigation Plan (2011) included an annual evaluation process of the plan's effectiveness, an annual update of the plan's vulnerability and capabilities assessments, and an annual maintenance report to summarize progress of the plan. This annual evaluation process was carried out by the County Hazard Mitigation Task Force, which was chaired by the County Emergency Management Director, every year since the previous plan was approved.

During this annual evaluation process, the County EM Director developed an annual progress report on the plan which covered a number of items, including any difficulties encountered during implementation and any recommendations for changes to the plan or changes in priorities. This report was then disseminated to each respective local government manager within Gaston County for review.

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 Task Force generally agreed that the plan was on course and that the monitoring and evaluating process itself was sufficient to ensure implementation of the plan.

Lincoln County

The Lincoln County Hazard Mitigation Plan (2010) included yearly meetings between all departments impacted by the plan to monitor progress and to take note of any revisions that might be needed during the plan update. These yearly meetings were convened by the Lincoln County Planning and Inspections Department (the Director or his/her designee is charged with this) and discussion revolved around the whether or not the county's vulnerability had decreased as a result of the plan. Meetings to discuss the plan were also held in the wake of every major disaster that occurred in the county during the interim update period.

In addition, staff continued to document natural hazard events as they occurred in order to ensure that the risk and vulnerability assessments were accurate and included relevant data. The adequacy of the county's resources and any redundancy among strategies were also discussed. As strategies were evaluated during the yearly reviews, many areas of overlap were identified across departments and mitigation was integrated into other areas of planning and local governance.

After the evaluation process was completed, the committee finalized its recommendations and these were reviewed by the Planning Board and Board of Commissioners. A presentation to these boards was made open the public and comments were received concerning the plan.

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.

10.2 IMPLEMENTATION AND INTEGRATION

Each agency, department, or other partner participating under the Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln Region.

Since the previous three plans were adopted (Lincoln County in 2010 and Cleveland and Gaston Counties in 2011), 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 Council, 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Council 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 Council 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 Council 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 Cleveland Gaston Lincoln Region. Any of the County Coordinators from Cleveland Gaston or Lincoln Counties can call for a reconvening of the Regional Hazard Mitigation Council for these reviews.

Five Year Plan Review

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Council every five years to determine whether there have been any significant changes in the Cleveland Gaston Lincoln 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 Cleveland Gaston and Lincoln 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 Cleveland County Emergency Management Coordinator will be responsible for reconvening the Regional Hazard Mitigation Council to conduct 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCEM) 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 Cleveland Gaston Lincoln 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 Cleveland Gaston Lincoln 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 Cleveland County Emergency Management Coordinator to reconvene the Regional Hazard Mitigation Council 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 Council 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 Cleveland Gaston and Lincoln 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 Council 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 Council:

- 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 Council, 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 Council (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 Council for further revision; or
- Defer the amendment request back to the Regional Hazard Mitigation Council 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 Council 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 Council;
- 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
Cleveland County

This annex includes jurisdiction-specific information for Cleveland County and its participating municipalities. It consists of the following five subsections:

- A.1 Cleveland County Community Profile
- A.2 Cleveland County Risk Assessment
- A.3 Cleveland County Vulnerability Assessment
- A.4 Cleveland County Capability Assessment
- A.5 Cleveland County Mitigation Strategy

A.1 CLEVELAND COUNTY COMMUNITY PROFILE

A.1.1 Geography and the Environment

Cleveland County is located in the southern portion of western North Carolina just west of Charlotte. It includes fifteen municipalities, the Town of Belwood, Town of Boiling Springs, Town of Casar, Town of Earl, Town of Fallston, Town of Grover, City of Kings Mountain, Town of Kingstown, Town of Lattimore, Town of Lawndale, Town of Mooresboro, Town of Patterson Springs, Town of Polkville, City of Shelby, Town of Waco, as well as many small unincorporated communities.

The county is situated in the foothills of the Appalachian Mountains and is named for a famous colonel from the American Revolutionary War. The total area of the county is 469 square miles, 4 square miles of which is water area.

From March through May, temperatures have an average high in the mid-sixties and an average low in the lower forties. Typically, the weather is milder by late April and warm in May. In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the upper 80s in July and August.

September through mid-November is typified by clear skies and cooler weather that alternates between warm days and cool nights. Daytime highs are usually in the 70s and 80s during September but fall to the 50s and 60s by early November. The first frost often occurs in late September and the lows are near freezing by November. During these autumn months, there are only occasional rain showers making it the driest period of the year.

A.1.2 Population and Demographics

According to the 2010 Census, Cleveland County has a population of 98,078 people. The county has seen almost 2% growth between 2000 and 2010, and the average population density is 211 people per square mile. Population counts from the US Census Bureau for 1990, 2000, and 2010 for the county and both of the participating jurisdictions are presented in **Table A.1**.

TABLE A.1: POPULATION COUNTS FOR CLEVELAND COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Cleveland County	**84,714**	**96,287**	**98,078**	**1.9%**
Town of Belwood	631	962	950	-1.2%
Town of Boiling Springs	2,445	3,866	4,647	20.2%
Town of Casar	328	308	297	-3.6%
Town of Earl	230	234	260	11.1%
Town of Fallston	498	603	607	0.7%
Town of Grover	516	698	708	1.4%
City of Kings Mountain	8,763	9,693	10,296	6.2%
Town of Kingstown	956	845	681	-19.4%
Town of Lattimore	183	419	488	16.5%
Town of Lawndale	573	642	606	-5.6%
Town of Mooresboro	294	314	311	-1.0%
Town of Patterson Springs	690	620	622	0.3%
Town of Polkville	1,514	535	545	1.9%
City of Shelby	14,669	19,477	20,323	4.3%
Town of Waco	320	328	321	-2.1%

Source: US Census Bureau

Based on the 2010 Census, the median age of residents of Cleveland County is 40.3 years. The racial characteristics of the county 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 CLEVELAND 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)*
Cleveland County	**75.6%**	**20.7%**	**0.2%**	**0.8%**	**0.0%**	**1.2%**	**1.5%**	**2.8%**
Town of Belwood	94.3%	2.4%	0.9%	0.3%	0.0%	0.9%	1.1%	4.1%
Town of Boiling Springs	86.1%	11.3%	0.2%	0.4%	0.0%	0.5%	1.5%	2.0%
Town of Casar	98.0%	0.0%	0.3%	0.0%	0.0%	0.0%	1.7%	3.4%
Town of Earl	91.2%	8.1%	0.0%	0.4%	0.0%	0.4%	0.0%	0.4%
Town of Fallston	92.8%	5.1%	0.0%	0.0%	0.0%	0.7%	1.5%	0.7%
Town of Grover	79.9%	11.9%	1.0%	2.1%	0.0%	0.7%	4.4%	4.5%
City of Kings Mountain	73.0%	22.5%	0.2%	1.6%	0.0%	1.1%	1.7%	2.6%
Town of Kingstown	8.1%	89.1%	0.1%	0.9%	0.0%	0.7%	1.0%	1.0%
Town of Lattimore	94.7%	3.1%	0.0%	0.6%	0.0%	0.8%	0.8%	3.1%
Town of Lawndale	79.2%	15.3%	0.0%	0.2%	0.0%	3.1%	2.1%	4.8%
Town of Mooresboro	81.0%	16.7%	0.6%	0.3%	0.0%	0.3%	1.0%	1.0%

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)*
Town of Patterson Springs	87.1%	8.7%	0.0%	0.3%	0.0%	0.8%	3.1%	2.4%
Town of Polkville	96.5%	1.7%	0.0%	0.2%	0.0%	0.0%	1.5%	3.9%
City of Shelby	54.7%	41.3%	0.4%	0.8%	0.0%	1.1%	1.7%	3.1%
Town of Waco	79.1%	19.6%	0.0%	0.0%	0.0%	0.9%	0.3%	1.2%

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

A.1.3 Housing

According to the 2010 US Census, there are 43,373 housing units in Cleveland 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 CLEVELAND COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2007-2011)
Cleveland County	**40,317**	**43,373**	**0.7%**	**$104,300**
Town of Belwood	410	423	0.9%	$89,600
Town of Boiling Springs	1,184	1,471	0.4%	$145,300
Town of Casar	145	152	2.0%	$57,900
Town of Earl	109	117	0.9%	$85,000
Town of Fallston	254	269	1.1%	$89,200
Town of Grover	313	315	0.3%	$86,000
City of Kings Mountain	4,064	4,597	0.3%	$109,300
Town of Kingstown	273	281	0.0%	$85,700
Town of Lattimore	127	154	0.6%	$82,500
Town of Lawndale	300	289	0.7%	$66,700
Town of Mooresboro	140	153	0.7%	$90,800
Town of Patterson Springs	272	270	0.0%	$91,200
Town of Polkville	234	279	1.4%	$104,200
City of Shelby	8,853	9,919	0.5%	$113,400
Town of Waco	145	149	2.7%	$81,300

Source: US Census Bureau

A.1.4 Infrastructure

Transportation

There are several major highways that cross through Cleveland County. Interstate 85 traverses north to south, entering North Carolina at Kings Mountain before running through Gastonia and the Charlotte area. US Route 74 has alternating names, but it is considered the commercial backbone and main truck route of Western North Carolina. It runs east to west through the southern part of Cleveland County.

Charlotte-Douglas International Airport is the largest airport in the state and is the primary airport used by residents of Cleveland County. The airport currently offers non-stop commercial flights on nine airlines to cities around the country and the world. This airport is less than 50 miles from most areas of the county and served over 41 million passengers in 2012, nearly doubling the number of passengers it served in 2000. A smaller airport that also serves the county is the Shelby-Cleveland County Regional Airport.

Utilities

Electrical power in the Cleveland County is provided by two public utilities and several electricity cooperatives. Duke Energy and Energy United provide service to the county and Southern Power, which is a wholesale energy provider to the NC Electric Membership Corporation and NC Municipal Power Agency Number 1, is located in Cleveland County.

Water and sewer service is provided by many of the towns in Cleveland County as well as by Cleveland County Water which is a regional water supplier to parts of the county. Although parts of the region 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 buildings and community facilities located throughout Cleveland County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 19 fire stations, 5 police stations, and 32 public schools located within the county.

There are 3 medical care facilities located in Cleveland County. The largest is Cleveland Regional Medical Center, a 241-bed short term acute center located in Shelby. There is a smaller hospital, Kings Mountain Hospital, located in Kings Mountain.

In addition to Kings Mountain State Park, Cleveland County contains numerous local parks and recreation areas, including the Shelby City Park, John H. Moss Lake, and the Kings Mountain National Military Park. These facilities offer recreational opportunities to area residents and many visitors each year.

A.1.5 Land Use

Cleveland County is a quickly developing county due to its proximity to the major metropolitan areas of Charlotte and Greenville-Spartanburg. There are many incorporated municipalities located throughout the county which cover a great deal of the county's land area and 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.

Due to increasing development in the area, Cleveland County's land use policy has been modified in recent years to better reflect these changes. Especially important in the decision-making process has been the increased pressure for development that has resulted from the Charlotte metropolitan area's expansion. Cleveland County has faced difficult decisions when it comes to land use as the conflict between growth and preservation of the county's natural resources have been an important topic of discussion when it comes to land use planning. As the county continues to grow, land use planning will play a critical role in the county's future.

A.1.6 Employment and Industry

According to the North Carolina Employment Security Commission, in 2012, Cleveland County had an average annual employment of 45,094 workers. In 2011, the Manufacturing industry employed 16.5 percent of the County's workforce followed by Retail Trade (11.5%); Educational Services (7.6%); and Accommodation and Food Services (7.3%). From 2007 to 2011, the average annual median household income in Cleveland County was $38,352 compared to $46,291 for the state of North Carolina.

A.2 CLEVELAND COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Cleveland 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. 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 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, Cleveland 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 CLEVELAND COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Cleveland County
2000	**EXTREME**
2001	**EXTREME**
2002	**EXCEPTIONAL**
2003	ABNORMAL
2004	MODERATE
2005	MODERATE
2006	SEVERE
2007	**EXCEPTIONAL**
2008	**EXCEPTIONAL**
2009	SEVERE
2010	MODERATE
2011	SEVERE
2012	SEVERE
2013	MODERATE

Source: North Carolina Drought Monitor (through July 2013)

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Cleveland 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 Cleveland 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 Cleveland County. No events were reported.

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 Cleveland County can be found below in **Table A.5**.

TABLE A.5: HIGHEST RECORDED TEMPERATURE IN CLEVELAND COUNTY

Location	Date	Temperature (F)
Shelby 2 NNE	7/30/1952	107
CLEVELAND 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 Shelby. **Table A.6** shows the average maximum temperatures from 1971 to 2000 at the Shelby 2 NNE observation station which can be used as a general comparison for the county.

TABLE A.6: AVERAGE MAXIMUM TEMPERATURE IN SHELBY 2 NNE, CLEVELAND COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	48.9	53.7	61.8	69.9	77.0	83.8	87.6	86.2	80.1	70.7	60.8	51.5

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Cleveland County has a probability level of possible (1 to 10 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 Cleveland 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, 124 recorded hailstorm events have affected Cleveland County since 1967.[1] **Table A.7** is a summary of the hail events in Cleveland 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 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 A.7: SUMMARY OF HAIL OCCURRENCES IN CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	1	0/0	$0
Boiling Springs	7	0/0	$0
Casar	11	0/0	$0
Earl	2	0/0	$0
Fallston	5	0/0	$0
Grover	3	0/0	$0
Kings Mountain	16	0/0	$0
Kingstown	0	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 Cleveland 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)
Lattimore	2	0/0	$0
Lawndale	3	0/0	$0
Mooresboro	2	0/0	$0
Patterson Springs	5	0/0	$0
Polkville	8	0/0	$0
Shelby	19	0/0	$0
Waco	2	0/0	$0
Unincorporated Area	38	0/0	$0
CLEVELAND COUNTY TOTAL	**124**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE A.8: HISTORICAL HAIL OCCURRENCES IN CLEVELAND COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Belwood				
BELWOOD	17-AUG-03	1.75 in.	0/0	$0
Boiling Springs				
BOILING SPGS	21-JUN-97	1.00 in.	0/0	$0
BOILING SPGS	05-AUG-97	0.88 in.	0/0	$0
BOILING SPGS	09-SEP-99	0.75 in.	0/0	$0
BOILING SPGS	16-MAR-02	0.88 in.	0/0	$0
BOILING SPGS	03-APR-06	0.75 in.	0/0	$0
BOILING SPGS	08-APR-06	0.75 in.	0/0	$0
BOILING SPGS	09-APR-11	1.75 in.	0/0	$0
Casar				
CASAR	16-MAR-96	0.75 in.	0/0	$0
CASAR	02-JUN-97	1.00 in.	0/0	$0
CASAR	10-JUL-97	0.75 in.	0/0	$0
CASAR	24-MAY-00	1.75 in.	0/0	$0
CASAR	07-MAY-02	0.75 in.	0/0	$0
CASAR	29-APR-03	0.88 in.	0/0	$0
CASAR	14-MAY-06	1.75 in.	0/0	$0
CASAR	10-SEP-06	0.75 in.	0/0	$0
CASAR	09-APR-11	1.25 in.	0/0	$0
CASAR	09-APR-11	1.75 in.	0/0	$0
CASAR	02-JUN-11	0.75 in.	0/0	$0
Earl				
EARL	16-JUL-97	0.75 in.	0/0	$0
EARL	16-MAY-12	0.75 in.	0/0	$0
Fallston				
FALLSTON	16-MAR-96	1.75 in.	0/0	$0
FALLSTON	15-JUN-96	0.75 in.	0/0	$0
FALLSTON	24-MAY-00	1.00 in.	0/0	$0
FALLSTON	03-APR-06	1.00 in.	0/0	$0
FALLSTON	16-JUN-09	1.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
Grover				
GROVER	20-MAY-06	1.75 in.	0/0	$0
GROVER	12-JUN-07	0.75 in.	0/0	$0
GROVER	10-APR-09	0.75 in.	0/0	$0
Kings Mountain				
KINGS MTN	24-MAY-96	0.75 in.	0/0	$0
KINGS MTN	27-APR-99	0.75 in.	0/0	$0
KINGS MTN	31-JUL-99	0.75 in.	0/0	$0
KINGS MTN	18-AUG-00	1.50 in.	0/0	$0
KINGS MTN	22-JUN-01	0.75 in.	0/0	$0
KINGS MTN	09-JUL-03	0.75 in.	0/0	$0
KINGS MTN	03-APR-06	0.75 in.	0/0	$0
KINGS MTN	20-MAY-06	1.00 in.	0/0	$0
KINGS MTN	20-MAY-06	0.75 in.	0/0	$0
KINGS MTN	10-JUN-06	1.75 in.	0/0	$0
KINGS MTN	15-JUL-06	1.00 in.	0/0	$0
KINGS MTN	16-JUN-09	1.00 in.	0/0	$0
KINGS MTN	16-JUN-09	1.75 in.	0/0	$0
KINGS MTN	28-MAR-10	0.88 in.	0/0	$0
KINGS MTN	05-APR-11	1.25 in.	0/0	$0
KINGS MTN	20-AUG-11	1.00 in.	0/0	$0
Kingstown				
None Reported	--	--	--	--
Lattimore				
LATTIMORE	04-JUL-06	1.00 in.	0/0	$0
LATTIMORE	16-JUN-07	0.75 in.	0/0	$0
Lawndale				
LAWNDALE	13-MAY-06	0.88 in.	0/0	$0
LAWNDALE	26-MAY-06	0.75 in.	0/0	$0
LAWNDALE	14-AUG-08	0.75 in.	0/0	$0
Mooresboro				
MOORESBORO	24-JUN-07	0.75 in.	0/0	$0
MOORESBORO	30-SEP-08	0.75 in.	0/0	$0
Patterson Springs				
PATTERSON SPGS	29-MAR-10	0.75 in.	0/0	$0
PATTERSON SPGS	31-MAR-12	1.00 in.	0/0	$0
PATTERSON SPGS	31-MAR-12	0.88 in.	0/0	$0
PATTERSON SPGS	31-MAR-12	0.88 in.	0/0	$0
PATTERSON SPGS	26-APR-12	0.75 in.	0/0	$0
Shelby				
SHELBY	13-JUN-97	0.75 in.	0/0	$0
SHELBY	16-JUL-97	0.75 in.	0/0	$0
SHELBY	07-SEP-98	0.75 in.	0/0	$0
SHELBY	03-JUN-99	1.75 in.	0/0	$0
SHELBY	03-JUN-99	0.75 in.	0/0	$0
SHELBY	03-JUN-99	0.88 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
SHELBY	25-AUG-00	0.75 in.	0/0	$0
SHELBY	24-JUN-01	1.75 in.	0/0	$0
SHELBY	07-MAY-02	0.75 in.	0/0	$0
SHELBY	21-JUL-03	1.00 in.	0/0	$0
SHELBY	19-MAY-05	0.88 in.	0/0	$0
SHELBY	28-JUL-05	1.75 in.	0/0	$0
SHELBY	18-MAY-06	0.88 in.	0/0	$0
SHELBY	20-MAY-06	1.75 in.	0/0	$0
SHELBY	10-JUN-06	0.75 in.	0/0	$0
SHELBY	09-APR-11	1.00 in.	0/0	$0
SHELBY	02-JUN-11	0.75 in.	0/0	$0
SHELBY	16-MAY-12	0.75 in.	0/0	$0
SHELBY	05-JUL-12	0.88 in.	0/0	$0
Waco				
WACO	12-MAY-07	0.75 in.	0/0	$0
WACO	09-MAY-09	0.75 in.	0/0	$0
Unincorporated Area				
CLEVELAND COUNTY	12-MAR-67	0.75 in.	0/0	$0
CLEVELAND COUNTY	28-JUN-74	1.50 in.	0/0	$0
CLEVELAND COUNTY	21-AUG-79	1.00 in.	0/0	$0
CLEVELAND COUNTY	16-JUN-80	2.75 in.	0/0	$0
CLEVELAND COUNTY	15-MAY-85	0.75 in.	0/0	$0
CLEVELAND COUNTY	15-MAY-85	0.75 in.	0/0	$0
CLEVELAND COUNTY	07-JUN-85	0.75 in.	0/0	$0
CLEVELAND COUNTY	17-MAY-88	1.75 in.	0/0	$0
CLEVELAND COUNTY	17-MAY-88	0.75 in.	0/0	$0
CLEVELAND COUNTY	01-APR-90	0.75 in.	0/0	$0
CLEVELAND COUNTY	21-MAY-90	1.00 in.	0/0	$0
CLEVELAND COUNTY	21-MAY-90	0.75 in.	0/0	$0
CLEVELAND COUNTY	21-MAY-90	1.00 in.	0/0	$0
CLEVELAND COUNTY	10-SEP-90	0.75 in.	0/0	$0
CLEVELAND COUNTY	07-MAR-92	1.50 in.	0/0	$0
CLEVELAND COUNTY	07-MAR-92	2.00 in.	0/0	$0
CLEVELAND COUNTY	07-MAR-92	1.00 in.	0/0	$0
CLEVELAND COUNTY	10-MAR-92	0.75 in.	0/0	$0
CLEVELAND COUNTY	13-MAY-92	0.75 in.	0/0	$0
CLEVELAND COUNTY	10-SEP-92	0.75 in.	0/0	$0
CLEVELAND COUNTY	10-SEP-92	0.75 in.	0/0	$0
Nr Grover	01-MAY-95	1.75 in.	0/0	$0
Kannapolis	01-MAY-95	0.75 in.	0/0	$0
CLEVELAND COUNTY	01-MAY-95	1.75 in.	0/0	$0
Northern	09-JUN-95	0.75 in.	0/0	$0
OLIVE GROVE	29-APR-03	1.75 in.	0/0	$0
METCALF	09-MAY-09	0.88 in.	0/0	$0
STUBBS	16-JUN-09	1.00 in.	0/0	$0
ARCHDALE	16-JUN-09	1.75 in.	0/0	$0
ARCHDALE	16-JUN-09	1.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
METCALF	01-JUL-09	0.88 in.	0/0	$0
ARCHDALE	23-JUL-09	0.75 in.	0/0	$0
WASHBURN	28-MAR-10	0.88 in.	0/0	$0
DOUBLE SHOALS	08-APR-10	0.88 in.	0/0	$0
METCALF	27-APR-10	0.88 in.	0/0	$0
WASHBURN	12-JUL-10	0.75 in.	0/0	$0
METCALF	05-APR-11	1.00 in.	0/0	$0
BEAM MILL	21-JUN-11	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 Cleveland 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 Cleveland County. The entire county is equally susceptible to hurricane and tropical storms.

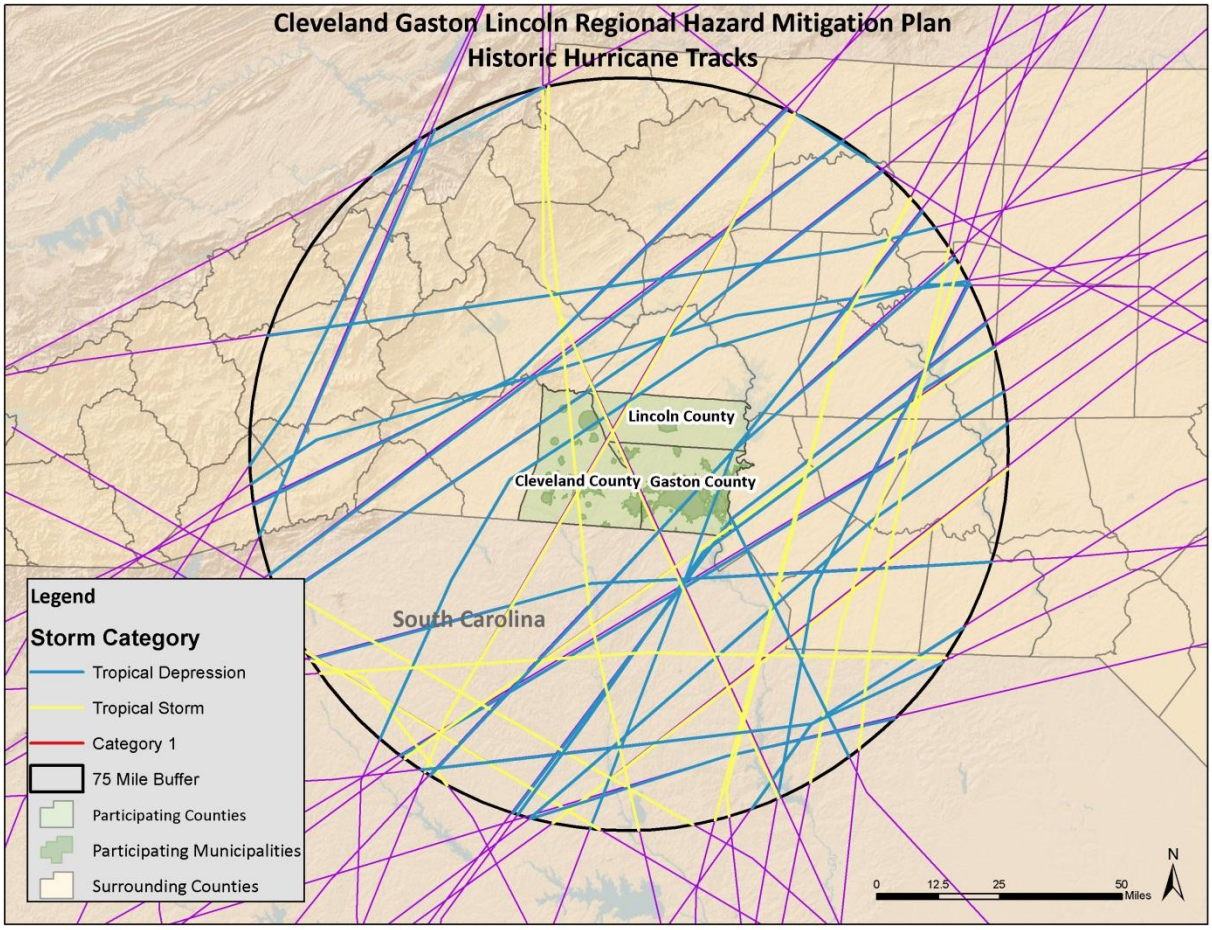
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 35 hurricane or tropical storm tracks have passed within 75 miles of Cleveland County since 1850.[2] This includes thirteen tropical storms and twenty-two tropical depressions.

Of the recorded storm events, two tropical storms and two tropical depressions have traversed directly through Cleveland County as shown in **Figure A.1**. **Table A.9** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cleveland Gaston Lincoln Region) and Category of the storm based on the Saffir-Simpson Scale.

[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.1: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF CLEVELAND COUNTY



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE A.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF CLEVELAND COUNTY (1850–2008)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35	Tropical Storm
6/22/1886	NOT NAMED	31	Tropical Depression
9/24/1889	NOT NAMED	40	Tropical Storm
1891	NOT NAMED	-	Tropical Depression
7/13/1901	NOT NAMED	26	Tropical Depression
10/11/1902	NOT NAMED	31	Tropical Depression
9/18/1906	NOT NAMED	35	Tropical Storm
9/23/1907	NOT NAMED	31	Tropical Depression
8/31/1911	NOT NAMED	22	Tropical Depression
6/14/1912	NOT NAMED	31	Tropical Depression
9/4/1913	NOT NAMED	22	Tropical Depression
8/3/1915	NOT NAMED	31	Tropical Depression
7/15/1916	NOT NAMED	40	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
10/3/1927	NOT NAMED	31	Tropical Depression
8/11/1928	NOT NAMED	26	Tropical Depression
5/30/1934	NOT NAMED	22	Tropical Depression
8/18/1939	NOT NAMED	22	Tropical Depression
10/9/1946	NOT NAMED	26	Tropical Depression
8/28/1949	NOT NAMED	35	Tropical Storm
8/31/1952	NOT NAMED	40	Tropical Storm
9/30/1959	GRACIE	53	Tropical Storm
8/30/1964	CLEO	22	Tropical Depression
6/9/1968	CELESTE	22	Tropical Depression
9/8/1977	BABE	22	Tropical Depression
9/5/1979	DAVID	40	Tropical Storm
7/25/1985	ONE-C	40	Tropical Storm
8/18/1985	BOB	22	Tropical Depression
9/22/1989	HUGO	48	Tropical Storm
5/21/1990	NOT NAMED	26	Tropical Depression
7/21/1994	BERYL	13	Tropical Depression
8/17/1994	NOT NAMED	13	Tropical Depression
7/24/1997	DANNY	18	Tropical Depression
9/17/2004	IVAN	18	Tropical Depression
9/28/2004	JEANNE	18	Tropical Depression
7/7/2005	CINDY	18	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center did not report any events associated with a hurricane or tropical storm in Cleveland County between 1950 and 2013. However, federal records indicate that two disaster declarations were made in 1989 (Hurricane Hugo) and 2004 (Tropical Storm Frances) for the county.[3]

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in Cleveland County. Most events do not carry winds that are above that of the winter storms and straight line winds received by the county. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm. Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

[3] All of the participating counties were declared disaster areas for these storms particular storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across much of western North Carolina with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph in many areas and numerous trees were downed. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

Probability of Future Occurrences
Given the inland location of the county, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to Cleveland County due to induced events like flooding and landsliding. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. However, when the county is impacted, the damage could be catastrophic, 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 Cleveland County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been 25 recorded lightning events in Cleveland County since 1995, as listed in summary **Table A.10**.[4] These events resulted in over $973,000 (2013 dollars) in damages and caused 4 injuries. A complete listing of those events can be found in **Table A.11**. 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.10: SUMMARY OF LIGHTNING OCCURRENCES IN CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$10,609
Casar	1	0/0	$30,252
Earl	1	0/0	$38,003
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	4	0/1	$68,540
Kingstown	0	0/0	$0
Lattimore	2	0/0	$38,700

[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 Cleveland 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)
Lawndale	1	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	1	0/0	$122,987
Shelby	12	0/3	$357,044
Waco	1	0/0	$168,826
Unincorporated Area	1	0/0	$138,423
CLEVELAND COUNTY TOTAL	**25**	**0/4**	**$973,384**

Source: National Climatic Data Center

TABLE A.11: HISTORIC LIGHTNING OCCURRENCES IN CLEVELAND COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Belwood				
None Reported	--	--	--	--
Boiling Springs				
BOILING SPGS	08-JUN-11	0/0	$10,609	Lightning struck a home on Wall Ave, starting a fire that damaged the roof and attic.
Casar				
CASAR	20-AUG-99	0.0	$30,252	A line of strong to severe thunderstorms moved west to east across western North Carolina during the early morning hours on the 20th. A very severe thunderstorm produced a long narrow path of wind damage across northern Yancey county. Numerous trees were downed, one on a car, a barn was destroyed and crops were flattened by the wind. There was also significant hail damage to crops. A public report of a roaring noise associated with the wind led some to believe it was a tornado. However, there was not enough evidence to classify the event as such. Trees were also downed in a few other counties and there were a few reports of dime to quarter size hail. The other major story of the night was the lightning damage. Numerous cloud to ground strikes in McDowell county resulted in power lines and trees catching fire, and

	Date	Deaths / Injuries	Property Damage*	Details
				causing power outages. Some power lines and trees were actually downed. Another strike resulted in a fire which destroyed an unoccupied house at Wildacres Retreat. Lightning caused a house fire in Casar which resulted in significant damage. A barn was destroyed along with the hay inside, by a lightning-ignited fire in Alexander Mills.
Earl				
EARL	07-JUL-05	0/0	$38,003	Lightning was suspected to have ignited a fire at a mobile home, which caused extensive damage.
Fallston				
None Reported	--	--	--	--
Grover				
None Reported	--	--	--	--
Kings Mountain				
KINGS MTN	18-AUG-03	0/0	$1,344	Lightning struck a house, blowing out 2 windows.
KINGS MTN	22-AUG-03	0/0		Lightning struck a substation, causing a power outage.
KINGS MTN	22-AUG-03	0/1		A person received minor injuries when he was struck by lightning in Kings Mountain. Also, high winds blew down several trees on County Line Rd.
KINGS MTN	23-AUG-03	0/0	$67,196	Lightning struck a manufacturing plant, causing significant damage.
Kingstown				
None Reported	--	--	--	--
Lattimore				
Lattimore	10-MAY-95	0/0	$24,858	Lightning started a fire in an outbuilding on Lee Street in Lattimore.
LATTIMORE	04-JUL-02	0/0	$13,842	Lightning struck and killed 6 cows and a bull.
Lawndale				
LAWNDALE	19-AUG-04	0/0	$0	Lightning struck a water plant, damaging the phone system and a pump system, resulting in a loss of service for 2000 customers.

	Date	Deaths / Injuries	Property Damage*	Details
Mooresboro				
None Reported	--	--	--	--
Patterson Springs				
None Reported	--	--	--	--
Polkville				
POLKVILLE	22-JUN-06	0/0	$122,987	Lightning ignited a fire, destroying a storage shed at a business. The 911 center received as many as 4 calls related to structural fires associated with lightning.
Shelby				
Shelby	20-JUL-95	0/0	$0	Home struck by lightning on Taylor road. County building also hit.
SHELBY	24-AUG-96	0/0	$0	
SHELBY	26-AUG-96	0/0	$0	
SHELBY	02-JUN-97	0/1	$0	Severe weather carried over from the morning in the foothills and into the piedmont, and developed in the mountains. Large hail caused much (although unknown dollar amounts) damage. The storms were quite slow moving, especially around Asheville and near Hendersonville, and caused hail for some time. In the city of Shelby, a man was struck and injured by lightning while mowing.
SHELBY	13-JUN-97	0/0	$7,865	Slow moving thunderstorms developed in the mountains and one became briefly severe near Weaverville blowing down some trees. Weak funnel clouds were reported in the same area. Around Shelby, Gastonia and Charlotte late in the evening, thunderstorms repeated over the same areas causing some severe urban flooding. Damaging winds occurred from east Gastonia into the northwest side of the Charlotte area. The most concentrated damage happened northwest of the airport where numerous trees were downed. Some fell on homes and cars and streets were blocked for several hours.

	Date	Deaths / Injuries	Property Damage*	Details
				Roads were closed around the area because of flooding. Lightning started an attic fire in Shelby. After midnight, thunderstorms moved through the North Carolina mountains after crossing the Tennessee border. One became severe blowing down trees in Jackson county.
SHELBY	03-JUN-99	0/0	$151,259	Lightning caused two fires in rural Shelby. A two story house was destroyed and major damage occurred at another house.
SHELBY	19-JAN-01	0/1	$0	A worker at a concrete plant was shocked by lightning traveling through a drain pipe. Minor injuries were reported.
SHELBY	24-MAY-01	0/0	$0	Lightning was suspected to have caused a fire which destroyed a plastic recycling plant.
SHELBY	03-JUL-02	0/0	$0	Lightning ignited several grass fires.
SHELBY	14-AUG-03	0/0	$13,439	A couple of house fires were started by lightning strikes.
SHELBY	22-AUG-03	0/1	$0	Lightning struck a man.
SHELBY	11-JUN-06	0/0	$184,481	Lightning struck a tree, then traveled along power lines to ignite a fire at a home. The home was practically a total loss.
Waco				
WACO	16-JUN-09	0/0	$168,826	Lightning struck a home on Cedar Lake Farm Rd, igniting a fire that caused significant damage.
Unincorporated Area				
OAKGROVE	14-SEP-02	0/0	$138,423	Lightning caused a fire at a home, destroying the house and its contents.

*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 Cleveland 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®), Cleveland 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.

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, Cleveland County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Cleveland County has uniform exposure to an event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms have not resulted in any disaster declarations in Cleveland County.[5] According to NCDC, there have been 202 reported thunderstorm wind and high wind events since 1960 in Cleveland County.[6] These events caused over $1 million (2013 dollars) in damages. There were reports of 6 injuries. **Table A.12** summarizes this information. **Table A.13** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.[7]

TABLE A.12: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	4	0/0	$28,982
Boiling Springs	11	0/0	$158,728
Casar	12	0/0	$0
Earl	4	0/0	$0
Fallston	6	0/0	$26,878
Grover	7	0/0	$6,720
Kings Mountain	14	0/0	$1,344
Kingstown	0	0/0	$0
Lattimore	4	0/0	$11,941
Lawndale	4	0/0	$99,978
Mooresboro	6	0/0	$110,243
Patterson Springs	5	0/0	$62,755
Polkville	8	0/6	$14,669
Shelby	37	0/0	$161,921
Waco	7	0/0	$71,643

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Unincorporated Area	73	0/0	$287,525
CLEVELAND COUNTY TOTAL	**202**	**0/6**	**$1,043,327**

Source: National Climatic Data Center

TABLE A.13: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN CLEVELAND COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Belwood					
BELWOOD	13-MAY-00	TSTM WIND	52 kts.	0/0	$0
BELWOOD	23-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
BELWOOD	02-AUG-08	THUNDERSTORM WIND	50 kts.	0/0	$28,982
BELWOOD	16-JUN-09	THUNDERSTORM WIND	50 kts.	0/0	$0
Boiling Springs					
BOILING SPRINGS	21-FEB-97	TSTM WIND	50 kts.	0/0	$0
BOILING SPGS	04-JUL-97	TSTM WIND	50 kts.	0/0	$0
BOILING SPGS	05-AUG-97	TSTM WIND	60 kts.	0/0	$157,302
BOILING SPGS	01-APR-01	TSTM WIND	50 kts.	0/0	$1,426
BOILING SPGS	19-NOV-03	TSTM WIND	50 kts.	0/0	$0
BOILING SPGS	07-JUL-05	TSTM WIND	50 kts.	0/0	$0
BOILING SPGS	25-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
BOILING SPGS	09-JUL-08	THUNDERSTORM WIND	55 kts.	0/0	$0
BOILING SPGS	28-MAY-09	THUNDERSTORM WIND	50 kts.	0/0	$0
BOILING SPGS	08-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
BOILING SPGS	08-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
Casar					
CASAR	06-SEP-98	TSTM WIND	50 kts.	0/0	$0
CASAR	08-JUL-01	TSTM WIND	50 kts.	0/0	$0
CASAR	08-JUN-03	TSTM WIND	50 kts.	0/0	$0
CASAR	25-APR-06	TSTM WIND	50 kts.	0/0	$0
CASAR	20-JUL-06	TSTM WIND	50 kts.	0/0	$0
CASAR	01-JAN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
CASAR	21-AUG-07	THUNDERSTORM WIND	50 kts.	0/0	$0
CASAR	22-AUG-07	THUNDERSTORM WIND	50 kts.	0/0	$0
CASAR	28-JUN-08	THUNDERSTORM WIND	50 kts.	0/0	$0
CASAR	28-JUN-10	THUNDERSTORM WIND	60 kts.	0/0	$0
CASAR	31-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
CASAR	31-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
Earl					
EARL	12-JUN-96	TSTM WIND	50 kts.	0/0	$0
EARL	28-JUN-08	THUNDERSTORM WIND	50 kts.	0/0	$0
EARL	11-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
EARL	02-OCT-12	THUNDERSTORM WIND	50 kts.	0/0	$0
Fallston					
FALLSTON	16-MAR-96	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
FALLSTON	24-MAY-96	TSTM WIND	50 kts.	0/0	$0
FALLSTON	20-JUL-98	TSTM WIND	50 kts.	0/0	$0
FALLSTON	29-JUL-03	TSTM WIND	65 kts.	0/0	$26,878
FALLSTON	04-MAR-08	THUNDERSTORM WIND	50 kts.	0/0	$0
FALLSTON	19-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
Grover					
Grover	19-JUL-94	THUNDERSTORM WINDS	0 kts.	0/0	$0
GROVER	21-FEB-97	TSTM WIND	50 kts.	0/0	$0
GROVER	16-JUL-97	TSTM WIND	50 kts.	0/0	$0
GROVER	17-AUG-03	TSTM WIND	50 kts.	0/0	$6,720
GROVER	19-NOV-03	TSTM WIND	50 kts.	0/0	$0
GROVER	24-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
GROVER	19-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
Kings Mountain					
KINGS MTN	27-MAY-96	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	28-AUG-97	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	01-AUG-99	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	01-AUG-99	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	18-AUG-00	TSTM WIND	70 kts.	0/0	$0
KINGS MTN	22-JUN-01	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	19-JUL-03	TSTM WIND	52 kts.	0/0	$1,344
KINGS MTN	22-AUG-03	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	20-MAY-06	TSTM WIND	50 kts.	0/0	$0
KINGS MTN	15-JUL-06	TSTM WIND	60 kts.	0/0	$0
KINGS MTN	19-JUN-07	THUNDERSTORM WIND	55 kts.	0/0	$0
KINGS MTN	28-JUN-08	THUNDERSTORM WIND	50 kts.	0/0	$0
KINGS MTN	02-MAY-09	THUNDERSTORM WIND	50 kts.	0/0	$0
KINGS MTN	22-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
Kingstown					
None Reported	--	--	--	--	--
Lattimore					
LATTIMORE	22-JUN-06	TSTM WIND	50 kts.	0/0	$0
LATTIMORE	16-JUN-07	THUNDERSTORM WIND	55 kts.	0/0	$11,941
LATTIMORE	26-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
LATTIMORE	05-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
Lawndale					
LAWNDALE	02-MAY-03	TSTM WIND	60 kts.	0/0	$67,196
LAWNDALE	22-APR-06	TSTM WIND	50 kts.	0/0	$0
LAWNDALE	08-APR-10	THUNDERSTORM WIND	60 kts.	0/0	$32,782
LAWNDALE	17-JUL-10	THUNDERSTORM WIND	55 kts.	0/0	$0
Mooresboro					
MOORESBORO	04-JUL-02	TSTM WIND	55 kts.	0/0	$4,153
MOORESBORO	24-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
MOORESBORO	25-AUG-07	THUNDERSTORM WIND	60 kts.	0/0	$0
MOORESBORO	28-MAR-10	THUNDERSTORM WIND	55 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
MOORESBORO	05-APR-11	THUNDERSTORM WIND	65 kts.	0/0	$106,090
MOORESBORO	18-JUN-11	THUNDERSTORM WIND	55 kts.	0/0	$0
Patterson Springs					
PATTERSON SPGS	11-JUN-09	THUNDERSTORM WIND	50 kts.	0/0	$11,255
PATTERSON SPGS	09-APR-11	THUNDERSTORM WIND	50 kts.	0/0	$0
PATTERSON SPGS	30-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
PATTERSON SPGS	30-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
PATTERSON SPGS	05-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$51,500
Polkville					
Polkville	25-SEP-94	THUNDERSTORM WINDS	0 kts.	0/0	$0
POLKVILLE	13-MAY-00	TSTM WIND	52 kts.	0/0	$0
POLKVILLE	07-MAY-02	TSTM WIND	58 kts.	0/0	$0
POLKVILLE	22-JUL-02	TSTM WIND	50 kts.	0/0	$0
POLKVILLE	12-JUL-03	TSTM WIND	60 kts.	0/0	$13,439
POLKVILLE	22-APR-05	TSTM WIND	50 kts.	0/0	$0
POLKVILLE	11-OCT-06	THUNDERSTORM WIND	55 kts.	0/0	$1,230
POLKVILLE	14-AUG-08	THUNDERSTORM WIND	50 kts.	0/0	$0
Shelby					
SHELBY	24-JAN-96	TSTM WIND	0 kts.	0/0	$80,456
SHELBY	24-MAY-96	TSTM WIND	50 kts.	0/0	$0
SHELBY	27-MAY-96	TSTM WIND	50 kts.	0/0	$0
SHELBY	15-JUL-96	TSTM WIND	50 kts.	0/0	$0
SHELBY	26-AUG-96	TSTM WIND	50 kts.	0/0	$0
SHELBY	14-JUN-97	TSTM WIND	50 kts.	0/0	$15,730
SHELBY	04-JUL-97	TSTM WIND	50 kts.	0/0	$0
SHELBY	16-JUL-97	TSTM WIND	50 kts.	0/0	$15,730
SHELBY	29-JUL-97	TSTM WIND	50 kts.	0/0	$3,146
SHELBY	29-JUN-98	TSTM WIND	50 kts.	0/0	$0
SHELBY	24-MAY-00	TSTM WIND	50 kts.	0/0	$0
SHELBY	11-JUL-00	TSTM WIND	50 kts.	0/0	$0
SHELBY	10-AUG-00	TSTM WIND	50 kts.	0/0	$0
SHELBY	18-AUG-00	TSTM WIND	65 kts.	0/1	$0
SHELBY	25-OCT-01	TSTM WIND	50 kts.	0/0	$0
SHELBY	13-MAY-02	TSTM WIND	55 kts.	0/0	$4,153
SHELBY	13-MAY-02	TSTM WIND	55 kts.	0/0	$1,384
SHELBY	03-JUL-02	TSTM WIND	55 kts.	0/0	$0
SHELBY	03-JUL-02	TSTM WIND	55 kts.	0/0	$0
SHELBY	03-JUL-02	TSTM WIND	52 kts.	0/0	$0
SHELBY	04-JUL-02	TSTM WIND	55 kts.	0/0	$4,153
SHELBY	14-SEP-02	TSTM WIND	50 kts.	0/0	$2,768
SHELBY	16-AUG-03	TSTM WIND	50 kts.	0/0	$0
SHELBY	22-AUG-03	TSTM WIND	55 kts.	0/0	$6,720
SHELBY	22-MAY-04	TSTM WIND	52 kts.	0/0	$0
SHELBY	05-JUL-05	TSTM WIND	55 kts.	0/0	$3,800
SHELBY	07-JUL-05	TSTM WIND	50 kts.	0/0	$0
SHELBY	15-JUL-06	TSTM WIND	60 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
SHELBY	16-JUN-07	THUNDERSTORM WIND	55 kts.	0/0	$23,881
SHELBY	29-AUG-07	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY	08-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY	11-JUN-09	THUNDERSTORM WIND	55 kts.	0/0	$0
SHELBY	10-JUN-10	THUNDERSTORM WIND	55 kts.	0/0	$0
SHELBY	05-AUG-10	THUNDERSTORM WIND	50 kts.	0/5	$0
SHELBY	30-NOV-10	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY	09-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY	21-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
Waco					
WACO	03-JUL-02	TSTM WIND	50 kts.	0/0	$0
WACO	17-AUG-03	TSTM WIND	50 kts.	0/0	$0
WACO	22-JUN-06	TSTM WIND	55 kts.	0/0	$0
WACO	24-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
WACO	27-JUL-07	THUNDERSTORM WIND	75 kts.	0/0	$71,643
WACO	16-JUN-09	THUNDERSTORM WIND	70 kts.	0/0	$0
WACO	13-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
Unincorporated Area					
CLEVELAND COUNTY	30-MAY-60	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	27-MAY-62	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	13-FEB-66	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	04-JUL-70	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	30-JUL-70	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	23-MAY-73	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	28-JUN-74	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	24-MAR-75	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	25-JUL-75	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	18-FEB-76	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	21-AUG-79	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	21-AUG-83	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	07-MAY-84	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	27-JUL-84	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	05-JUN-85	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	10-JUL-85	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	10-JUL-85	TSTM WIND	52 kts.	0/0	$0
CLEVELAND COUNTY	26-APR-86	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	21-JUL-86	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	24-MAY-88	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	24-MAY-88	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	05-MAY-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	06-MAY-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	22-MAY-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	15-JUN-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	15-JUN-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	25-JUL-89	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	28-APR-90	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
CLEVELAND COUNTY	28-APR-90	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	29-APR-91	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	04-JUN-92	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	12-AUG-92	TSTM WIND	0 kts.	0/0	$0
CLEVELAND COUNTY	30-OCT-92	TSTM WIND	0 kts.	0/0	$0
Western	29-MAY-93	THUNDERSTORM WINDS	0 kts.	0/0	$0
CLEVELAND COUNTY	01-MAY-95	THUNDERSTORM WINDS	0 kts.	0/0	$0
CLEVELAND COUNTY	18-JAN-96	HIGH WIND	0 kts.	0/0	$5,028
CLEVELAND COUNTY	24-FEB-98	HIGH WIND	50 kts.	0/0	$1,936
CLEVELAND COUNTY	03-MAR-99	HIGH WIND	60 kts.	0/0	$151,259
CLEVELAND COUNTY	28-MAR-00	HIGH WIND	50 kts.	0/0	$0
CLEVELAND COUNTY	06-MAR-01	HIGH WIND	55 kts.	0/0	$0
CLEVELAND COUNTY	20-MAR-01	HIGH WIND	55 kts.	0/0	$67,893
CLEVELAND COUNTY	17-APR-01	HIGH WIND	50 kts.	0/0	$0
CLEVELAND COUNTY	04-FEB-02	HIGH WIND	50 kts.	0/0	$0
CLEVELAND COUNTY	25-DEC-02	HIGH WIND	50 kts.	0/0	$0
CLEVELAND COUNTY	07-MAR-04	HIGH WIND	60 kts.	0/0	$30,445
CLEVELAND COUNTY	02-APR-05	HIGH WIND	55 kts.	0/0	$2,534
COUNTYWIDE	11-JUN-06	TSTM WIND	55 kts.	0/0	$0
CLEVELAND COUNTY	16-APR-07	HIGH WIND	60 kts.	0/0	$28,430
POLKVILLE	22-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
BEAM MILL	22-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
POLKVILLE	29-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY MUNI ARPT	30-SEP-08	THUNDERSTORM WIND	50 kts.	0/0	$0
STUBBS	09-MAY-09	THUNDERSTORM WIND	50 kts.	0/0	$0
OAKGROVE	05-AUG-09	THUNDERSTORM WIND	55 kts.	0/0	$0
POLKVILLE	05-AUG-09	THUNDERSTORM WIND	60 kts.	0/0	$0
TOLUCA	19-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
POLKVILLE	28-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
OLIVE GROVE	13-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
OLIVE GROVE	16-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
BEAM MILL	30-NOV-10	THUNDERSTORM WIND	50 kts.	0/0	$0
DOUBLE SHOALS	09-APR-11	THUNDERSTORM WIND	50 kts.	0/0	$0
OAKGROVE	05-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHDALE	11-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
STUBBS	21-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
BEAM MILL	21-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
STUBBS	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
STUBBS	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
OLIVE GROVE	11-AUG-11	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHDALE	20-AUG-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SHELBY MUNI ARPT	21-AUG-11	THUNDERSTORM WIND	50 kts.	0/0	$0
LAWNDALE JCT	01-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
TOLUCA	28-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
ARCHDALE	08-AUG-12	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*

*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 Cleveland 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 Cleveland County is uniformly exposed to this hazard.

Historical Occurrences

Tornadoes have resulted in one disaster declaration in Cleveland County in 1989.[8] According to the National Climatic Data Center, there have been a total of 19 recorded tornado events in the Cleveland County since 1973 (**Table A.14**), resulting in over $54.1 million (2013 dollars) in property damages.[9] In addition, 36 injuries were reported (**Table A.15**). The magnitude of these tornadoes ranges from F0 to F4 in intensity, although an 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 63 years.

TABLE A.14: SUMMARY OF TORNADO OCCURRENCES IN CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0
Earl	1	0/0	$852,283
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	1	0/0	$23,185
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	1	0/0	$65,239
Polkville	1	0/0	$13,439

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[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 Cleveland County. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Shelby	1	0/0	$1,609
Waco	2	0/0	$65,239
Unincorporated Area	12	0/36	$53,150,666
CLEVELAND COUNTY TOTAL	**19**	**0/36**	**$54,171,660**

Source: National Climatic Data Center

TABLE A.15: HISTORICAL TORNADO IMPACTS IN CLEVELAND COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Belwood					
None Reported	--	--	--	--	--
Boiling Springs					
None Reported	--	--	--	--	--
Casar					
None Reported	--	--	--	--	--
Earl					
Earl	16-AUG-94	F1	0/0	$852,283	At approximately 630 PM EDT, a tornado touched down in southern Cleveland County near the town of Earl, which is south of Shelby. The tornado affected areas off of route 18. One mobile home was completely destroyed on John Crawford Road. Extensive damage was done to a home off Mt. Sinai road. Several trees and power lines were also downed.
Fallston					
None Reported	--	--	--	--	--
Grover					
None Reported	--	--	--	--	--
Kings Mountain					
KINGS MTN	28-APR-08	F0	0/0	$23,185	A weak tornado caused a small damage path along Yarborough Rd just west of its intersection with El Bethel Rd. The skirting was ripped from several mobile homes. Other mobile homes received roof damage and one home was blown off its blocks. A metal utility building was also damaged. Several trees were blown down, including a large tree that fell across three vehicles.
Kingstown					
None Reported	--	--	--	--	--
Lattimore					
None Reported	--	--	--	--	--

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Lawndale					
None Reported	--	--	--	--	--
Mooresboro					
None Reported	--	--	--	--	--
Patterson Springs					
PATTERSON SPGS	27-SEP-04	F1	0/0	$65,239	This tornado touched down near the community of Patterson Springs, blowing down numerous trees and power lines along its 2-mile track. Some of the trees fell on homes. Several outbuildings were also destroyed.
Polkville					
POLKVILLE	12-JUN-03	F1	0/0	$13,439	This weak tornado blew down numerous trees along its 6 mile path. Trees fell on and destroyed a vehicle.
Shelby					
SHELBY	16-SEP-96	F0	0/0	$1,609	A weak tornado touched down very briefly causing minor damage to one home. Shingles were removed and a minivan was tipped up but not blown over by the wind.
Waco					
WACO	17-SEP-04	F0	0/0	$65,239	This brief tornado blew down numerous trees and power lines along Hatcher and Costner Roads in the town of Waco. Some trees fell on vehicles and homes. Roofs were blown off of a barn and a chicken house. The metal roof of a porch was also blown off. In addition, 2 power poles and a street light were snapped.
WACO	16-JUN-09	F1	0/0	$0	An intermittent tornado damage path began in the Racine Rd area north of the Stony Point community, and extended south, southeast before dissipating just north of I-85. Damage was mainly confined to downed trees and power lines. However, two mobile homes were shifted off their foundations and several homes received minor to moderate roof damage.
Unincorporated Area					
CLEVELAND COUNTY	27-MAY-73	F3	0/3	$1,421,475	
CLEVELAND COUNTY	15-MAY-75	F1	0/0	$11,728	
CLEVELAND COUNTY	24-JUN-79	F1	0/0	$87,073	
CLEVELAND COUNTY	05-MAY-89	F4	0/30	$50,921,206	
CLEVELAND COUNTY	10-FEB-90	F2	0/0	$483,507	

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
CLEVELAND COUNTY	10-APR-90	F0	0/0	$48,351	
CLEVELAND COUNTY	04-JUN-92	F0	0/0	$44,997	
CLEVELAND COUNTY	22-NOV-92	F1	0/0	$44,997	
BEAM MILL	19-APR-08	F1	0/0	$28,982	An NWS survey found a damage path in the Fallston area of northern Cleveland County. In addition to uprooted and snapped trees, several homes received mainly minor roof damage from East Double Shoals Rd to Fallston Rd. A grain silo was also damaged on Fallston Rd. The tornado continued northeast, uprooting trees and downing power lines before lifting in extreme southwest Lincoln County.
BEAM MILL	16-JUN-09	F0	0/0	$0	A short, weak tornado path began near the intersection of Fallston-Waco Rd and Devine Rd, and extended south for more than a mile. Damage was mainly confined to uprooted and snapped trees. Some trees fell on vehicles and homes. However, some homes received minor to moderate roof damage.
BEAM MILL	09-APR-11	F0	0/3	$53,045	A short tornado path began between Dick Spangler Rd and Fallston Rd north of Shelby. The tornado moved southeast for about one half mile before lifting just east of the intersection of Oakberry St and Fallston Rd. Most of the damage was limited to downed trees and minor structural damage to frame homes. The roof was blown off a vehicle shed between Wright St and Dick Spangler Rd. Damage was more significant near the end of the path across from Oakberry St. Two mobile homes were flipped while several other mobile homes received mainly minor damage to underskirting and roofing. Two men and a woman residing in one of the flipped homes received mainly minor injuries.
STUBBS	16-NOV-11	F0	0/0	$5,305	A small area of weak tornado damage occurred on the northeast side of Shelby, near the Airport Rd and highway 180 intersection. Damage was mainly limited to uprooted hardwoods and snapped pine trees. However, some minor structural damage was observed to several homes in the area.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details

*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 Cleveland County experience a direct tornado strike. The probability of future tornado occurrences affecting Cleveland 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. Cleveland County is accustomed to severe winter weather conditions and frequently receives severe 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 Cleveland County. This includes snow storms in 1977 and 1993, the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002.[10] According to the National Climatic Data Center, there have been a total of 54 recorded winter storm events in Cleveland County since 1993 (**Table A.16**).[11] These events resulted in over $22.6 million (2013 dollars) in damages.[12] Detailed information on the recorded winter storm events can be found in **Table A.17**.

TABLE A.16: SUMMARY OF WINTER STORM EVENTS IN CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Cleveland County	54	0/0	$22,610,038

Source: National Climatic Data Center

[10] 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*.
[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 Cleveland 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.17: HISTORICAL WINTER STORM IMPACTS IN CLEVELAND COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Belwood				
None Reported	--	--	--	--
Boiling Springs				
None Reported	--	--	--	--
Casar				
None Reported	--	--	--	--
Earl				
None Reported	--	--	--	--
Fallston				
None Reported	--	--	--	--
Grover				
None Reported	--	--	--	--
Kings Mountain				
None Reported	--	--	--	--
Kingstown				
None Reported	--	--	--	--
Lattimore				
None Reported	--	--	--	--
Lawndale				
None Reported	--	--	--	--
Mooresboro				
None Reported	--	--	--	--
Patterson Springs				
None Reported	--	--	--	--
Polkville				
None Reported	--	--	--	--
Shelby				
None Reported	--	--	--	--
Waco				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	12-MAR-93	WINTER STORM	2/10†	$874,516
Northern Interior and	10-FEB-94	ICE STORM	0/0	$0
CLEVELAND COUNTY	11-JAN-96	WINTER STORM	0/0	$0
CLEVELAND COUNTY	02-FEB-96	ICE STORM	0/0	$1,787,900
CLEVELAND COUNTY	03-FEB-96	SNOW	0/0	$0
CLEVELAND COUNTY	16-FEB-96	SNOW	0/0	$0
CLEVELAND COUNTY	09-JAN-97	Freezing rain	0/0	$0
CLEVELAND COUNTY	15-JAN-97	Snow	0/0	$0
CLEVELAND COUNTY	13-FEB-97	WINTER STORM	0/0	$0
CLEVELAND COUNTY	13-FEB-97	ICE STORM	0/0	$0
CLEVELAND COUNTY	29-DEC-97	SNOW	0/0	$0

	Date	Type of Storm	Deaths / Injuries	Property Damage*
CLEVELAND COUNTY	23-DEC-98	FREEZING RAIN/SLEET	0/0	$0
CLEVELAND COUNTY	02-JAN-99	ICE STORM	0/0	$0
CLEVELAND COUNTY	01-FEB-99	FREEZING RAIN	0/0	$0
CLEVELAND COUNTY	19-FEB-99	SNOW	0/0	$0
CLEVELAND COUNTY	09-MAR-99	SNOW AND SLEET	0/0	$0
CLEVELAND COUNTY	18-JAN-00	SNOW	0/0	$0
CLEVELAND COUNTY	22-JAN-00	HEAVY SNOW	0/0	$0
CLEVELAND COUNTY	24-JAN-00	HEAVY SNOW	0/0	$0
CLEVELAND COUNTY	29-JAN-00	FREEZING RAIN	0/0	$0
CLEVELAND COUNTY	19-NOV-00	SNOW	0/0	$0
CLEVELAND COUNTY	03-DEC-00	SNOW	0/0	$0
CLEVELAND COUNTY	13-DEC-00	FREEZING RAIN	0/0	$0
CLEVELAND COUNTY	28-DEC-00	ICY ROADS	0/0	$0
CLEVELAND COUNTY	22-FEB-01	SNOW/SLEET	0/0	$0
CLEVELAND COUNTY	20-MAR-01	HEAVY SNOW	0/0	$0
CLEVELAND COUNTY	17-APR-01	SNOW SHOWERS	0/0	$0
CLEVELAND COUNTY	03-JAN-02	HEAVY SNOW	0/0	$0
CLEVELAND COUNTY	06-JAN-02	ICY ROADS	0/0	$0
CLEVELAND COUNTY	04-DEC-02	ICE STORM	0/0	$19,577,022
CLEVELAND COUNTY	16-JAN-03	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	23-JAN-03	HEAVY SNOW	0/0	$0
CLEVELAND COUNTY	16-FEB-03	SLEET STORM	0/0	$0
CLEVELAND COUNTY	27-FEB-03	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	04-DEC-03	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	14-DEC-03	ICE STORM	0/0	$1,344
CLEVELAND COUNTY	25-JAN-04	SLEET STORM	0/0	$0
CLEVELAND COUNTY	27-JAN-04	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	26-FEB-04	HEAVY SNOW	0/0	$255,246
CLEVELAND COUNTY	27-MAR-04	FROST/FREEZE	0/0	$0
CLEVELAND COUNTY	29-JAN-05	WINTER STORM	0/0	$0
CLEVELAND COUNTY	29-JAN-05	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	17-MAR-05	WINTER WEATHER/MIX	0/0	$0
CLEVELAND COUNTY	08-DEC-05	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	15-DEC-05	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	15-DEC-05	ICE STORM	0/0	$114,009
CLEVELAND COUNTY	16-DEC-05	FREEZING FOG	0/0	$0
CLEVELAND COUNTY	20-MAR-06	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	18-JAN-07	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	01-FEB-07	WINTER STORM	0/0	$0
CLEVELAND COUNTY	08-APR-07	FROST/FREEZE	0/0	$0
CLEVELAND COUNTY	16-JAN-08	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	19-JAN-08	WINTER WEATHER	0/0	$0
CLEVELAND COUNTY	01-MAR-09	HEAVY SNOW	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 Cleveland County. The text below describes one of the major events and associated impacts on the county. Similar impacts can be expected with severe winter weather.

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

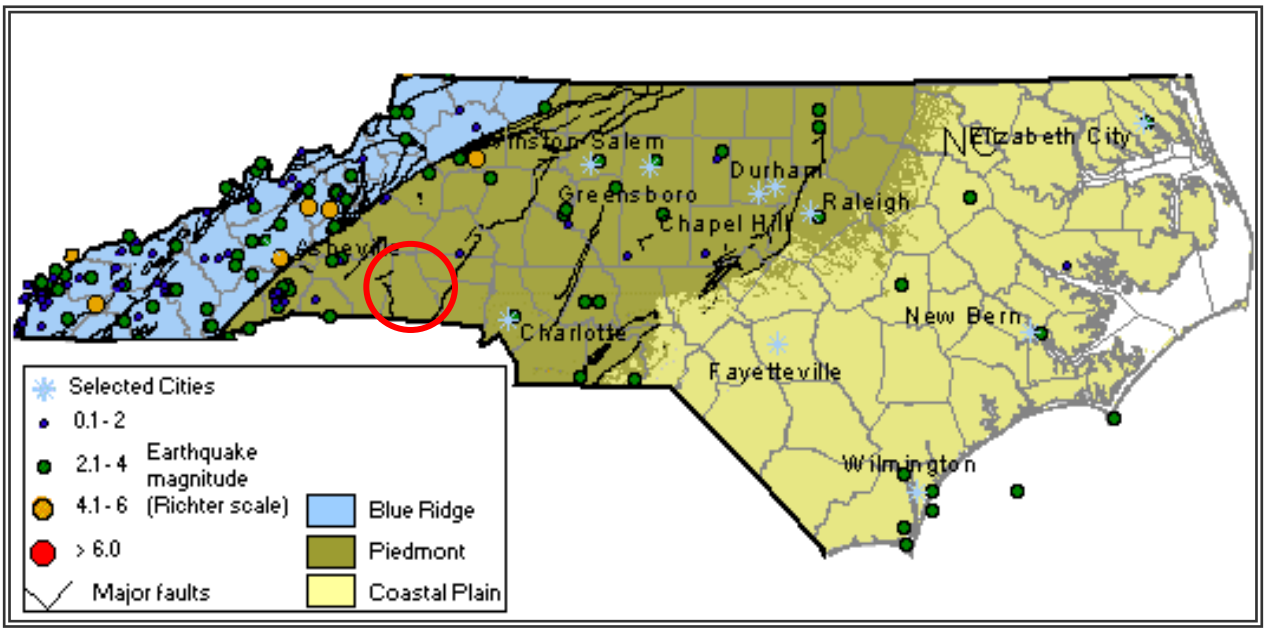
Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could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

Probability of Future Occurrences
Winter storm events will remain a regular occurrence in Cleveland County due to its location in the western part of the state. According to historical information, Cleveland County generally experiences several 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.2** is a map showing geological and seismic information for North Carolina.

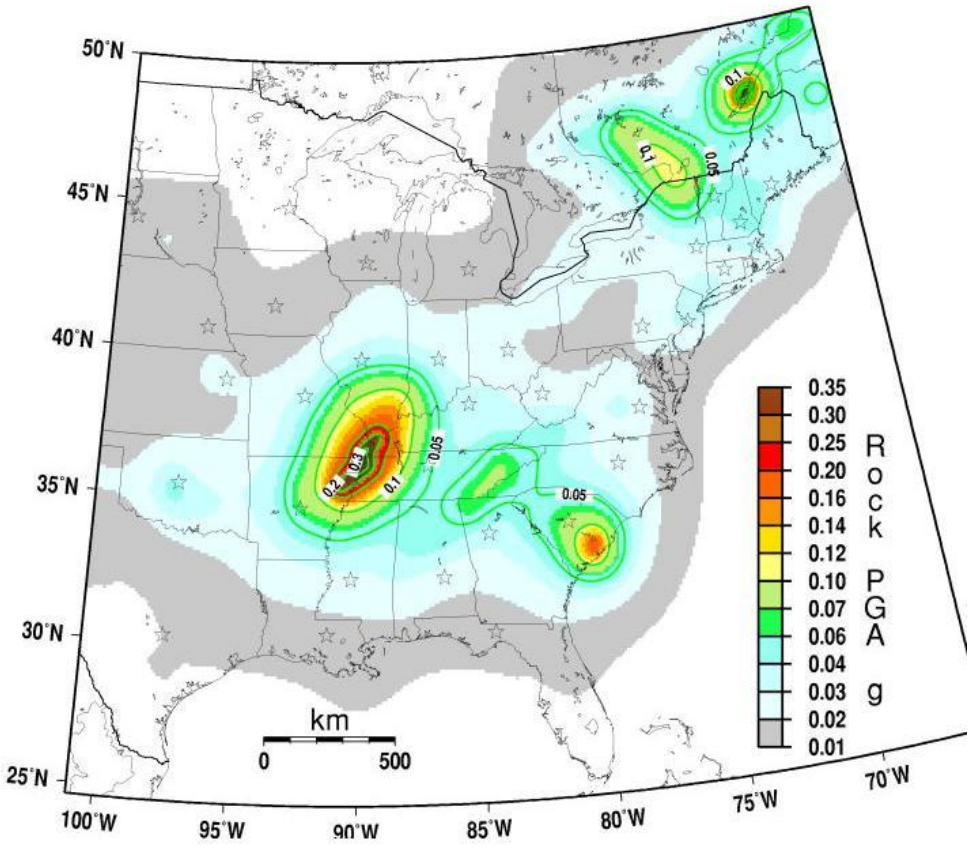
FIGURE A.2: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure A.3 shows the intensity level associated with Cleveland 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, Cleveland 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 A.3: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

Historical Occurrences

At least 15 earthquakes are known to have affected Cleveland County since 1886. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table A.18** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table A.19** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE A.18: SUMMARY OF SEISMIC ACTIVITY IN CLEVELAND COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Belwood	1	IV	< 4.8
Boiling Springs	1	V	< 4.8
Casar	1	IV	< 4.8
Earl	0	--	--
Fallston	1	IV	< 4.8
Grover	1	IV	< 4.8
Kings Mountain	2	VI	< 5.4

[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
Kingstown	0	--	--
Lattimore	1	IV	< 4.8
Lawndale	0	--	--
Mooresboro	2	IV	< 4.8
Patterson Springs	0	--	--
Polkville	1	IV	< 4.8
Shelby	4	V	< 4.8
Waco	0	--	--
Unincorporated Area	0	--	--
CLEVELAND COUNTY TOTAL	**15**	**VI**	**< 5.4**

Source: National Geophysical Data Center

TABLE A.19: SIGNIFICANT SEISMIC EVENTS IN CLEVELAND COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Belwood				
Belwood	5/13/1957	52.0 km	4	IV
Boiling Springs				
Boiling Springs	5/13/1957	66.0 km	4	V
Casar				
Casar	5/13/1957	43.0 km	4	IV
Earl				
None Reported	--	--	--	--
Fallston				
Fallston	5/13/1957	57.0 km	4	IV
Grover				
Grover	5/13/1957	81.0 km	4	IV
Kings Mountain				
Kings Mountain	9/1/1886	287.0 km	4	V
Kings Mountain	1/1/1913	68.0 km	5	VI
Kingstown				
None Reported	--	--	--	--
Lattimore				
Lattimore	5/13/1957	56.0 km	4	IV
Lawndale				
None Reported	--	--	--	--
Mooresboro				
Mooresboro	5/13/1957	56.0 km	4	IV
Mooresboro	11/30/1973	211.0 km	4.7	IV
Patterson Springs				
None Reported	--	--	--	--
Polkville				
Polkville	5/13/1957	48.0 km	4	IV

Location	Date	Epicentral Distance	Magnitude	MMI
Shelby				
Shelby	11/3/1928	124.0 km	4	III
Shelby	12/20/1940	1269.0 km	4	III
Shelby	1/2/1954	242.0 km	4	IV
Shelby	5/13/1957	65.0 km	4	V
Waco				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Cleveland County is unlikely. However, it is likely 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 and 10 percent (possible).

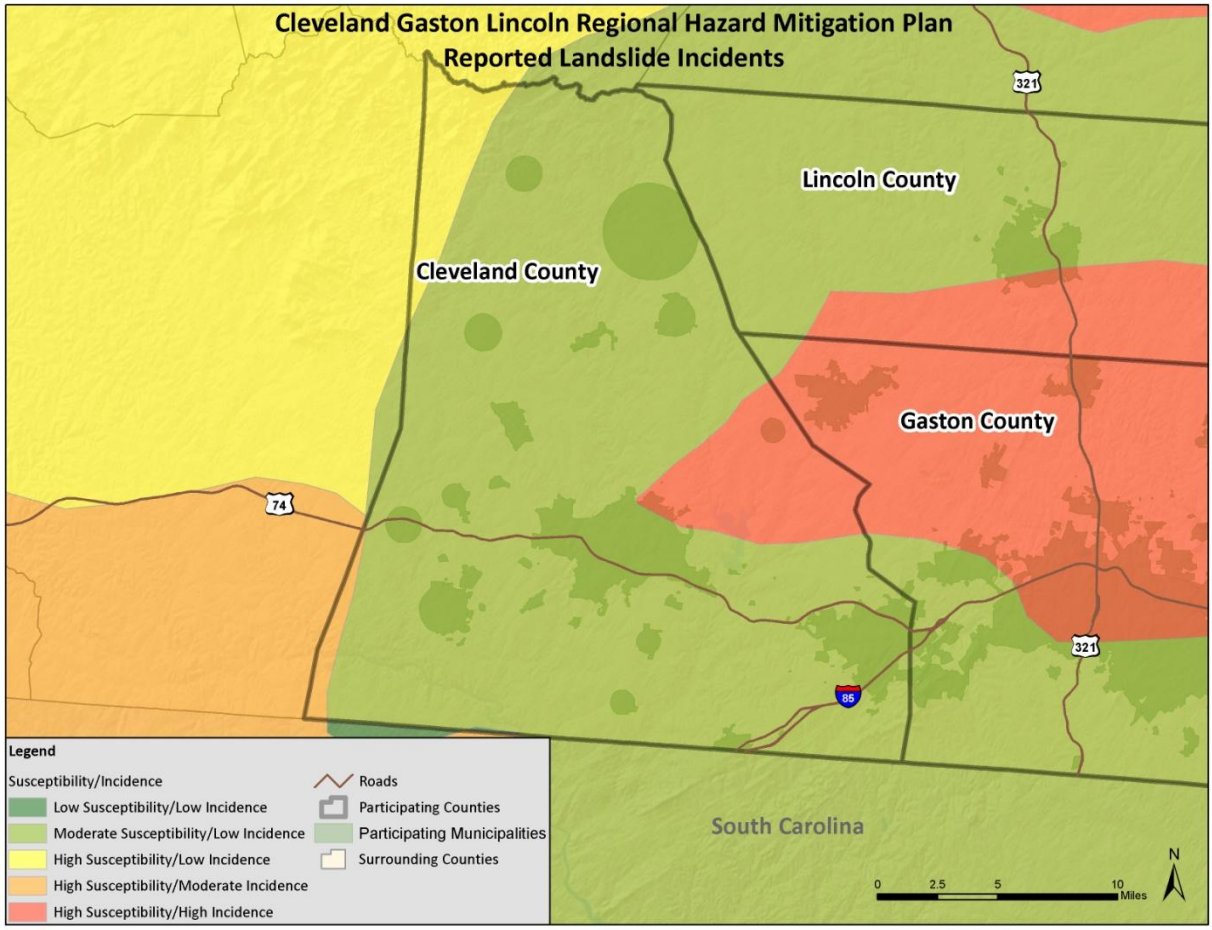
A.2.10 Landslide

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 Cleveland County.

According to **Figure A.4** below, the majority of the county has moderate landslide activity. The remaining portion of the county, along the east and west county boundaries, has a high incidence occurrence rate. There is high susceptibility throughout the county.

FIGURE A.4: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF CLEVELAND COUNTY



Source: USGS

Historical Occurrences

Steep topography throughout Cleveland County makes the planning area 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. **Table A.20** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey[14]. The georeferenced locations of the landslide events presented in the aforementioned tables are presented in **Figure A.5**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Cleveland County.

TABLE A.20: SUMMARY OF LANDSLIDE ACTIVITY IN CLEVELAND COUNTY

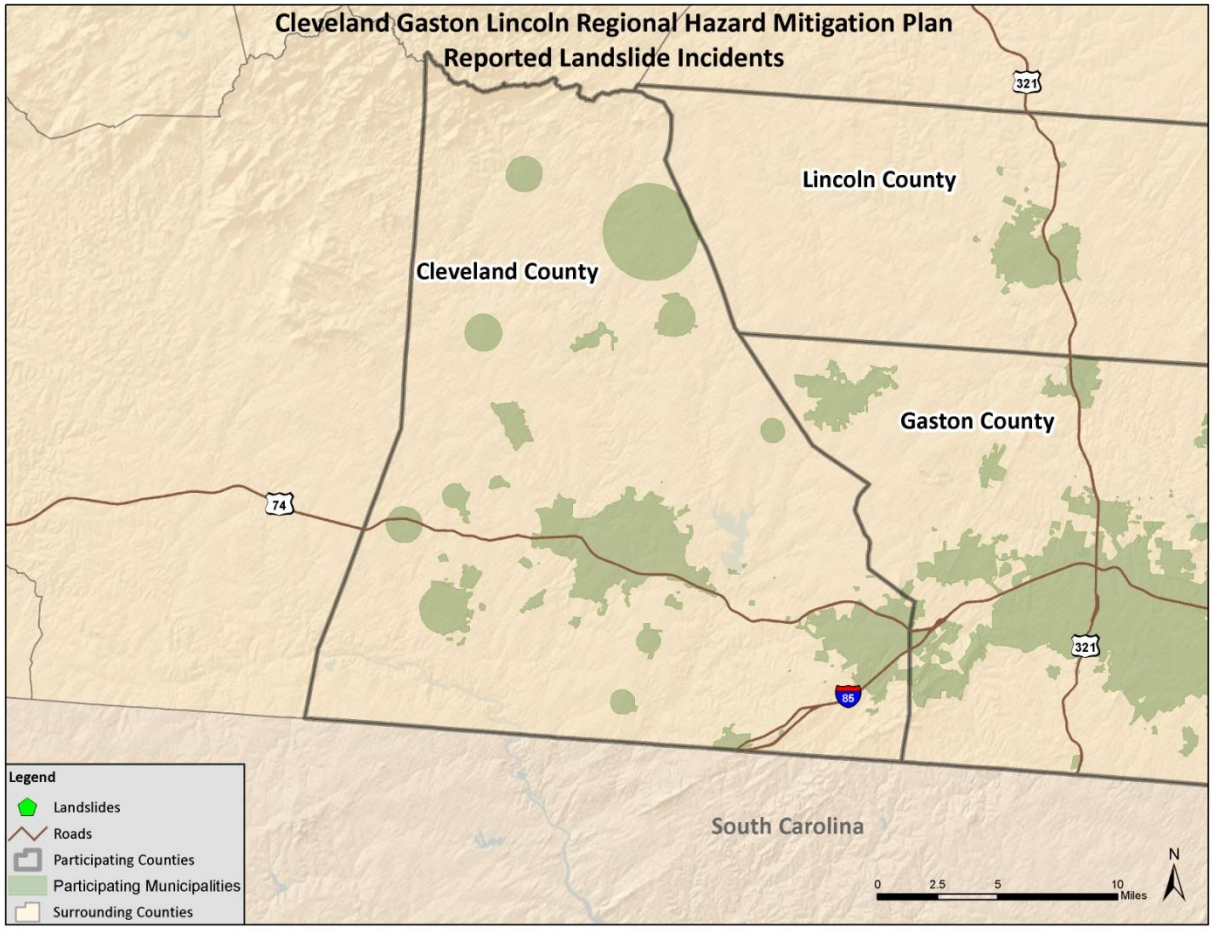
Location	Number of Occurrences
Belwood	0
Boiling Springs	0

[14] 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. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

Location	Number of Occurrences
Casar	0
Earl	0
Fallston	0
Grover	0
Kings Mountain	0
Kingstown	0
Lattimore	0
Lawndale	0
Mooresboro	0
Patterson Springs	0
Polkville	0
Shelby	0
Waco	0
Unincorporated Area	0
CLEVELAND COUNTY TOTAL	**0**

Source: North Carolina Geological Survey

FIGURE A.5: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN CLEVELAND COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

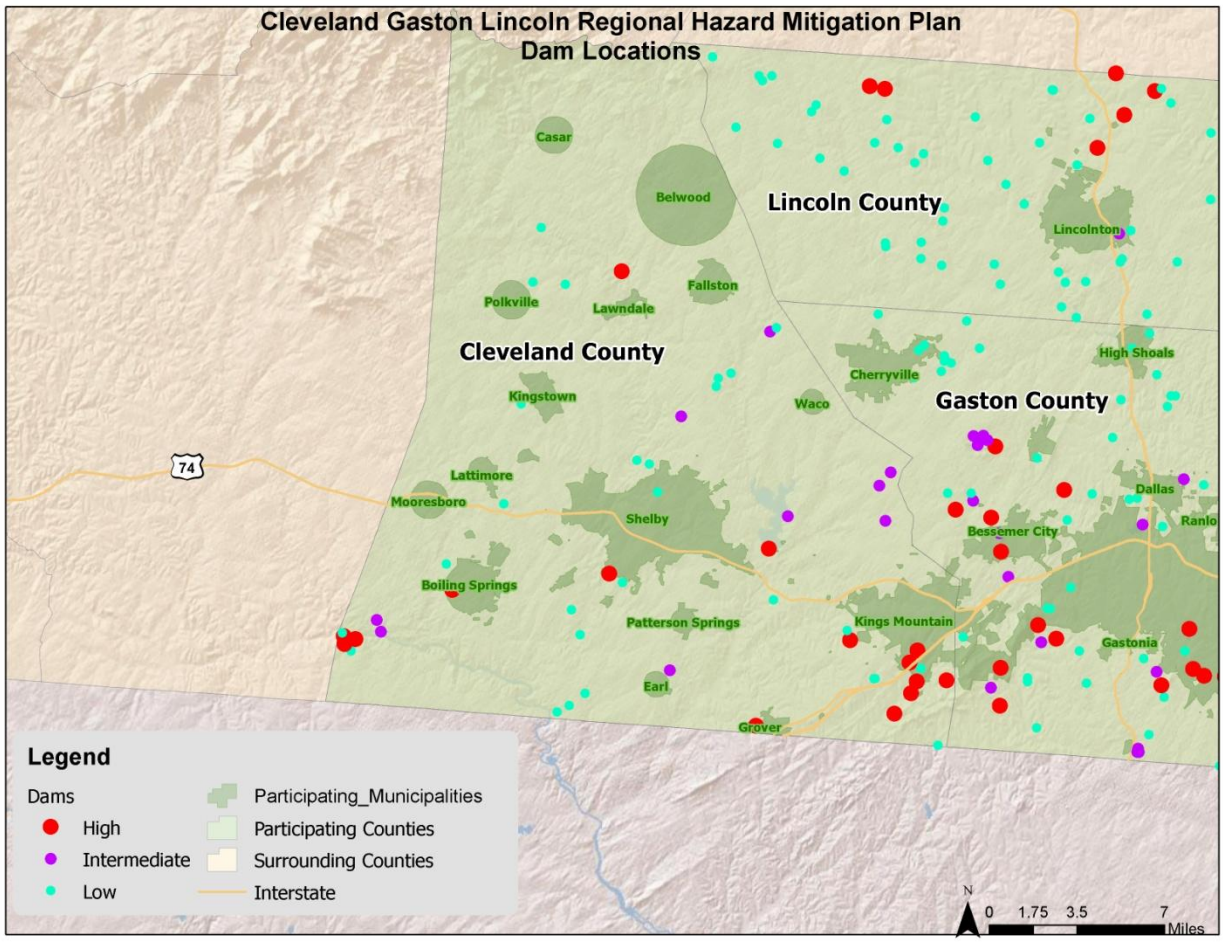
Based on historical information and the USGS susceptibility index, the probability of future landslide events is possible (1 to 10 percent probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Cleveland 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 of Land Management there are 52 dams in Cleveland County.[15] **Figure A.6** shows the dam location and the corresponding hazard ranking for each. Of these dams, 15 are classified as high hazard potential. These high hazard dams are listed in **Table A.21**.

FIGURE A.6: CLEVELAND COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2012

[15] The February 8, 2012 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.

TABLE A.21: CLEVELAND COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Cleveland County				
C.E. Harry Lake Dam	High	10	120	Private
Hughes Lake Dam	High	7.7	130	Private
Kings Mountain City Lake Dam #2	High	30	714	Local Gov
Kings Mountain Lake Dam #1	High	30	450	Utility
Lake Montonia Dam	High	25.5	314	Private
Rockwood Lithium Dam	High	7.8	150	Private
Cliffside Active Ash Basin Upstream Dam	High	24.3	0	
Cliffside Active Ash Basin Downstream Dam	High	64.2	0	
Cliffside Inactive Ash Basin 1-4 Main Dam	High	13.6	139	
Martin Marietta Co Dam	High	5	40	Private
Maples Fishing Pond Dam	High	8	52	Private
Lake Hollifield Dam	High	0	0	Private
Poplar Circle Dam	High	1.9	22	Private
Moss Lake Dam	High	1329	51032	Local Gov
Cleveland County Water Storage Reservoir Dam	High	7.1	150	Local Gov

Source: North Carolina Division of Land Resources, 2012

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

According to the North Carolina Division of Land Resources, there has been a total of one dam breech reported in Cleveland County. Additionally, several breach scenarios in the county could be catastrophic.

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

Cleveland County

There is no recorded history of dam failure occurring in Cleveland 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 Cleveland County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Cleveland 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 committee.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Cleveland County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Little information could be found 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 negligible potential impact.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Cleveland 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

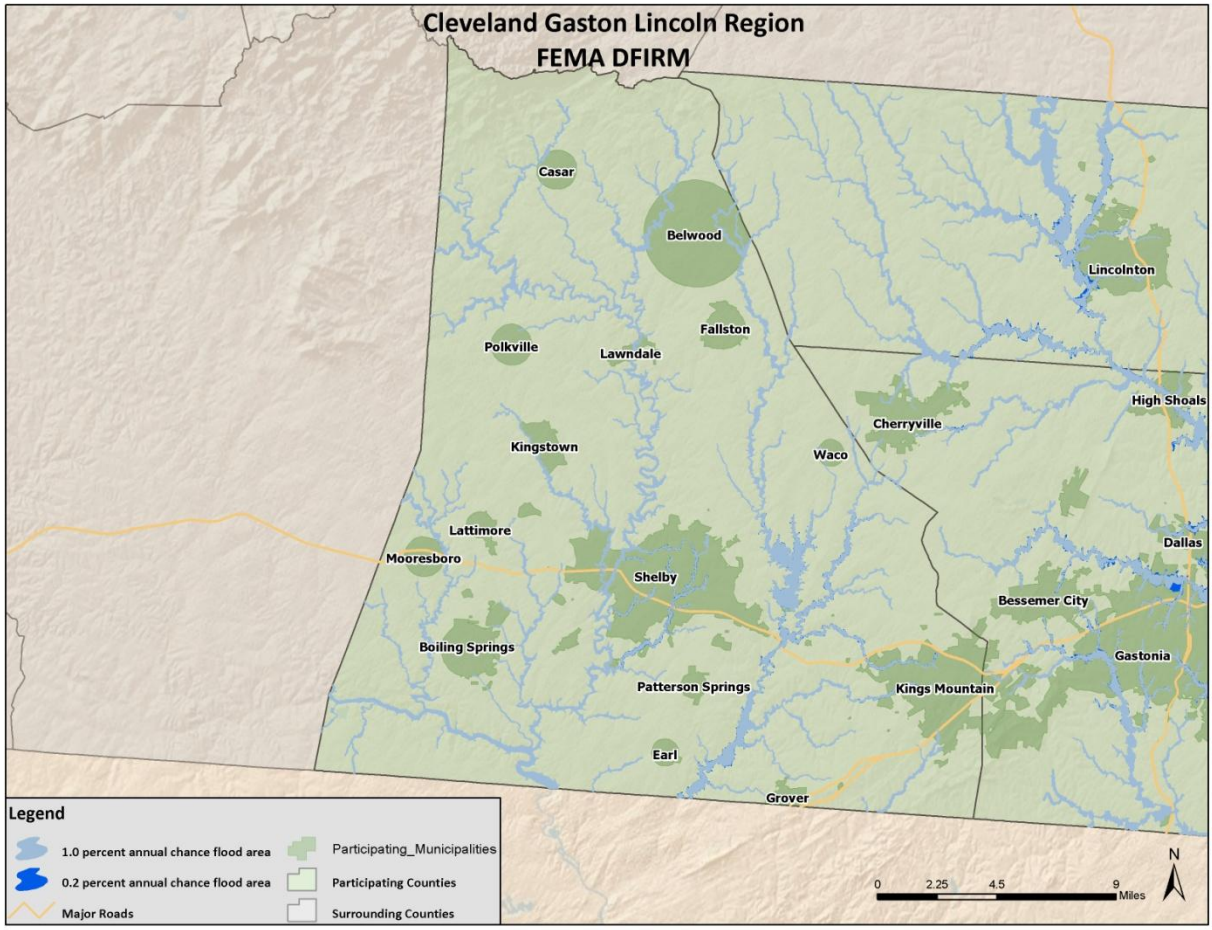
Location and Spatial Extent

There are areas in Cleveland 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).[16] 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 469 square miles that make up Cleveland County, there are 24.2 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.7 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 5.3 percent of the total land area in Cleveland 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.7**, **Figure A.8**, **Figure A.9**, **Figure A.10**, **Figure A.11**, **Figure A.12**, **Figure A.13**, **Figure A.14**, **Figure A.15**, **Figure A.16**, **Figure A.17**, **Figure A.18**, **Figure A.19**, **Figure A.20**, **Figure A.21**, and **Figure A.22** illustrate the location and extent of currently mapped special flood hazard areas for Cleveland County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

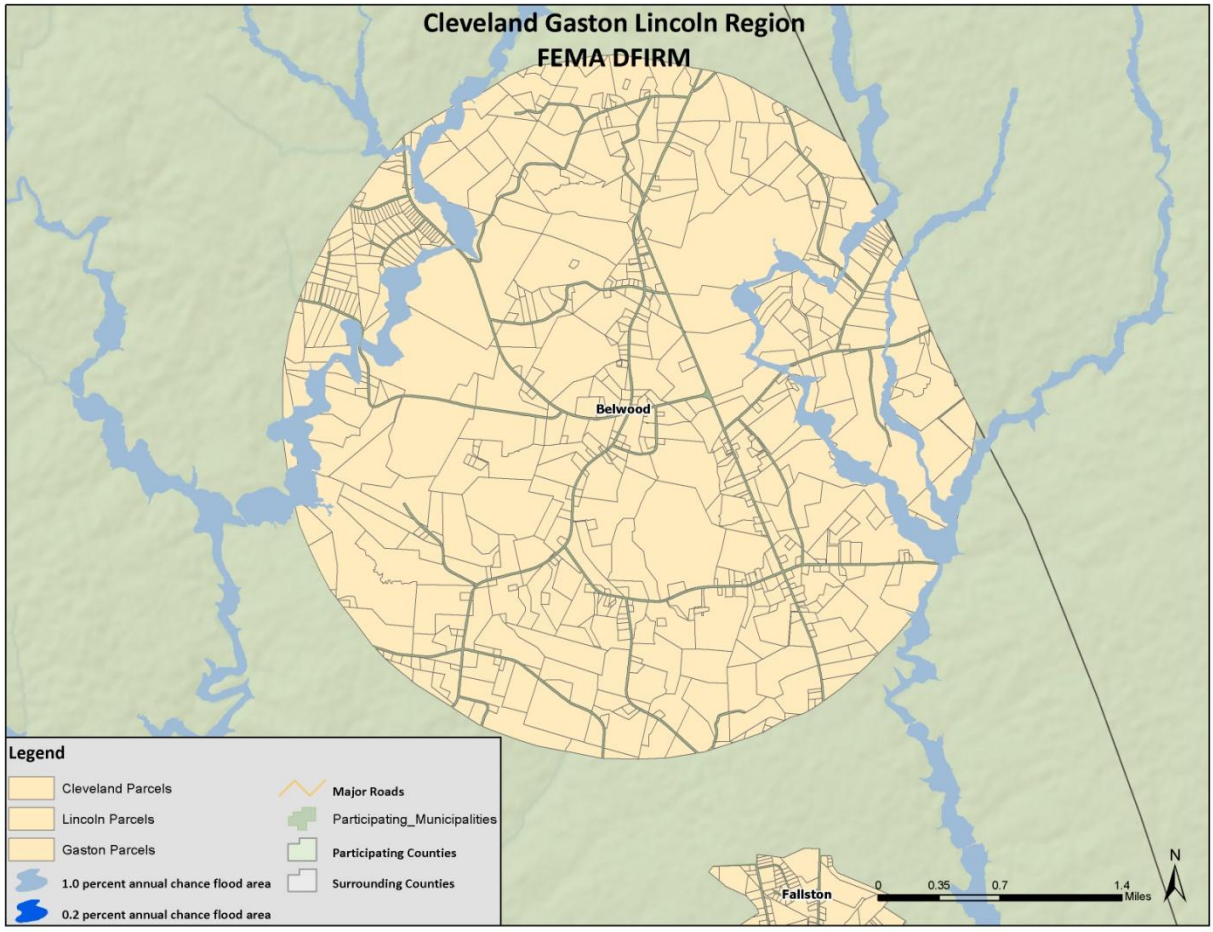
[16] The county-level DFIRM data used for Cleveland County were updated in 2009.

FIGURE A.7: SPECIAL FLOOD HAZARD AREAS IN CLEVELAND COUNTY



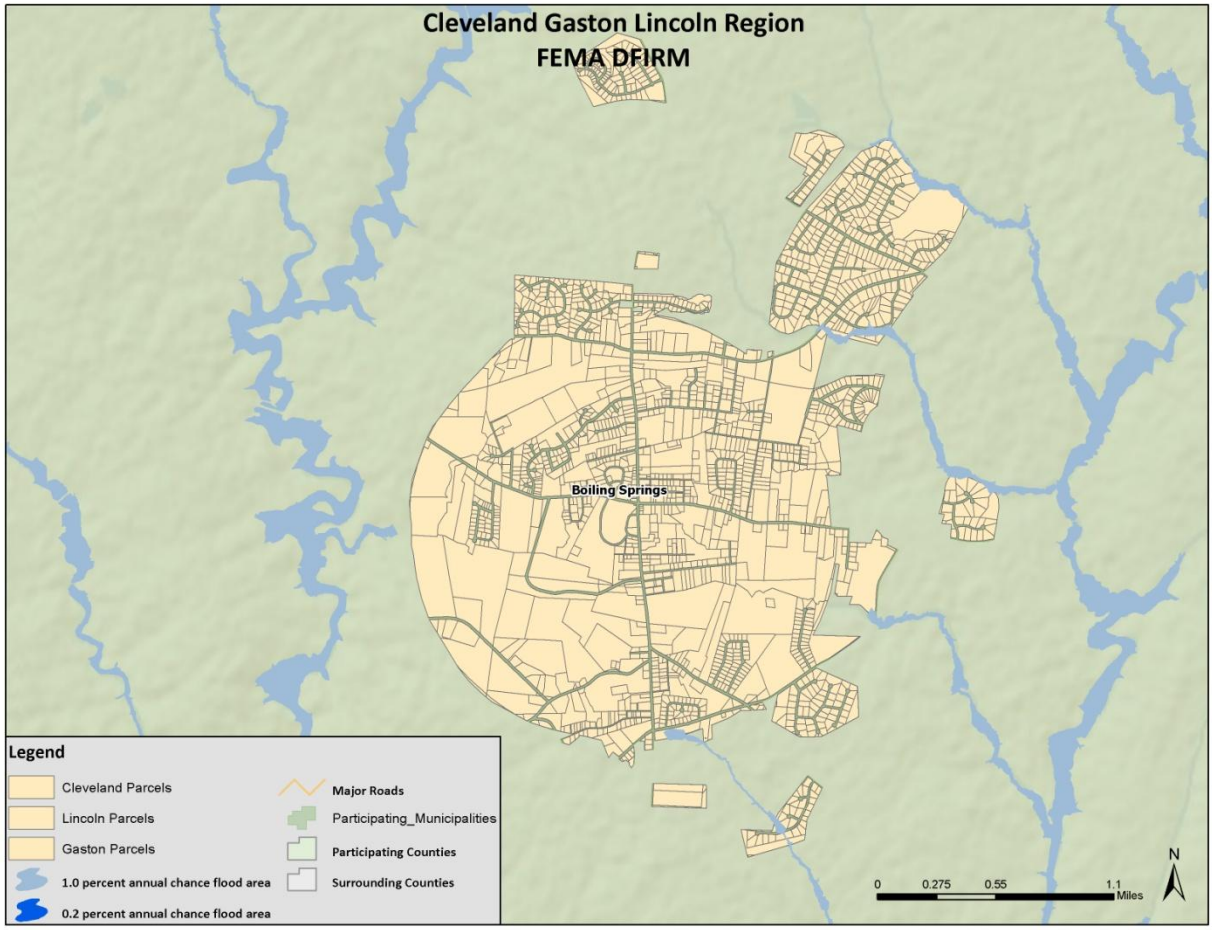
Source: Federal Emergency Management Agency

FIGURE A.8: SPECIAL FLOOD HAZARD AREAS IN BELWOOD



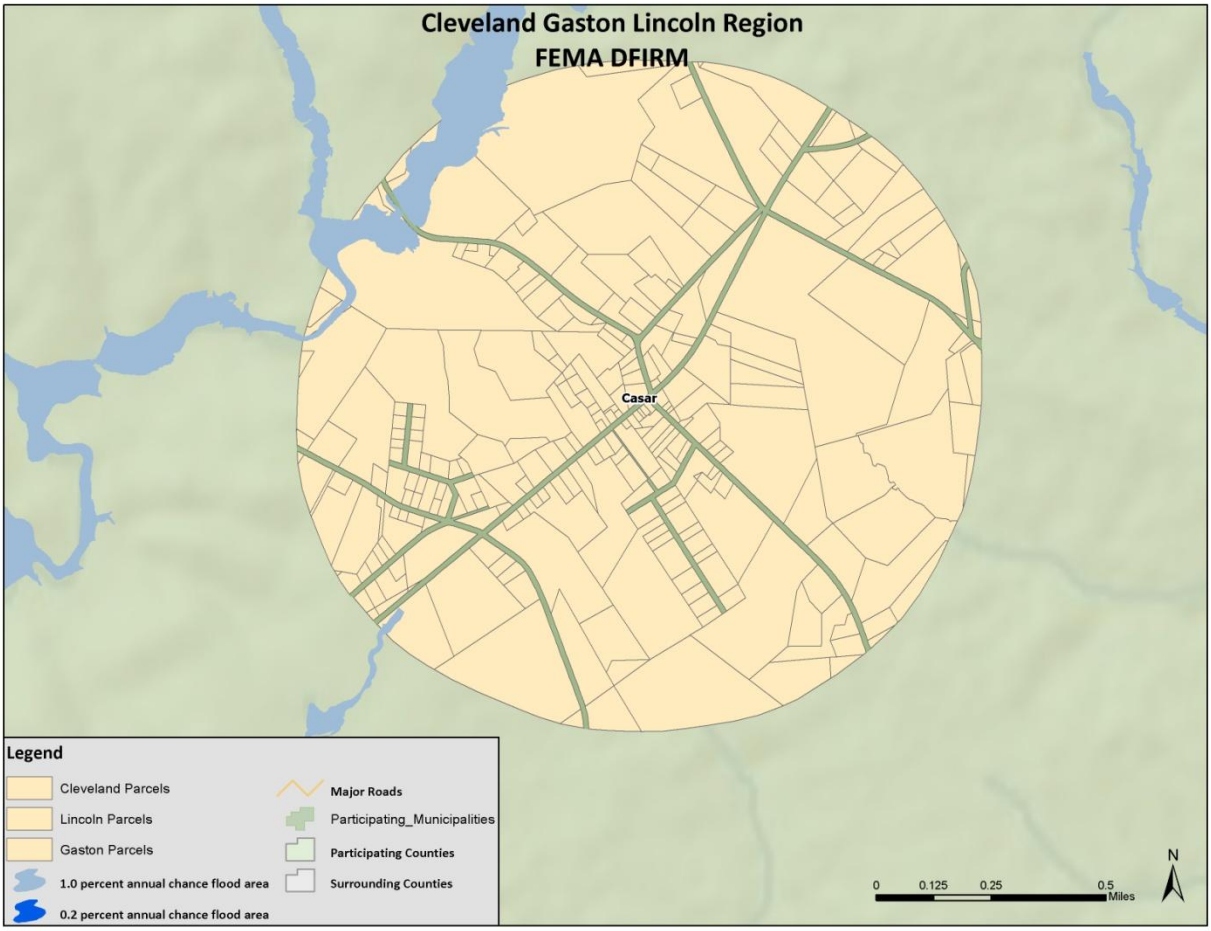
Source: Federal Emergency Management Agency

FIGURE A.9: SPECIAL FLOOD HAZARD AREAS IN BOILING SPRINGS



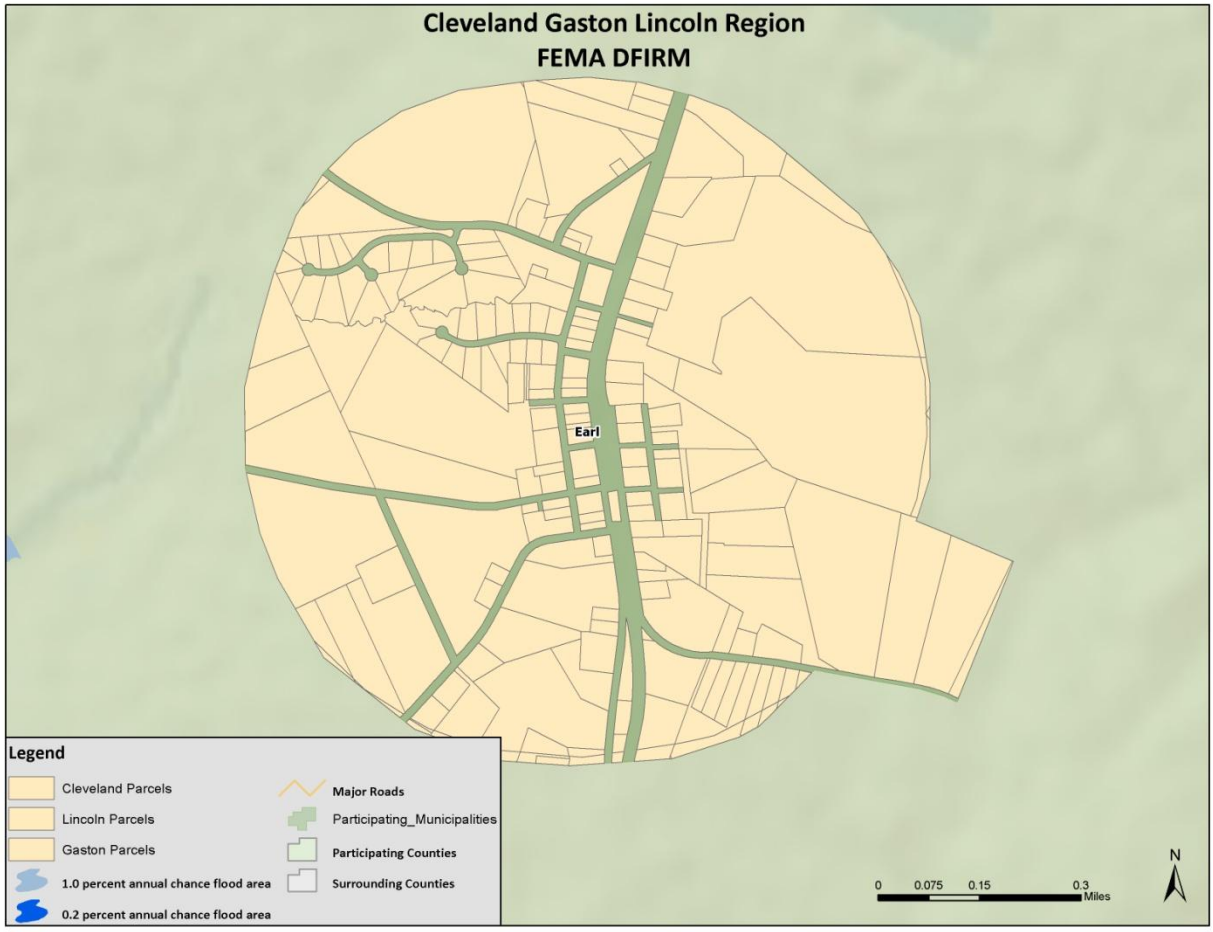
Source: Federal Emergency Management Agency

FIGURE A.10: SPECIAL FLOOD HAZARD AREAS IN CASAR



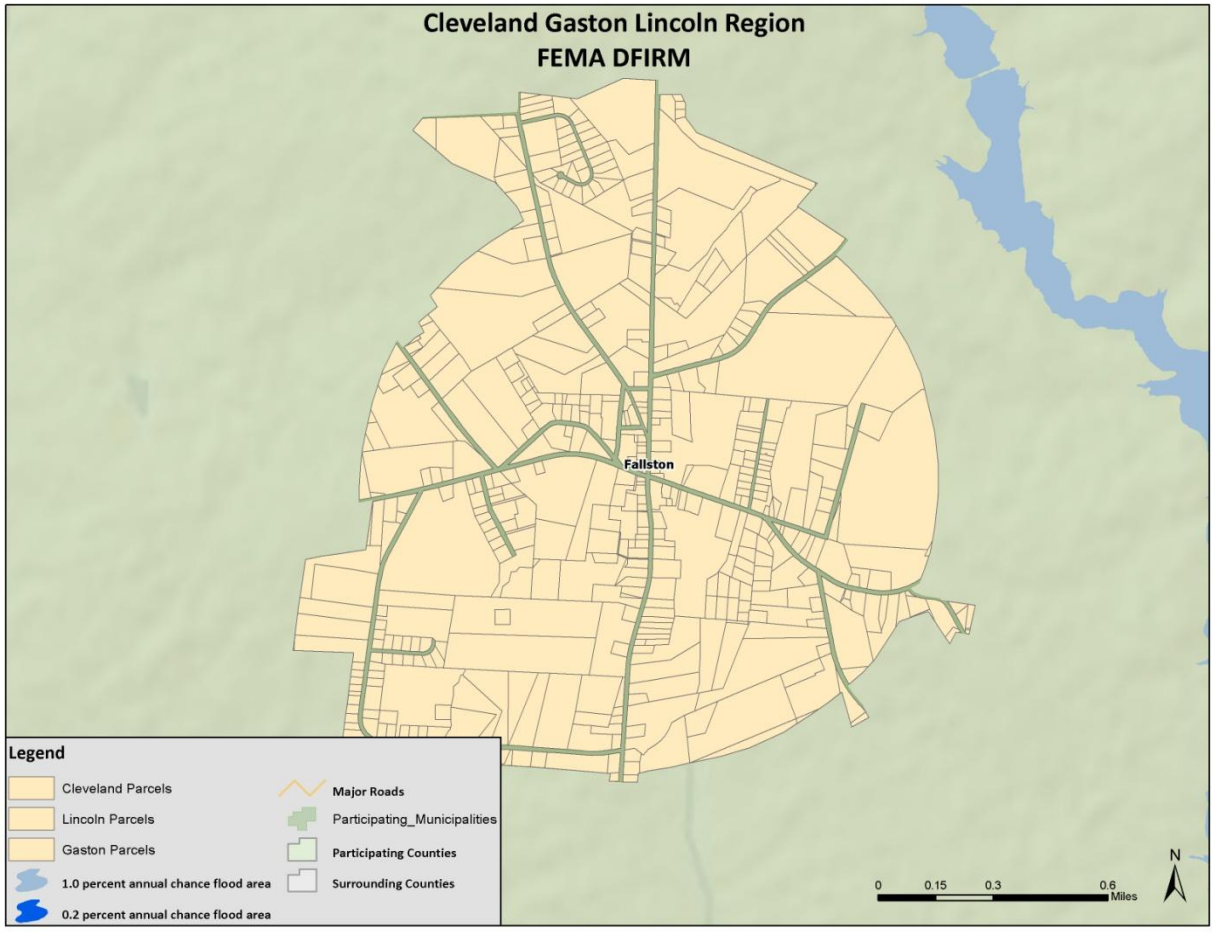
Source: Federal Emergency Management Agency

FIGURE A.11: SPECIAL FLOOD HAZARD AREAS IN EARL



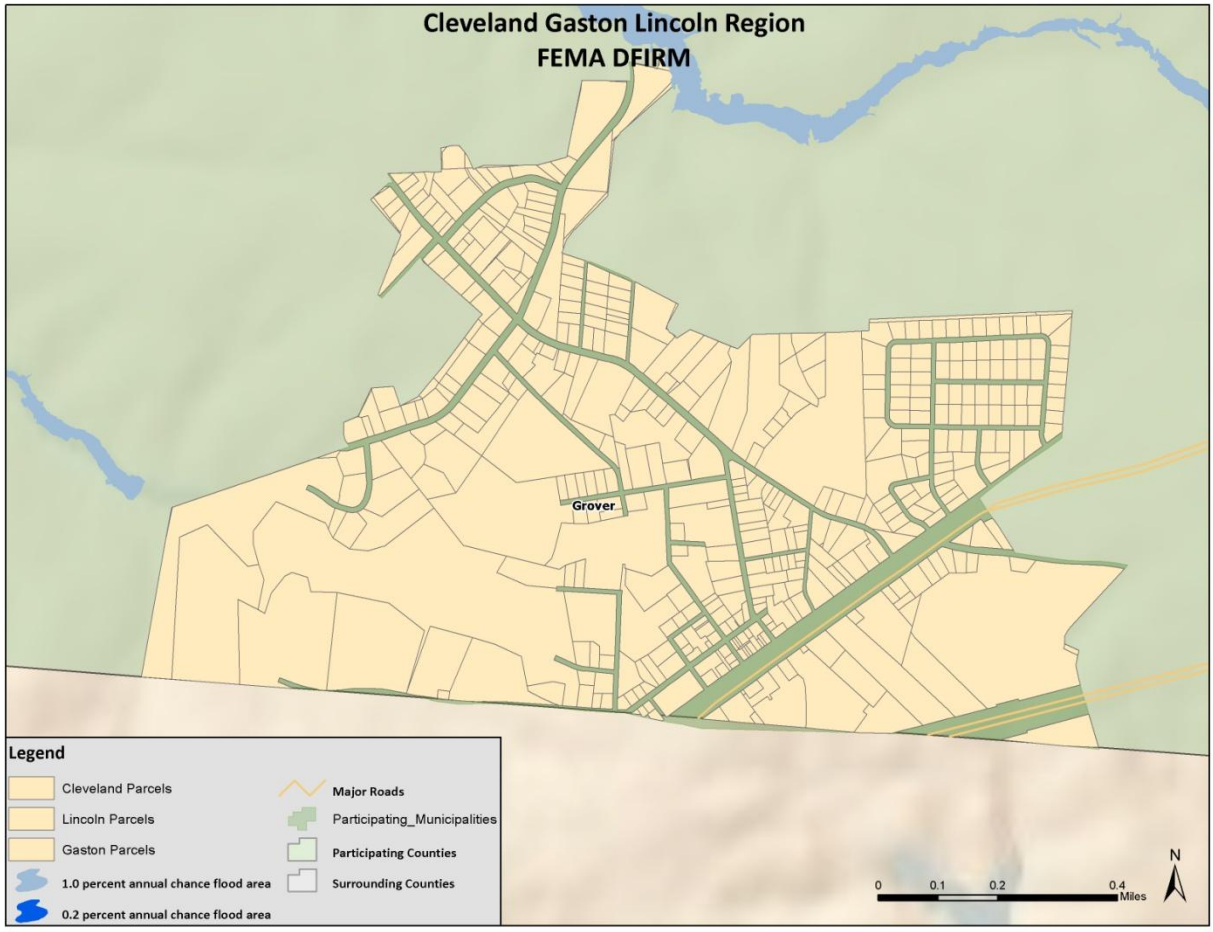
Source: Federal Emergency Management Agency

FIGURE A.12: SPECIAL FLOOD HAZARD AREAS IN FALLSTON



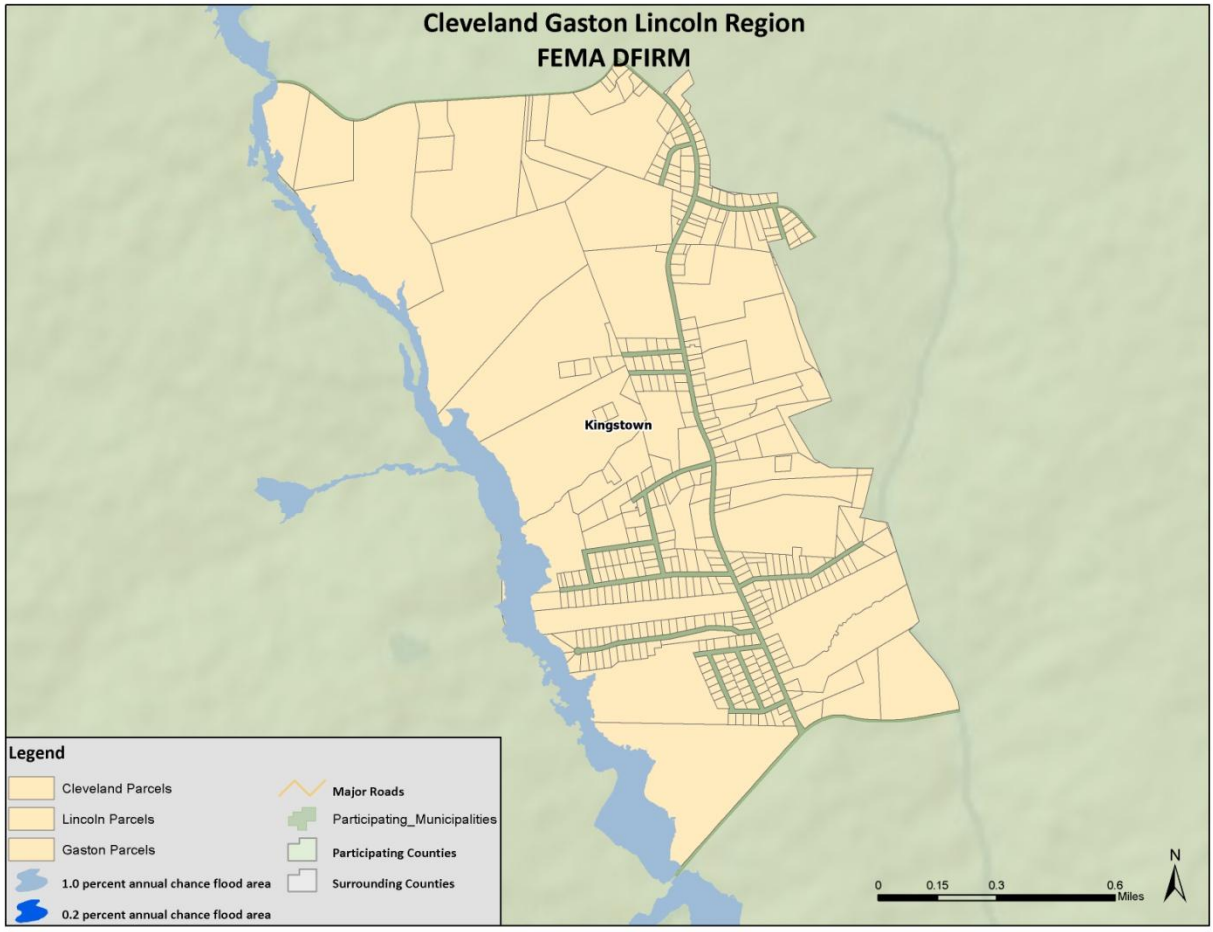
Source: Federal Emergency Management Agency

FIGURE A.13: SPECIAL FLOOD HAZARD AREAS IN GROVER



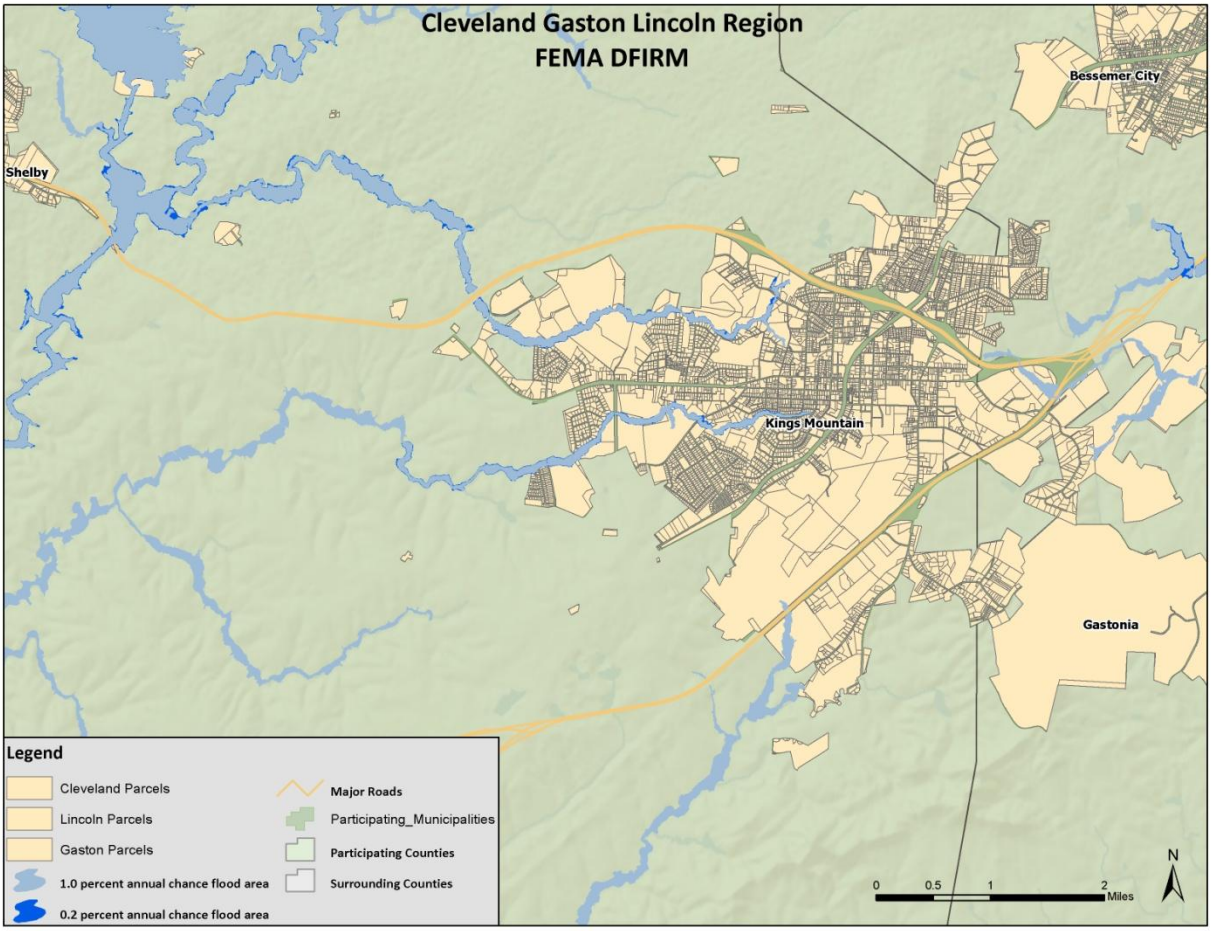
Source: Federal Emergency Management Agency

FIGURE A.14: SPECIAL FLOOD HAZARD AREAS IN KINGSTOWN



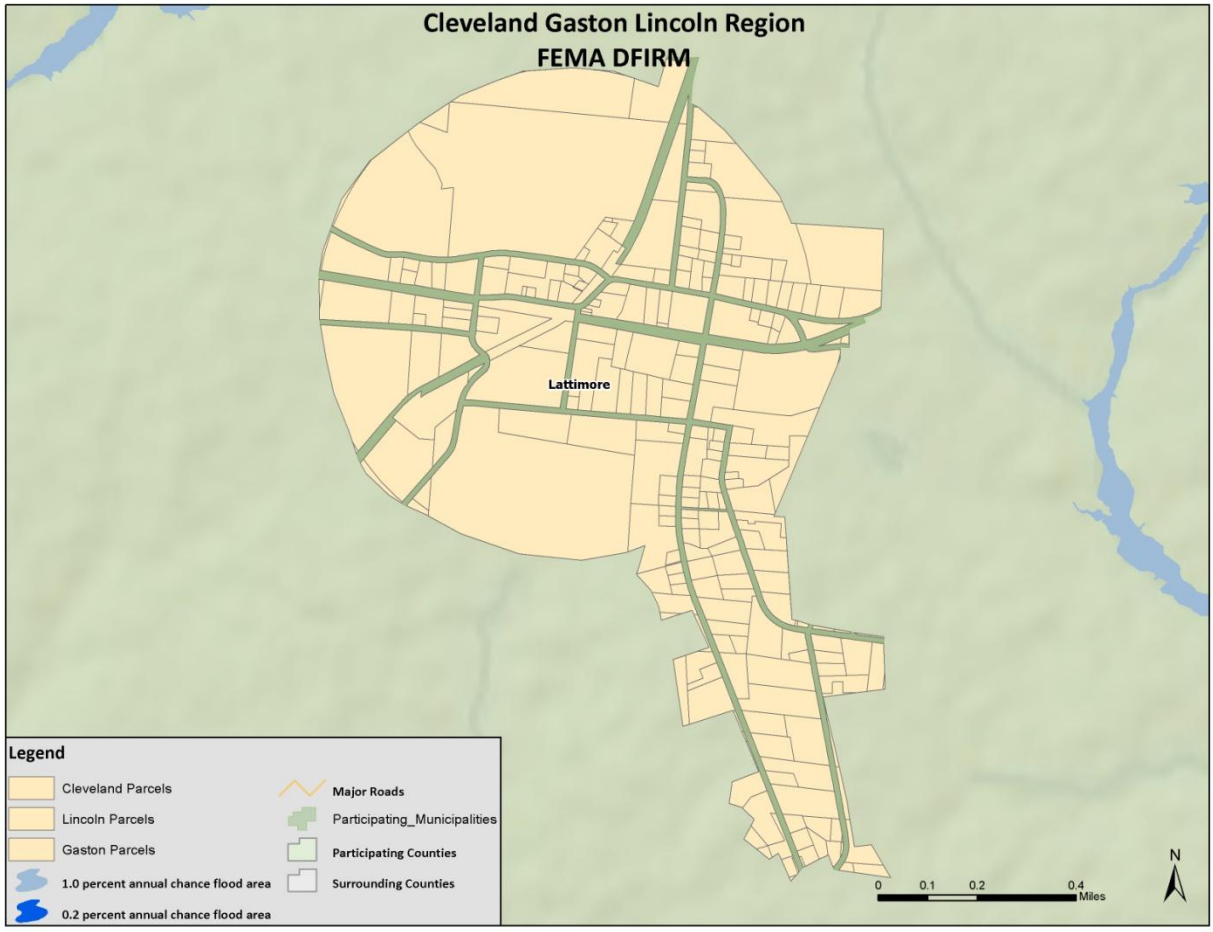
Source: Federal Emergency Management Agency

FIGURE A.15: SPECIAL FLOOD HAZARD AREAS IN KINGS MOUNTAIN



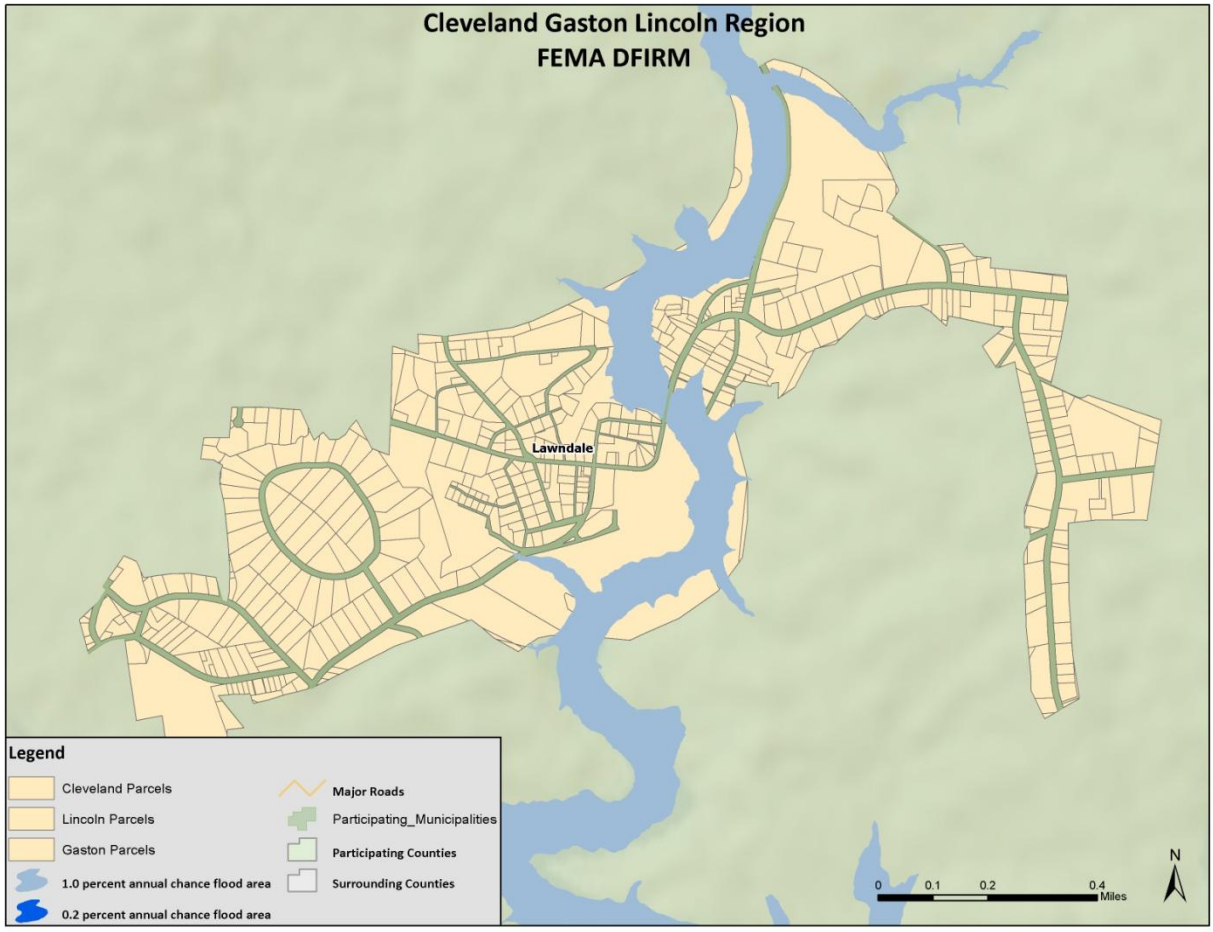
Source: Federal Emergency Management Agency

FIGURE A.16: SPECIAL FLOOD HAZARD AREAS IN LATTIMORE



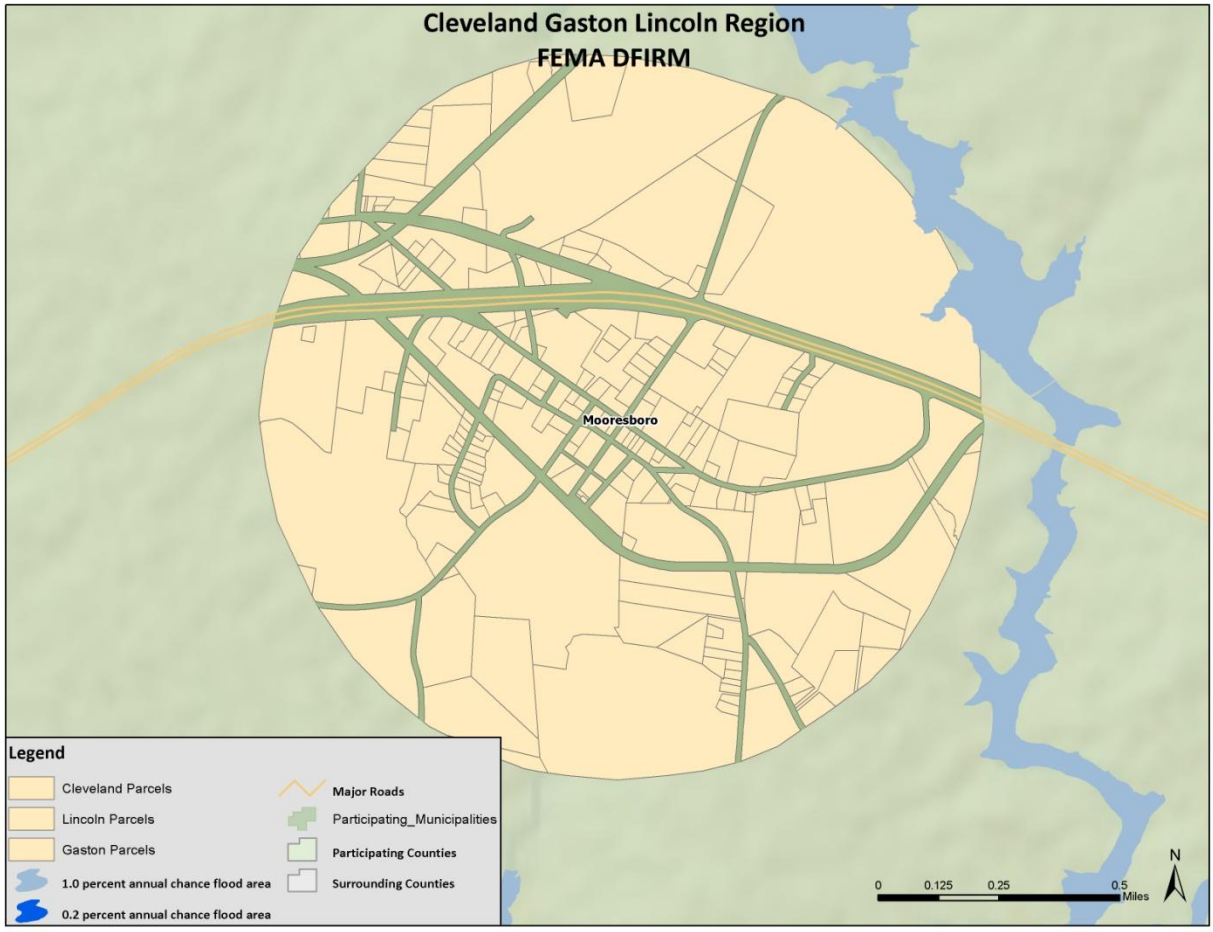
Source: Federal Emergency Management Agency

FIGURE A.17: SPECIAL FLOOD HAZARD AREAS IN LAWNDALE



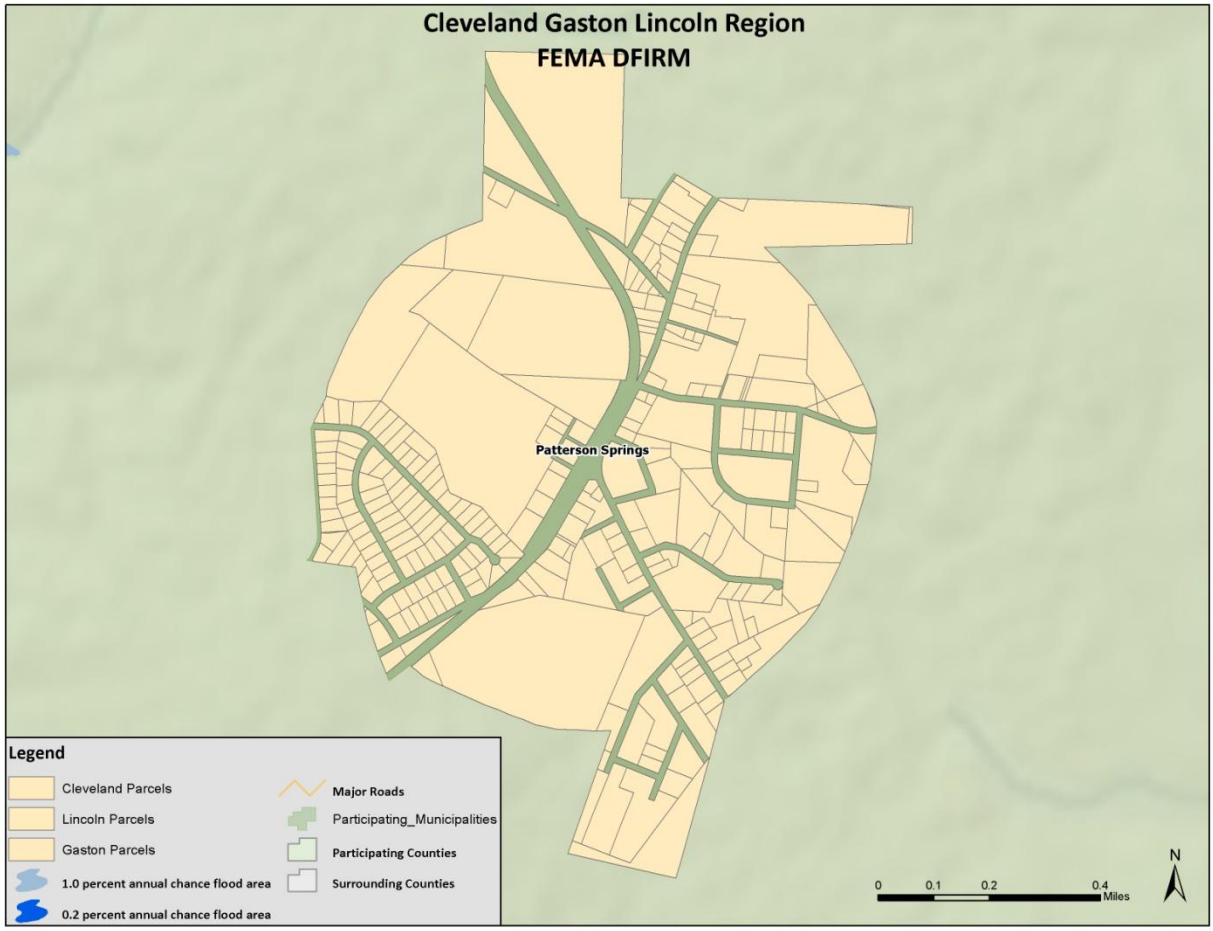
Source: Federal Emergency Management Agency

FIGURE A.18: SPECIAL FLOOD HAZARD AREAS IN MOORESBORO



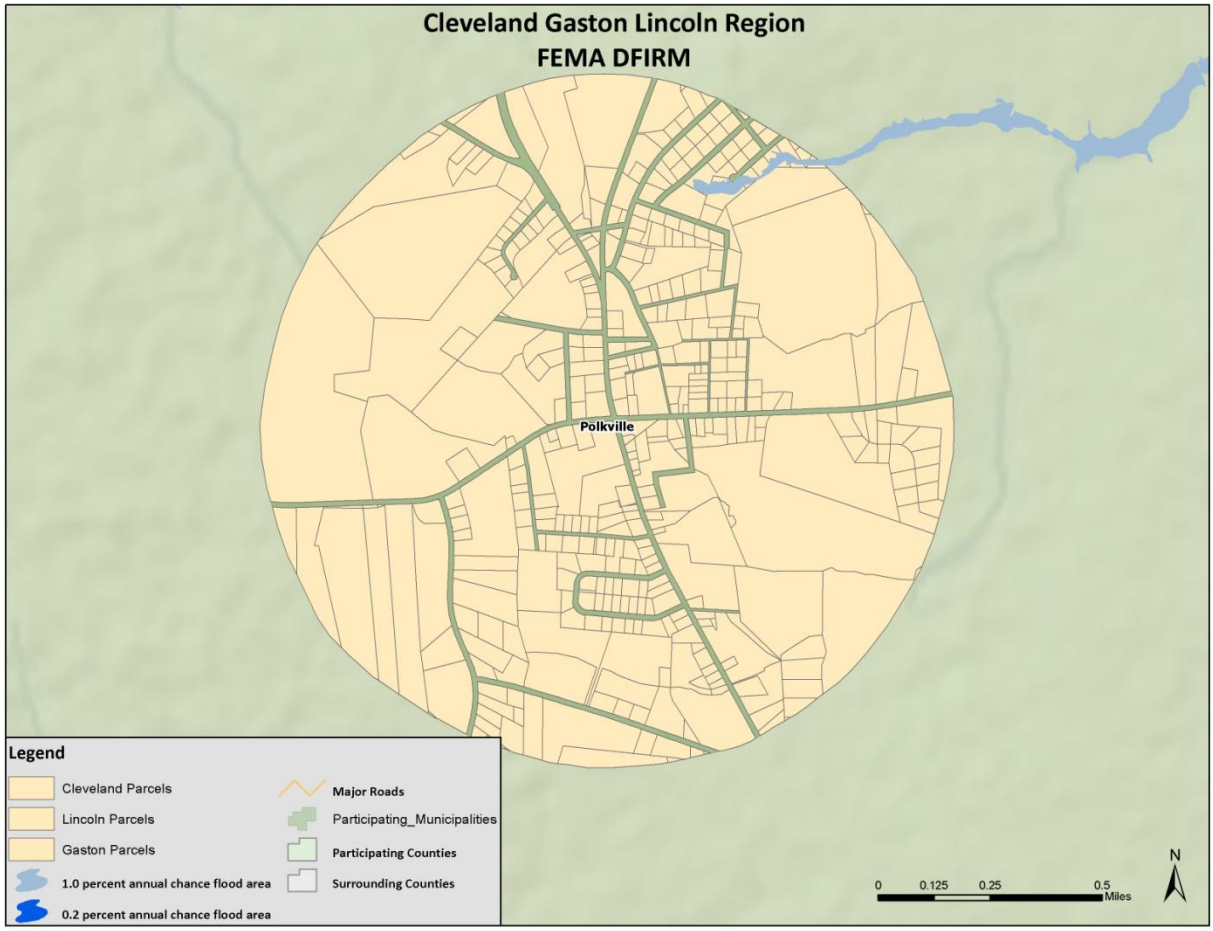
Source: Federal Emergency Management Agency

FIGURE A.19: SPECIAL FLOOD HAZARD AREAS IN PATTERSON SPRINGS



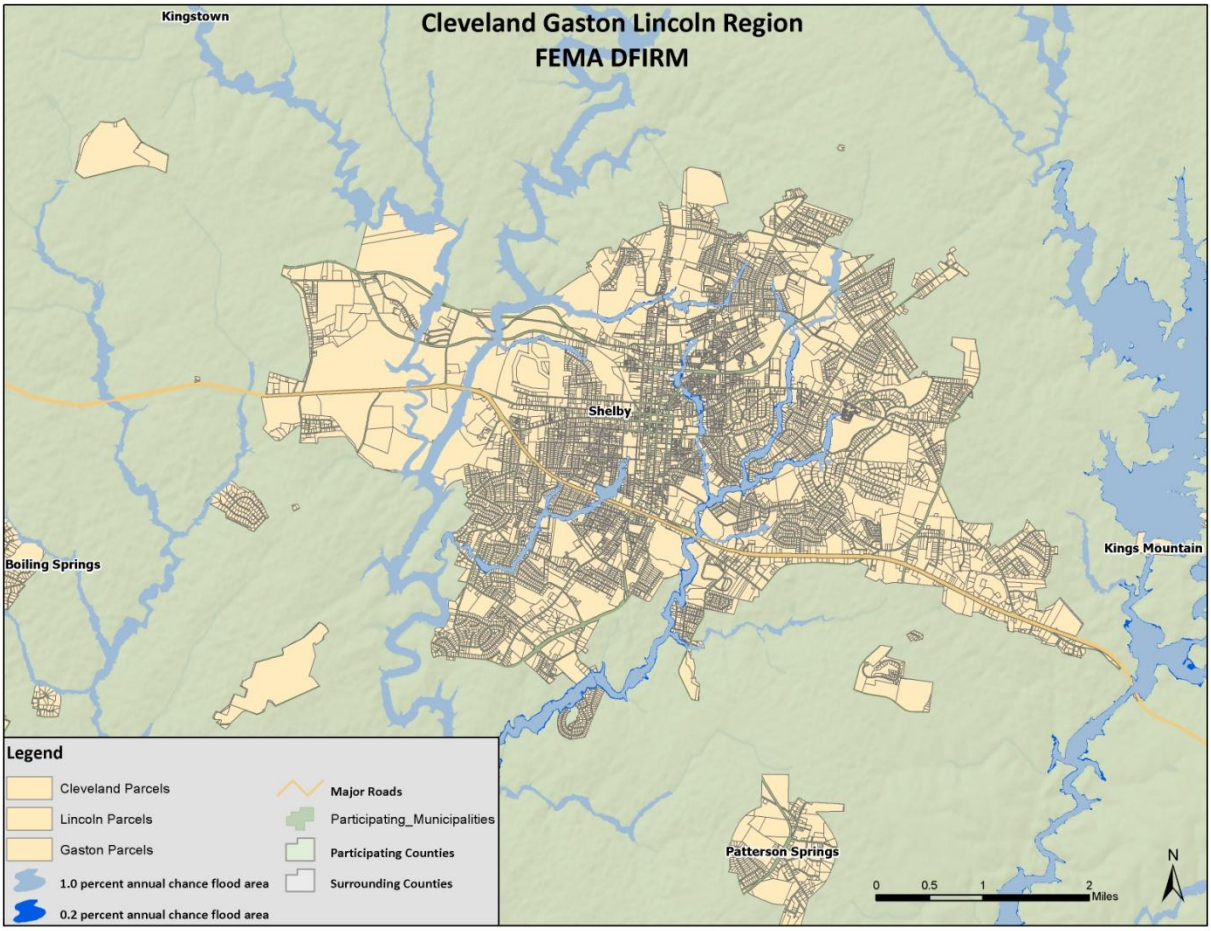
Source: Federal Emergency Management Agency

FIGURE A.20: SPECIAL FLOOD HAZARD AREAS IN POLKVILLE



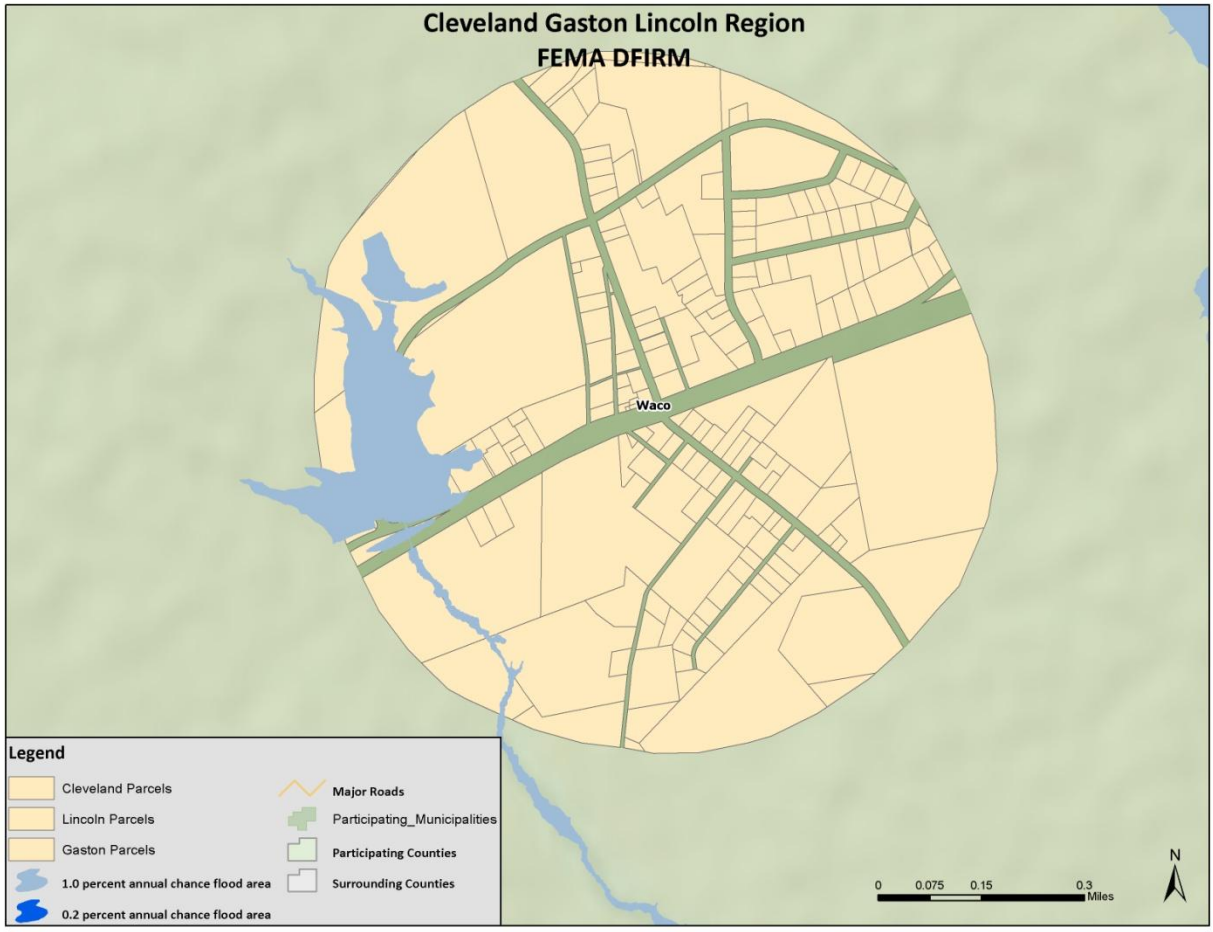
Source: Federal Emergency Management Agency

FIGURE A.21: SPECIAL FLOOD HAZARD AREAS IN SHELBY



Source: Federal Emergency Management Agency

FIGURE A.22: SPECIAL FLOOD HAZARD AREAS IN WACO



Source: Federal Emergency Management Agency

Historical Occurrences

Information from the National Climatic Data Center was used to ascertain historical flood events. The National Climatic Data Center reported a total of 13 events in Cleveland County since 1993.[17] A summary of these events is presented in **Table A.22**. These events accounted for over $74,000 (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 CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0

[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)
Earl	0	0/0	$0
Fallston	1	0/0	$0
Grover	1	0/0	$0
Kings Mountain	1	0/0	$0
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	0	0/0	$0
Shelby	4	0/0	$10,927
Waco	0	0/0	$0
Unincorporated Area	6	0/0	$63,339
CLEVELAND COUNTY TOTAL	**13**	**0/0**	**$74,266**

Source: National Climatic Data Center

TABLE A.23: HISTORICAL FLOOD EVENTS IN CLEVELAND COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Belwood				
None Reported	--	--	--	--
Boiling Springs				
None Reported	--	--	--	--
Casar				
None Reported	--	--	--	--
Earl				
None Reported	--	--	--	--
Fallston				
FALLSTON	14-JUL-15	FLASH FLOOD	0/0	$0
Grover				
GROVER	17-AUG-03	FLASH FLOOD	0/0	$0
Kings Mountain				
KINGS MTN	12-NOV-02	URBAN/SML STREAM FLD	0/0	$0
Kingstown				
None Reported	--	--	--	--
Lattimore				
None Reported	--	--	--	--
Lawndale				
None Reported	--	--	--	--
Mooresboro				
None Reported	--	--	--	--
Patterson Springs				
None Reported	--	--	--	--

	Date	Type	Deaths / Injuries	Property Damage*
Polkville				
None Reported	--	--	--	--
Shelby				
Shelby	03-JUL-95	FLASH FLOOD	0/0	$0
SHELBY	24-JUN-01	FLASH FLOOD	0/0	$0
SHELBY	07-AUG-03	FLASH FLOOD	0/0	$0
SHELBY	19-AUG-10	FLASH FLOOD	0/0	$10,927
Waco				
None Reported	--	--	--	--
Unincorporated Area				
CLEVELAND COUNTY	23-MAR-93	FLASH FLOODS	0/0	$0
CLEVELAND COUNTY	20-MAR-03	FLASH FLOOD	0/0	$0
CLEVELAND COUNTY	22-MAY-03	FLOOD	0/0	$0
CLEVELAND COUNTY	12-JUL-03	FLASH FLOOD	0/0	$0
CLEVELAND COUNTY	08-SEP-04	FLOOD	0/0	$0
CLEVELAND COUNTY	07-OCT-05	FLOOD	0/0	$63,339

*Property damage is reported in 2013 dollars; All damage may not have been reported.
Source: National Climatic Data Center

The flood event described below is not reported above because it occurred during the development of this plan.

July 27 and 28, 2013
Heavy rainfall on July 27 and 28 caused flooding in Cleveland County to flood. As much as 6 to 7 inches of rain fell in the northeastern part of the County. Numerous roads and bridges were washed out.

Historical Summary of Insured Flood Losses
According to FEMA flood insurance policy records as of February 2012, there have been 25 flood losses reported in Cleveland County through the National Flood Insurance Program (NFIP) since 1978, totaling over $400,000 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 Cleveland County were either uninsured, denied claims payment, or not reported.

TABLE A.24: SUMMARY OF INSURED FLOOD LOSSES IN CLEVELAND COUNTY

Location	Flood Losses	Claims Payments
Belwood	0	$0
Boiling Springs	0	$0
Casar*	--	--
Earl*	--	--
Fallston*	--	--
Grover*	--	--
Kings Mountain	3	$11,804
Kingstown	0	$0

Location	Flood Losses	Claims Payments
Lattimore*	--	--
Lawndale*	--	--
Mooresboro*	--	--
Patterson Springs*	--	--
Polkville	0	$0
Shelby	19	$361,473
Waco*	--	--
Unincorporated Area	3	$29,294
CLEVELAND COUNTY TOTAL	**25**	**$402,571**

*This community does not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: FEMA, NFIP

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 October 2013, there is one non-mitigated repetitive loss property located in Cleveland County, which accounted for three losses and more than $8,000 in claims payments under the NFIP. The average claim amount for this property is $2,870. The property is single family 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 Cleveland County.

TABLE A.25: REPETITIVE LOSS PROPERTIES IN CLEVELAND COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Belwood	0	--	0	$0	$0	$0	$0
Boiling Springs	0	--	0	$0	$0	$0	$0
Casar*	0	--	0	$0	$0	$0	$0
Earl*	0	--	0	$0	$0	$0	$0
Fallston*	0	--	0	$0	$0	$0	$0
Grover*	0	--	0	$0	$0	$0	$0
Kings Mountain	0	--	0	$0	$0	$0	$0
Kingstown	0	--	0	$0	$0	$0	$0
Lattimore*	0	--	0	$0	$0	$0	$0
Lawndale*	0	--	0	$0	$0	$0	$0
Mooresboro*	0	--	0	$0	$0	$0	$0
Patterson Springs*	0	--	0	$0	$0	$0	$0
Polkville	0	--	0	$0	$0	$0	$0
Shelby	1	residential	3	$8,360.80	$249.67	$8,610.47	$2,870.16
Waco*	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
CLEVELAND COUNTY TOTAL	**1**		**3**	**$8,360.80**	**$249.67**	**$8,610.47**	**$2,870.16**

* 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 Cleveland 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).

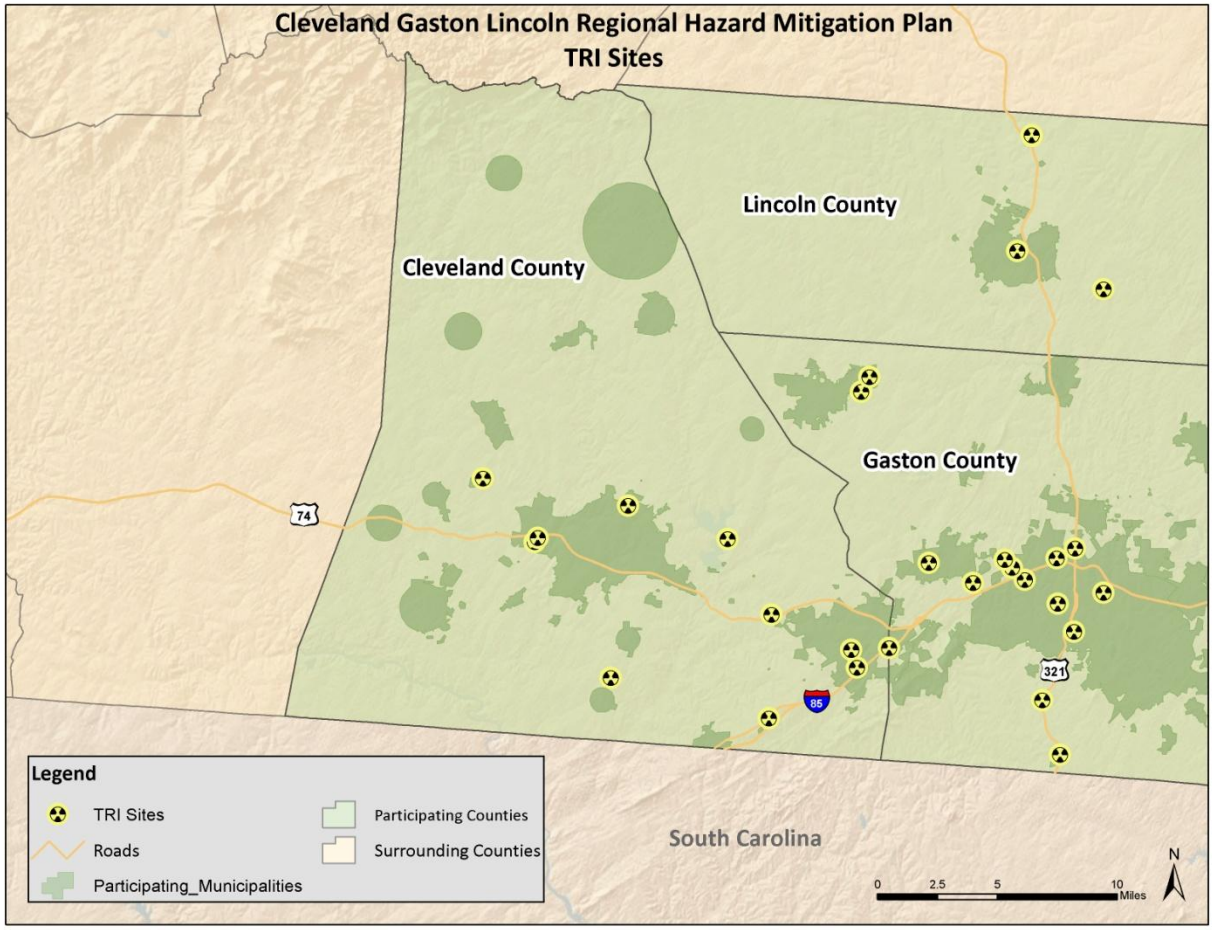
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Lawndale, Kings Mountain, and Shelby have more floodplain and thus a higher risk of flood than other municipalities. 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.

A.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Cleveland County has 24 TRI sites. These sites are shown in **Figure A.23.**

FIGURE A.23: TOXIC RELEASE INVENTORY (TRI) SITES IN CLEVELAND COUNTY



Source: EPA

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are narrow and winding, making hazardous material transport in the area especially treacherous. All roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of eight recorded HAZMAT incidents in Cleveland County since 1972 (**Table A.26**). **Table A.27** presents detailed information on historic HAZMAT incidents in Cleveland 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 CLEVELAND COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Earl	0	0/0	$0
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	4	0/0	$0
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	0	0/0	$0
Shelby	3	0/1	$0
Waco	0	0/0	$0
Unincorporated Area	0	0/0	$0
CLEVELAND COUNTY TOTAL	**7**	**0/0**	**$0**

Source: USDOT PHMSA

TABLE A.27: HAZMAT INCIDENTS IN CLEVELAND COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Belwood							
None Reported	--	--	--	--	--	--	--
Boiling Springs							
None Reported	--	--	--	--	--	--	--
Casar							
None Reported	--	--	--	--	--	--	--
Earl							
None Reported	--	--	--	--	--	--	--
Fallston							
None Reported	--	--	--	--	--	--	--
Grover							
None Reported	--	--	--	--	--	--	--
Kings Mountain							
I-1972090107	8/14/1972	KIN M	Rail	No	0/0	$0	0
I-1978091252	8/15/1978	KINGS MTN	Rail	No	0/0	$0	20 LGA
I-1980090960	6/3/1980	KINGS MT	Highway	No	0/0	$0	50 LGA
I-1984100481	10/10/1984	KINGS MOUNTAIN	Rail	No	0/0	$0	1 LGA
Kingstown							
None Reported	--	--	--	--	--	--	--
Lattimore							
None Reported	--	--	--	--	--	--	--
Lawndale							
None Reported	--	--	--	--	--	--	--

Report Number	Date	City	Mode	Serious Incident?	Fatalities / Injuries	Damages ($)*	Quantity Released
Mooresboro							
None Reported	--	--	--	--	--	--	--
Patterson Springs							
None Reported	--	--	--	--	--	--	--
Polkville							
None Reported	--	--	--	--	--	--	--
Shelby							
I-1994081365	8/3/1994	SHELBY	Highway	No	0/0	$0	50 LGA
I-1996101042	9/30/1996	SHELBY	Highway	No	0/0	$0	55 LGA
I-2007100437	10/1/2007	SHELBY	Highway	No	0/1	$0	0.03125 LGA
Waco							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
None Reported	--	--	--	--	--	--	--

*Property damage is reported in 2013 dollars.
Source: USDOT PHMSA

Probability of Future Occurrences

Given the location of 24 toxic release inventory sites in Cleveland County and several 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

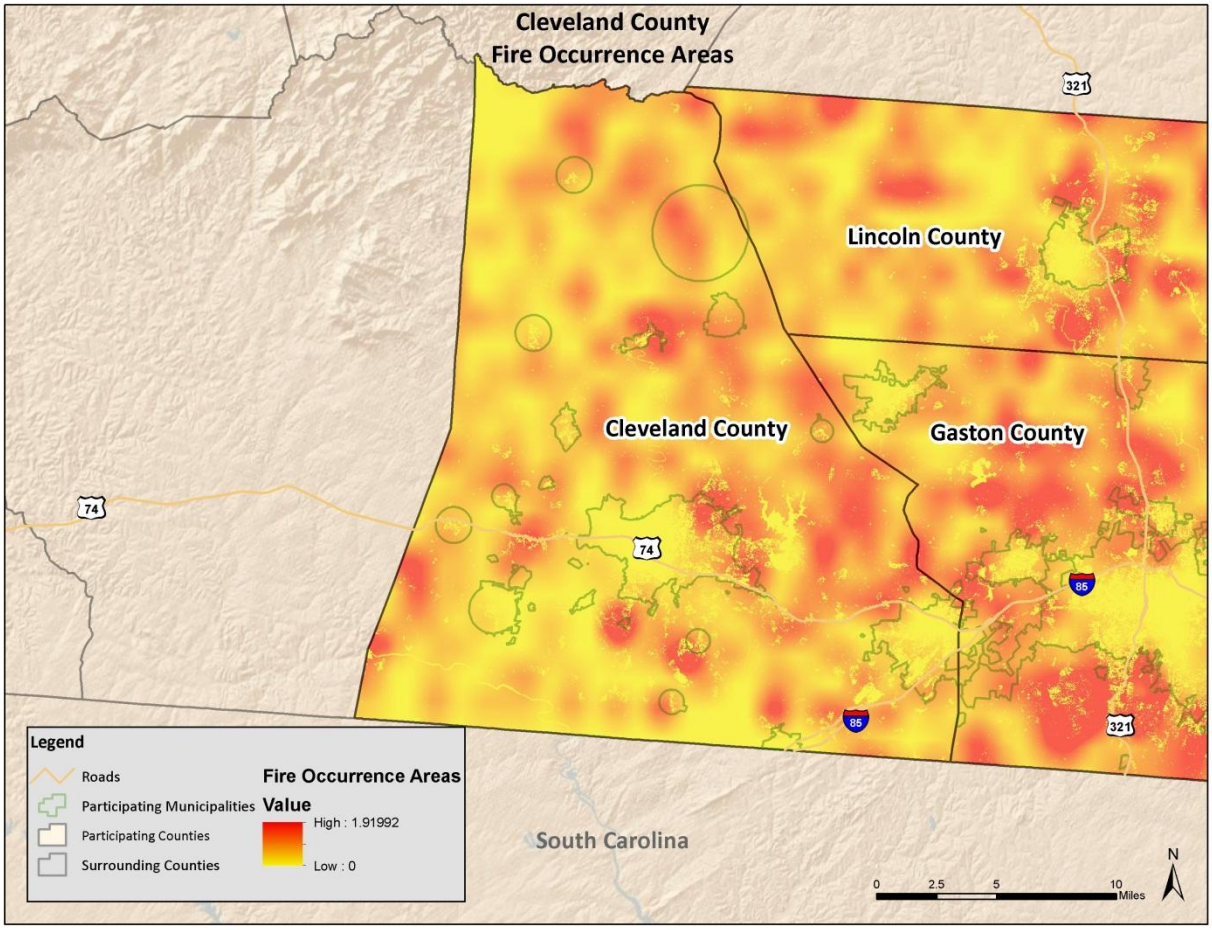
Location and Spatial Extent

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.24 shows the Fire Occurrence Areas (FOA) in Cleveland 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.24: HISTORIC WILDFIRE EVENTS IN CLEVELAND COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Cleveland County experienced an average of 62 wildfires annually which burn an average of 56 acres per year. The data indicates that most of these fires are small, averaging 1 acre 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 CLEVELAND COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Cleveland County										
Number of Fires	29	63	60	68	87	63	56	84	75	32
Number of Acres	40.2	56.2	46.0	52.4	45.0	58.8	74.7	96.3	72.1	15.9

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Cleveland 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. In this case, the participating jurisdictions appear to have a similar risk to the surrounding areas. The probability assigned to Cleveland County for future wildfire events is likely (10 to 100 percent annual probability).

A.2.16 Nuclear Accident

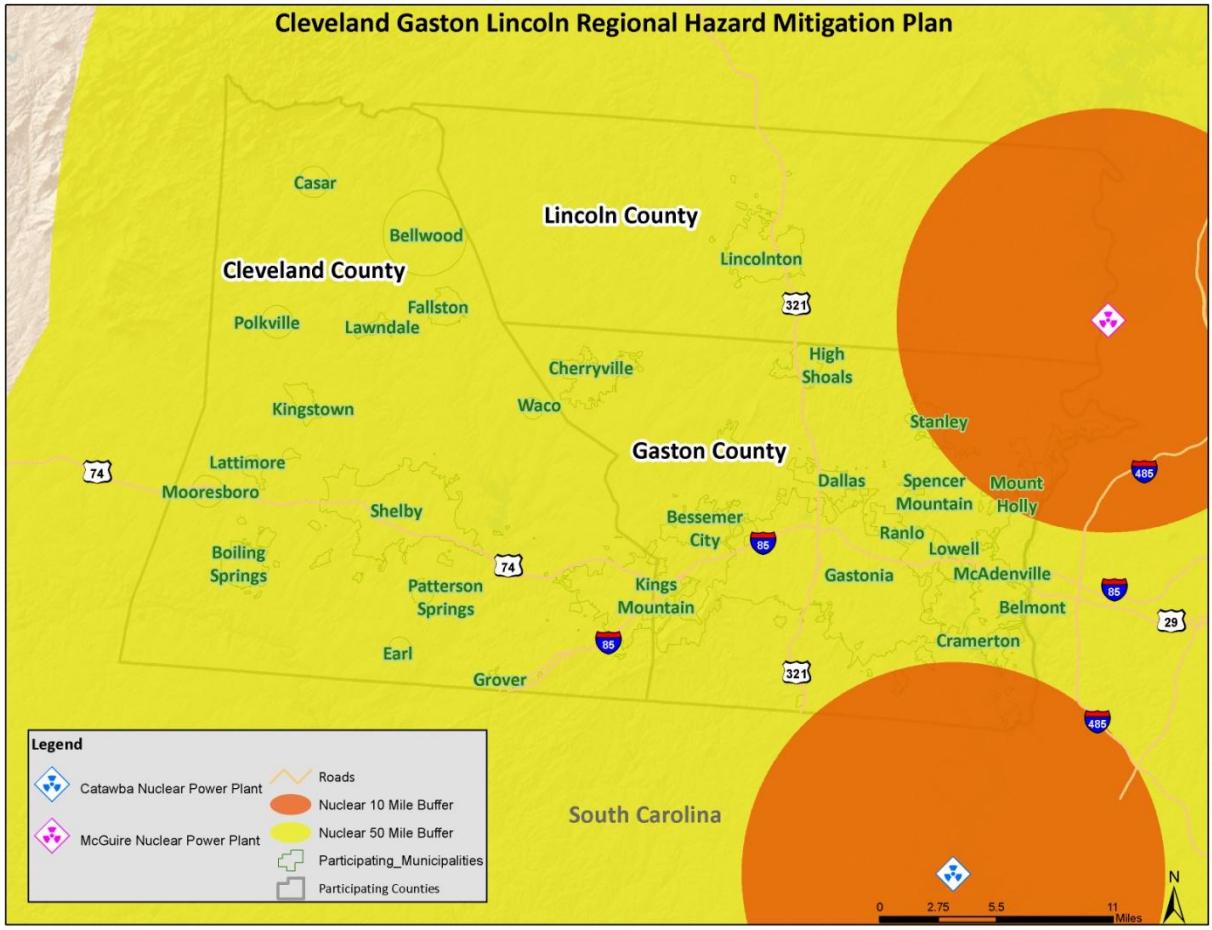
Location and Spatial Extent

The entire county is at risk to a nuclear incident. However, Cleveland County has less susceptibility than areas in the eastern part of the region due to their proximity to the McGuire 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.25**). All areas of the county are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

Historical Occurrences

Although there have been no major nuclear events at the McGuire or Catawba Nuclear Stations, 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.

FIGURE A.25: MCGUIRE NUCLEAR POWER STATION INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

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).

A.2.17 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.29 describes the extent of each natural hazard identified for Cleveland County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE A.29 EXTENT OF CLEVELAND 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. Cleveland 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 Cleveland County is 107 degrees Fahrenheit in Shelby on July 30, 1952.
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Cleveland County was 2.75 inches (reported on June 16, 1980). 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 hurricanes to traverse directly through Cleveland County were Hurricane Gracie in 1959 which reached a maximum wind speed of 53 miles per hour in the region and Hurricane Hugo in 1989 which carried tropical force winds of 48 knots. Although the county is much more likely to be impacted by the remnants of a hurricane or tropical storm, these events demonstrate that Category 3 or 4 storms can and have impacted the county directly.
Lightning	According to the Vaisala flash density map (Figure 5.5), Cleveland 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 63-year history from the National Climatic Data Center, the strongest recorded wind event in Cleveland County was reported on July 27, 2007 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 5.15 and 5.16). The greatest magnitude reported was an F4 (reported on May 5, 1989).
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 Cleveland County was 14 inches in Shelby on January 8, 1998. Due to extreme variations in elevation 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 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from Cleveland County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was reported in Kings Mountain with a MMI of VI (strong) with a correlating Richter Scale measurement of approximately 5.

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 between moderate and high in Cleveland County. There is also 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 52 dams in Cleveland County, 15 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 Cleveland 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 5.3 percent of the total land area in Cleveland 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 Broad River near the Town of Boiling Springs in 1928. Water reached a discharge of 73,300 cubic feet per second and the stream gage height was recorded at 24.3 feet.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 55 LGA released on the highway in Shelby on September 30, 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 Cleveland County in any year was 87 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2010 when 96 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 McGuire or Catawba 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 McGuire or Catawba is possible.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Cleveland 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 5.18.2.

Table A.30 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 Committee. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE A.30: SUMMARY OF PRI RESULTS FOR CLEVELAND 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	Possible	Minor	Large	More than 24 hours	Less than 1 week	**2.1**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Possible	Critical	Large	More than 24 hours	Less than 24 hours	**2.6**
Lightning	Highly Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	**2.5**
Thunderstorm/High Wind	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.0**
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Landslide	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	**2.1**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	12 to 24 hours	Less than 24 hours	**2.3**
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	**2.7**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	More than 1 week	**2.4**
Nuclear Accident	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**

A.2.18 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Cleveland County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table A.31**). 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 Cleveland 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.31: CONCLUSIONS ON HAZARD RISK FOR CLEVELAND COUNTY

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

A.3 CLEVELAND COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Cleveland 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.32 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Cleveland County and its participating jurisdictions (study area of vulnerability assessment).[19]

[19] 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.32: IMPROVED PROPERTY IN CLEVELAND COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Belwood	686	$58,289,861	414	$30,592,037
Boiling Springs	1,687	$296,274,322	1,314	$239,387,733
Casar	231	$16,363,619	154	$12,305,479
Earl	154	$8,881,215	98	$6,713,199
Fallston	437	$36,167,955	298	$27,973,608
Grover	404	$26,859,550	304	$22,496,439
Kings Mountain	4,975	$590,287,912	3,988	$466,349,108
Kingstown	345	$17,857,330	252	$15,131,648
Lattimore	178	$17,141,404	130	$12,011,781
Lawndale	377	$13,918,239	268	$10,636,366
Mooresboro	215	$14,717,469	155	$9,425,427
Patterson Springs	220	$14,397,719	179	$11,094,782
Polkville	376	$25,096,652	236	$19,017,096
Shelby	10,735	$1,537,443,376	8,513	$1,127,560,219
Waco	167	$10,972,473	130	$7,903,750
Unincorporated Area	36,898	$4,078,343,437	23,599	$2,517,019,362
CLEVELAND COUNTY TOTAL	**57,632**	**$6,704,174,137**	**36,044**	**$4,488,000,411**

Table A.33 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools and other critical facilities located in Cleveland 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.26** shows the locations of essential facilities in Cleveland County. **Table A.45**, 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.

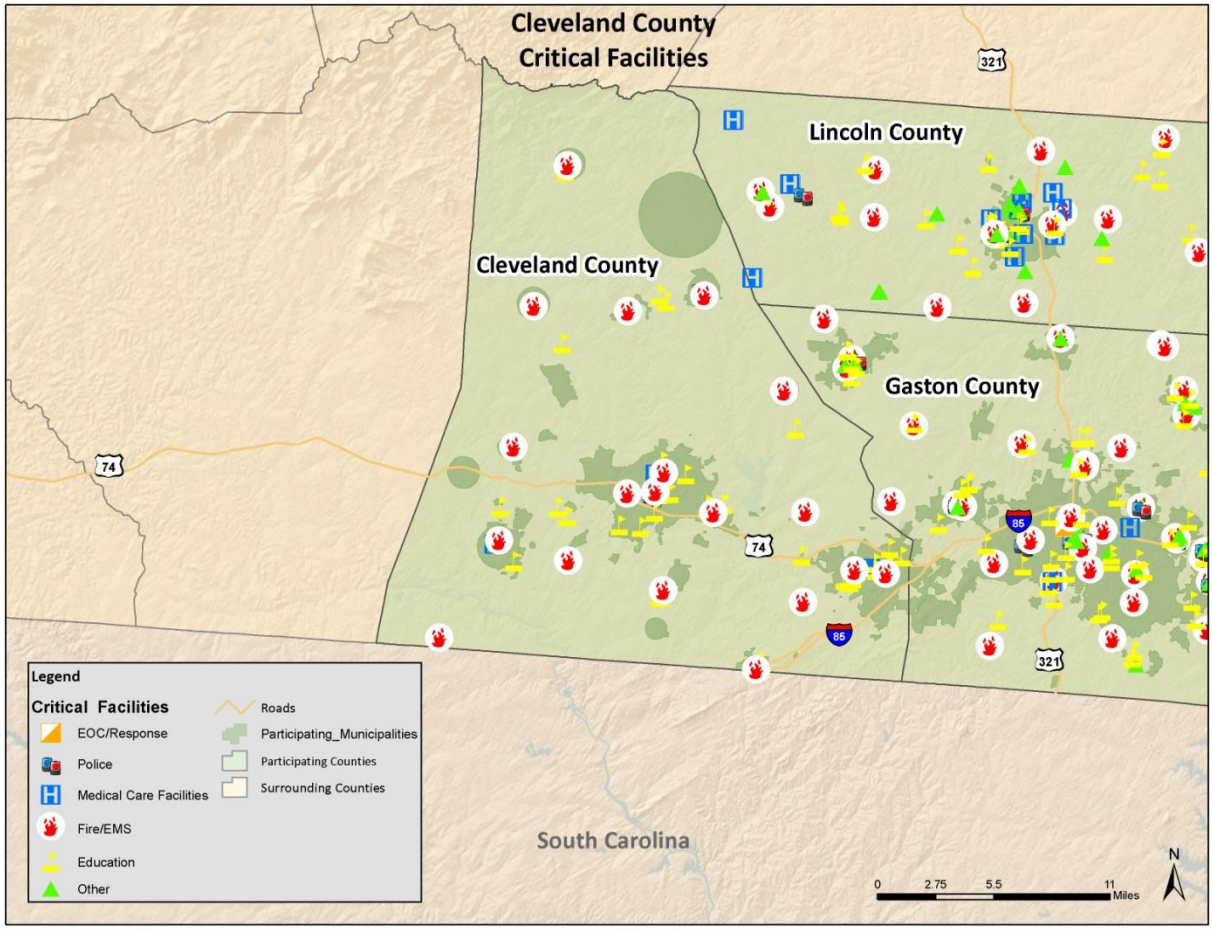
TABLE A.33: CRITICAL FACILITY INVENTORY IN CLEVELAND COUNTY

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Belwood	0	0	0	0	0	0
Boiling Springs	1	0	1	0	1	0
Casar	1	0	0	0	1	0
Earl	0	0	0	0	0	0
Fallston	1	1	0	0	1	0
Grover	1	1	0	0	1	0
Kingstown	0	0	0	0	0	0
Kings Mountain	2	1	1	0	7	0
Lattimore	1	0	0	0	0	0
Lawndale	1	0	0	0	0	0
Mooresboro	0	0	0	0	0	0
Patterson Springs	0	0	0	0	0	0

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Polkville	1	0	0	0	0	0
Shelby	4	2	1	0	10	0
Waco	1	0	0	0	0	0
Unincorporated Area	5	0	0	0	11	0
CLEVELAND COUNTY TOTAL	**19**	**5**	**3**	**0**	**32**	**0**

Source: Hazus-MH

FIGURE A.26: CRITICAL FACILITY LOCATIONS IN CLEVELAND COUNTY



Source: 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 Cleveland County that are potentially at risk to these hazards.

Table A.34 lists the population by jurisdiction according to U.S. Census 2010 population estimates. Unfortunately, estimates were not available at the census block level, limited the results to county-wide

estimates. The total population in Cleveland County according to Census data is 98,078 persons. Additional population estimates are presented above in Section A.1.

TABLE A.34: TOTAL POPULATION IN CLEVELAND COUNTY

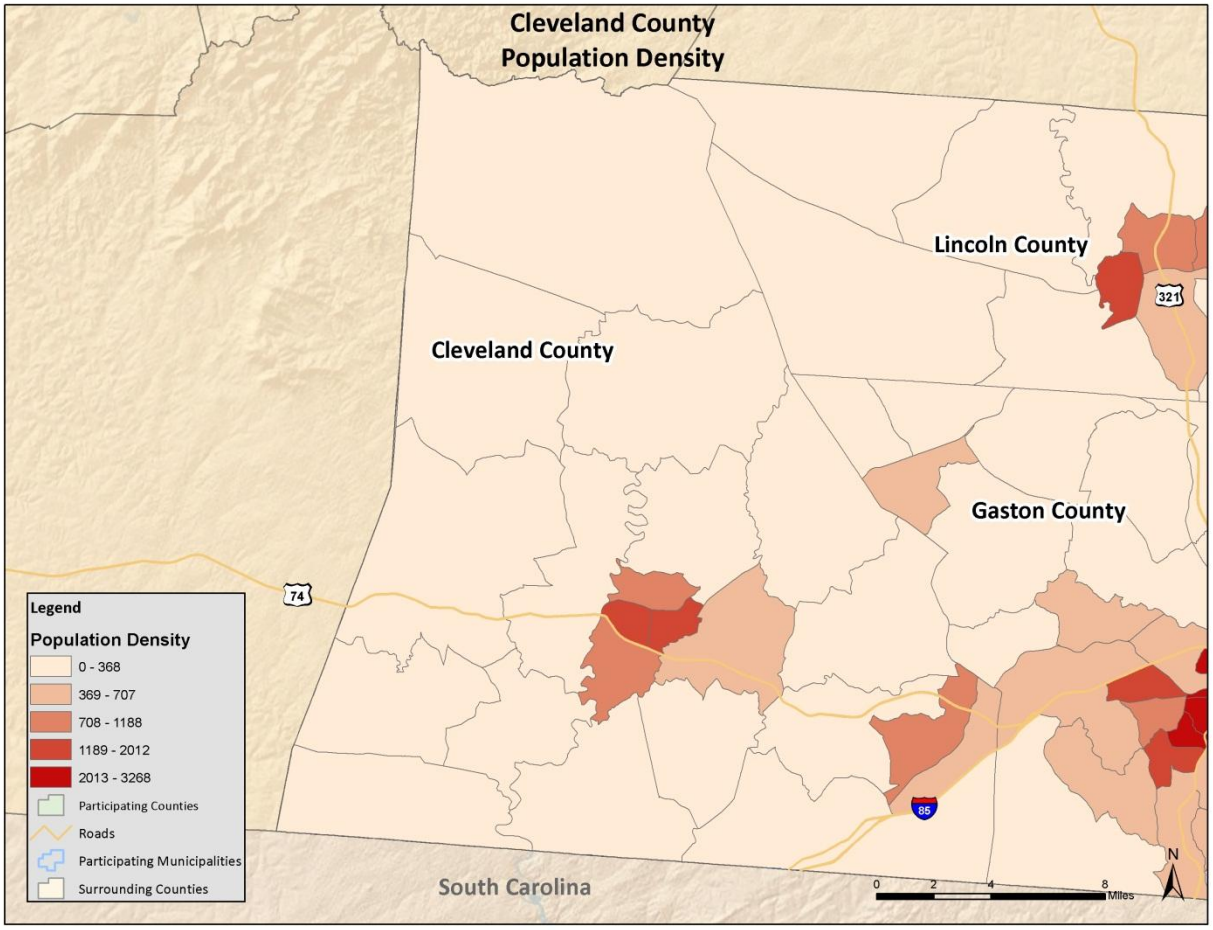
Jurisdiction	2010 Census Population
Cleveland County	**98,078**
Town of Belwood	950
Town of Boiling Springs	4,647
Town of Casar	297
Town of Earl	260
Town of Fallston	607
Town of Grover	708
City of Kings Mountain	10,296
Town of Kingstown	681
Town of Lattimore	488
Town of Lawndale	606
Town of Mooresboro	311
Town of Patterson Springs	622
Town of Polkville	545
City of Shelby	20,323
Town of Waco	321

Source: U.S. Census 2010

In addition, **Figure A.27** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.[20]

[20] Population by census block was not available at the time this plan was completed.

FIGURE A.27: POPULATION DENSITY IN CLEVELAND COUNTY



Source: U.S. Census Bureau, 2010

A.3.3 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 Cleveland County, are presented here. All other hazards are assumed to impact the entire planning region (drought, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total county exposure, and thus risk, was presented in **Table A.32**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table A.45.**

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

Hurricane and Tropical Storm

Historical evidence indicates that Cleveland 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.3.3.

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.35.** Only losses to buildings 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.35: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Cleveland County	$339,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table A.36.**

TABLE A.36: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Belwood	58	68	87	94
Boiling Springs	58	68	87	93
Casar	57	67	86	93
Earl	59	69	88	95
Fallston	58	68	87	94
Grover	60	70	88	96
Kingstown	61	71	90	97
Kings Mountain	58	68	86	93
Lattimore	58	68	86	93
Lawndale	58	68	87	94
Mooresboro	58	68	86	93
Patterson Springs	59	69	88	95
Polkville	57	67	86	93
Shelby	60	70	88	96
Waco	59	69	88	96
Unincorporated Area	61	71	80	90
MAXIMUM WIND SPEED REPORTED	**61**	**71**	**90**	**97**

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 Cleveland 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.45** 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 Cleveland 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 Cleveland 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.37** summarizes the findings.

TABLE A.37: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Cleveland County	$40,000

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.45**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Cleveland 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 Cleveland 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.3.9), county level tax parcel data, and GIS analysis. **Table A.38** presents the potential at-risk property where available. All areas of Cleveland County are identified as moderate or high incidence areas by the USGS landslide data. All areas are also of high

landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE A.38: 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	High	Moderate	High	Moderate	High
Belwood	686	0	414	0	$30,592,037	$0
Boiling Springs	1,687	0	1,314	0	$239,387,733	$0
Casar	231	0	154	0	$12,305,479	$0
Earl	154	0	98	0	$6,713,199	$0
Fallston	437	0	298	0	$27,973,608	$0
Grover	404	0	304	0	$22,496,439	$0
Kingstown	345	0	252	0	$15,131,648	$0
Kings Mountain	4,975	0	3,988	0	$466,349,108	$0
Lattimore	178	0	130	0	$12,011,781	$0
Lawndale	377	0	268	0	$10,636,366	$0
Mooresboro	215	0	155	0	$9,425,427	$0
Patterson Springs	220	0	179	0	$11,094,782	$0
Polkville	376	0	236	0	$19,017,096	$0
Shelby	10,327	453	8,266	269	$1,093,356,031	$395,705,084
Waco	0	167	0	130	$0	$41,990,995
Unincorporated Area	31,510	5,746	20,174	3,617	$2,148,111,765	$7,903,750
CLEVELAND COUNTY TOTAL	**52,122**	**6,366**	**36,230**	**4,016**	**$4,124,602,499**	**$445,599,829**

Source: USGS

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk.

Critical Facilities

All critical facilities are located in a high susceptibility area. Fifty-seven facilities in Cleveland County are located in the moderate incidence area (high susceptibility). The remaining 2 critical facilities are located in the high landslide incidence/susceptibility area. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Cleveland 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 Cleveland County is susceptible to flood events. A total of 13 flood events have been reported by the National Climatic Data Center resulting in $74,000 dollars in damages. On an annualized level, these damages amounted to $3,774 for Cleveland 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.39** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE A.39: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

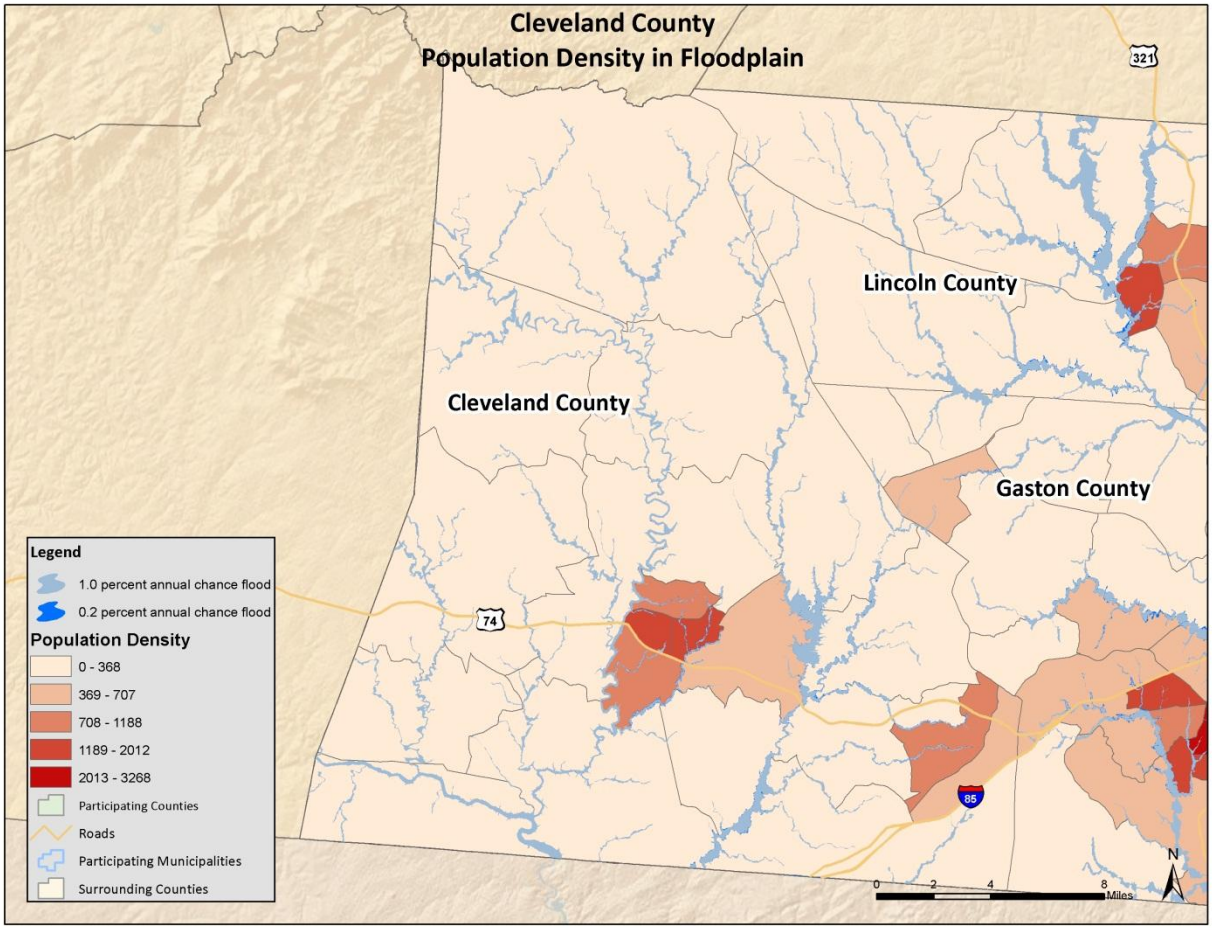
	1.0-percent ACF			0.2-percent ACF		
Location	**Approx. Number of Parcels**	**Approx. Number Improved Buildings**	**Approx. Improved Value of Buildings**	**Approx. Number of Parcels**	**Approx. Number Improved Buildings**	**Approx. Improved Value of Buildings**
Belwood	79	48	$2,816,461	0	0	$0
Boiling Springs	16	12	$2,966,018	0	0	$0
Casar	1	0	$0	0	0	$0
Earl	0	0	$0	0	0	$0
Fallston	0	0	$0	0	0	$0
Grover	0	0	$0	0	0	$0
Kings Mountain	107	65	$28,481,646	4	3	$123,860
Kingstown	3	3	$125,922	0	0	$0
Lattimore	0	0	$0	0	0	$0
Lawndale	0	12	$216,229	0	0	$0
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	8	2	$230,601	0	0	$0
Shelby	589	383	$96,886,489	58	39	$10,318,458
Waco	7	6	$584,665	0	0	$0
Unincorporated Area	3,364	1,735	$314,873,436	192	150	$29,510,480
CLEVELAND COUNTY TOTAL	**4,167**	**2,264**	**$436,220,849**	**254**	**192**	**$39,952,798**

Source: FEMA DFIRM

Social Vulnerability

Since 2010 population was only available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure A.28** is presented to gain a better understanding of at risk population.

FIGURE A.28 : POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, U.S. Census 2010

Critical Facilities

The critical facility analysis revealed that there are a no critical facilities located in the Cleveland County 1.0-percent annual chance floodplain and 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.45** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Cleveland 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 Cleveland County is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to

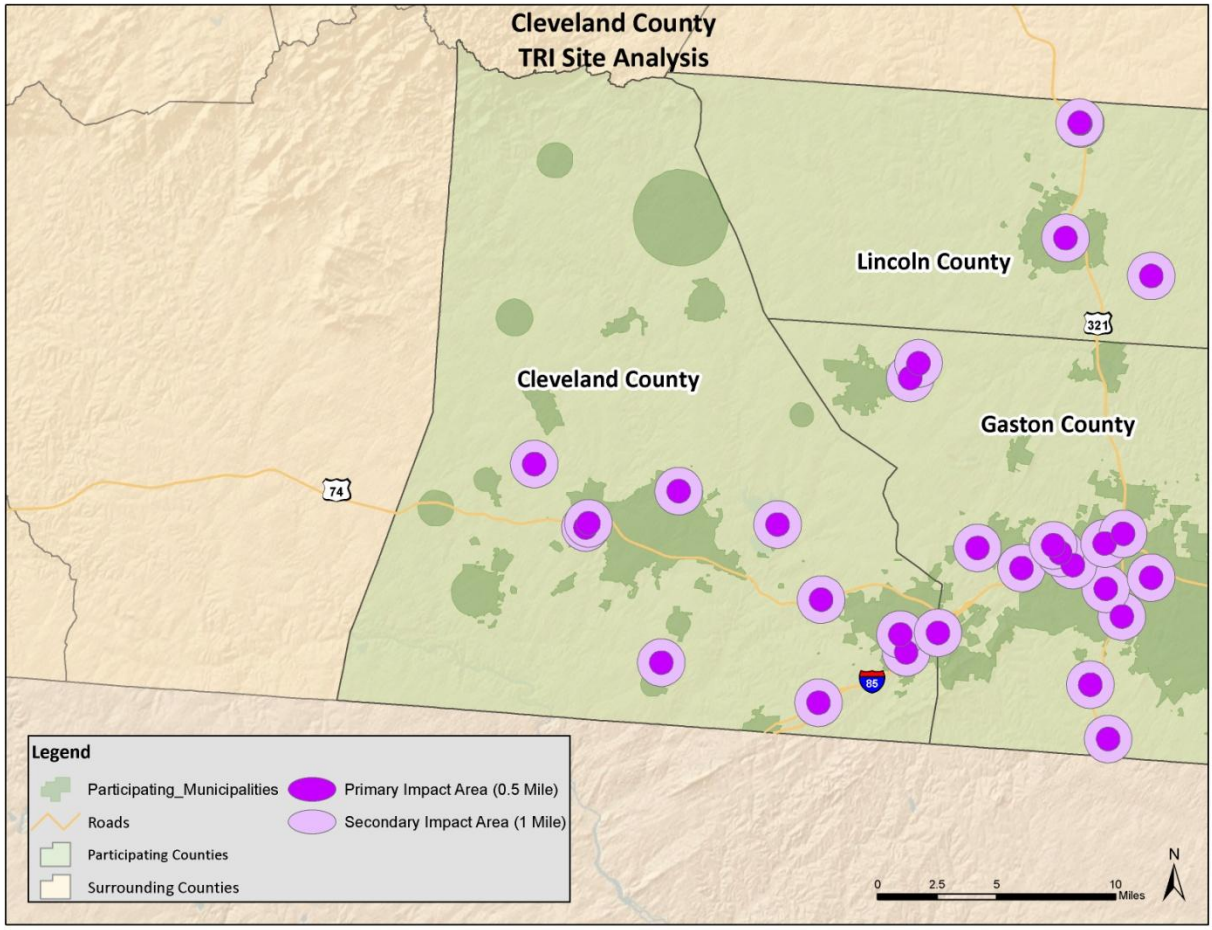
calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Cleveland County.

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.[21] In both scenarios, two sizes of buffers—0.5 mile and 1 mile buffer—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 Cleveland County, along with buffers, were used for analysis as shown in **Figure A.29.** 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.30** 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.40** (fixed sites), **Table A.41** (mobile road sites) and **Table A.42** (mobile railroad sites).[22]

[21] This type of analysis will likely yield conservative results (generally higher than what is actually reported after an event).
[22] Note that parcels included in the 1 mile analysis are also included in the 0.5 mile analysis.

FIGURE A.29 : TRI SITES WITH BUFFERS IN CLEVELAND COUNTY



Source: EPA

TABLE A.40: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

	0.5-mile buffer			1.0-mile buffer		
Location	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	1	1	$94,432	86	49	$3,504,372
Fallston	0	0	$0	0	0	$0
Grover	0	0	$0	0	0	$0
Kingstown	0	0	$0	0	0	$0
Kings Mountain	494	371	$63,862,476	2,139	1,726	$270,093,406
Lattimore	0	0	$0	0	0	$0
Lawndale	0	0	$0	0	0	$0
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	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
Shelby	501	289	$56,919,672	1,516	1,080	$380,734,087
Waco	0	0	$0	0	0	$0
Unincorporated Area	637	434	$113,349,213	2,474	1,663	$360,226,078
CLEVELAND COUNTY TOTAL	**1,633**	**1,095**	**$234,225,793**	**6,215**	**4,518**	**$1,014,557,943**

FIGURE A.30 : MOBILE HAZMAT BUFFERS IN CLEVELAND COUNTY

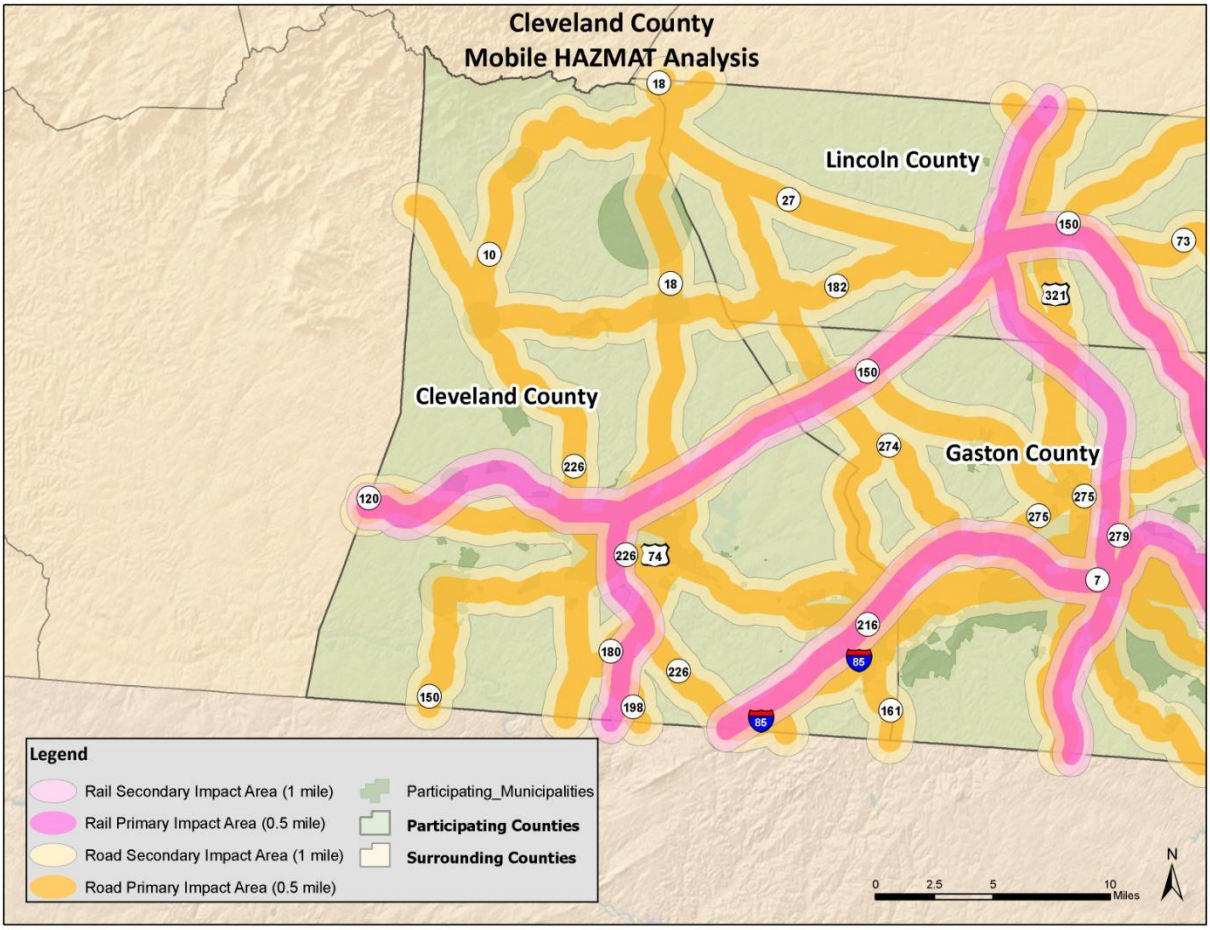


TABLE A.41: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

Location	0.5-meter buffer			1.0-meter buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Belwood	297	194	$14,927,335	471	304	$23,461,639
Boiling Springs	857	659	$136,550,386	1,316	1,031	$190,184,269
Casar	225	149	$11,811,644	231	154	$12,305,479

	0.5-meter buffer			1.0-meter buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Earl	154	98	$6,713,199	154	98	$6,713,199
Fallston	425	287	$27,190,992	437	298	$27,973,608
Grover	404	304	$22,496,439	404	304	$22,496,439
Kingstown	2	2	$111,465	66	39	$2,130,556
Kings Mountain	4,523	3,661	$432,219,367	4,975	3,988	$466,349,108
Lattimore	0	0	$0	27	21	$1,958,976
Lawndale	375	267	$10,600,956	377	268	$10,636,366
Mooresboro	194	141	$8,792,187	215	155	$9,425,427
Patterson Springs	220	179	$11,094,782	220	179	$11,094,782
Polkville	373	235	$18,923,714	376	236	$19,017,096
Shelby	9,419	7,477	$988,476,300	10,674	8,458	$1,112,699,524
Waco	167	130	$7,903,750	167	130	$7,903,750
Unincorporated Area	13,913	9,109	$994,460,703	22,282	14,348	$1,548,804,128
CLEVELAND COUNTY TOTAL	**31,548**	**22,892**	**$2,692,273,219**	**42,392**	**30,011**	**$3,473,154,346**

TABLE A.42: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

	0.5-meter buffer			1.0-meter buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	141	96	$6,643,896	154	98	$6,713,199
Fallston	0	0	$0	0	0	$0
Grover	293	232	$18,103,548	402	302	$22,403,159
Kingstown	0	0	$0	0	0	$0
Kings Mountain	2,682	2,265	$210,689,081	3,917	3,306	$355,717,859
Lattimore	157	116	$10,946,203	178	130	$12,011,781
Lawndale						
Mooresboro	194	140	$8,181,587	215	155	$9,425,427
Patterson Springs	204	165	$10,000,711	220	179	$11,094,782
Polkville	0	0	$0	0	0	$0
Shelby	4,021	3,000	$387,305,638	7,051	5,485	$659,615,537
Waco	116	90	$5,196,587	167	130	$7,903,750
Unincorporated Area	3,012	1,957	$329,869,180	6,002	4,023	$552,159,492
CLEVELAND COUNTY TOTAL	**10,820**	**8,061**	**$986,936,431**	**18,306**	**13,808**	**$1,637,044,986**

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 nine Cleveland County facilities located in a HAZMAT risk zone. The primary impact zone includes just one facility, a school. The remaining facilities are in the secondary, 1 mile zone. A list of specific critical facilities and their associated risk can be found in **Table A.45** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Cleveland County revealed that there are 51 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 30 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for railroad and/or the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table A.45** 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 Cleveland 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.

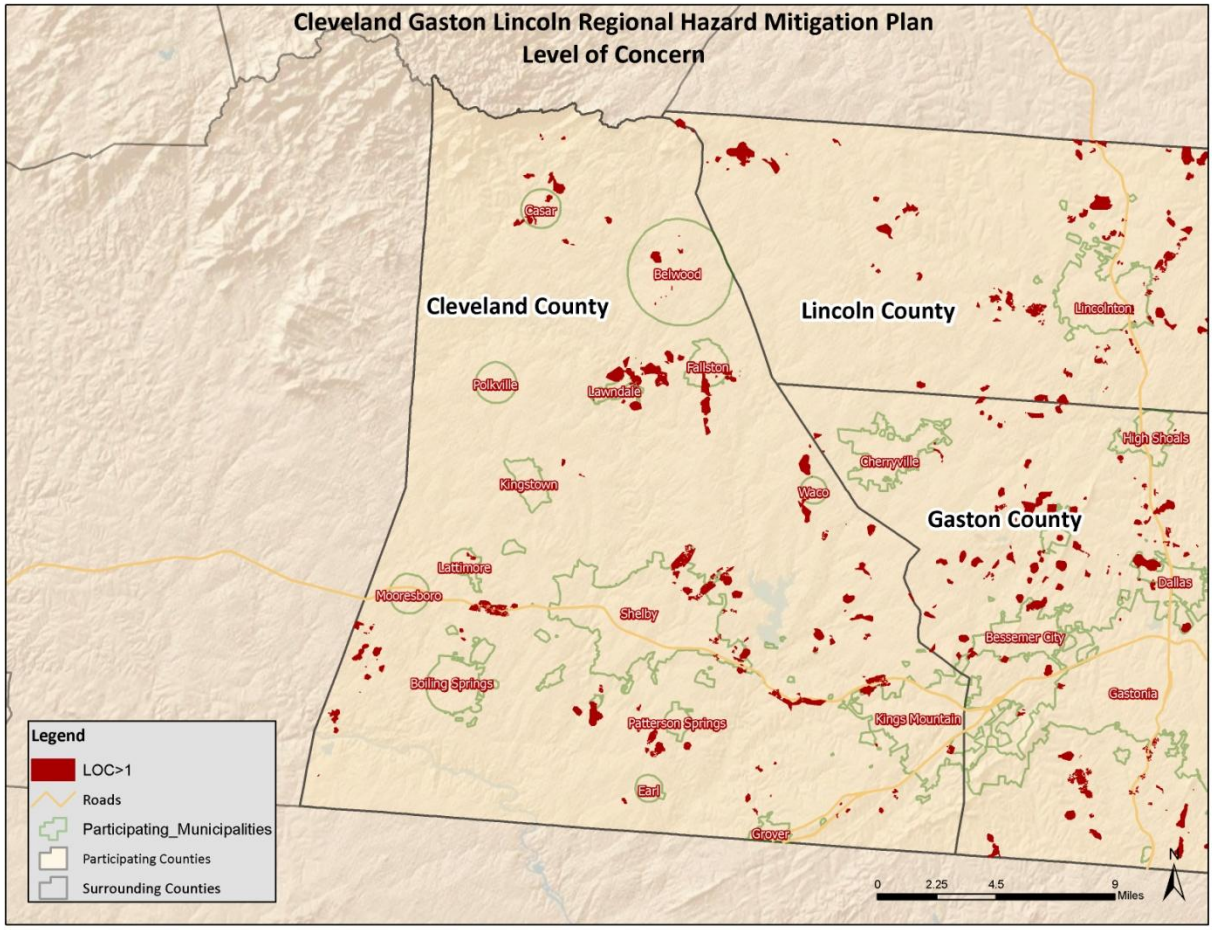
Wildfire

Although historical evidence indicates that Cleveland County is susceptible to wildfire events, there are few reports of 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.31**, **Figure A.32**, **Figure A.33**, **Figure A.34**, **Figure A.35**, **Figure A.36**, **Figure A.37**, **Figure A.38**, **Figure A.39**, **Figure A.40**, **Figure A.41**, **Figure A.42**, **Figure A.43**, **Figure A.44**, **Figure A.45**, and **Figure A.46** 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). Six was the highest level recorded in the Cleveland Gaston Lincoln planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The region contains some lands where the value falls into the at-risk category, though the region has somewhat less land labeled as at-risk compared to other regions of North Carolina. Since all of this land area is on the lower tenth of the overall LOC scale, there is likely considerably less risk in the region than in other areas of the country.

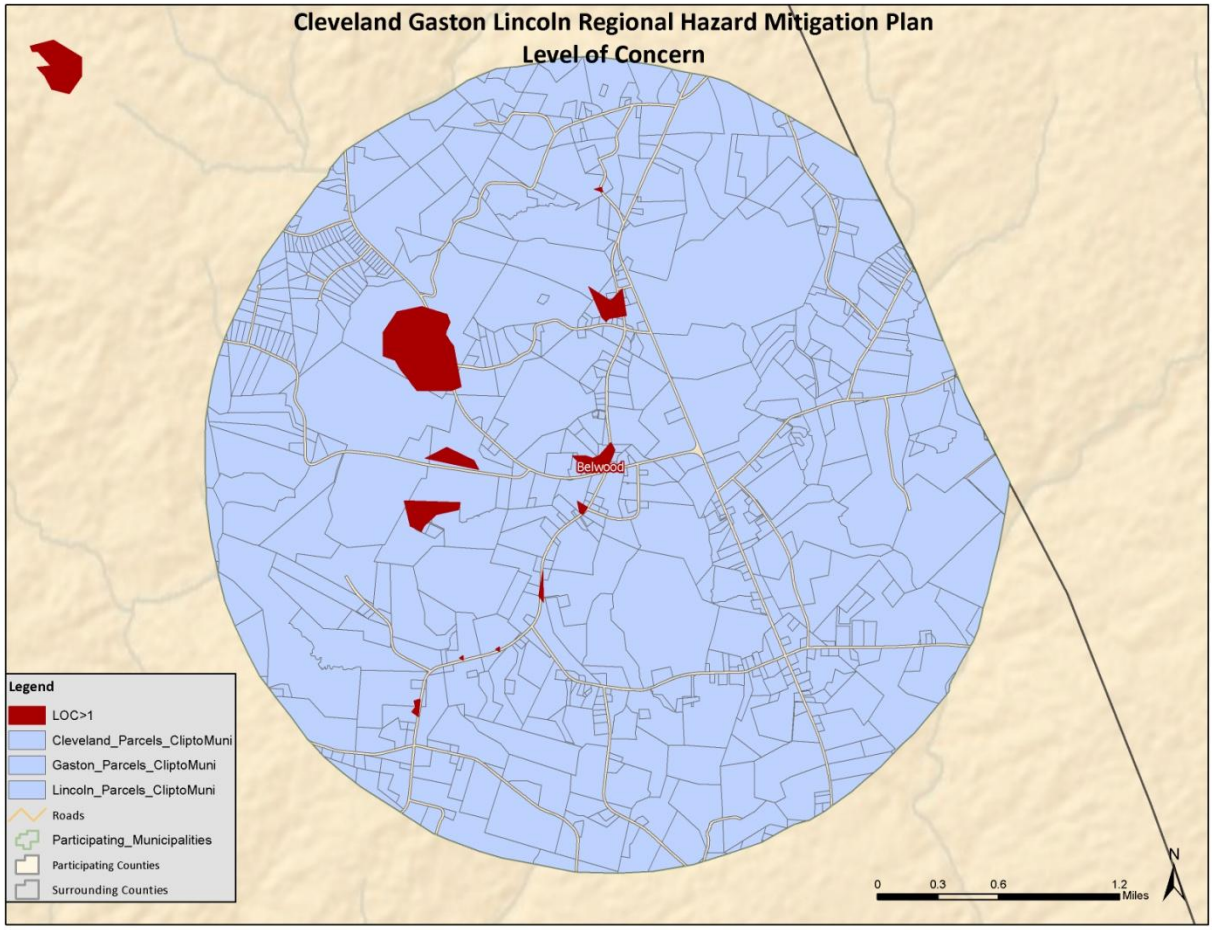
Table A.43 shows the results of the analysis.

FIGURE A.31: WILDFIRE RISK AREAS IN CLEVELAND COUNTY



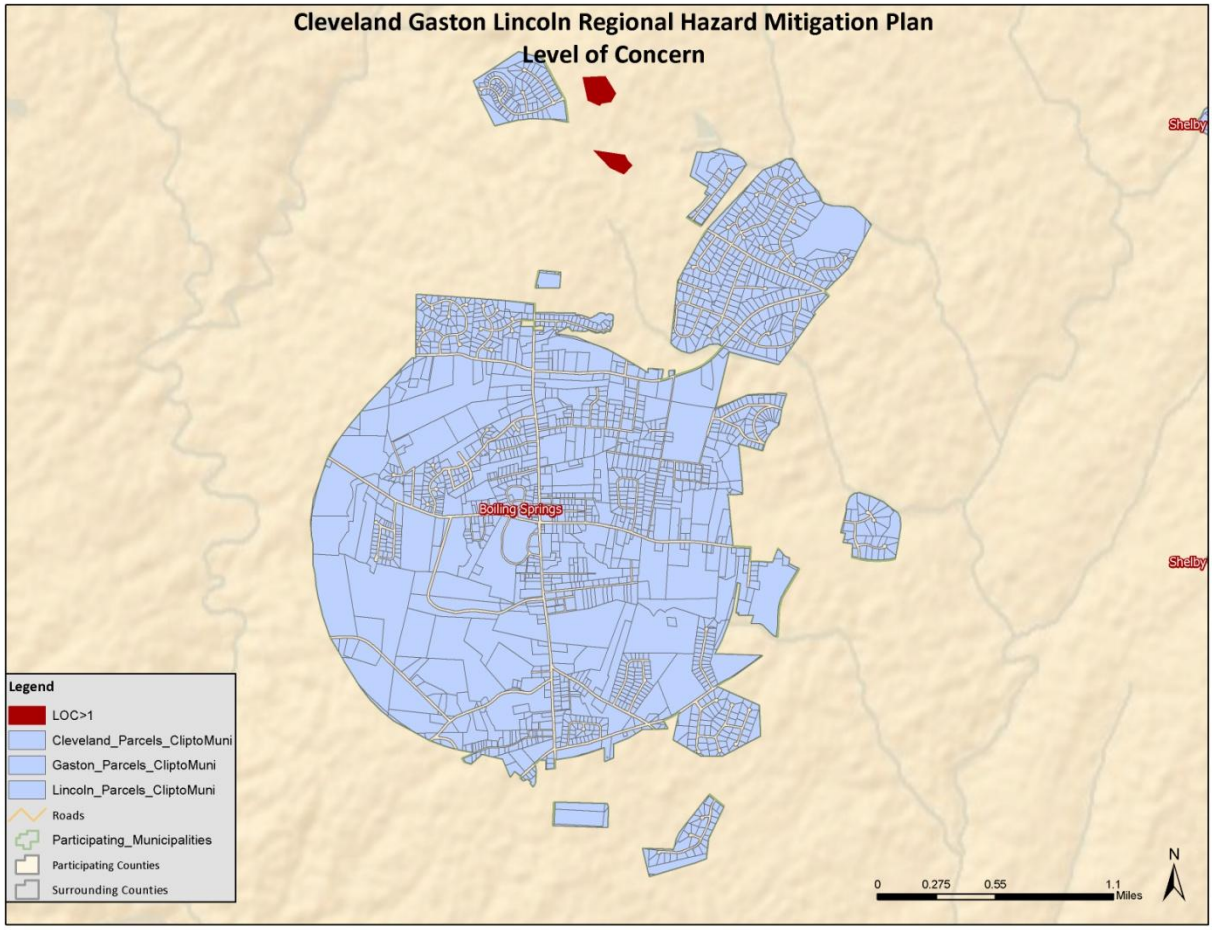
Source: Southern Wildfire Risk Assessment Data

FIGURE A.32: WILDFIRE RISK AREAS IN BELWOOD



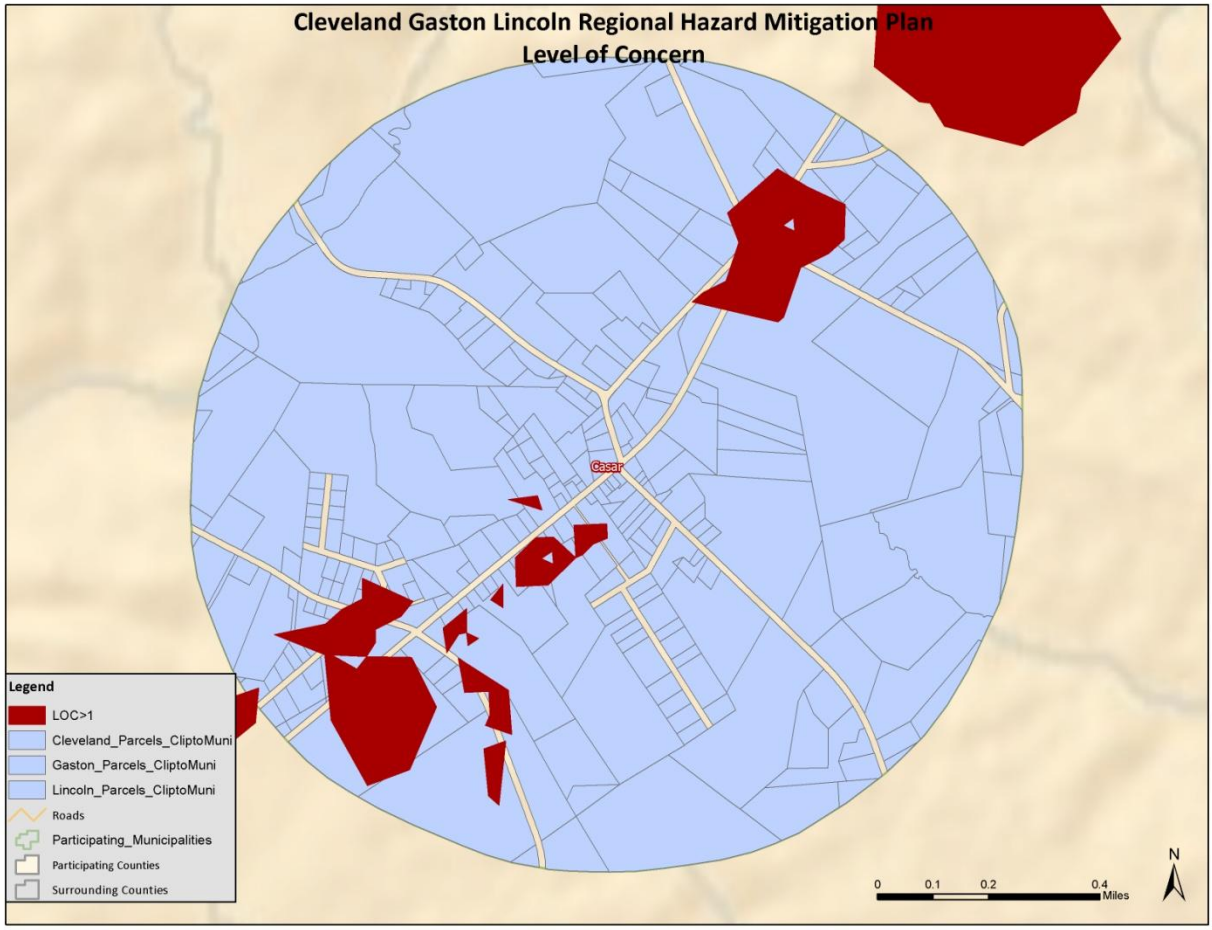
Source: Southern Wildfire Risk Assessment Data

FIGURE A.33: WILDFIRE RISK AREAS IN BOILING SPRINGS



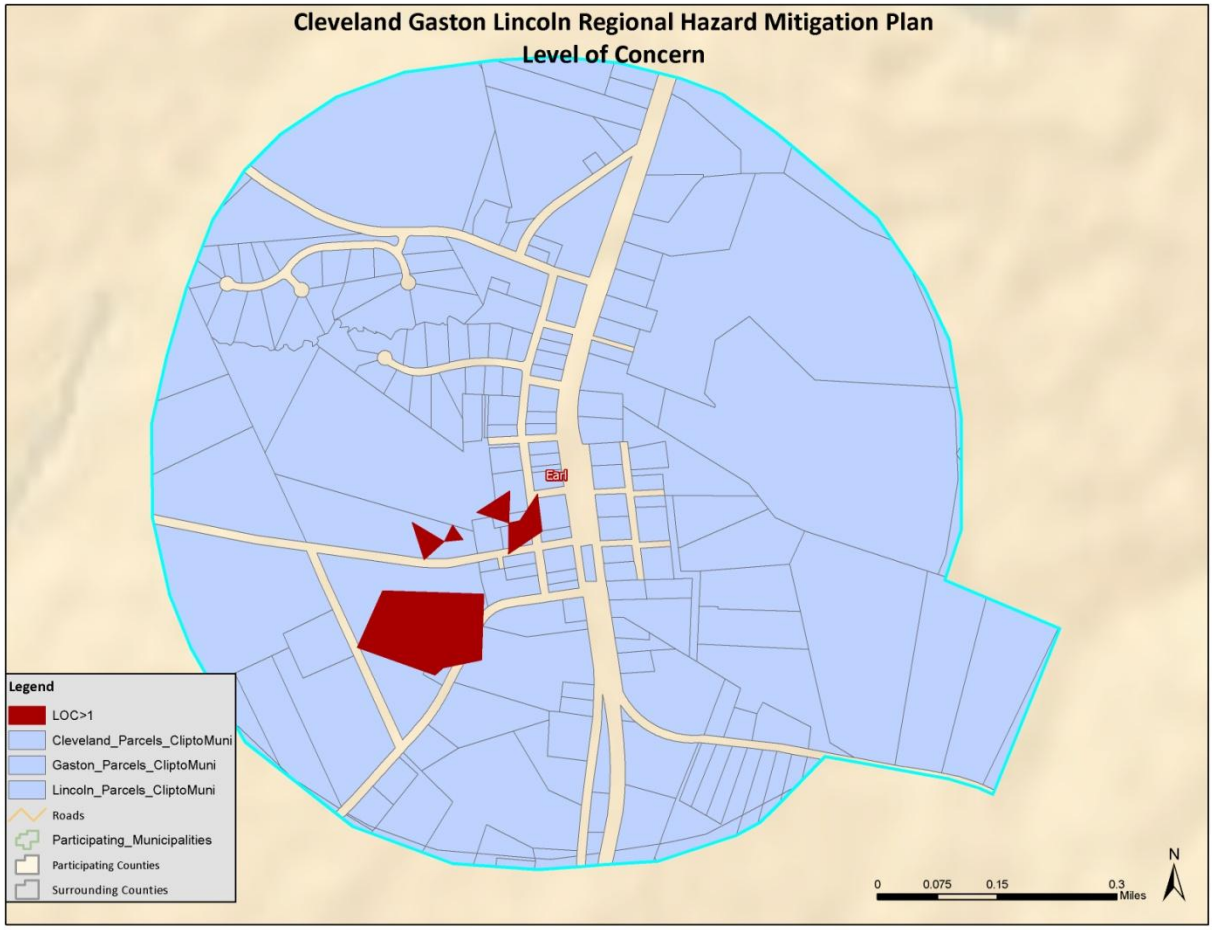
Source: Southern Wildfire Risk Assessment Data

FIGURE A.34: WILDFIRE RISK AREAS IN CASAR



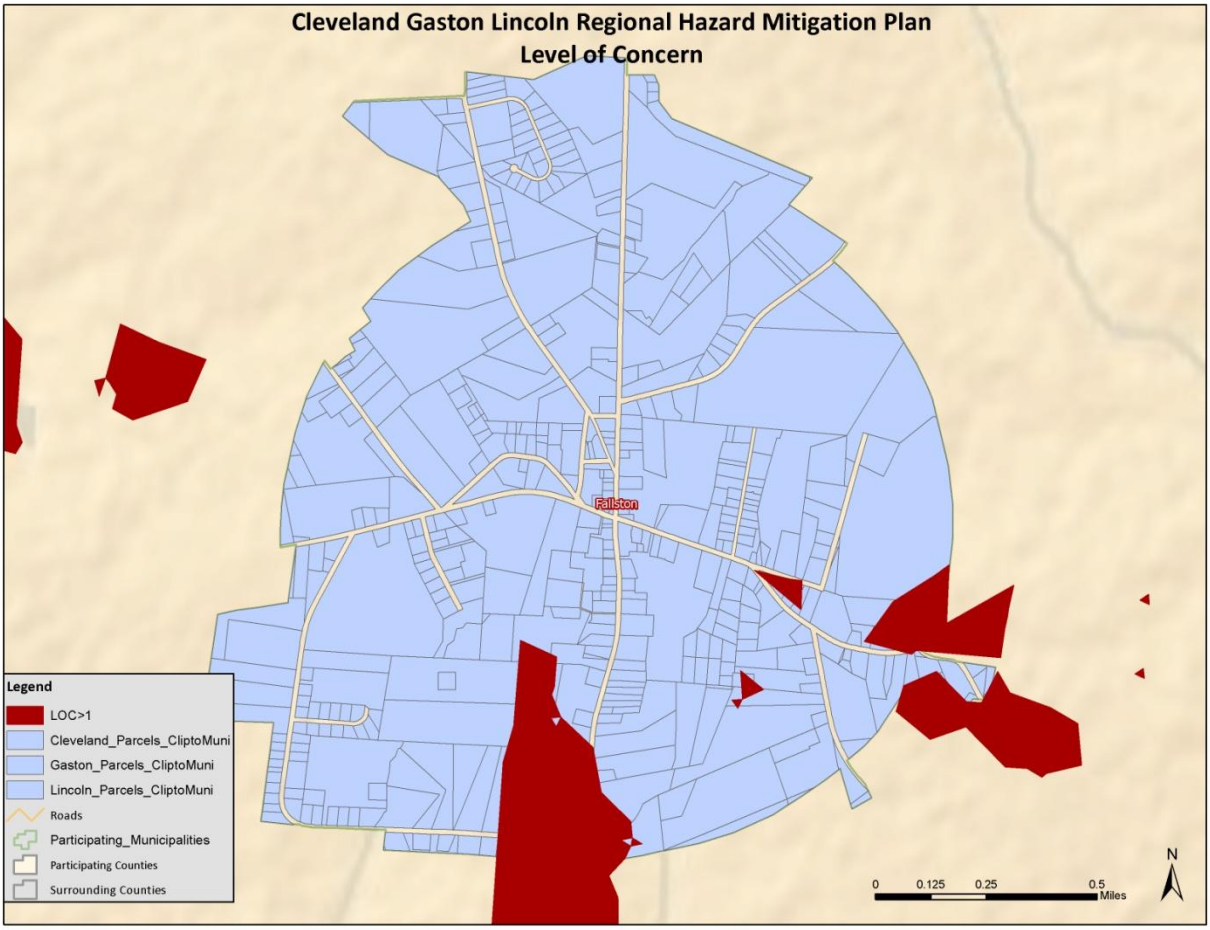
Source: Southern Wildfire Risk Assessment Data

FIGURE A.35: WILDFIRE RISK AREAS IN EARL



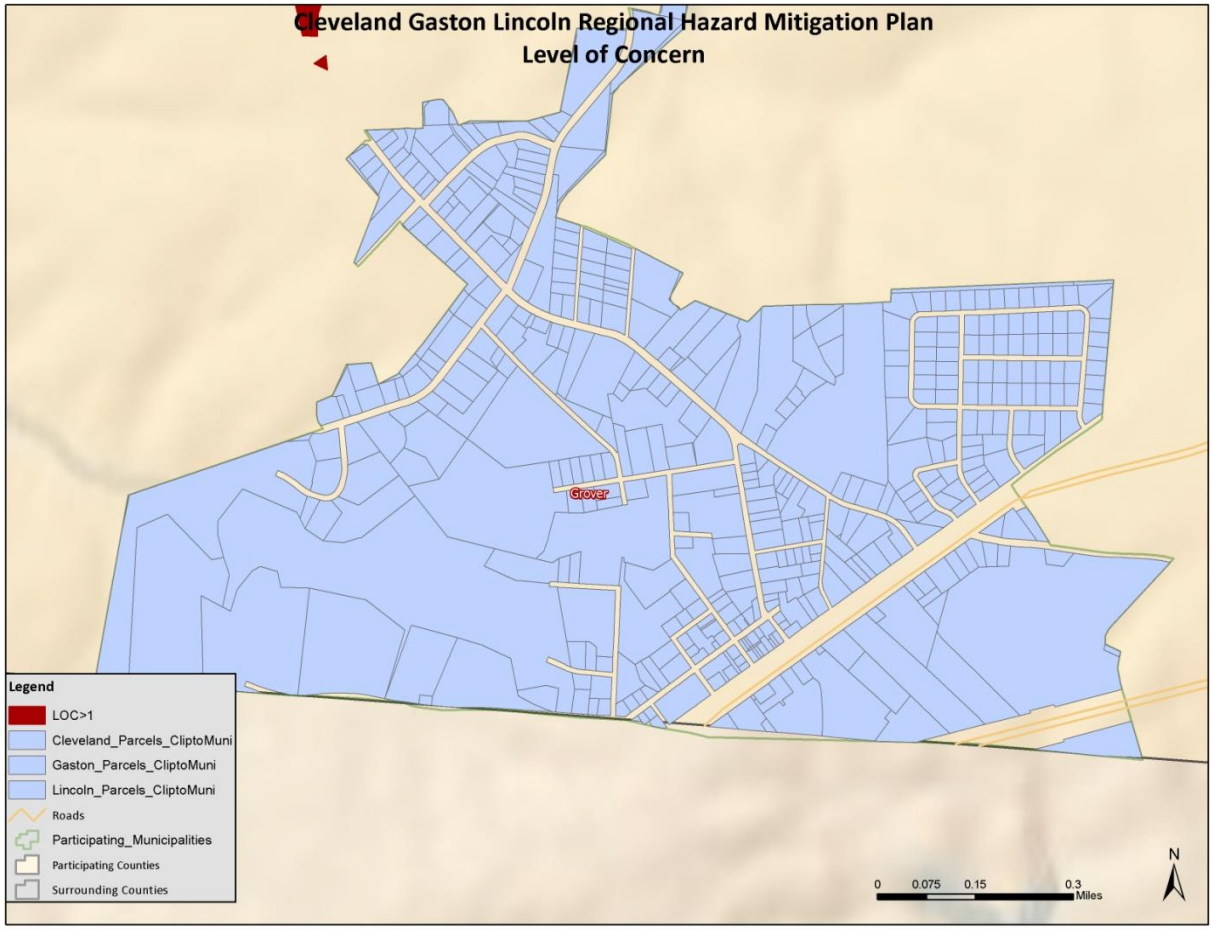
Source: Southern Wildfire Risk Assessment Data

FIGURE A.36: WILDFIRE RISK AREAS IN FALLSTON



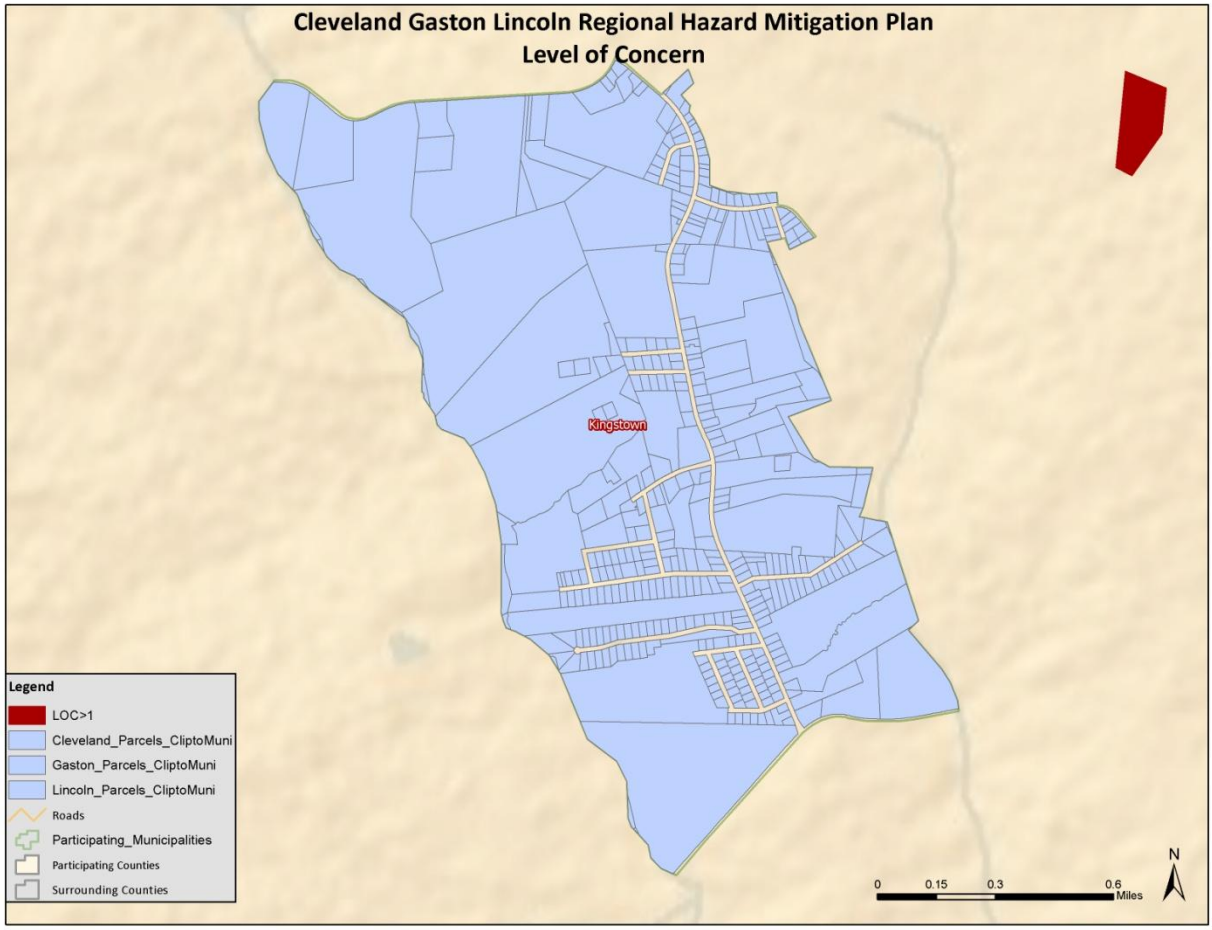
Source: Southern Wildfire Risk Assessment Data

FIGURE A.37: WILDFIRE RISK AREAS IN GROVER



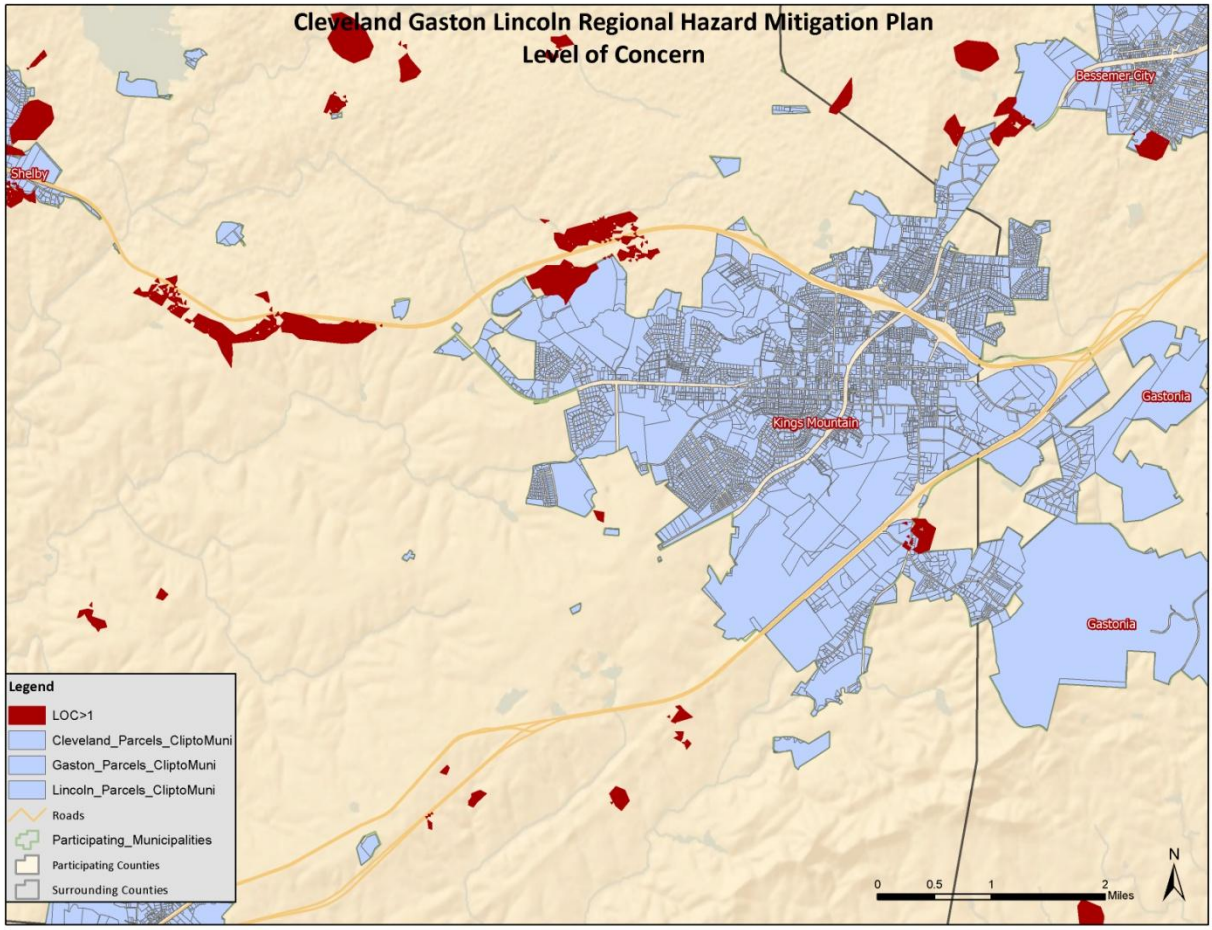
Source: Southern Wildfire Risk Assessment Data

FIGURE A.38: WILDFIRE RISK AREAS IN KINGSTOWN



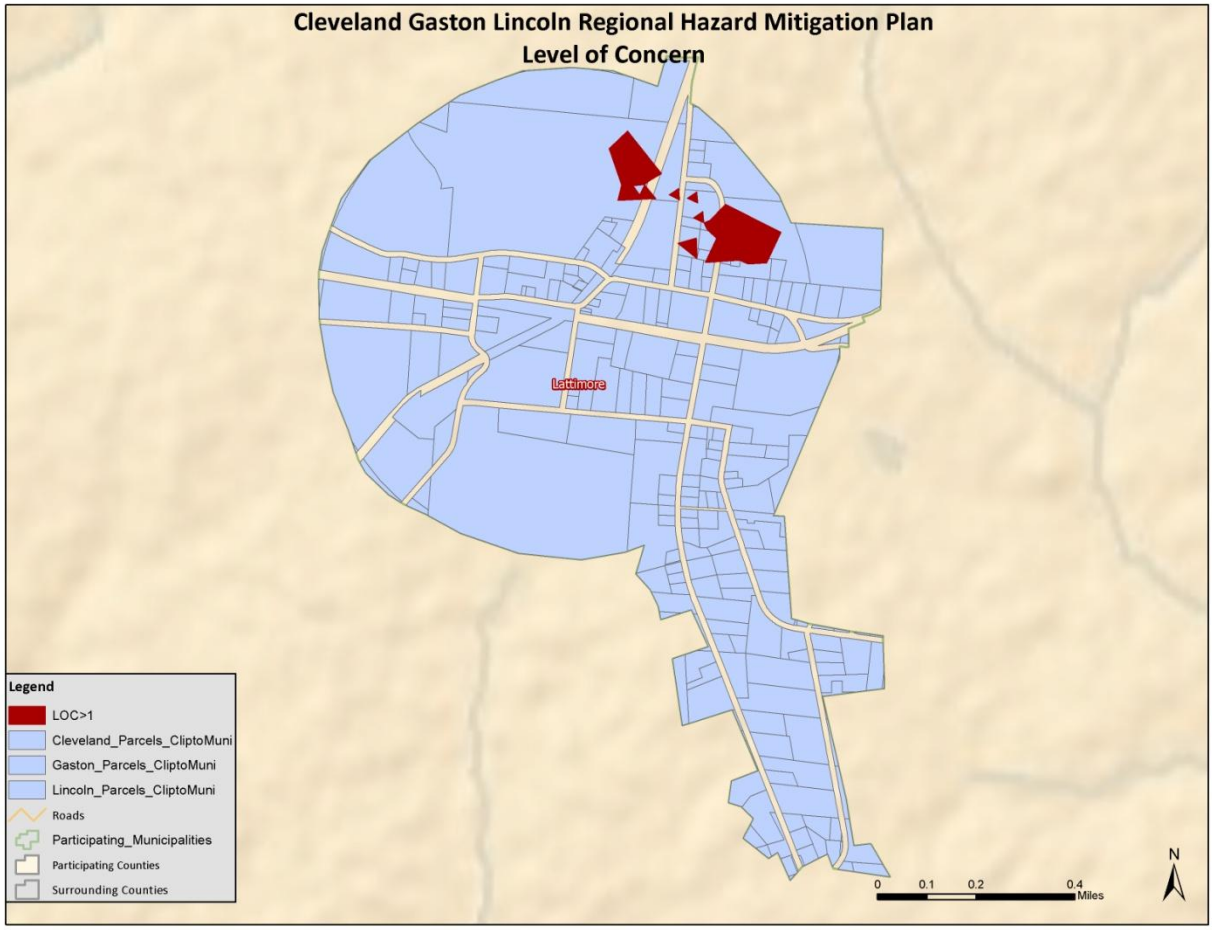
Source: Southern Wildfire Risk Assessment Data

FIGURE A.39: WILDFIRE RISK AREAS IN KINGS MOUNTAIN



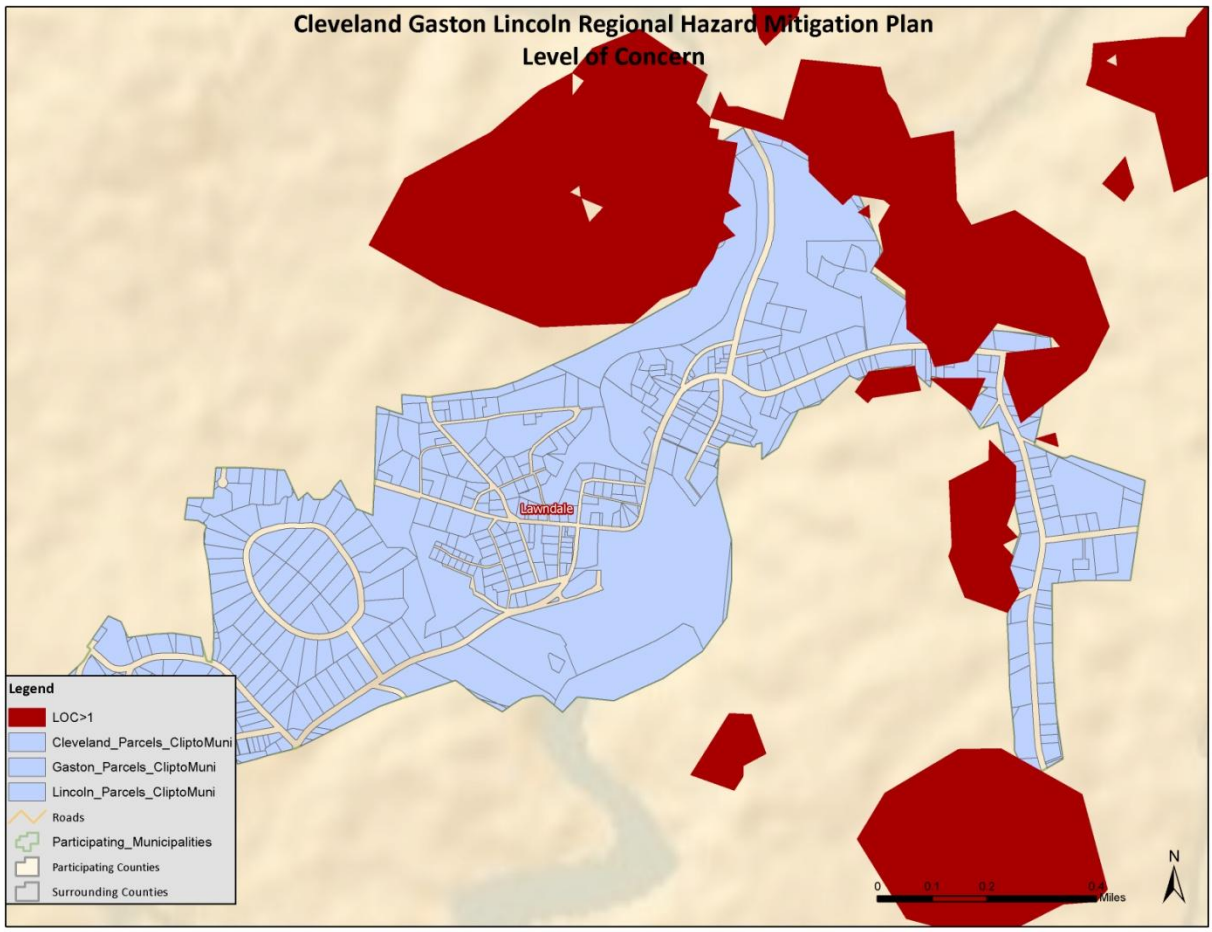
Source: Southern Wildfire Risk Assessment Data

FIGURE A.40: WILDFIRE RISK AREAS IN LATTIMORE



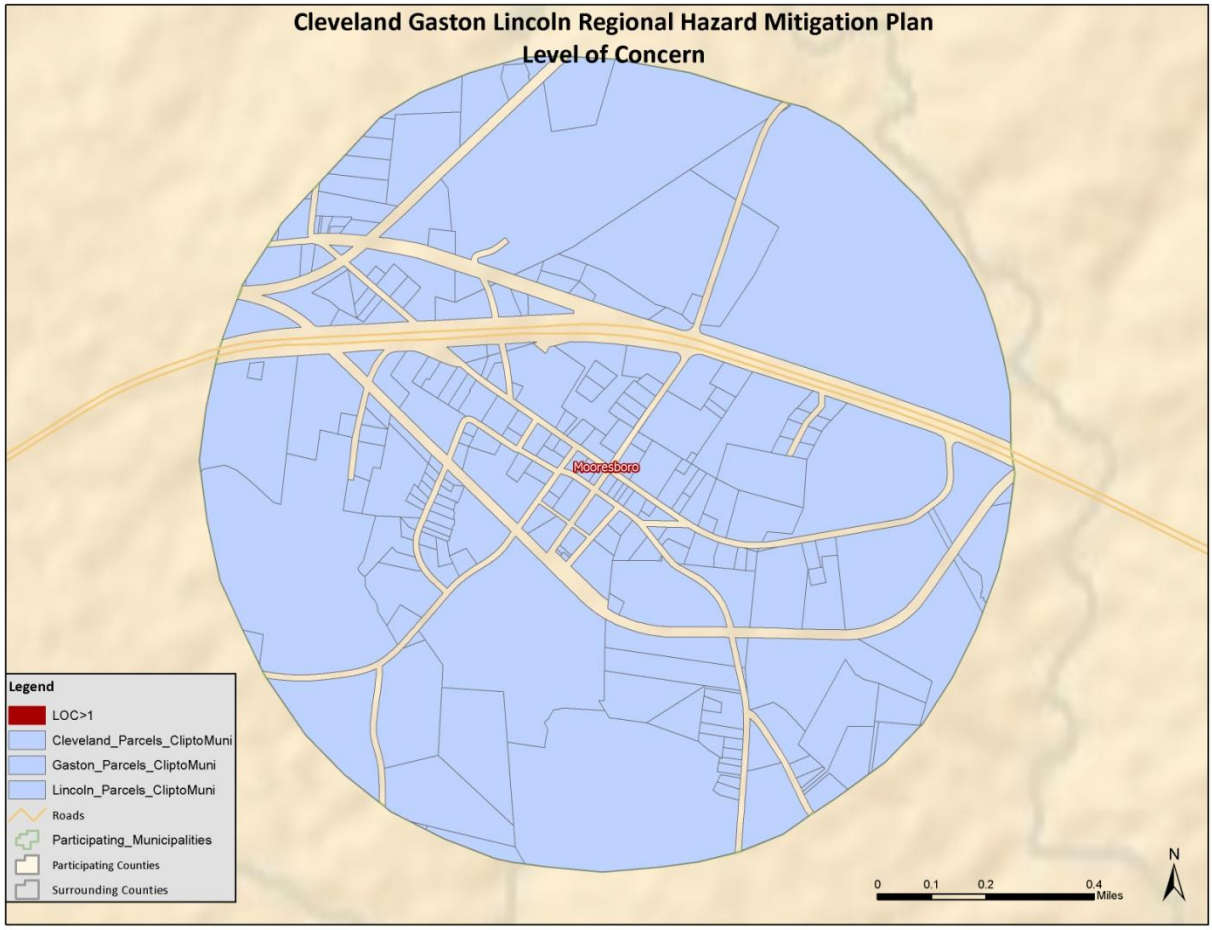
Source: Southern Wildfire Risk Assessment Data

FIGURE A.41: WILDFIRE RISK AREAS IN LAWNDALE



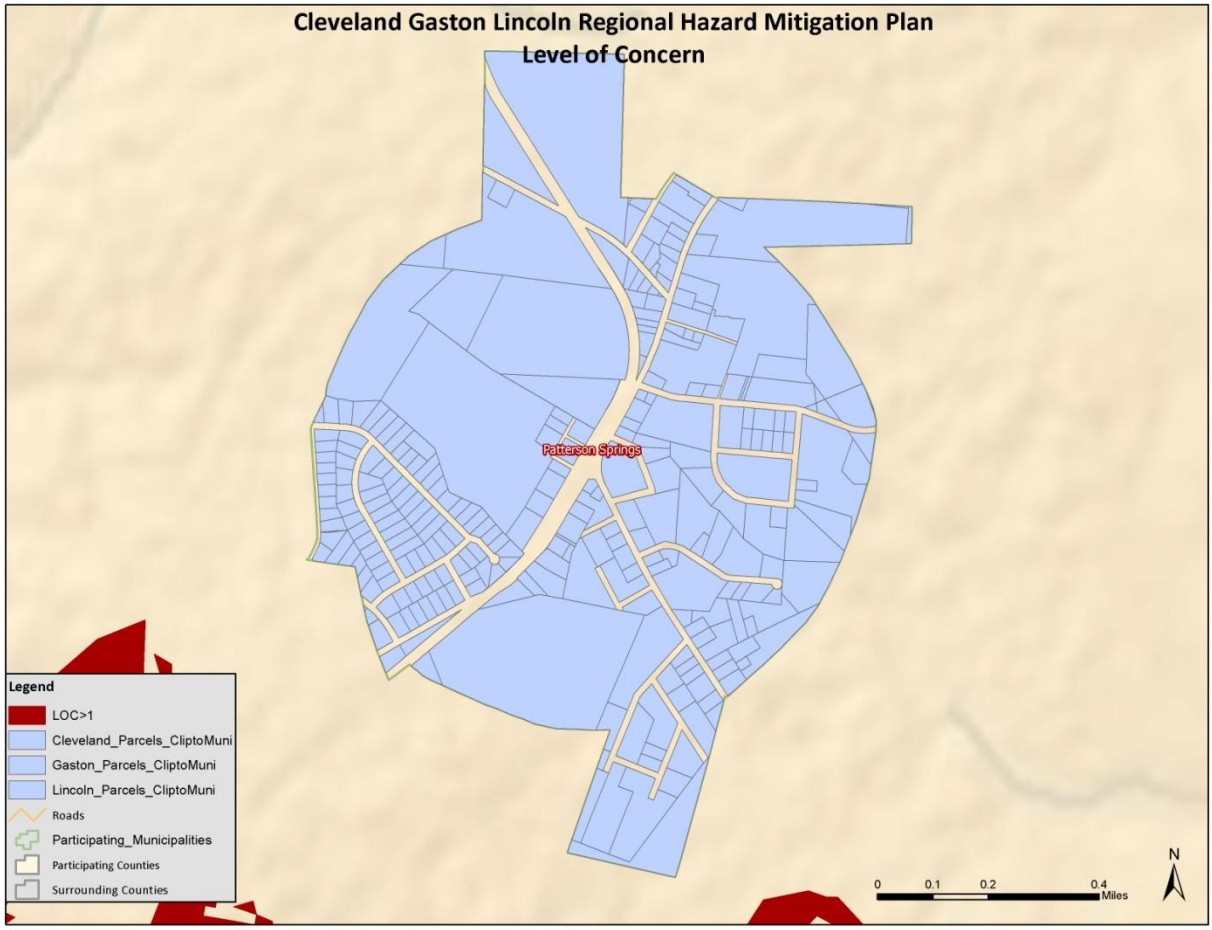
Source: Southern Wildfire Risk Assessment Data

FIGURE A.42: WILDFIRE RISK AREAS IN MOORESBORO



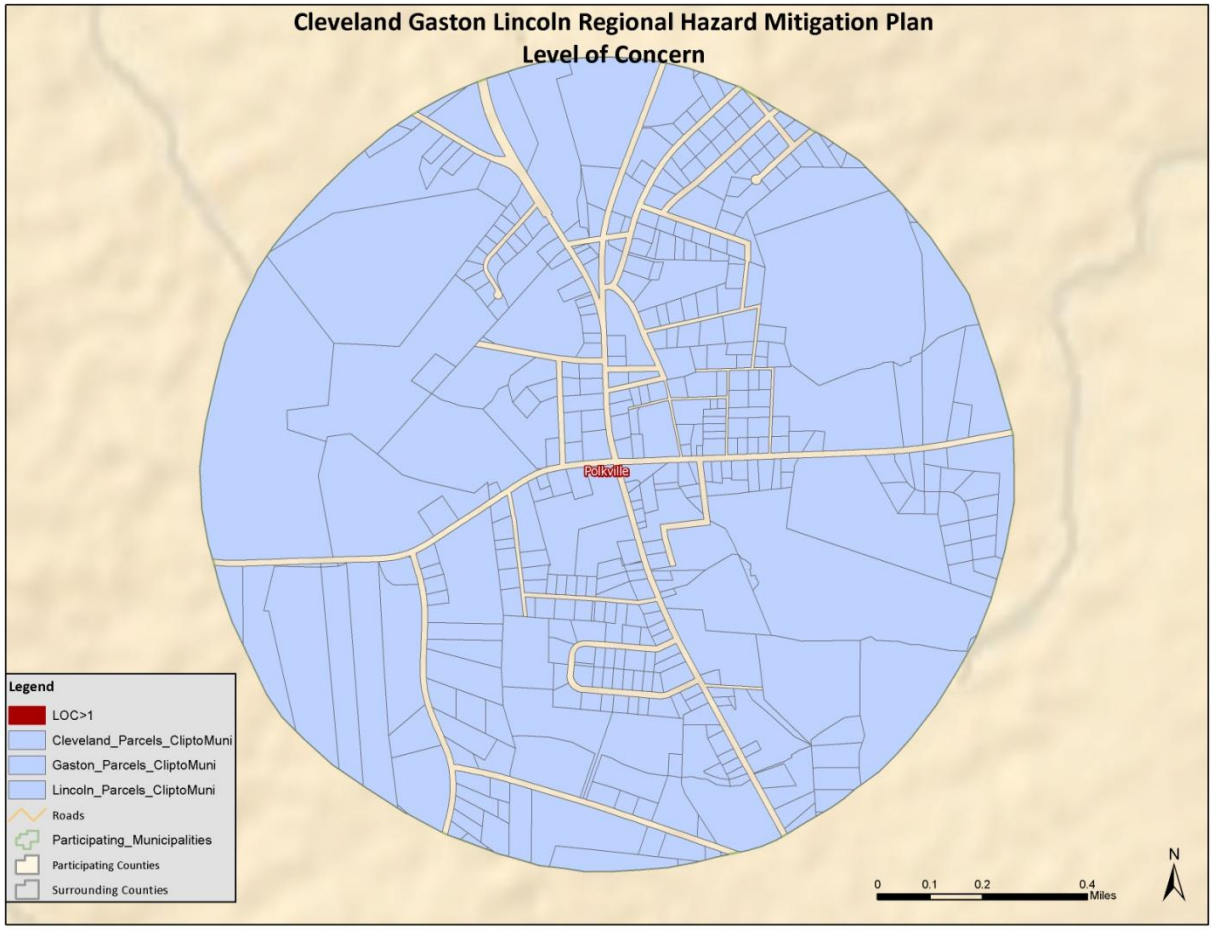
Source: Southern Wildfire Risk Assessment Data

FIGURE A.43: WILDFIRE RISK AREAS IN PATTERSON SPRINGS



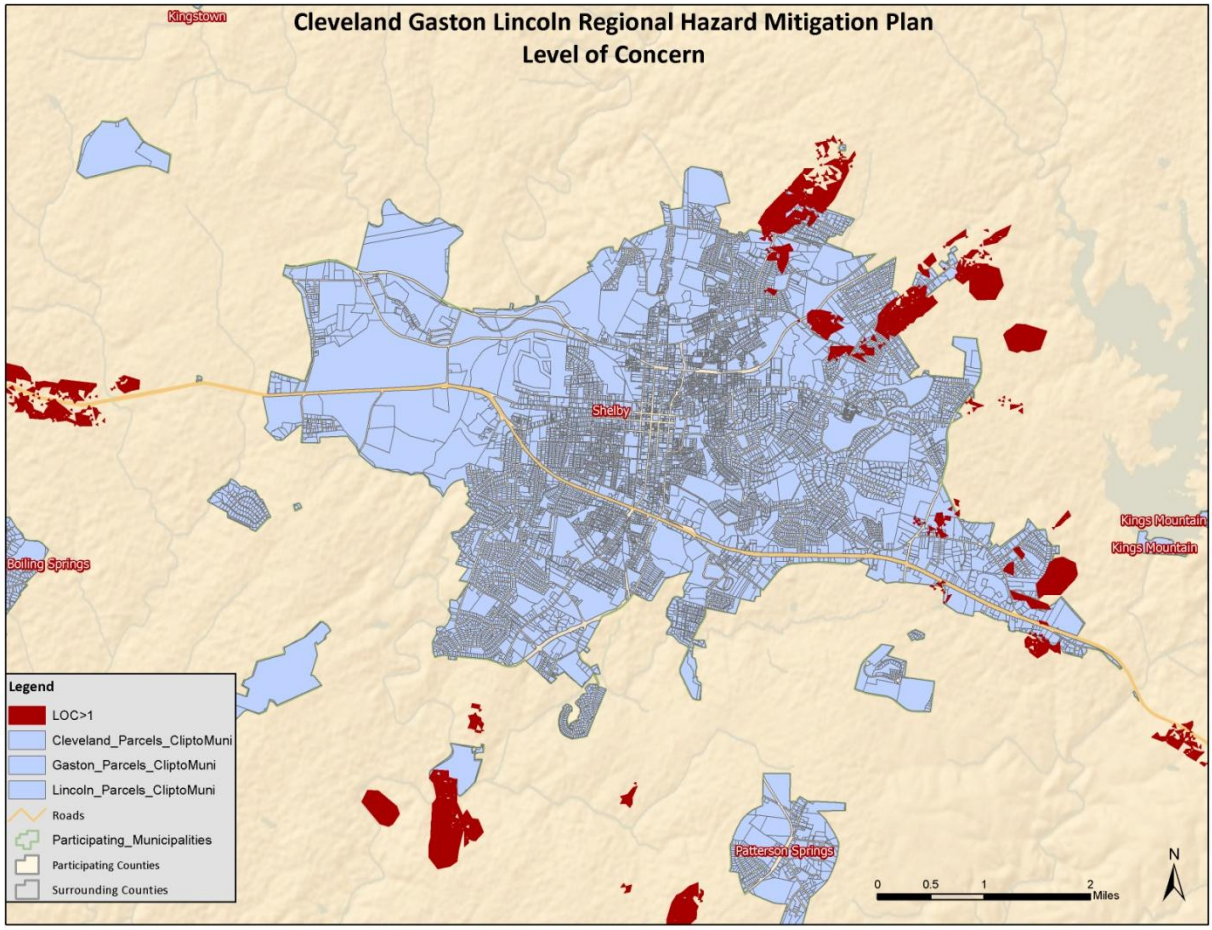
Source: Southern Wildfire Risk Assessment Data

FIGURE A.44: WILDFIRE RISK AREAS IN POLKVILLE



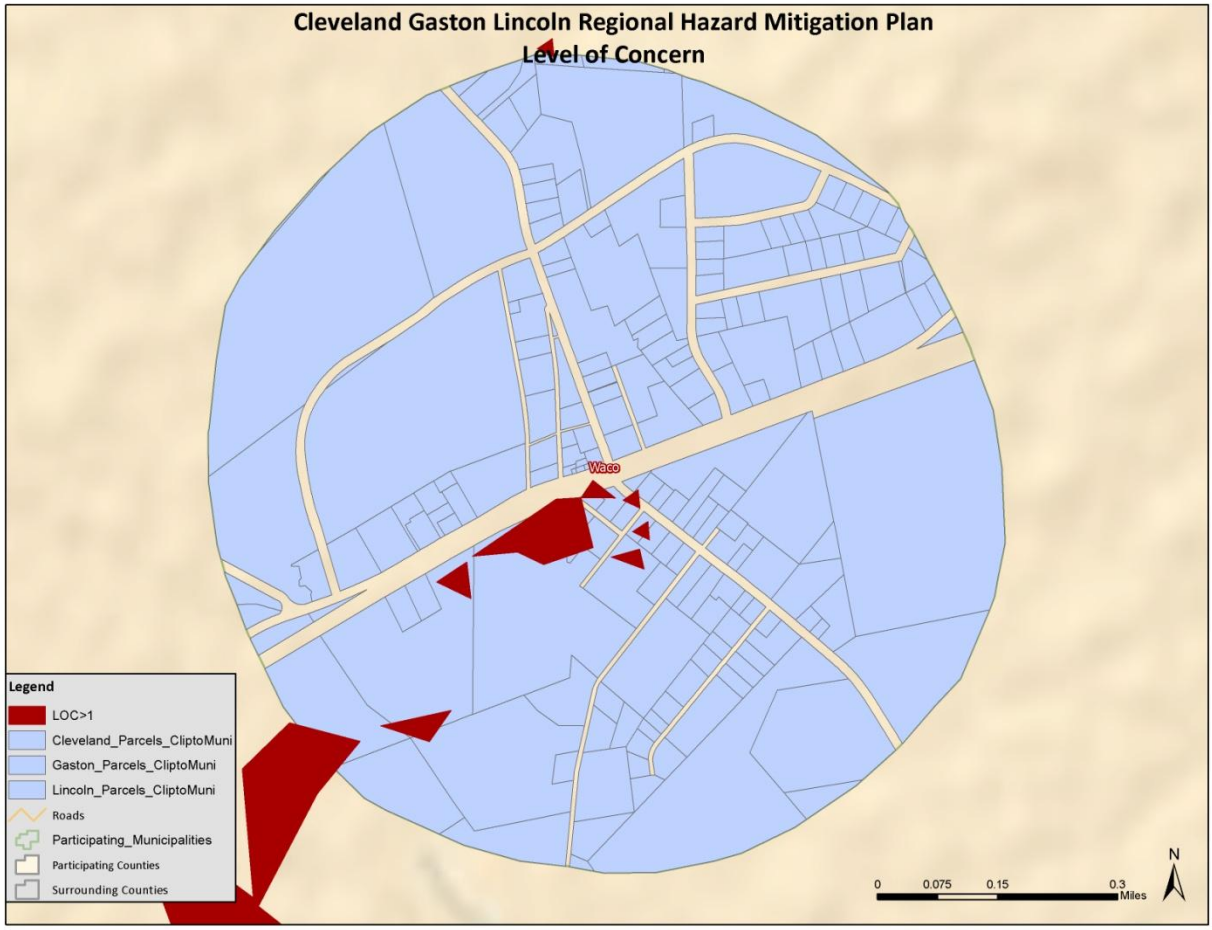
Source: Southern Wildfire Risk Assessment Data

FIGURE A.45: WILDFIRE RISK AREAS IN SHELBY



Source: Southern Wildfire Risk Assessment Data

FIGURE A.46: WILDFIRE RISK AREAS IN WACO



Source: Southern Wildfire Risk Assessment Data

TABLE A.43: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value**
Belwood	53	32	$2,928,213
Boiling Springs	0	0	$0
Casar	47	34	$7,136,006
Earl	12	10	$554,341
Fallston	35	25	$1,787,318
Grover	0	0	$0
Kingstown	0	0	$0
Kings Mountain	11	7	$169,637
Lattimore	12	9	$963,841
Lawndale	29	21	$1,474,674
Mooresboro	0	0	$0
Patterson Springs	0	0	$0
Polkville	0	0	$0

	HIGH WILDFIRE RISK AREA		
Location	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Shelby	331	233	$73,528,366
Waco	12	11	$892,319
Unincorporated Area	1,346	890	$107,523,321
CLEVELAND COUNTY TOTAL	**1,888**	**1,272**	**$196,958,036**

Looking at jurisdictional level, unincorporated areas of the county face the highest level of concern areas. However, some areas of the county (notably Shelby) 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 two critical facilities located in wildfire areas of concern. 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.45** 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 Cleveland County.

Conclusions on Hazard Vulnerability

Table A.44 presents a summary of annualized loss for each hazard in Cleveland 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 A.44: ANNUALIZED LOSS FOR CLEVELAND COUNTY

Event	Cleveland County
Dam Failure	Negligible
Drought	Negligible
Extreme Heat	Negligible
Erosion	Negligible
Hail	Negligible
Hurricane & Tropical Storm	$339,000
Landslide	Negligible

Event	Cleveland County
Lightning	$113,416
Thunderstorm Wind/High Wind	$73,813
Tornado	$1,394,197
Winter Storm & Freeze	$1,130,502
Flood	$3,774
Earthquake	$40,000
HAZMAT Incident	Negligible
Wildfire	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, 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.45** 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.45: AT-RISK CRITICAL FACILITIES IN CLEVELAND COUNTY

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER							
FACILITY NAME	FACILITY TYPE	Drought	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
CLEVELAND COUNTY																					
Police Station	Police	X	X	X	X	X	X	X	X		X						X				
FALLSTON ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X				
Fallston Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X				
Polkville Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X				
Lawndale Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X				
Waco Fire Station	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X		
Lattimore Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X		X	X		
Hospital	Medical	X	X	X	X	X	X	X	X		X				X		X		X		
Police Station	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X		
NORTH ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X		X		
EAST ELEMENTARY	Education	X	X	X	X	X	X	X	X		X					X	X	X	X		
WEST ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X		
KINGS MOUNTAIN HIGH	Education	X	X	X	X	X	X	X	X		X						X		X		
KINGS MOUNTAIN MIDDLE	Education	X	X	X	X	X	X	X	X		X						X		X		
DAVIDSON SCHOOL	Education	X	X	X	X	X	X	X	X		X						X		X		
CCS BUSINESS OFFICES	Education	X	X	X	X	X	X	X	X		X					X	X	X	X		
Kings Mountain Fire Station #2	Fire/EMS	X	X	X	X	X	X	X	X		X						X				
Kings Mountain Fire Station #1	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X		

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
Hospital	Medical	X	X	X	X	X	X	X	X		X					X	X	X	X	
Police Station	Police	X	X	X	X	X	X	X	X		X						X	X	X	
Police Station	Police	X	X	X	X	X	X	X	X		X						X	X	X	
JEFFERSON ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
GRAHAM ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X		X		X	
ELIZABETH INTERMEDIATE	Education	X	X	X	X	X	X	X	X		X						X			
JAMES LOVE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
MARION ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X		X	
NORTH SHELBY SCHOOL	Education	X	X	X	X	X	X	X	X		X				X	X	X		X	
SHELBY HIGH	Education	X	X	X	X	X	X	X	X		X						X	X	X	
SHELBY MIDDLE	Education	X	X	X	X	X	X	X	X		X						X		X	
CCS ADMINISTRATIVE OFFICES	Education	X	X	X	X	X	X	X	X		X						X			
CCS INSTRUCTIONAL OFFICES	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Cleveland Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Shelby #1 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Shelby #2 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X		X	
Shelby #3 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Hospital	Medical	X	X	X	X	X	X	X	X		X						X			
BOILING SPRINGS ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
Boiling Springs Rural Station #1	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Police Station	Police	X	X	X	X	X	X	X	X		X					X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
GROVER ELEMENTARY	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Grover Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
CASAR ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
Casar Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
UNION ELEMENTARY	Education	X	X	X	X	X	X	X	X		X						X			
WASHINGTON ELEMENTARY	Education	X	X	X	X	X	X	X	X	X										
SPRINGMORE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X									
BETHWARE ELEMENTARY	Education	X	X	X	X	X	X	X	X		X			X	X		X			
TOWNSHIP 3 ELEMENTARY	Education	X	X	X	X	X	X	X	X		X				X		X	X	X	
BURNS HIGH	Education	X	X	X	X	X	X	X	X		X						X			X
BURNS MIDDLE	Education	X	X	X	X	X	X	X	X		X						X			X
CREST MIDDLE	Education	X	X	X	X	X	X	X	X		X					X				
KINGS MOUNTAIN INTERMEDIATE	Education	X	X	X	X	X	X	X	X		X						X			
SCHOOL BUS GARAGE	Education	X	X	X	X	X	X	X	X		X						X			
CREST HIGH	Education	X	X	X	X	X	X	X	X		X									
Oak Grove Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X									
Shanghai Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Boiling Springs Rural Fire Station #2	Fire/EMS	X	X	X	X	X	X	X	X		X									
Number 3 Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Bethlehem Fire Station	Fire/EMS	X	X	X	X	X	X	X	X		X									

A.4 CLEVELAND COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Cleveland 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.46 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Cleveland 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan.

TABLE A.46: 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
CLEVELAND COUNTY	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Belwood	✓	✓		✓											✓	✓	✓			✓	✓	✓	
Boiling Springs	✓	✓		✓	✓							✓	✓		✓	✓	✓			✓	✓	✓	
Casar	✓	✓															✓			✓	✓		
Earl	✓	✓		✓													✓			✓	✓		
Fallston	✓	✓															✓			✓	✓		
Grover	✓	✓		✓												✓	✓			✓	✓		
Kings Mountain	✓	✓		✓	✓							✓	✓		✓	✓	✓			✓	✓	✓	
Kingstown	✓	✓		✓											✓					✓	✓	✓	

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
Lattimore	✓	✓																		✓	✓		
Lawndale	✓	✓		✓																✓	✓		
Mooresboro	✓	✓		✓												✓	✓			✓	✓		
Patterson Springs	✓	✓		✓																✓	✓		
Polkville	✓	✓		✓											✓					✓	✓	✓	
Shelby	✓	✓		✓	✓							✓	✓		✓	✓	✓	✓		✓	✓	✓	
Waco	✓	✓		✓																✓	✓		

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Cleveland County has previously adopted a hazard mitigation plan. All of the participating municipalities were also included in this plan.

Emergency Operations Plan
Cleveland County maintains an emergency operations plan through its Emergency Management Department.

General Planning

Comprehensive Land Use Plan
Cleveland County has adopted a land use plan. The plan's coverage includes all areas outside the planning jurisdictions of Boiling Springs, Kings Mountain, and Shelby.

Capital Improvements Plan
Cleveland County, Boiling Springs, Kings Mountain and Shelby have capital improvement plans in place.

Zoning Ordinance
Cleveland County administers zoning for the county as well as Belwood, Grover, and Mooresboro. Boiling Springs, Shelby, and Kings Mountain administer their own zoning ordinances.

Subdivision Ordinance
Cleveland County administers subdivision regulations for the county, Belwood, Casar, Earl, Fallston, Grover, and Mooresboro. Boiling Springs, Shelby, and Kings Mountain administer their own subdivision regulations.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Cleveland County provides building code enforcement for the county and all of its municipalities except Shelby and Kings Mountain, which administer their own building code enforcement.

Floodplain Management

Table A.47 provides NFIP policy and claim information for each participating jurisdiction in Cleveland County.

TABLE A.47: 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
CLEVELAND COUNTY†	10/23/95	07/02/08	18	$4,290,800	3	$29,294
Belwood	05/24/12	07/02/08	0	$0	0	$0
Boiling Springs	03/21/13	07/02/08	0	$0	0	$0
Casar*	--	--	--	--	--	--
Earl*	--	--	--	--	--	--
Fallston*	--	--	--	--	--	--
Grover*	--	--	--	--	--	--
Kings Mountain	04/30/86	07/02/08(M)	6	$870,000	3	$11,804
Kingstown	10/03/12	07/02/08	0	$0	0	$0
Lattimore*	--	--	--	--	--	--
Lawndale*	--	--	--	--	--	--
Mooresboro*	--	--	--	--	--	--
Patterson Springs*	--	--	--	--	--	--

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
Polkville	03/22/12	02/20/08	0	$0	0	$0
Shelby	04/03/78	07/02/08	32	$8,180,900	19	$361,473
Waco*	--	--	--	--	--	--

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
(M) – No Elevation Determined, all Zone A, C and X
Source: NFIP Community Status information as of 7/22/13; NFIP claims and policy information as of 5/31/13

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Cleveland County, Belwood, Boiling Springs, Kings Mountain, Kingstown, Polkville and Shelby all participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Cleveland County and all of its municipalities except Casar, Fallston, and Lattimore have signed resolutions of support for the Carolina Thread Trail Master Plan for Cleveland County Communities to work with neighboring communities and with the Carolina Thread Trail to plan, design, and build trails to connect communities.

Stormwater Management Plan
Although Cleveland County and its municipalities do not have stormwater management plans in place, the county, Boiling Springs, Kings Mountain, and Shelby have adopted stormwater management regulations through various local ordinances.

A.4.2 Administrative and Technical Capability

Table A.48 provides a summary of the capability assessment results for Cleveland 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.48: 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
CLEVELAND COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	
Belwood	✓	✓	✓	✓	✓		✓	✓	✓	
Boiling Springs	✓	✓		✓	✓		✓	✓	✓	
Casar	✓	✓	✓	✓			✓	✓	✓	
Earl	✓	✓	✓	✓			✓	✓	✓	
Fallston	✓	✓	✓	✓			✓	✓	✓	
Grover	✓	✓	✓	✓			✓	✓	✓	
Kings Mountain	✓	✓		✓	✓		✓	✓	✓	
Kingstown	✓	✓	✓	✓	✓		✓	✓	✓	
Lattimore	✓	✓	✓	✓			✓	✓	✓	
Lawndale	✓	✓	✓	✓			✓	✓	✓	
Mooresboro	✓	✓	✓	✓			✓	✓	✓	
Patterson Springs	✓	✓	✓	✓			✓	✓	✓	
Polkville	✓	✓	✓	✓	✓		✓	✓	✓	
Shelby	✓	✓		✓	✓		✓	✓	✓	
Waco	✓	✓	✓	✓			✓	✓	✓	

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.49 provides a summary of the results for Cleveland 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.49: 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: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.
CLEVELAND COUNTY	✓	✓	✓						✓	✓
Belwood	✓	✓	✓						✓	✓
Boiling Springs	✓	✓	✓						✓	✓
Casar	✓	✓	✓						✓	✓
Earl	✓	✓	✓						✓	✓
Fallston	✓	✓	✓						✓	✓
Grover	✓	✓	✓						✓	✓
Kings Mountain	✓	✓	✓							✓
Kingstown	✓	✓	✓						✓	✓
Lattimore	✓	✓	✓						✓	✓
Lawndale	✓	✓	✓						✓	✓

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: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.
Mooresboro	✓	✓	✓						✓	
Patterson Springs	✓	✓	✓						✓	
Polkville	✓	✓	✓						✓	
Shelby	✓	✓	✓						✓	
Waco	✓	✓	✓						✓	

A.4.4 Political Capability

The previous hazard mitigation plan indicates that Cleveland 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 Cleveland County Board of Commissioners, the professional staff and the citizens of the county are continually striving to make Cleveland 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.50 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 jurisdictions is 23.25, which falls into the moderate capability ranking.

TABLE A.50: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
CLEVELAND COUNTY	42	High
Belwood	26	Moderate
Boiling Springs	33	Moderate
Casar	17	Limited
Earl	18	Limited
Fallston	17	Limited
Grover	19	Limited
Kings Mountain	32	Moderate
Kingstown	24	Moderate
Lattimore	16	Limited
Lawndale	17	Limited
Mooresboro	19	Limited
Patterson Springs	17	Limited
Polkville	24	Moderate
Shelby	34	Moderate
Waco	17	Limited

A.5 CLEVELAND COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Cleveland 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 Council 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

Cleveland County developed five mitigation goals in coordination with the other participating Cleveland Gaston Lincoln Region jurisdictions. The regional mitigation goals are presented in **Table A.51**.

TABLE A.51: CLEVELAND GASTON LINCOLN REGIONAL MITIGATION GOALS

	Goal
Goal #1	Protect the health, safety, and welfare of residents and visitors.
Goal #2	Protect buildings, critical facilities, and infrastructure through cost-effective mitigation actions.
Goal #3	Increase public awareness of hazards and mitigation.
Goal #4	Enhance capabilities of local governments to reduce future impacts and improve effectiveness of mitigation actions.
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.

A.5.2 Mitigation Action Plan

The mitigation actions proposed by Cleveland County, the Town of Belwood, the Town of Boiling Springs, the Town of Casar, the Town of Earl, the Town of Fallston, the Town of Grover, the City of Kings Mountain, the Town of Kingstown, the Town of Lattimore, the Town of Lawndale, the Town of Mooresboro, the Town of Patterson Springs, the Town of Polkville, the City of Shelby, and the Town of Waco are listed in the following individual Mitigation Action Plans.

Cleveland 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	County Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	Emergency Management	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the UDO-Article XIII (Floodplains) to raise the reference level for all residential and non-residential construction.	Flood	Medium	County Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. This action will be removed in the next update.
P-4	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the County Code to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	County Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the County. The County participates in remapping efforts as requested and will do so when the state updates the maps next. The current effective date for Cleveland County's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Utility Provider	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	County Planning	Local	Completed	The County joined the NFIP in October 3, 1995. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	County Planning	Local	2017	There is only 1 property in the County that is considered a repetitive loss property under the qualification of the NFIP. The County will annually monitor the repetitive loss list and work to determine if mitigation is a feasible solution for those properties.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	Identify alternate Emergency Operations Center locations.	All	High	Emergency Management	Local	Completed	Action complete. The County has identified the Cleveland County Fire Training Center as the alternate EOC. This action will be removed in the next update.
ES-5	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Belwood 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the UDO to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	Action completed. The Town joined the NFIP 05/24/12 and continues to implement flood damage prevention regulations. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	EM	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Boiling Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	Joined the NFIP on 03/21/13 and continues to implement flood damage prevention regulations. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Casar 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 Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	These regulations have not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2017	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	Action complete. The County has identified the Cleveland County Fire Training Center as the alternate EOC. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Earl 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 the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	County Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2019	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Fallston 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 Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Subdivision regulations with Mitigation Objectives. This is to be completed at the next update of the subdivision regulations pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Grover 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the UDO to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Emergency Management	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-7	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2017	The Town has not yet joined the NFIP, but it is still considering doing so. The town has not had the staff time to implement this activity in the past.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

City of Kings Mountain 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	City Planning	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Medium	City Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. The county will continue to evaluate this action as changes may be required in the future. This action will be removed in the next update.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	City Planning	Local	2017	Cluster Development is permitted in the Thoroughfare Protection District, so this action is partially completed. The ordinance will continue to be reviewed going forward to determine if other areas should allow cluster development.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the City. The City participates in remapping efforts as requested. The current effective date for City's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	City Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	City Planning	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	City Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The City joined the NFIP in 1986 and continues to enforce the Flood Damage Prevention Ordinance. The county will review and update annually if changes are needed. This action will be removed in the next update
P-11	Implement existing Water Restriction Ordinance, when warranted.	Drought/Heat Wave	Low	COKM-Water Resources Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed.	Five levels of water shortage response are outlined in the Water and Sewer Ordinance. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Continue research and development of an additional water supply reservoir.	Drought/Heat Wave	Medium	COKM-Water Resources Dept. & COKM Planning Dept	Local Funding and/or Grants, Relief Funds, etc. as available.	2018	No work has been done on this through 2014. To be located by 2018 with development pending funding, staff resources and political will.
P-13	Maintain an up-to-date snow removal plan.	Winter Storm and Freeze	High	COKM-Public Works Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The existing plan is maintained and kept up to date. The plan is generally reviewed annually and updates are made as necessary. This action will be removed in the next update.
P-14	Continue to implement tree trimming policies around City owned power lines. Increase the number of tree trimming crews.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	COKM-Electric Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	Tree trimming policies are implemented and the number of tree trimming crews are increased as funding allows. Tree trimming activities have occurred many times over the past 5 years, on a sub-annual basis. This action will be removed in the next update.
P-15	Discourage the planting of canopy trees where they may grow into power lines; Implement project “Evergreen” encouraging plantings of under lower story trees.	Winter Storm and Freeze	Medium	COKM-Electric and Codes Administration Departments	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Existing Plan which is to be reviewed and updated annually	Project Evergreen is a new initiative that is part of this plan and it will be implemented going forward. This plan will be reviewed and updated annually to determine if new initiatives like this are needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Continue the partnership between the Codes Administration Department and the City Fire Department.	Wildfire	High	COKM-Codes Administration and Fire Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2015	The Codes Administration Department and City Fire Department have an continuing partnership. These two groups have met many times over the past several years to discuss fire codes and will continue to do so annually.
P-17	Continue to enforce zoning ordinances.	Hurricane, Tornado, Thunderstorm	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Zoning Enforcement Officer is responsible for enforcing the City's zoning ordinances and over the past 5 years the officer has enforced all zoning codes. This action will be removed in the next update.
P-18	Continue to enforce the City's Flood Damage Prevention Ordinance.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administration is responsible for enforcing the Flood Damage Prevention Ordinance and has done so over the past 5 years. This action will be removed in the next update.
P-19	Continue to identify areas within the flood zone, and/or who have had repetitive damage due to flooding, and develop mitigation strategies on a case-by-case basis.	Flood	Medium	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2017	Areas of flood risk have been identified over the past 5 years, but this will continually need to be completed/evaluated in the future pending funding, staff resources and political will.
P-20	Pursue funding to implement mitigation strategies in identified area.	Flood	Medium	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Deleted	No funding has been applied for in the past and this action was deemed very general so it will be deleted in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-21	Continue to inspect buildings and implement pursuant to the Flood Management Ordinance.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2016	The designated Floodplain Administration is responsible for enforcing the Flood Damage Prevention Ordinance including inspection of buildings. This has been done consistently over the last 5 years and will continue to be done annually.
P-22	Continue to enforce the Stormwater Code for control of the 2yr, 10yr and 25yr storms.	Flood	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The Soil Erosion and Sediment Control Ordinance includes provisions for control of 2-, 10-, and 25-year storms. This ordinance has been enforced over the past 5 years. This action will be removed in the next update.
P-23	Develop and implement the City's own Erosion Control Plan.	Erosion	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The City maintains a Stormwater Management Plan to comply with NPDES Phase II Permit and has implemented it over the past 5 years. This action will be removed in the next update.
P-24	Continue to inspect and investigate possible sinkhole locations, and make repairs as needed.	Sinkhole	High	COKM-Public Works Department	Local Funding and/or Grants, Relief Funds, etc. as available.	2015	To be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-25	Should a dam be built that would impact Gaston County Residents, then our current inspection and maintenance plan that we have for our Cleveland County locations would apply immediately upon construction.	Dam Failure	Currently Low	COKM-Water Department and Risk Management Department	Local Funding and/or Grants, Relief Funds, etc. as available.	Completed	The existing inspection and maintenance plan is applied to all new dams upon construction. No significant dams have been constructed in the past 5 years. This action will be removed in the next update.
Property Protection							
PP-1	Continue to enforce the NC building, housing, and fire codes.	Wildfire, Hurricane, Flood, Earthquake, Landslide, Erosion, Sinkhole	High	COKM-Codes Administration and Fire Departments.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City's Codes Administration and Engineering Standards Department is responsible for enforcing the building codes and performs minimum housing inspections. The fire code is enforced by the Bureau of Fire Prevention in the Fire Department. These departments have enforced these codes over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
ES-5	Maintain and/or purchase emergency generators for Critical Service Departments.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	COKM-Public Work, Fire and Police Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2017	To be completed in the future pending funding, staff resources and political will. The city has not applied for any mitigation funding over the past 5 years.
ES-6	Maintain the City's Emergency Operations Plan, including creating and maintaining emergency equipment lists and contacts.	Winter Storm and Freeze, Hurricane, Tornado, Landslide, Earthquake, Sinkhole, Thunderstorm	High	COKM-Each Department for equipment list. Risk Management maintains the emergency contact list.	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Existing Plan which will be reviewed and updated annually	Review and update of the EOP takes place annually and will continue to be carried out on an annual basis. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Maintain existing interconnects.	Drought/Heat Wave	High	COKM-Water Resources Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Interconnects have been maintained and this action will continue to be reviewed and updated annually. This action will be removed in the next update.
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/Heat Wave	High	COKM-Water Resources Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. Opportunities for additional interconnects have not been available over the past several years.
S-3	Encourage buried utilities where technologically and economically feasible.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Low	COKM-Electric and Codes Administration Departments	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.
PEA-2	Encourage fire suppression systems.	Wildfire	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	Annually review and update	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.

Town of Kingstown Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 7/2/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on 10/03/12. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Lattimore Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2018	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Lattimore and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Lawndale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Lawndale and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Mooresboro 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporating hazard mitigation objectives.	All	Medium	County Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.
P-3	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	County Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	Emergency Management	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-7	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.

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	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Mooresboro and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.

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 Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Patterson Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2015	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Deleted	The Town has not yet joined the NFIP because there is no SFHA per the flood maps. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Patterson Springs and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Polkville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the Town. The Town participates in remapping efforts as requested. The current effective date for Town's flood maps is 2/20/08.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP in 2012. This action will be removed in the next update
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Polkville and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update

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.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

City of Shelby 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 next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2015	As of 2014, there has been no action taken to update the Land Use Plan with Mitigation Objectives. This is to be completed at the next update of the Land Use Plan (which is supposed to occur in 2015) pending funding, staff resources and political will.
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	City Planning	Local	2019	No policy has been developed as of 2014. This is to be completed in 2019 pending funding, staff resources and political will.
P-3	Update the Floodplain Ordinance to raise the minimum flood protection level.	Flood	Medium	City Planning	Local	Completed	Completed on October 3, 1995. The UDO requires the reference level be elevated no lower than the regulatory flood protection elevation. The county will continue to evaluate this action as changes may be required in the future. This action will be removed in the next update.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2019	This Article has not been updated as of 2014. This action to be completed in the future pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	City Planning	Local	Completed	Complete July 7, 1998. The UDO permits cluster subdivisions in accordance with provisions of the subdivision regulations. This action will be removed in the next update.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2019	The State of North Carolina, as one of FEMA's Cooperating Technical Partner states, maintains the regulatory flood maps for the City. The City participates in remapping efforts as requested. The current effective date for City's flood maps is 7/2/08.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	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	City Inspections	Local	This will be implemented directly after any flooding events occur	This action represents procedures that are implemented by the County Building Department. These procedures are implemented on an as-needed basis to identify buildings that might be at risk of future flooding. Over the past several years, there have been no major events that required extensive flood inspections, but occasionally buildings were inspected in this regard.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	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; conduct inspections on first come, first serve basis; 4) work overtime to expedite utility reconnections.	All	High	City Planning	Local	This will be implemented directly after any events occur	This action represents procedures that are implemented by the local utility providers. There have been several smaller scale events that required utility response over the past several years and utility companies have frequently responded to calls about disconnected services due to storms. These procedures are implemented on an as-needed basis pending funding, staff resources and political will.
P-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	PZ	Local	2015	Action completed, but this will need to be constantly updated so that an active and up to date zoning map will be on file at all times. The county will review and update annually if changes are needed.
P-10	Participate in the National Flood Insurance Program	Flood	High	City Planning	Local	Completed	The City joined the NFIP in 1978 and continues to enforce the flood damage prevention ordinance. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	City Planning	Local	2017	There is one repetitive loss property in the City. The City will continue to monitor the repetitive loss list and work to determine if mitigation is feasible for those properties.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the City of Shelby and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Town of Waco Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	Deleted	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed in the next update.
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2016	The Town has not yet joined the NFIP, but it is still considering doing so. Staff time was not sufficient to complete this activity over the past 5 years.
Emergency Services							
ES-1	Ensure adequate evacuation warning in case of major hazard event.	All	High	Emergency Management	Local	Completed	The County has contracted with Emergency Communications Network (ECN) and uses the Code Red system to notify citizens of emergency events. This system includes the Town of Waco and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2017	No new shelters have been added over the past 5 years. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2017.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Establish program to maintain continuity of government operations.	All	High	Emergency Management	Local	Completed	Completed Continuity Plan on 9-25-06. This action will be removed in the next update.
ES-4	Identify alternate detour routes from major arteries in the county.	All	High	Emergency Management	Local	Completed	This action has been completed. Alternate detour routes from major arteries in the County have been identified. This action will be removed in the next update.
Public Education and Awareness							
PEA-1	Place flood protection and other hazard education materials in all branches of the Cleveland County public library system.	All	High	Emergency Management	Local	2015, Annually review and update	Outreach to citizens has been performed regularly over the past several years through a number of mediums including placement of materials in the library system. The county will review and update materials on an annual basis.

Annex B
Gaston County

This annex includes jurisdiction-specific information for Gaston County and its participating municipalities. It consists of the following five subsections:

- B.1 Gaston County Community Profile
- B.2 Gaston County Risk Assessment
- B.3 Gaston County Vulnerability Assessment
- B.4 Gaston County Capability Assessment
- B.5 Gaston County Mitigation Strategy

B.1 GASTON COUNTY COMMUNITY PROFILE

B.1.1 Geography and the Environment

Gaston County is located west of Charlotte, and includes the City of Belmont, City of Bessemer City, City of Cherryville, Town of Cramerton, Town of Dallas, City of Gastonia, City of High Shoals, City of Lowell, Town of McAdenville, City of Mount Holly, Town of Ranlo, Town of Spencer Mountain, and the Town of Stanley. To the east is Charlotte/Mecklenburg County, to the north is Lincoln County, to the west is Cleveland County, and to the south is York County, SC. The total area of the county is 364 square miles, 7 square miles of which is water area.

From March through May, temperatures have an average high in the mid-sixties and an average low in the lower forties. Typically, the weather is milder by late April and warm in May. In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the upper 80s in July and August.

September through mid-November is typified by clear skies and cooler weather that alternates between warm days and cool nights. Daytime highs are usually in the 70s and 80s during September but fall to the 50s and 60s by early November. The first frost often occurs in late September and the lows are near freezing by November. During these autumn months, there are only occasional rain showers making it the driest period of the year.

B.1.2 Population and Demographics

According to the 2010 Census, Gaston County has a population of 206,086 people. The county has seen 8% growth between 2000 and 2010, and the average population density is 579 people per square mile. Population counts from the US Census Bureau for 1990, 2000, and 2010 for the county and both of the participating jurisdictions are presented in **Table B.1**.

TABLE B.1: POPULATION COUNTS FOR GASTON COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Gaston County	**175,093**	**190,365**	**206,086**	**8.3%**
City of Belmont	8,434	8,705	10,076	15.7%
City of Bessemer City	4,698	5,119	5,340	4.3%
City of Cherryville	4,756	5,361	5,760	7.4%
Town of Cramerton	2,371	2,976	4,165	40.0%
Town of Dallas	3,012	3,402	4,488	31.9%
City of Gastonia	54,732	66,277	71,741	8.2%
City of High Shoals	605	729	696	-4.5%
City of Lowell	2,704	2,662	3,526	32.5%
Town of McAdenville	830	619	651	5.2%
City of Mount Holly	7,710	9,618	13,656	42.0%
Town of Ranlo	1,650	2,198	3,434	56.2%
Town of Spencer Mountain	135	51	37	-27.5%
Town of Stanley	2,823	3,053	3,556	16.5%

Source: US Census Bureau

Based on the 2010 Census, the median age of residents of Gaston County is 38.9 years. The racial characteristics of the county are presented in **Table B.2**. Whites make up the majority of the population in the county, accounting for around 78 percent of the population.

TABLE B.2: DEMOGRAPHICS OF GASTON 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)*
Gaston County	**78.2%**	**15.3%**	**0.4%**	**1.2%**	**0.0%**	**3.1%**	**1.8%**	**5.9%**
City of Belmont	83.6%	8.9%	0.3%	4.1%	0.2%	1.4%	1.6%	3.5%
City of Bessemer City	79.6%	14.4%	0.4%	0.7%	0.0%	3.0%	1.9%	5.1%
City of Cherryville	85.1%	10.3%	0.2%	0.7%	0.0%	2.1%	1.6%	3.7%
Town of Cramerton	91.1%	4.2%	0.6%	2.2%	0.0%	0.3%%	1.5%	1.3%
Town of Dallas	76.4%	15.9%	0.4%	0.6%	0.0%	4.9%	1.8%	8.0%
City of Gastonia	63.0%	27.8%	0.4%	1.3%	0.0%	5.2%	2.2%	9.6%
City of High Shoals	85.9%	7.3%	1.4%	0.3%	0.0%	1.9%	3.2%	4.2%
City of Lowell	85.9%	8.7%	0.5%	1.0%	0.1%	2.4%	1.2%	5.7%
Town of McAdenville	89.2%	2.2%	1.5%	0.9%	0.2%	3.8%	2.2%	5.7%
City of Mount Holly	80.4%	12.7%	0.4%	2.4%	0.1%	2.4%	1.6%	5.5%
Town of Ranlo	75.1%	15.9%	0.8%	1.8%	0.0%	4.1%	2.3%	7.3%
Town of Spencer Mountain	73.0%	0.0%	0.0%	0.0%	0.0%	24.3%	2.7%	24.3%

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)*
Town of Stanley	87.6%	9.7%	0.4%	0.4%	0.0%	0.5%	1.3%	1.6%

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

B.1.3 Housing

According to the 2010 US Census, there are 88,686 housing units in Gaston County, the majority of which are single family homes or mobile homes. Housing information for the county and municipalities is presented in **Table B.3**. As shown in the table, the county and municipalities all have a relatively low percentage of seasonal housing units.

TABLE B.3: HOUSING CHARACTERISTICS OF GASTON COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2007-2011)
Gaston County	**73,936**	**88,686**	**0.3%**	**$124,300**
City of Belmont	3,348	4,221	0.6%	$160,300
City of Bessemer City	2,009	2,348	0.2%	$94,500
City of Cherryville	2,177	2,621	0.3%	$107,000
Town of Cramerton	1,169	1,834	0.3%	$164,200
Town of Dallas	1,324	2,003	0.3%	$132,700
City of Gastonia	25,945	31,238	0.2%	$133,800
City of High Shoals	284	308	0.3%	$84,000
City of Lowell	1,085	1,536	0.3%	$114,600
Town of McAdenville	247	283	0.7%	$163,000
City of Mount Holly	4,028	5,905	0.3%	$155,600
Town of Ranlo	857	1,369	0.1%	$109,900
Town of Spencer Mountain	16	8	0.0%	--
Town of Stanley	1,201	1,507	0.0%	$114,600

Source: US Census Bureau

B.1.4 Infrastructure

Transportation

There are three key roads that traverse Gaston County: Interstate 85, US 321, and US 74. Interstate 85 is an important interstate route extending east-west through unincorporated areas of Gaston County and Cleveland County as well as Belmont, Gastonia, Bessemer City, and Kings Mountain. I-85 also has an interchange with another major regional roadway, US 321. US 321, which offers additional access to other parts of the region, is an important north-south route through Gaston County and Lincoln County.

US Route 74, another commercial and truck route, also extends through both Gaston County and Lincoln County.

Charlotte-Douglas International Airport is the largest airport in the state and is the primary airport used by residents of Gaston County. The airport currently offers non-stop commercial flights on nine airlines to cities around the country and the world. This airport is less than 50 miles from most areas in the county and served over 41 million passengers in 2012, nearly doubling the number of passengers it served in 2000. A smaller airport that also serves the county is Gastonia Municipal Airport.

Utilities

Electrical power in Gaston County is provided by two public utilities and several electricity cooperatives. Duke Energy and Energy United provide service to the county and Rutherford Electric Membership Corporation is also present in parts of the county.

Water and sewer service is provided by many of the towns in Gaston County whereas the use of wells and septic systems is typically found in unincorporated Gaston County as the county is not a public water provider.

Community Facilities

There are a number of buildings and community facilities located throughout Gaston County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 43 fire stations, 14 police stations, and 52 public schools located within the county.

There are 3 medical care facilities located in Gaston County. The largest is Caromont Regional Medical Center, a 435-bed hospital located in the City of Gastonia. Another facility is the Carolinas Rehabilitation/Mt. Holly Facility.

In addition to Crowders Mountain State Park, Gaston County contains numerous local parks and recreation areas, including 20 county-operated parks and easy access to Mountain Island Lake, the Catawaba River, and Lake Wylie. These facilities offer recreational opportunities to area residents and many visitors each year.

B.1.5 Land Use

Gaston County is a quickly developing county due to its proximity to the major metropolitan area of Charlotte. There are many incorporated municipalities located throughout the county which cover a great deal of the county's land area and 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.

Due to increasing development in the area, Gaston County's land use policy has been modified in recent years to better reflect these changes. Especially important in the decision-making process has been the increased pressure for development that has resulted from the Charlotte metropolitan area's expansion. Gaston County has faced difficult decisions when it comes to land use as the conflict between growth and preservation of the county's natural resources have been an important topic of discussion when it comes to land use planning. As the county continues to grow, land use planning will play a critical role in the county's future.

B.1.6 Employment and Industry

In 2012, Gaston County had an average annual employment of 89,791 workers. In 2011, according to NCESC, the Manufacturing industry employed the most people, with 17.3 percent of the workforce, followed by Health Care and Social Assistance (17.1%); Retail Trade (13.8%); Accommodation and Food Services (8.7%); and Educational Services (8.3%). The average annual median household income in Gaston County was $43,052 from 2007 to 2011.

B.2 GASTON COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Gaston 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. 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 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, Gaston County has had drought occurrences all of the last fourteen years (2000-2012). **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 GASTON COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Gaston County
2000	EXTREME
2001	EXTREME
2002	EXCEPTIONAL
2003	ABNORMAL
2004	SEVERE
2005	MODERATE
2006	SEVERE
2007	EXCEPTIONAL
2008	EXCEPTIONAL
2009	SEVERE
2010	MODERATE
2011	SEVERE
2012	SEVERE
2013	SEVERE

Source: North Carolina Drought Monitor (through July 2013)

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Gaston 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 Gaston 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 Gaston County. No events were reported.

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 1890. The recorded maximum for Gaston County can be found below in **Table B.5**.

TABLE B.5: HIGHEST RECORDED TEMPERATURE IN GASTON COUNTY REGION

Location	Date	Temperature (F)
Gastonia	6/27/1954	107
GASTON 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 in Gastonia. **Table B.6** shows the average maximum temperatures from 1971 to 2000 at the Gastonia observation station which can be used as a general comparison for the county.

TABLE B.6: AVERAGE MAXIMUM TEMPERATURE IN GASTONIA, GASTON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	50.2	55.0	63.1	71.6	79.0	85.4	89.3	87.8	81.9	72.2	62.5	53.3

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all Gaston County has a probability level of possible (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 Gaston 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, 133 recorded hailstorm events have affected Gaston County since 1962.[1] **Table B.7** is a summary of the hail events in Gaston County. **Table B.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in over $400,000 (2013 dollars) in property damages. Hail ranged in diameter from 0.75 inches to 4.5 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 GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	6	0/0	$403,175
Bessemer City	7	0/0	$0
Cherryville	14	0/0	$0
Cramerton	1	0/0	$0
Dallas	9	0/0	$0
Gastonia	25	0/0	$0
High Shoals	1	0/0	$0
Lowell	1	0/0	$0
McAdenville	1	0/0	$0
Mount Holly	9	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 Gaston 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)
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	3	0/0	$0
Unincorporated Area	56	0/0	$0
GASTON COUNTY TOTAL	**133**	**0/0**	**$403,175**

Source: National Climatic Data Center

TABLE B.8: HISTORICAL HAIL OCCURRENCES IN GASTON COUNTY

	Date	Magnitude	Deaths / Injuries	Property Damage*
Belmont				
BELMONT	20-MAR-98	0.75 in.	0/0	$0
BELMONT	15-MAY-03	1.75 in.	0/0	$403,175
BELMONT	09-JUL-03	0.75 in.	0/0	$0
BELMONT	16-JUL-03	0.75 in.	0/0	$0
BELMONT	19-JUN-05	0.88 in.	0/0	$0
BELMONT	20-MAY-06	0.75 in.	0/0	$0
Bessemer City				
BESSEMER CITY	24-MAY-96	0.75 in.	0/0	$0
BESSEMER CITY	28-AUG-97	0.75 in.	0/0	$0
BESSEMER CITY	08-JAN-98	0.75 in.	0/0	$0
BESSEMER CITY	15-MAY-03	0.75 in.	0/0	$0
BESSEMER CITY	20-MAY-06	0.88 in.	0/0	$0
BESSEMER CITY	09-APR-11	2.75 in.	0/0	$0
BESSEMER CITY	09-APR-11	2.75 in.	0/0	$0
Cherryville				
Cherryville	13-MAY-93	1.00 in.	0/0	$0
CHERRYVILLE	16-MAR-96	1.75 in.	0/0	$0
CHERRYVILLE	05-AUG-03	1.00 in.	0/0	$0
CHERRYVILLE	05-AUG-03	0.75 in.	0/0	$0
CHERRYVILLE	26-MAY-06	1.00 in.	0/0	$0
CHERRYVILLE	26-MAY-06	1.00 in.	0/0	$0
CHERRYVILLE	26-MAY-06	1.25 in.	0/0	$0
CHERRYVILLE	26-MAY-06	1.75 in.	0/0	$0
CHERRYVILLE	24-JUN-07	0.75 in.	0/0	$0
CHERRYVILLE	16-AUG-08	0.75 in.	0/0	$0
CHERRYVILLE	09-MAY-09	0.88 in.	0/0	$0
CHERRYVILLE	05-APR-11	0.88 in.	0/0	$0
CHERRYVILLE	09-APR-11	1.75 in.	0/0	$0
CHERRYVILLE	09-APR-11	1.25 in.	0/0	$0
Cramerton				
CRAMERTON	11-AUG-11	1.00 in.	0/0	$0
Dallas				
DALLAS	12-JUL-03	0.75 in.	0/0	$0
DALLAS	22-MAY-04	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
DALLAS	25-APR-06	0.75 in.	0/0	$0
DALLAS	18-MAY-06	0.75 in.	0/0	$0
DALLAS	02-JUL-06	0.88 in.	0/0	$0
DALLAS	12-MAY-07	1.00v	0/0	$0
DALLAS	26-APR-08	1.00 in.	0/0	$0
DALLAS	20-MAY-08	0.88 in.	0/0	$0
DALLAS	09-APR-11	0.75 in.	0/0	$0
Gastonia				
Gastonia	01-MAY-95	1.75 in.	0/0	$0
GASTONIA	15-APR-96	0.75 in.	0/0	$0
GASTONIA	13-JUN-97	1.00 in.	0/0	$0
GASTONIA	06-JUL-99	1.00 in.	0/0	$0
GASTONIA	01-APR-01	0.75 in.	0/0	$0
GASTONIA	25-MAY-01	0.75 in.	0/0	$0
GASTONIA	26-JUN-01	0.75 in.	0/0	$0
GASTONIA	02-AUG-02	1.50 in.	0/0	$0
GASTONIA	09-JUL-03	1.00 in.	0/0	$0
GASTONIA	12-JUL-03	0.75 in.	0/0	$0
GASTONIA	16-JUL-03	1.00 in.	0/0	$0
GASTONIA	19-JUL-03	1.75 in.	0/0	$0
GASTONIA	23-MAY-04	1.00 in.	0/0	$0
GASTONIA	22-APR-06	0.88 in.	0/0	$0
GASTONIA	20-MAY-06	1.00 in.	0/0	$0
GASTONIA	11-JUN-06	1.00 in.	0/0	$0
GASTONIA	11-APR-07	0.75 in.	0/0	$0
GASTONIA	11-JUN-07	0.88 in.	0/0	$0
GASTONIA	24-JUN-07	0.88 in.	0/0	$0
GASTONIA	25-JUN-07	0.75 in.	0/0	$0
GASTONIA	27-JUL-07	0.75 in.	0/0	$0
GASTONIA	20-MAY-08	1.00 in.	0/0	$0
GASTONIA	28-MAR-10	1.00 in.	0/0	$0
GASTONIA	05-APR-11	1.00 in.	0/0	$0
GASTONIA	20-AUG-11	0.75 in.	0/0	$0
High Shoals				
HIGH SHOALS	22-JUN-08	0.88 in.	0/0	$0
Lowell				
LOWELL	10-MAY-05	1.00 in.	0/0	$0
McAdenville				
MC ADENVILLE	05-APR-11	1.00 in.	0/0	$0
Mount Holly				
MT HOLLY	08-JAN-98	0.75 in.	0/0	$0
MT HOLLY	10-JUN-98	0.75 in.	0/0	$0
MT HOLLY	10-JUN-98	0.75 in.	0/0	$0
MT HOLLY	10-JUN-98	0.75 in.	0/0	$0
MT HOLLY	15-MAY-03	1.75 in.	0/0	$0
MT HOLLY	12-JUL-03	0.75 in.	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
MT HOLLY	05-AUG-03	0.75 in.	0/0	$0
MT HOLLY	11-JUN-07	0.75 in.	0/0	$0
MT HOLLY	10-APR-09	0.75 in.	0/0	$0
Ranlo				
None Reported	--	--	--	--
Spencer Mountain				
None Reported	--	--	--	--
Stanley				
STANLEY	15-MAY-03	1.00 in.	0/0	$0
STANLEY	20-MAY-08	1.00 in.	0/0	$0
STANLEY	20-MAY-08	0.75 in.	0/0	$0
Unincorporated Area				
GASTON COUNTY	09-MAY-62	1.75	0/0	$0
GASTON COUNTY	20-MAY-67	1.00	0/0	$0
GASTON COUNTY	21-JUN-70	0.75	0/0	$0
GASTON COUNTY	03-APR-74	4.50	0/0	$0
GASTON COUNTY	22-JUN-78	1.75	0/0	$0
GASTON COUNTY	22-JUN-78	1.75	0/0	$0
GASTON COUNTY	16-JUN-80	1.75	0/0	$0
GASTON COUNTY	26-APR-82	1.75	0/0	$0
GASTON COUNTY	06-MAY-84	0.75	0/0	$0
GASTON COUNTY	26-MAY-84	0.75	0/0	$0
GASTON COUNTY	03-JUN-85	0.75	0/0	$0
GASTON COUNTY	04-JUN-85	1.75	0/0	$0
GASTON COUNTY	04-JUN-85	1.00	0/0	$0
GASTON COUNTY	05-JUN-85	1.75	0/0	$0
GASTON COUNTY	06-JUN-85	1.00	0/0	$0
GASTON COUNTY	06-JUN-85	0.75	0/0	$0
GASTON COUNTY	07-JUN-85	1.00	0/0	$0
GASTON COUNTY	07-JUN-85	1.00	0/0	$0
GASTON COUNTY	10-JUL-85	0.75	0/0	$0
GASTON COUNTY	13-JUL-85	1.00	0/0	$0
GASTON COUNTY	06-AUG-86	0.75	0/0	$0
GASTON COUNTY	15-APR-87	0.75	0/0	$0
GASTON COUNTY	02-MAY-87	1.75	0/0	$0
GASTON COUNTY	03-JUN-87	0.75	0/0	$0
GASTON COUNTY	16-MAY-88	0.75	0/0	$0
GASTON COUNTY	24-MAY-88	0.90	0/0	$0
GASTON COUNTY	26-JUN-88	1.50	0/0	$0
GASTON COUNTY	26-JUN-88	1.00	0/0	$0
GASTON COUNTY	01-APR-90	0.75	0/0	$0
GASTON COUNTY	01-APR-90	1.75	0/0	$0
GASTON COUNTY	01-MAY-90	0.75	0/0	$0
GASTON COUNTY	08-JUN-90	0.75	0/0	$0
GASTON COUNTY	08-JUN-90	1.00	0/0	$0
GASTON COUNTY	01-JUL-90	1.75	0/0	$0

	Date	Magnitude	Deaths / Injuries	Property Damage*
GASTON COUNTY	07-MAR-92	1.00	0/0	$0
GASTON COUNTY	07-MAR-92	1.25	0/0	$0
GASTON COUNTY	19-MAR-92	1.00	0/0	$0
GASTON COUNTY	08-JUN-92	0.75	0/0	$0
GASTON COUNTY	21-JUN-92	1.75	0/0	$0
Catawba Heights	19-AUG-94	1.00	0/0	$0
Nr Kannapolis	01-MAY-95	0.75	0/0	$0
Crowders Mt.	19-MAY-95	0.75	0/0	$0
LUCIA	10-JUN-06	0.88	0/0	$0
GASTONIA ARPT	10-APR-09	0.88	0/0	$0
HARDINS	09-APR-11	1.75	0/0	$0
GASTONIA ARPT	09-APR-11	2.75	0/0	$0
BOOGERTOWN	02-JUN-11	0.75	0/0	$0
BOOGERTOWN	02-JUN-11	1.25	0/0	$0
BELMONT JCT	05-JUN-11	1.00	0/0	$0
SOUTH GASTONIA	04-JUL-11	1.00	0/0	$0
SOUTH GASTONIA	04-JUL-11	1.00	0/0	$0
BELMONT JCT	11-AUG-11	1.25	0/0	$0
CROWDERS	24-MAR-12	0.75	0/0	$0
CROWDERS	24-MAR-12	1.00	0/0	$0
CROWDERS	24-MAR-12	0.75	0/0	$0
DELLVIEW	18-OCT-12	0.75	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 Gaston 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 Gaston County. The entire county is equally susceptible to hurricane and tropical storms.

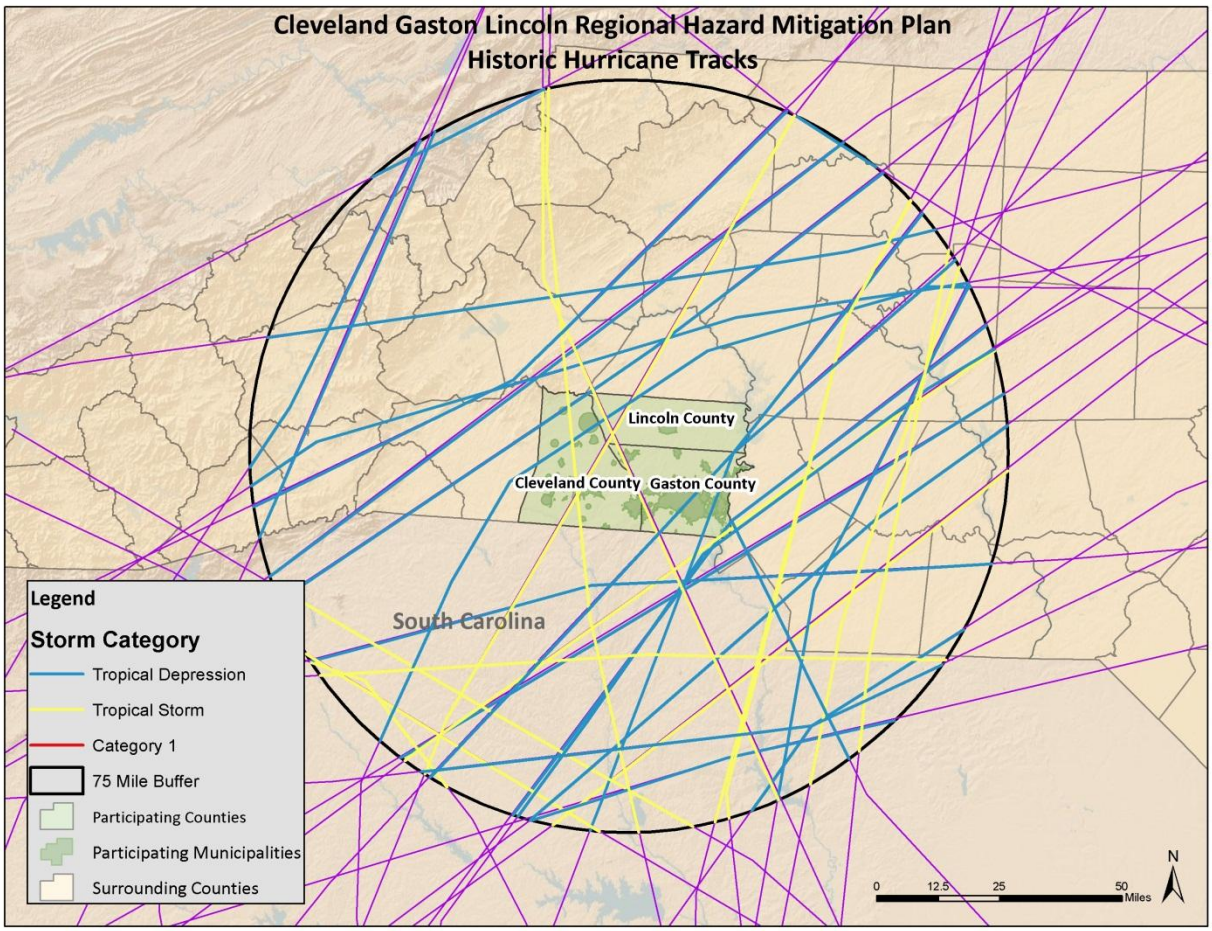
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 35 hurricane or tropical storm tracks have passed within 75 miles of the Gaston County since 1850.[2] This includes thirteen tropical storms and twenty-two tropical depressions.

[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.

Of the recorded storm events, two tropical storms and three tropical depressions have traversed directly through Gaston County as shown in **Figure B.1**. **Table B.9** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cleveland Gaston Lincoln Region) and Category of the storm based on the Saffir-Simpson Scale.

FIGURE B.1: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF GASTON COUNTY



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE B.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF GASTON COUNTY (1850–2010)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35	Tropical Storm
6/22/1886	NOT NAMED	31	Tropical Depression
9/24/1889	NOT NAMED	40	Tropical Storm
1891	NOT NAMED	-	Tropical Depression
7/13/1901	NOT NAMED	26	Tropical Depression
10/11/1902	NOT NAMED	31	Tropical Depression
9/18/1906	NOT NAMED	35	Tropical Storm
9/23/1907	NOT NAMED	31	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/31/1911	NOT NAMED	22	Tropical Depression
6/14/1912	NOT NAMED	31	Tropical Depression
9/4/1913	NOT NAMED	22	Tropical Depression
8/3/1915	NOT NAMED	31	Tropical Depression
7/15/1916	NOT NAMED	40	Tropical Storm
10/3/1927	NOT NAMED	31	Tropical Depression
8/11/1928	NOT NAMED	26	Tropical Depression
5/30/1934	NOT NAMED	22	Tropical Depression
8/18/1939	NOT NAMED	22	Tropical Depression
10/9/1946	NOT NAMED	26	Tropical Depression
8/28/1949	NOT NAMED	35	Tropical Storm
8/31/1952	NOT NAMED	40	Tropical Storm
9/30/1959	GRACIE	53	Tropical Storm
8/30/1964	CLEO	22	Tropical Depression
6/9/1968	CELESTE	22	Tropical Depression
9/8/1977	BABE	22	Tropical Depression
9/5/1979	DAVID	40	Tropical Storm
7/25/1985	ONE-C	40	Tropical Storm
8/18/1985	BOB	22	Tropical Depression
9/22/1989	HUGO	48	Tropical Storm
5/21/1990	NOT NAMED	26	Tropical Depression
7/21/1994	BERYL	13	Tropical Depression
8/17/1994	NOT NAMED	13	Tropical Depression
7/24/1997	DANNY	18	Tropical Depression
9/17/2004	IVAN	18	Tropical Depression
9/28/2004	JEANNE	18	Tropical Depression
7/7/2005	CINDY	18	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center did not report any events associated with a hurricane or tropical storm in Gaston County between 1950 and 2011. However, federal records indicate that two disaster declarations were made in 1989 (Hurricane Hugo) and 2004 (Tropical Storm Frances) for the county.[3]

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in Gaston County. Most events do not carry winds that are above that of the winter storms and straight line winds received by the county. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm.

[3] All of the participating counties were declared disaster areas for these storms particular storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across much of western North Carolina with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph in many areas and numerous trees were downed. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

Probability of Future Occurrences
Given the inland location of the county, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to Gaston County due to induced events like flooding and landsliding. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. However, when the county is impacted, the damage could be catastrophic, 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 Gaston County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been 25 recorded lightning events in Gaston County since 1993, as listed in summary **Table B.10**.[4] These events resulted in more than $587,000 (2013 dollars) in damages and caused 7 injuries. A complete listing of those events can be found in **Table B.11**. 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.10: SUMMARY OF LIGHTNING OCCURRENCES IN GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	2	0/0	$13,048
Bessemer City	0	0/0	$0
Cherryville	2	0/1	$50,660
Cramerton	0	0/0	$0
Dallas	2	0/0	$10,050
Gastonia	10	0/6	$471,982

[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 Gaston 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)
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	2	0/0	$41,577
GASTON COUNTY TOTAL	**18**	**0/7**	**$587,317**

Source: National Climatic Data Center

TABLE B.11: HISTORIC LIGHTNING OCCURRENCES IN GASTON COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Belmont				
BELMONT	15-JUN-00	0/0	$0	A supercell thunderstorm moved through the northwest piedmont producing significant wind damage in a 3 to 4 mile wide path. In and around Harmony thousands of trees were downed, barns were destroyed, and a roof was blown off a frame house. Debris was blown up to 500 yards in some cases. Golf ball size hail was also reported in Harmony. The damage track continued into western Davie county where numerous trees were blown down and roofs were blown off several structures, including a mobile home. Numerous trees and power lines were downed in eastern Catawba county as well. Later in the evening a severe thunderstorm in southeast Union county blew a tree onto a recreational vehicle at the Cane Creek Campground. Lightning ignited an attic fire in a house in Belmont.
BELMONT	12-JUL-04	0/0	$13,048	Lightning ignited a fire at a church, destroying the steeple and causing additional damage.
Bessemer City				
None Reported	--	--	--	--

	Date	Deaths / Injuries	Property Damage*	Details
Cherryville				
CHERRYVILLE	04-JUL-02	0/1	$41,527	Lightning caused a minor injury at a baseball field. Lightning was also blamed for the loss of equipment at a radio station.
CHERRYVILLE	04-JUL-04	0/0	$9,133	A lightning strike killed 7 cattle.
Cramerton				
None Reported	--	--	--	--
Dallas				
Dallas	24-JAN-93	0/0	$8,745	The impact of lightning blew a hole through a brick exterior wall and sheetrock off interior walls of a house. Extensive damage also occurred to the electrical system.
DALLAS	26-MAY-04	0/0	$1,305	Lightning struck a trailer.
Gastonia				
GASTONIA	05-AUG-96	0/2	$0	
GASTONIA	23-JUL-97	0/0	$31,460	Lightning started a fire in the attic of a house. A cluster of thunderstorms producing very heavy rain sank south in the Charlotte metro area shortly before midnight of the 23rd and continued to redevelop over the area through mid-morning. Severe flash flooding resulted as nearly 10 inches of rain fell in some spots. Mecklenburg county officials requested that people not try to go to work or drive around. Numerous roads and bridges were washed out or damaged. A railroad trestle collapsed, dropping a locomotive 100 feet into a raging creek. Two women died after their vehicles became trapped in flood waters around 2 AM EST. A young girl perished around 9 AM EST when she went to play in the waters and was swept away. In Cabarrus county, 3 of the 4 injuries occurred when a plant roof collapsed due to the weight of the rain water. The fourth injury occurred in Mount Pleasant when a person drove into a wash-out.
GASTONIA	24-JUL-99	0/0	$0	Clusters of slow-moving thunderstorms developed

	Date	Deaths / Injuries	Property Damage*	Details
				during the afternoon on another hot and humid summer day. Some of the storms became severe, producing large hail the size of nickels and quarters, and straight-line winds which downed numerous trees. In Kannapolis, the roof of a commercial building was blown off. The Gastonia area experienced a severe thunderstorm which lasted nearly an hour. Numerous trees and power lines were downed, some of which fell on a trailer and homes. Urban flooding in normally flood-prone areas stranded a few cars and lightning strikes caused several house fires. In rural areas around Monroe, small streams briefly came out of their banks and flooded typical flood-prone areas.
GASTONIA	24-AUG-02	0/0	$0	Lightning damaged equipment at the 911 center, disrupting service.
GASTONIA	22-FEB-03	0/3	$13,439	Lightning struck a home, causing 3 minor injuries, and significant damage to the home.
GASTONIA	10-MAY-05	0/1	$0	Lightning struck and injured a person.
GASTONIA	27-JUN-05	0/0	$63,339	Lightning sparked several structural fires in the county.
GASTONIA	28-JUL-05	0/0	$0	Several structural fires caused by lightning.
GASTONIA	18-MAY-06	0/0	$307,468	Lightning ignited a fire at a home, causing extensive damage to the second story.
GASTONIA	28-JUL-09	0/0	$56,275	Lightning ignited a fire at a business on W Airline Ave.
High Shoals				
None Reported	--	--	--	--
Lowell				
None Reported	--	--	--	--
McAdenville				
None Reported	--	--	--	--
Mount Holly				
None Reported	--	--	--	--

	Date	Deaths / Injuries	Property Damage*	Details
Ranlo				
None Reported	--	--	--	--
Spencer Mountain				
None Reported	--	--	--	--
Stanley				
None Reported	--	--	--	--
Unincorporated Area				
CROWDERS	04-AUG-03	0/0	$13,439	Continuous lightning ignited several structural fires.
BOOGERTOWN	19-AUG-09	0/0	$28,138	Lightning ignited a fire at a home on Robinwood Rd on the southeast side of Gastonia. The fire caused significant damage to the attic and a bedroom.

*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 Gaston 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®), Gaston 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, Gaston County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Gaston County has uniform exposure to an event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms have not resulted in any disaster declarations in Gaston County.[5] According to NCDC, there have been 192 reported thunderstorm wind and high wind events since 1955 in Gaston County.[6] These events caused over $800,000 (2013 dollars) in damages. There were reports of three injuries and

[5]A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[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 Gaston County. As additional local data becomes available, this hazard profile will be amended.

two fatalities. **Table B.12** summarizes this information. **Table B.13** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event. [7]

TABLE B.12: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	11	0/0	$35,950
Bessemer City	9	0/0	$0
Cherryville	15	0/0	$6,921
Cramerton	5	0/0	$3,800
Dallas	11	0/0	$68,111
Gastonia	44	0/0	$213,514
High Shoals	1	0/0	$0
Lowell	2	0/0	$24,597
McAdenville	1	0/1	$0
Mount Holly	9	0/0	$140,623
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	
Stanley	3	0/0	$5,150
Unincorporated Area	80	2/2	$310,362
GASTON COUNTY TOTAL	**192**	**2/3**	**$809,028**

Source: National Climatic Data Center

TABLE B.13: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN GASTON COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Belmont					
Belmont	20-AUG-93	THUNDERSTORM WINDS	0 kts.	0/0	$0
BELMONT	15-JUN-96	TSTM WIND	50 kts.	0/0	$0
BELMONT	24-AUG-96	TSTM WIND	55 kts.	0/0	$0
BELMONT	13-MAY-02	TSTM WIND	55 kts.	0/0	$6,921
BELMONT	02-JUL-02	TSTM WIND	60 kts.	0/0	$27,685
BELMONT	02-AUG-02	TSTM WIND	50 kts.	0/0	$0
BELMONT	09-JUL-03	TSTM WIND	50 kts.	0/0	$0
BELMONT	29-JUL-03	TSTM WIND	50 kts.	0/0	$1,344
BELMONT	19-JUN-05	TSTM WIND	50 kts.	0/0	$0
BELMONT	20-AUG-05	TSTM WIND	50 kts.	0/0	$0
BELMONT	03-SEP-12	THUNDERSTORM WIND	50 kts.	0/0	$0
Bessemer City					
BESSEMER CITY	15-MAR-96	TSTM WIND	0 kts.	0/0	$0
BESSEMER CITY	15-JUL-96	TSTM WIND	50 kts.	0/0	$0
BESSEMER CITY	31-JUL-99	TSTM WIND	50 kts.	0/0	$0
BESSEMER CITY	22-JUN-01	TSTM WIND	55 kts.	0/0	$0
BESSEMER CITY	22-AUG-03	TSTM WIND	50 kts.	0/0	$0

[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*
BESSEMER CITY	03-AUG-06	TSTM WIND	50 kts.	0/0	$0
BESSEMER CITY	24-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
BESSEMER CITY	09-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
BESSEMER CITY	05-AUG-09	THUNDERSTORM WIND	55 kts.	0/0	$0
Cherryville					
CHERRYVILLE	27-MAY-96	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	29-MAY-96	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	20-JUL-98	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	10-AUG-00	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	04-JUL-02	TSTM WIND	50 kts.	0/0	$6,921
CHERRYVILLE	26-MAY-06	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	26-MAY-06	TSTM WIND	55 kts.	0/0	$0
CHERRYVILLE	22-JUN-06	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	04-JUL-06	TSTM WIND	50 kts.	0/0	$0
CHERRYVILLE	24-JUN-07	THUNDERSTORM WIND	55 kts.	0/0	$0
CHERRYVILLE	21-AUG-07	THUNDERSTORM WIND	55 kts.	0/0	$0
CHERRYVILLE	16-AUG-08	THUNDERSTORM WIND	50 kts.	0/0	$0
CHERRYVILLE	27-OCT-10	THUNDERSTORM WIND	50 kts.	0/0	$0
CHERRYVILLE	05-APR-11	THUNDERSTORM WIND	65 kts.	0/0	$0
CHERRYVILLE	05-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
Cramerton					
CRAMERTON	10-AUG-00	TSTM WIND	50 kts.	0/0	$0
CRAMERTON	20-JUL-05	TSTM WIND	50 kts.	0/0	$3,800
CRAMERTON	22-JUL-06	TSTM WIND	50 kts.	0/0	$0
CRAMERTON	02-MAY-09	THUNDERSTORM WIND	50 kts.	0/0	$0
CRAMERTON	18-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
Dallas					
DALLAS	20-APR-96	TSTM WIND	0 kts.	0/0	$24,137
DALLAS	13-JUL-96	TSTM WIND	50 kts.	0/0	$0
DALLAS	13-MAY-02	TSTM WIND	55 kts.	0/0	$34,606
DALLAS	02-MAY-03	TSTM WIND	52 kts.	0/0	$6,720
DALLAS	19-NOV-03	TSTM WIND	50 kts.	0/0	$1,344
DALLAS	26-MAY-04	TSTM WIND	50 kts.	0/0	$1,305
DALLAS	03-APR-06	TSTM WIND	50 kts.	0/0	$0
DALLAS	20-MAY-06	TSTM WIND	55 kts.	0/0	$0
DALLAS	26-MAY-06	TSTM WIND	50 kts.	0/0	$0
DALLAS	04-MAR-08	THUNDERSTORM WIND	50 kts.	0/0	$0
DALLAS	11-AUG-11	THUNDERSTORM WIND	55 kts.	0/0	$0
Gastonia					
Gastonia	03-AUG-93	THUNDERSTORM WINDS	52 kts.	0/0	$0
Gastonia	19-AUG-94	THUNDERSTORM WINDS	0 kts.	0/0	$0
GASTONIA	15-MAR-96	TSTM WIND	0 kts.	0/0	$40,228
GASTONIA	20-APR-96	TSTM WIND	0 kts.	0/0	$40,228
GASTONIA	27-MAY-96	TSTM WIND	52 kts.	0/0	$0
GASTONIA	15-JUN-96	TSTM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
GASTONIA	21-FEB-97	TSTM WIND	52 kts.	0/0	$0
GASTONIA	04-JUL-97	TSTM WIND	50 kts.	0/0	$0
GASTONIA	16-JUL-97	TSTM WIND	50 kts.	0/0	$0
GASTONIA	28-JUL-97	TSTM WIND	50 kts.	0/0	$0
GASTONIA	28-JUL-97	TSTM WIND	50 kts.	0/0	$0
GASTONIA	10-JUN-99	TSTM WIND	50 kts.	0/0	$0
GASTONIA	24-JUL-99	TSTM WIND	60 kts.	0/0	$0
GASTONIA	13-MAY-00	TSTM WIND	52 kts.	0/0	$0
GASTONIA	10-AUG-00	TSTM WIND	50 kts.	0/0	$0
GASTONIA	18-AUG-00	TSTM WIND	55 kts.	0/0	$0
GASTONIA	01-APR-01	TSTM WIND	50 kts.	0/0	$0
GASTONIA	25-OCT-01	TSTM WIND	50 kts.	0/0	$0
GASTONIA	22-JUL-02	TSTM WIND	50 kts.	0/0	$0
GASTONIA	02-AUG-02	TSTM WIND	50 kts.	0/0	$27,685
GASTONIA	24-AUG-02	TSTM WIND	55 kts.	0/0	$0
GASTONIA	09-JUL-03	TSTM WIND	50 kts.	0/0	$0
GASTONIA	12-JUL-03	TSTM WIND	50 kts.	0/0	$0
GASTONIA	19-JUL-03	TSTM WIND	52 kts.	0/0	$0
GASTONIA	19-JUL-03	TSTM WIND	50 kts.	0/0	$1,344
GASTONIA	19-JUL-03	TSTM WIND	52 kts.	0/0	$2,688
GASTONIA	20-JUL-03	TSTM WIND	50 kts.	0/0	$0
GASTONIA	23-MAY-04	TSTM WIND	50 kts.	0/0	$0
GASTONIA	23-MAY-04	TSTM WIND	60 kts.	0/0	$0
GASTONIA	08-JUN-04	TSTM WIND	50 kts.	0/0	$0
GASTONIA	08-MAR-05	TSTM WIND	55 kts.	0/0	$101,342
GASTONIA	28-JUL-05	TSTM WIND	50 kts.	0/0	$0
GASTONIA	10-JUN-06	TSTM WIND	50 kts.	0/0	$0
GASTONIA	11-JUN-06	TSTM WIND	55 kts.	0/0	$0
GASTONIA	11-JUN-06	TSTM WIND	55 kts.	0/0	$0
GASTONIA	15-JUL-06	TSTM WIND	55 kts.	0/0	$0
GASTONIA	15-APR-07	THUNDERSTORM WIND	55 kts.	0/0	$0
GASTONIA	11-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
GASTONIA	27-JUL-07	THUNDERSTORM WIND	55 kts.	0/0	$0
GASTONIA	26-JUN-08	THUNDERSTORM WIND	50 kts.	0/0	$0
GASTONIA	05-APR-11	THUNDERSTORM WIND	55 kts.	0/0	$0
GASTONIA	10-JUN-11	THUNDERSTORM WIND	55 kts.	0/0	$0
GASTONIA	16-MAY-12	THUNDERSTORM WIND	50 kts.	0/0	$0
GASTONIA	10-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
High Shoals					
HIGH SHOALS	03-AUG-06	TSTM WIND	55 kts.	0/0	$0
Lowell					
LOWELL	15-NOV-06	THUNDERSTORM WIND	50 kts.	0/0	$24,597
LOWELL	16-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
McAdenville					
MC ADENVILLE	11-AUG-11	THUNDERSTORM WIND	65 kts.	0/1	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Mount Holly					
MT HOLLY	28-JUL-97	TSTM WIND	50 kts.	0/0	$0
MT HOLLY	10-JUN-98	TSTM WIND	50 kts.	0/0	$0
MT HOLLY	10-MAY-00	TSTM WIND	55 kts.	0/0	$73,427
MT HOLLY	12-JUL-03	TSTM WIND	60 kts.	0/0	$67,196
MT HOLLY	23-MAY-04	TSTM WIND	50 kts.	0/0	$0
MT HOLLY	31-MAY-04	TSTM WIND	50 kts.	0/0	$0
MT HOLLY	25-JUN-07	THUNDERSTORM WIND	55 kts.	0/0	$0
MT HOLLY	27-APR-08	THUNDERSTORM WIND	55 kts.	0/0	$0
MT HOLLY	05-JUN-11	THUNDERSTORM WIND	60 kts.	0/0	$0
Ranlo					
RANLO	08-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
Spencer Mountain					
None Reported	--	--	--	--	--
Stanley					
Stanley	19-AUG-94	THUNDERSTORM WINDS	0 kts.	0/0	$0
STANLEY	08-AUG-11	THUNDERSTORM WIND	55 kts.	0/0	$0
STANLEY	01-SEP-12	THUNDERSTORM WIND	45 kts.	0/0	$5,150
Unincorporated Area					
GASTON COUNTY	28-JUL-55	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	06-JUN-63	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	01-MAY-66	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	29-JUN-66	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	30-JUN-66	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	12-JUN-68	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	05-AUG-70	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	03-AUG-73	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	24-MAR-75	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	16-JUN-80	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	06-JUN-81	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	21-AUG-83	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	03-JUN-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	07-JUN-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	10-JUL-85	TSTM WIND	52 kts.	0/0	$0
GASTON COUNTY	10-JUL-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	13-JUL-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	13-JUL-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	21-AUG-85	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	21-JUL-86	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	29-JUL-86	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	03-AUG-86	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	07-AUG-86	TSTM WIND	50 kts.	0/0	$0
GASTON COUNTY	03-JUN-87	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	18-JUN-87	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	13-JUL-87	TSTM WIND	0 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
GASTON COUNTY	17-MAY-88	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	18-JUN-88	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	26-JUN-88	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	26-JUN-88	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	05-MAY-89	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	06-MAY-89	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	06-MAY-89	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	12-JUN-89	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	27-JUL-89	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	10-FEB-90	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	28-APR-90	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	01-MAY-90	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	01-JUL-90	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	21-AUG-90	TSTM WIND	0 kts.	0/1	$0
GASTON COUNTY	21-AUG-90	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	29-APR-91	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	19-MAR-92	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	19-MAR-92	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	21-JUN-92	TSTM WIND	0 kts.	0/0	$0
GASTON COUNTY	25-JUN-92	TSTM WIND	52 kts.	0/0	$0
GASTON COUNTY	18-JUL-92	TSTM WIND	0 kts.	0/0	$0
S Portion	19-JUL-94	THUNDERSTORM WINDS	0 kts.	0/0	$0
GASTON COUNTY	18-JAN-96	HIGH WIND	0 kts.	0/0	$5,028
EAST GASTONIA	13-JUN-97	TSTM WIND	50 kts.	0/0	$0
GASTON COUNTY	24-FEB-98	HIGH WIND	50 kts.	0/0	$1,936
CENTRAL PORTION	20-JUL-98	TSTM WIND	50 kts.	0/0	$0
GASTON COUNTY	03-MAR-99	HIGH WIND	60 kts.	0/0	$151,259
GASTON COUNTY	15-SEP-99	HIGH WIND	45 kts.	0/0	$0
GASTON COUNTY	28-MAR-00	HIGH WIND	50 kts.	0/0	$0
GASTON COUNTY	06-MAR-01	HIGH WIND	55 kts.	0/0	$0
GASTON COUNTY	20-MAR-01	HIGH WIND	55 kts.	0/0	$67,893
GASTON COUNTY	04-FEB-02	HIGH WIND	50 kts.	0/0	$0
GASTON COUNTY	07-MAR-04	HIGH WIND	65 kts.	0/0	$55,815
GASTON COUNTY	16-APR-07	HIGH WIND	60 kts.	0/0	$28,430
GASTON COUNTY	10-FEB-08	HIGH WIND	55 kts.	0/0	$0
MOUNTIAN VIEW	31-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
MOUNTIAN VIEW	11-FEB-09	THUNDERSTORM WIND	50 kts.	0/0	$0
CROWDERS	11-JUN-09	THUNDERSTORM WIND	55 kts.	0/0	$0
CROWDERS	28-MAR-10	THUNDERSTORM WIND	50 kts.	0/0	$0
GASTONIA ARPT	28-MAR-10	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTH GASTONIA	13-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
MOUNTIAN VIEW	13-JUN-10	THUNDERSTORM WIND	55 kts.	0/0	$0
SOUTH GASTONIA	18-AUG-10	THUNDERSTORM WIND	50 kts.	0/0	$0
MOUNTIAN VIEW	30-NOV-10	THUNDERSTORM WIND	50 kts.	0/0	$0
GASTONIA ARPT	05-APR-11	THUNDERSTORM WIND	55 kts.	0/0	$0
CROWDERS	18-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
NORTH BELMONT	14-AUG-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTH GASTONIA	05-SEP-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SOUTH GASTONIA	23-MAR-12	THUNDERSTORM WIND	40 kts.	2/1	$0
HARDINS	05-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
ALEXIS	05-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
BELMONT SOUTH	09-JUL-12	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 Gaston 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 Gaston County is uniformly exposed to this hazard.

Historical Occurrences

Tornadoes have resulted in one disaster declaration in Gaston County in 1974.[8] According to the National Climatic Data Center, there have been a total of 13 recorded tornado events in Gaston County since 1956 (**Table B.14**), resulting in nearly $17 million (2013 dollars) in property damages.[9] In addition, 1 death and 11 injuries were reported (**Table B.15**). The magnitude of these tornadoes ranges from F0 to F2 in intensity, although an F3 to 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 63 years.

TABLE B.14: SUMMARY OF TORNADO OCCURRENCES IN GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	0	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$2,693,982
Cramerton	1	0/0	$61,494
Dallas	0	0/0	$0
Gastonia	4	0/0	$8,570,522
High Shoals	0	0/0	$0

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[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 Gaston County. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	6	1/11	$5,318,979
GASTON COUNTY TOTAL	**13**	**1/11**	**$16,644,977**

Source: National Climatic Data Center

TABLE B.15: HISTORICAL TORNADO IMPACTS IN GASTON COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Belmont					
None Reported	--	--	--	--	--
Bessemer City					
None Reported	--	--	--	--	--
Cherryville					
CHERRYVILLE	12-JUL-03	F1	0/0	$2,687,833	This weak tornado, or perhaps a series of weak tornadoes, caused widespread tree and power line damage as it tracked across northern Gaston County. The most significant damage occurred in the Mount Holly area, as well as far northern portions of Belmont.
CHERRYVILLE	26-MAY-06	F1	0/0	$6,149	This weak tornado touched down near the intersection of Hephzibah Church Rd and St Marks Church Rd, then made intermittent contact with the ground along a 2 mile path before lifting east of Landers Chapel Rd near its intersection with Gaston-Webb Chapel Rd. Damage was mainly confined to downed trees. However, a carport was blown into the tops of a tree and the roof of a barn on St. Marks Church Rd was blown off and tossed approximately 0.5 miles. In addition to the tornado, hail up to the size of golfballs fell.
Cramerton					
CRAMERTON	15-NOV-06	F1	0/0	$61,494	An NWS survey found a short damage path, consistent with a tornado, near Cramerton. The tornado damaged the West Cramerton Baptist Church, removing several shingles, damaging stained glass windows, knocking off the steeple and blowing off the front

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					door.
Dallas					
None Reported	--	--	--	--	--
Gastonia					
GASTONIA	08-MAR-05	F0	0/0	$1,267	A weak tornado developed within a squall line as it passed just south of Gastonia. A funnel cloud was observed just west of highway 321, but the condensation funnel did not extend to the ground. Eyewitnesses ran inside their home, at which time the house reportedly shook. Shingles were torn off the roof of the home, and numerous large limbs were blown down.
GASTONIA	13-JAN-06	F1	0/0	$430,456	his small, weak tornado touched down just west of the highway 274/275 intersection in Bessemer City, just north of highway 274 near the Barkers Ridge subdivision. The tornado skirted a mobile home park, where it moved a trailer about 3 feet before moving across Barkers Ridge. The roof was blown off of one unoccupied, newly constructed home. 5 additional homes in the small subdivision received significant exterior damage, and were condemned. Several other homes received minor damage. After leaving the subdivision the tornado appeared to lift briefly as it moved into a wooded area. However, additional damage occurred near the intersection of Jim Clark and JK Road, where most of the tin roof was removed from a barn. In addition, shingles were removed from the roof of a home, and several trees were blown down, one of which fell on an outbuilding. The tornado then blew over a travel trailer before lifting.
GASTONIA	05-JAN-07	F0	0/0	$23,881	A short tornado damage track ran through the Autumn Acres subdivision in Gastonia. Eight homes received mostly minor roof damage. Some outbuildings were also damaged.
GASTONIA	09-MAY-08	F2	0/0	$8,114,919	A tornado track began just southeast of Gastonia and continued well into Mecklenburg County on the northwest side of Charlotte. Where the tornado first touched down, part

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					of the roof was blown off the roof of an office building near the intersection of Union Rd and Garrison Bvd. The tornado continued east-northeast to the Garrison Blvd, S New Hope Rd area, where numerous homes and businesses received minor to moderate roof damage and numerous large trees were uprooted. The tornado produced sporadic, mainly minor damage as it moved through McAdenville, where it crossed I-85, blowing several cars off the interstate. The most significant damage was observed in the Catawba Heights/ Belmont area, near I-85, where much of the metal roof was peeled from a large wharehouse, causing 7 million dollars in damage. Another industrial business in this area lost most of its roof.
High Shoals					
None Reported	--	--	--	--	--
Lowell					
None Reported	--	--	--	--	--
McAdenville					
None Reported	--	--	--	--	--
Mount Holly					
None Reported	--	--	--	--	--
Ranlo					
None Reported	--	--	--	--	--
Spencer Mountain					
None Reported	--	--	--	--	--
Stanley					
GASTON COUNT	27-MAY-73	F3	0/3	$1,421,475	
Unincorporated Area					
GASTON COUNTY	06-APR-56	F1	0/0	$2,325,304	
GASTON COUNTY	28-MAY-73	F0	0/0	$0	
GASTON COUNTY	02-APR-74	F1	1/10	$1,281,139	
GASTON COUNTY	15-MAY-75	F1	0/1	$117,282	
CROWDERS	21-FEB-97	F1	0/0	$393,254	
BELMONT SOUTH	28-MAR-10	F1	0/0	$1,202,000	A very short tornado path was surveyed near Belmont. The tornado touched down in the Parkdale Dr/Landing Rd area, where a mill was damaged. Part of the metal sheet roofing was peeled back and thrown

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					in multiple directions, allowing some interior walls to collapse. A tractor trailer was also overturned on the south side of the mill. Several homes were damaged at a mobile home park adjacent to the mill, where a number of trees were also blown down. The tornado traveled roughly 200 yards before lifting.

*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 Gaston County experience a direct tornado strike. The probability of future tornado occurrences affecting Gaston 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. Gaston County is accustomed to severe winter weather conditions and frequently receives severe 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

Severe winter weather has resulted in two disaster declarations in Gaston County. This includes snow storms in 1977 and 1993, the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002.[10] According to the National Climatic Data Center, there have been a total of 48 recorded winter storm events in Gaston County since 1993 (**Table B.16**).[11] These events resulted in over $22 million (2013 dollars) in damages. Detailed information on the recorded winter storm events can be found in **Table B.17**.[12]

[10] 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*.
[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 Gaston 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 B.16: SUMMARY OF WINTER STORM EVENTS IN GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Gaston County	48	0/0	$22,832,181

Source: National Climatic Data Center

TABLE B.17: HISTORICAL WINTER STORM IMPACTS IN GASTON COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Belmont				
None Reported	--	--	--	--
Bessemer City				
None Reported	--	--	--	--
Cherryville				
None Reported	--	--	--	--
Cramerton				
None Reported	--	--	--	--
Dallas				
None Reported	--	--	--	--
Gastonia				
None Reported	--	--	--	--
High Shoals				
None Reported	--	--	--	--
Lowell				
None Reported	--	--	--	--
McAdenville				
None Reported	--	--	--	--
Mount Holly				
None Reported	--	--	--	--
Ranlo				
None Reported	--	--	--	--
Spencer Mountain				
None Reported	--	--	--	--
Stanley				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	12-MAR-93	WINTER STORM	2/10†	$874,516
Northern Interior and	10-FEB-94	ICE STORM	0/0	
GASTON COUNTY	06-JAN-96	WINTER STORM	0/0	
GASTON COUNTY	11-JAN-96	WINTER STORM	0/0	
GASTON COUNTY	02-FEB-96	ICE STORM	0/0	$2,011,388
GASTON COUNTY	03-FEB-96	SNOW	0/0	
GASTON COUNTY	16-FEB-96	SNOW	0/0	
GASTON COUNTY	06-DEC-96	Icy Roads	0/0	

	Date	Type of Storm	Deaths / Injuries	Property Damage*
GASTON COUNTY	09-JAN-97	Freezing rain	0/0	
GASTON COUNTY	15-JAN-97	Snow	0/0	
GASTON COUNTY	13-FEB-97	WINTER STORM	0/0	
GASTON COUNTY	13-FEB-97	ICE STORM	0/0	
GASTON COUNTY	29-DEC-97	SNOW	0/0	
GASTON COUNTY	19-JAN-98	SNOW	0/0	
GASTON COUNTY	23-DEC-98	FREEZING RAIN/SLEET	0/0	
GASTON COUNTY	24-DEC-98	ICE STORM	0/0	
GASTON COUNTY	02-JAN-99	ICE STORM	0/0	
GASTON COUNTY	01-FEB-99	FREEZING RAIN	0/0	
GASTON COUNTY	19-FEB-99	SNOW	0/0	
GASTON COUNTY	09-MAR-99	SNOW AND SLEET	0/0	
GASTON COUNTY	18-JAN-00	SNOW	0/0	
GASTON COUNTY	22-JAN-00	HEAVY SNOW	0/0	
GASTON COUNTY	24-JAN-00	HEAVY SNOW	0/0	
GASTON COUNTY	29-JAN-00	ICE STORM	0/0	
GASTON COUNTY	19-NOV-00	SNOW	0/0	
GASTON COUNTY	17-APR-01	SNOW SHOWERS	0/0	
GASTON COUNTY	03-JAN-02	HEAVY SNOW	0/0	
GASTON COUNTY	08-FEB-02	ICY ROADS	0/0	
GASTON COUNTY	04-DEC-02	ICE STORM	0/0	$19,577,022
GASTON COUNTY	16-JAN-03	WINTER WEATHER/MIX	0/0	
GASTON COUNTY	23-JAN-03	HEAVY SNOW	0/0	
GASTON COUNTY	16-FEB-03	SLEET STORM	0/0	
GASTON COUNTY	27-FEB-03	WINTER WEATHER/MIX	0/0	
GASTON COUNTY	25-JAN-04	SLEET STORM	0/0	
GASTON COUNTY	27-JAN-04	WINTER WEATHER/MIX	0/0	
GASTON COUNTY	26-FEB-04	HEAVY SNOW	0/0	$255,246
GASTON COUNTY	27-MAR-04	FROST/FREEZE	0/0	
GASTON COUNTY	29-JAN-05	WINTER STORM	0/0	
GASTON COUNTY	29-JAN-05	WINTER WEATHER/MIX	0/0	
GASTON COUNTY	15-DEC-05	WINTER WEATHER	0/0	
GASTON COUNTY	15-DEC-05	ICE STORM	0/0	$114,009
GASTON COUNTY	16-DEC-05	FREEZING FOG	0/0	
GASTON COUNTY	18-JAN-07	WINTER WEATHER	0/0	
GASTON COUNTY	01-FEB-07	WINTER STORM	0/0	
GASTON COUNTY	08-APR-07	FROST/FREEZE	0/0	
GASTON COUNTY	16-JAN-08	WINTER WEATHER	0/0	
GASTON COUNTY	18-DEC-09	WINTER WEATHER	0/0	
GASTON COUNTY	25-DEC-10	HEAVY SNOW	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 Gaston County. The text below describes one of the major events and associated impacts on the county. Similar impacted can be expected with severe winter weather.

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

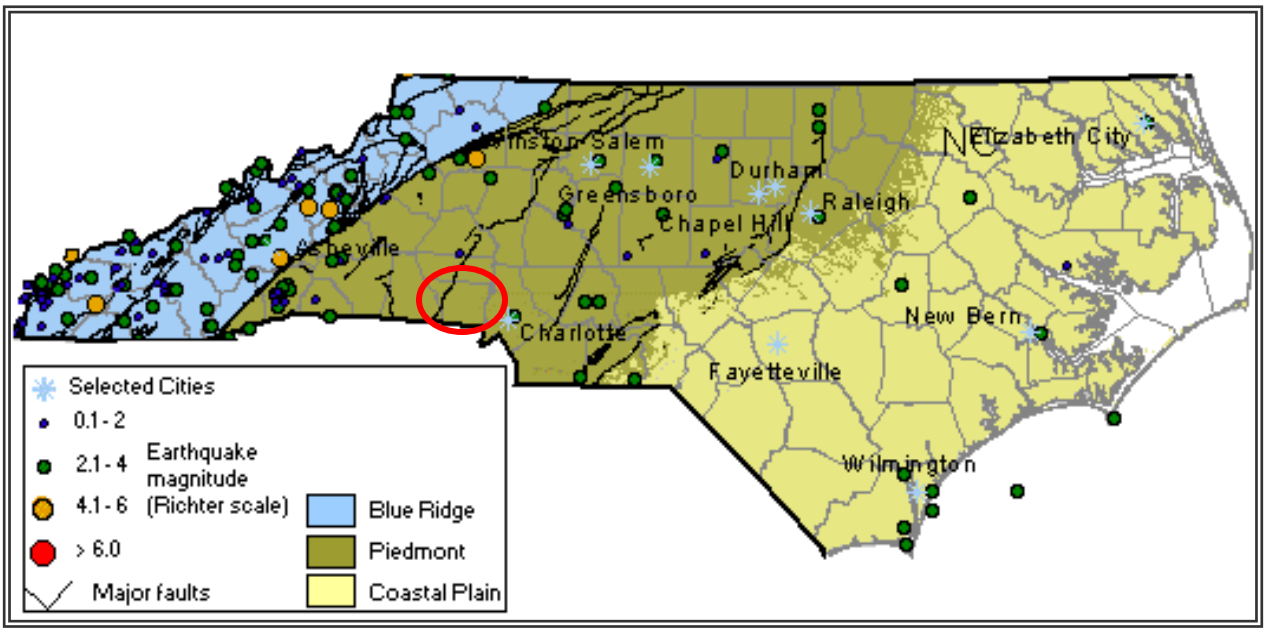
Winter storms throughout the planning area have several negative externalities including hypothermia for those individuals having to remain outdoors for a certain length of time and likely increased impact for the need of medical services, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could lead to fire or an accumulation of toxic fumes.

Probability of Future Occurrences
Winter storm events will remain a regular occurrence in Gaston County due to its location in the western part of the state. According to historical information, Gaston County experiences several 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.2** is a map showing geological and seismic information for North Carolina.

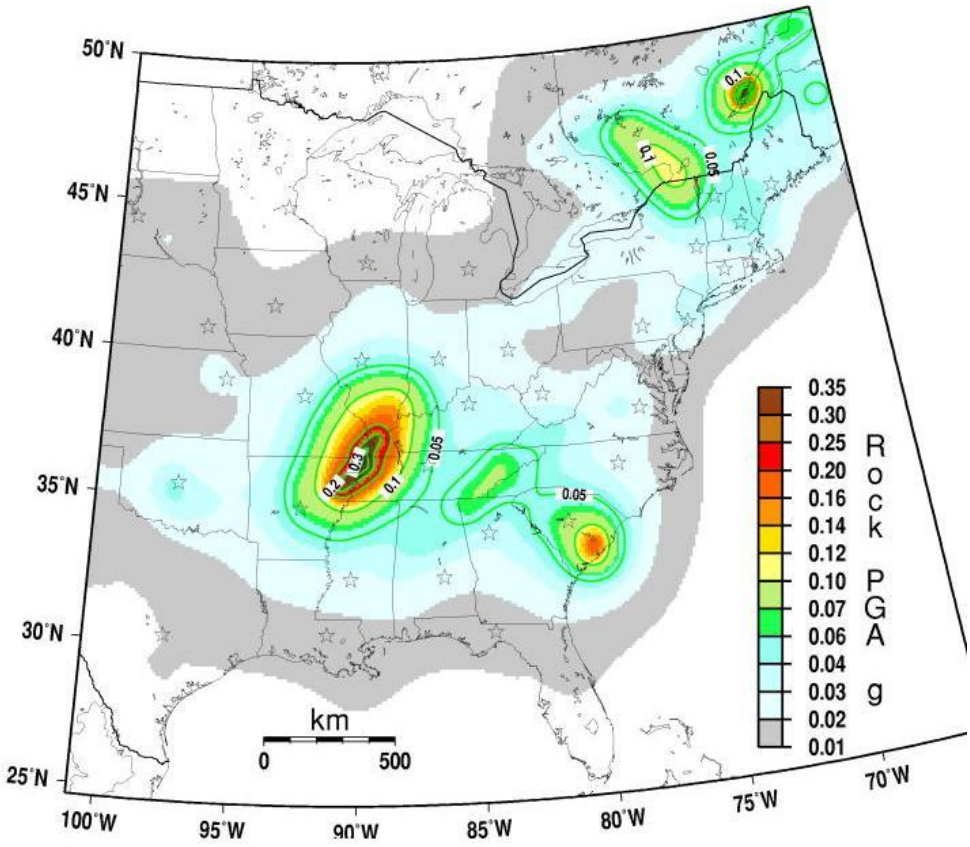
FIGURE B.2: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure B.3 shows the intensity level associated with Gaston 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, Gaston County lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the county exists within an area of moderate seismic risk.

FIGURE B.3: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

Historical Occurrences

At least 6 earthquakes are known to have affected Gaston County since 1886. The strongest of these measured a VII on the Modified Mercalli Intensity (MMI) scale. **Table B.18** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table B.19** presents a detailed occurrence of each event including the date, distance from the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE B.18: SUMMARY OF SEISMIC ACTIVITY IN GASTON COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Belmont	0	--	--
Bessemer City	0	--	--
Cherryville	1	IV	< 4.8
Cramerton	0	--	--
Dallas	1	VII	< 6.1
Gastonia	2	III	< 4.8
High Shoals	1	V	< 4.8

[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
Lowell	0	--	--
McAdenville	0	--	--
Mount Holly	1	III	< 4.8
Ranlo	0	--	--
Spencer Mountain	0	--	--
Stanley	0	--	--
Unincorporated Area	0	--	--
GASTON COUNTY TOTAL	**6**	**VII**	**< 6.1**

Source: National Geophysical Data Center

TABLE B.19: SIGNIFICANT SEISMIC EVENTS IN GASTON COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Belmont				
None Reported	--	--	--	--
Bessemer City				
None Reported	--	--	--	--
Cherryville				
Cherryville	5/13/1957	69.0 km	4	IV
Cramerton				
None Reported	--	--	--	--
Dallas				
Dallas	9/1/1886	290.0 km	6	VII
Gastonia				
Gastonia	5/13/1957		4	III
Gastonia	11/20/1969	238.0 km	4.3	V
High Shoals				
High Shoals	2/3/1972	223.0 km	4.5	IV
Lowell				
None Reported	--	--	--	--
McAdenville				
None Reported	--	--	--	--
Mount Holly				
None Reported	11/3/1928	162.0 km	4	III
Ranlo				
None Reported	--	--	--	--
Spencer Mountain				
None Reported	--	--	--	--
Stanley				
None Reported	--	--	--	--
Unincorporated Area				
None Reported	--	--	--	--

Location	Date	Epicentral Distance	Magnitude	MMI

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Gaston County is unlikely. However, it is likely 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 and 10 percent (possible).

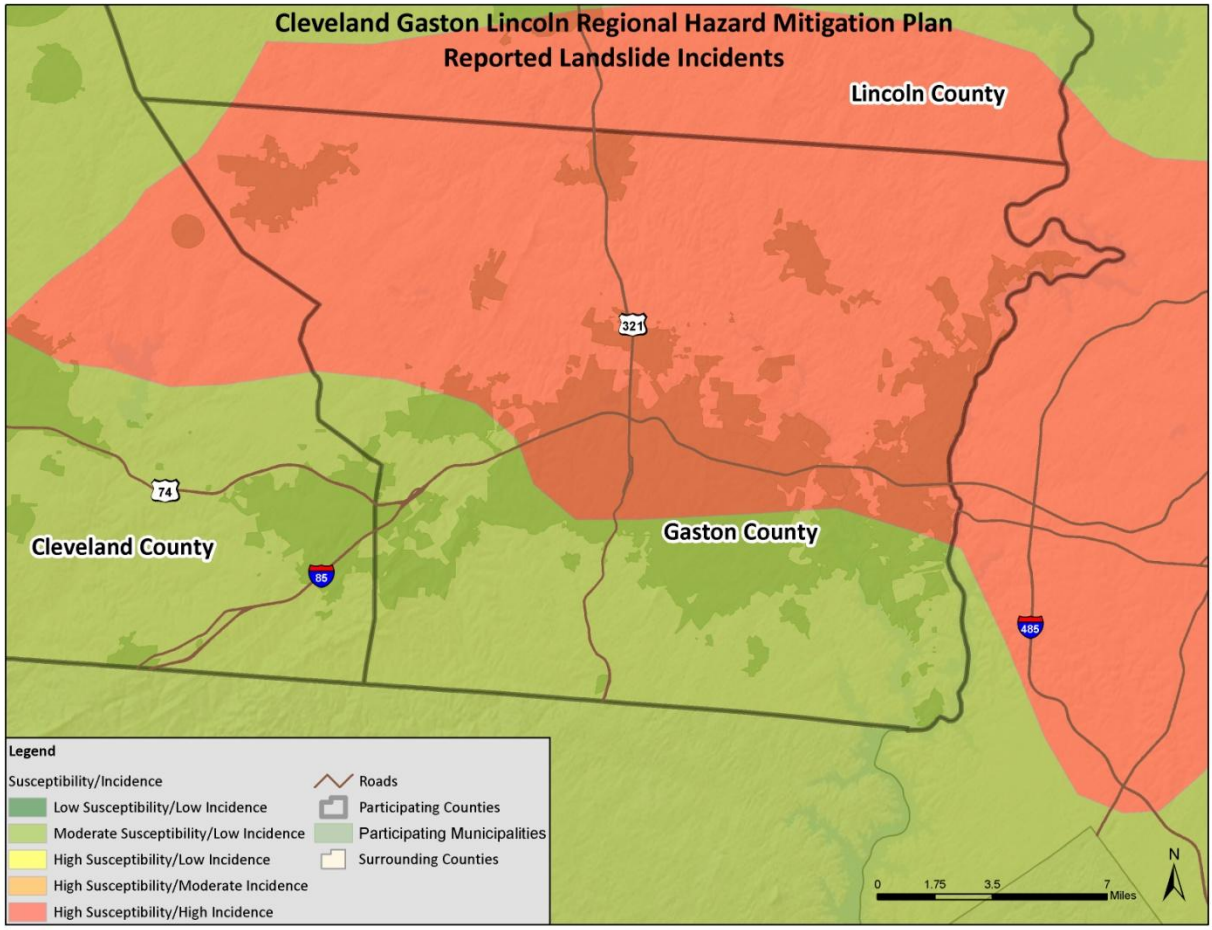
B.2.10 Landslide

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 Gaston County.

According to **Figure B.4** below, the majority of the county has high landslide susceptibility/incidence. The remaining portion of the county, mostly along the southern boundary, has a low incidence occurrence rate. There is a moderate to high susceptibility throughout the county.

FIGURE B.4: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF GASTON COUNTY



Source: USGS

Historical Occurrences

Steep topography in some areas of Gaston County makes the planning area 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. **Table B.20** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey[14]. The georeferenced locations of the landslide events presented in the aforementioned tables are presented in **Figure B.5**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Gaston County.

TABLE B.20: SUMMARY OF LANDSLIDE ACTIVITY IN GASTON COUNTY

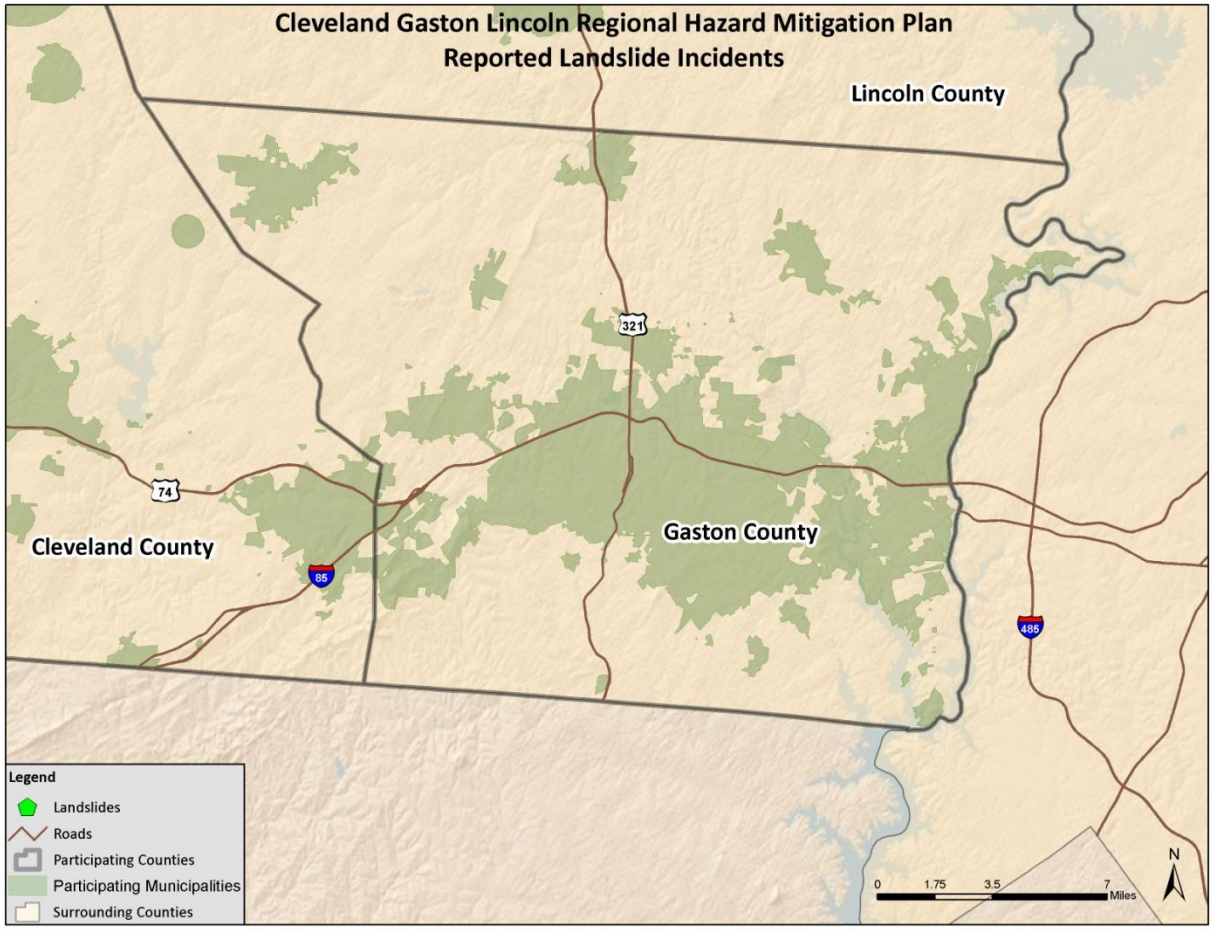
Location	Number of Occurrences
Belmont	0
Bessemer City	0

[14] 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. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

Cherryville	0
Cramerton	0
Dallas	0
Gastonia	0
High Shoals	0
Lowell	0
McAdenville	0
Mount Holly	0
Ranlo	0
Spencer Mountain	0
Stanley	0
Unincorporated Area	0
GASTON COUNTY TOTAL	**0**

Source: North Carolina Geological Survey

FIGURE B.5: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN GASTON 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 (1 to 10 percent probability). Local conditions may become more favorable for

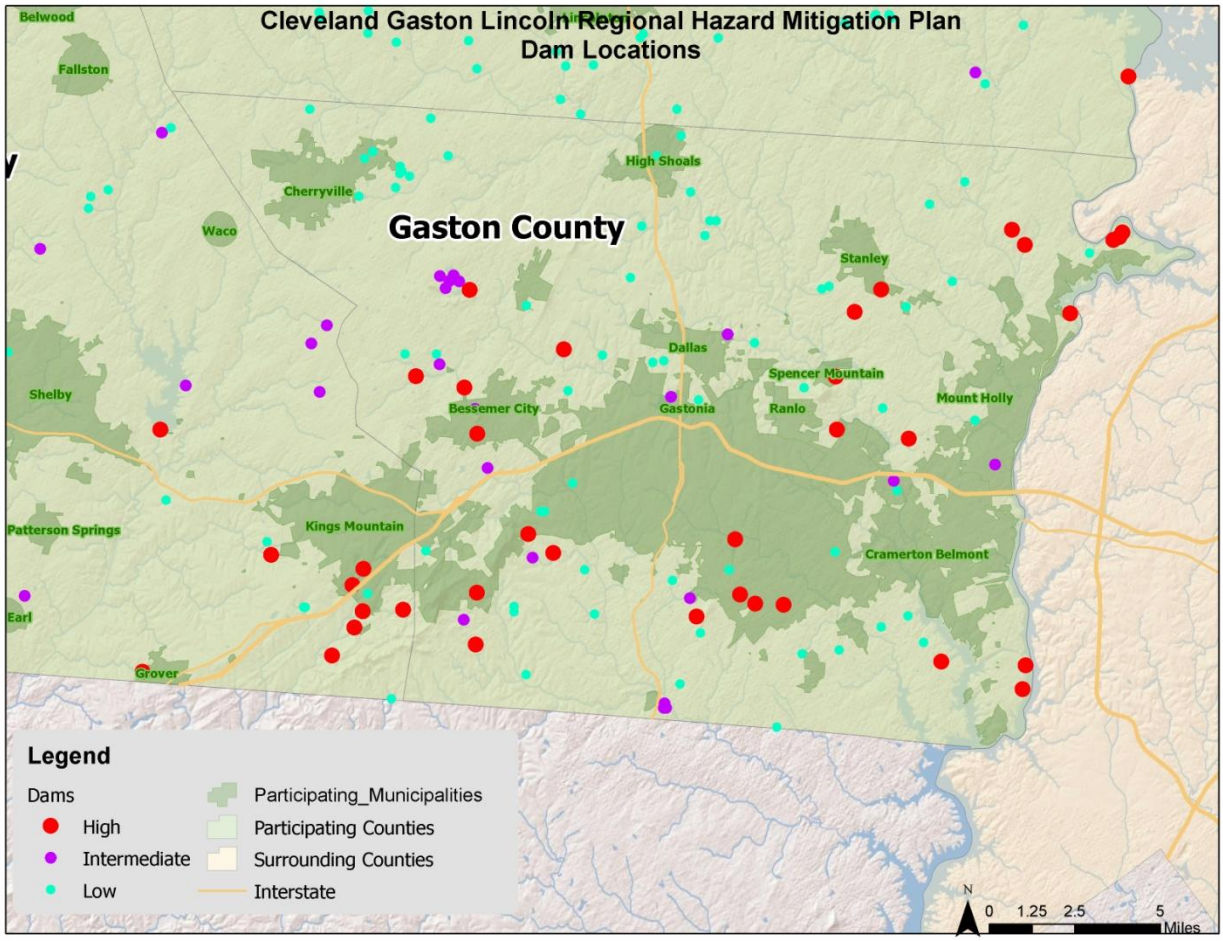
landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in Gaston County have greater risk than others given factors such as steepness on slope and modification of slopes.

B.2.11 Dam and Levee Failure

Location and Spatial Extent

According to the North Carolina Division of Land Management there are 105 dams in Gaston County.[15] **Figure B.6** 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 B.21**.

FIGURE B.6: GASTON COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2012

[15] The February 8, 2012 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.

TABLE B.21: GASTON COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Gaston County				
Allen Active Ash Basin Dam	High	172	0	Utility
Allen Retired Ash Basin Dam	High	62	0	Utility
Paradise Point Dam	High	8	50	Private
Sparrow Springs Lake Dam	High	8	60	Private
Dobbs Pond Dam #2	High	1.8	14	Private
Messick Mobile Home Park Dam	High	0	0	
Gaston Country Club Lake Dam	High	5	70	Private
Shorts Lake Dam	High	12	151	State
Leigh Lake Dam	High	2.4	21	Private
Johnny Long Pond Dam	High	13.3	149	Private
Robinwood Lake Dam	High	32	514	Private
Lake Sparta	High	2	18	Private
Ridley Dam	High	1.5	13	Private
Branch Lake Dam	High	0	0	Private
Poston Park Dam	High	11	325	Local Gov
Arrowood Lake Dam	High	25	440	Local Gov
Ben Webber Lake Dam	High	12	150	Local Gov
Pharr Yarns Dam	High	2.5	12	Private
Jacobs Pond Dam	High	2.5	24	Private
James Davis Dam	High	2.8	24	Private
Mtn. Island Dam	High	3000	139752	Utility
Lithco Mine Tailings Dam F	High	4.4	56	Private
Warren Dam	High	4.7	44	Private
Archie Harris Dam	High	1	9	Private
Riverbend Active Ash Basin Dam 1 (Primary)	High	41.5	0	
Riverbend Ash Basin Intermediate Dam	High	0	0	
Riverbend Ash Basin Dam 2 (Secondary)	High	29.7	0	
Cox Dam	High	6	37	Private

Source: North Carolina Division of Land Resources, 2012

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

According to the North Carolina Division of Land Resources, there have been a total of five dam breeches reported in Gaston County. Additionally, several breach scenarios in the county could be catastrophic.

The National Climatic Data Center also reported one dam failure event in Bessemer City on May 4, 1997 when a small dam on a three-acre lake broke following several heavy rain episodes. Flooding was not

severe but caused some damage to roads and resulted in the loss of a large number of fish. This resulted in $3,146 (2013 dollars) of property damage.

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

Gaston County
There has not been a significant dam failure and resulting flood along the Catawba River or South Fork of the Catawba. However, the potential does exist.

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. Even though it is not located in Gaston County, inundation by failure of the Cowans Ford Dam would cause catastrophic damage, including loss of life and injuries, especially to those areas located along the Catawba River. In addition to local devastation, the region as whole would be impacted.

B.2.12 Erosion

Location and Spatial Extent
Erosion in Gaston County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Gaston 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 committee.

Historical Occurrences
Several sources were vetted to identify areas of erosion in Gaston 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 no specific hazard history of erosion exists and it was found to be a hazard with a negligible potential impact.

Probability of Future Occurrences
Erosion remains a natural, dynamic, and continuous process for Gaston 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

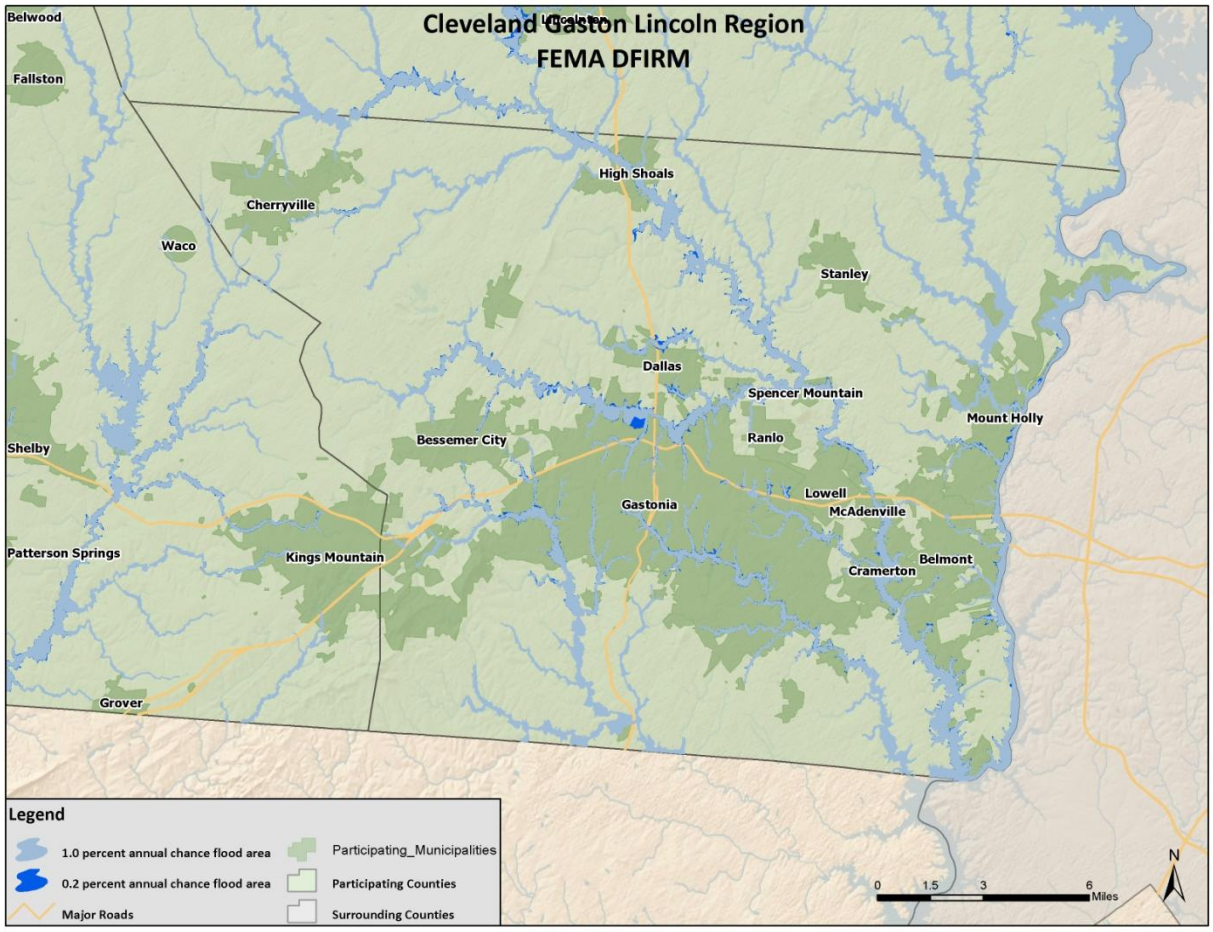
Location and Spatial Extent
There are areas in Gaston County that are susceptible to flood events. Special flood hazard areas in the county were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[16] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 364 square miles that make up Gaston County, there are 29.0 square miles of land in

[16] The county-level DFIRM data used for Gaston County were updated in 2010.

zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 2.0 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

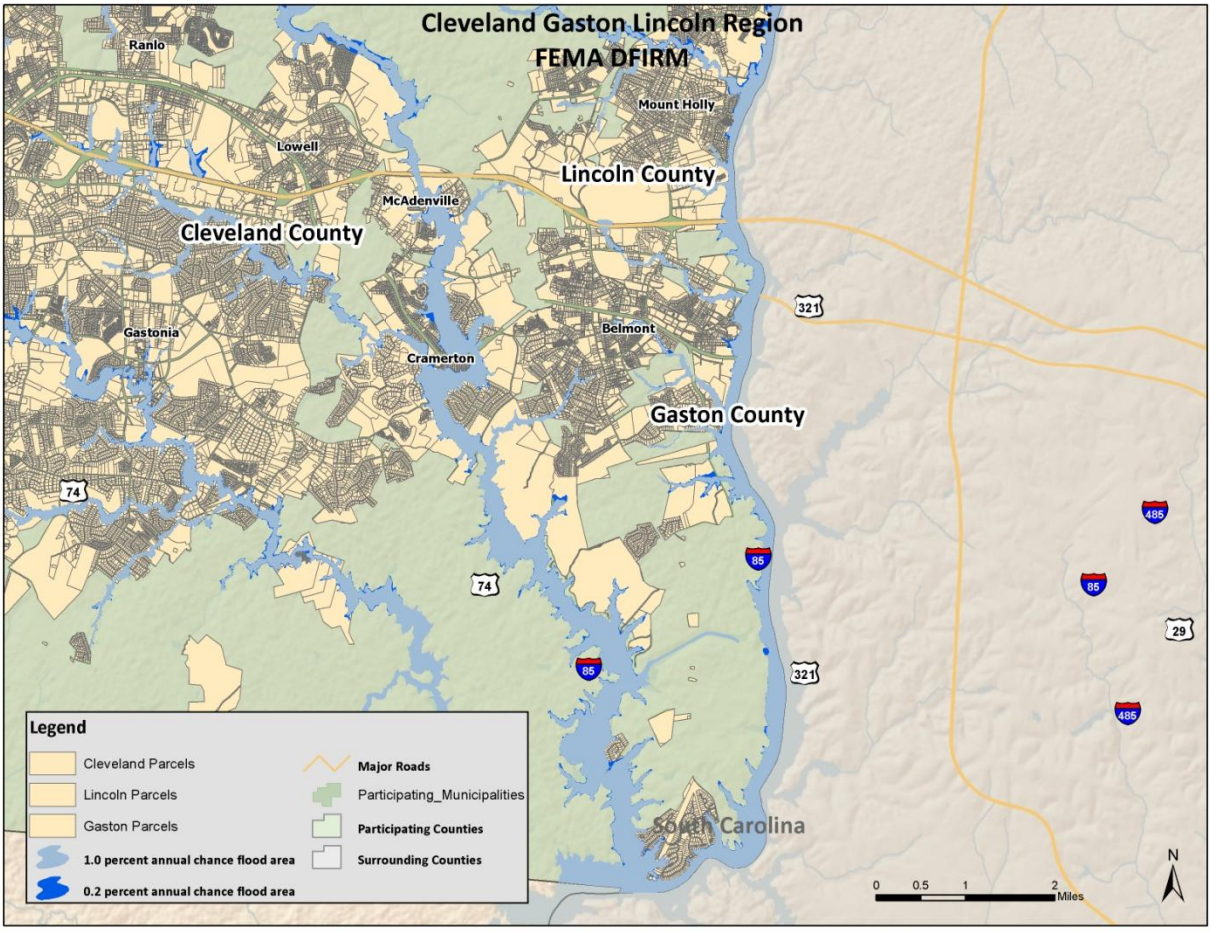
These flood zone values account for 8.5 percent of the total land area in Gaston County. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure B.7**, **Figure B.8**, **Figure B.9**, **Figure B.10**, **Figure B.11**, **Figure B.12**, **Figure B.13**, **Figure B.14**, **Figure B.15**, **Figure B.16**, **Figure B.17**, **Figure B.18**, **Figure B.19**, and **Figure B.20** illustrate the location and extent of currently mapped special flood hazard areas for Gaston County and its municipalities based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

FIGURE B.7: SPECIAL FLOOD HAZARD AREAS IN GASTON COUNTY



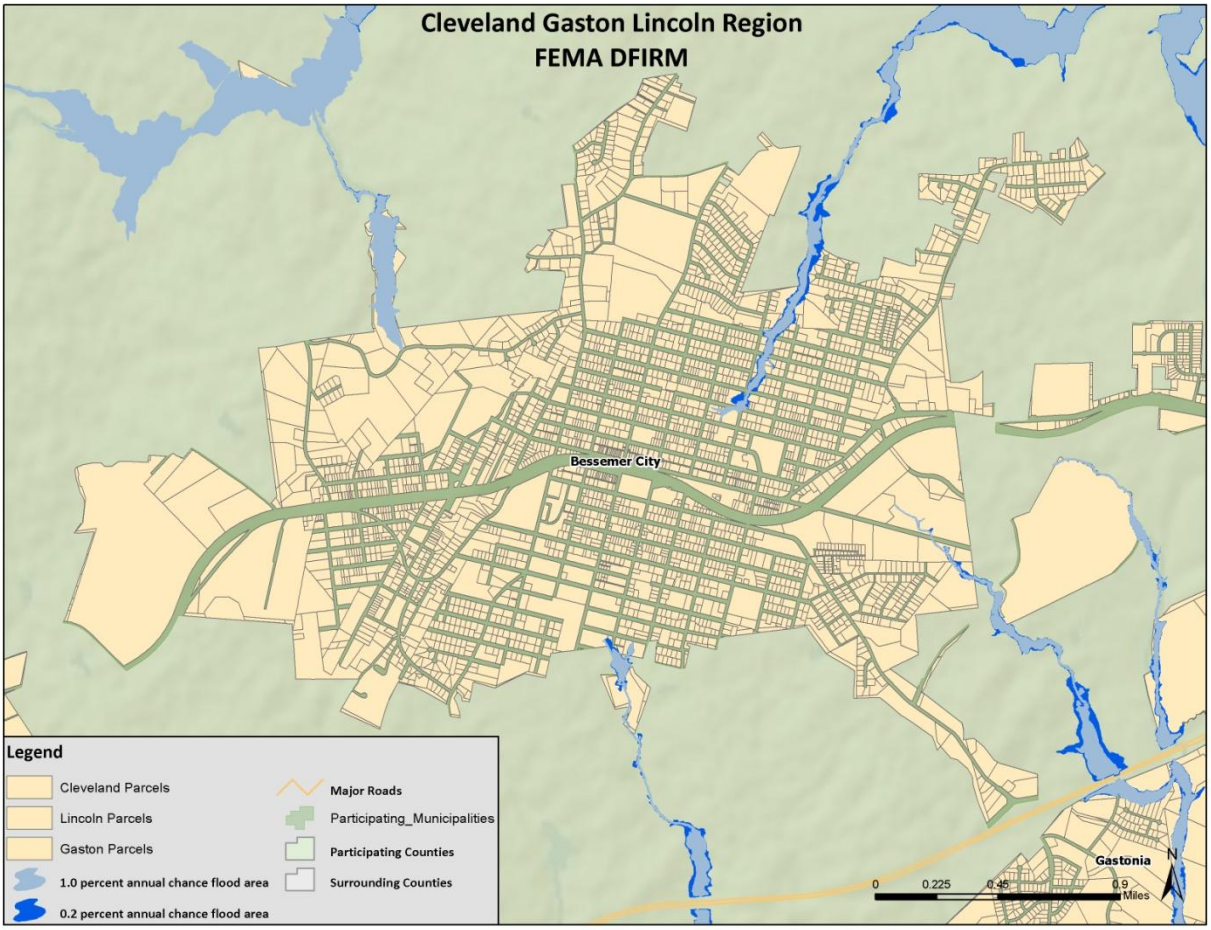
Source: Federal Emergency Management Agency

FIGURE B.8: SPECIAL FLOOD HAZARD AREAS IN BELMONT



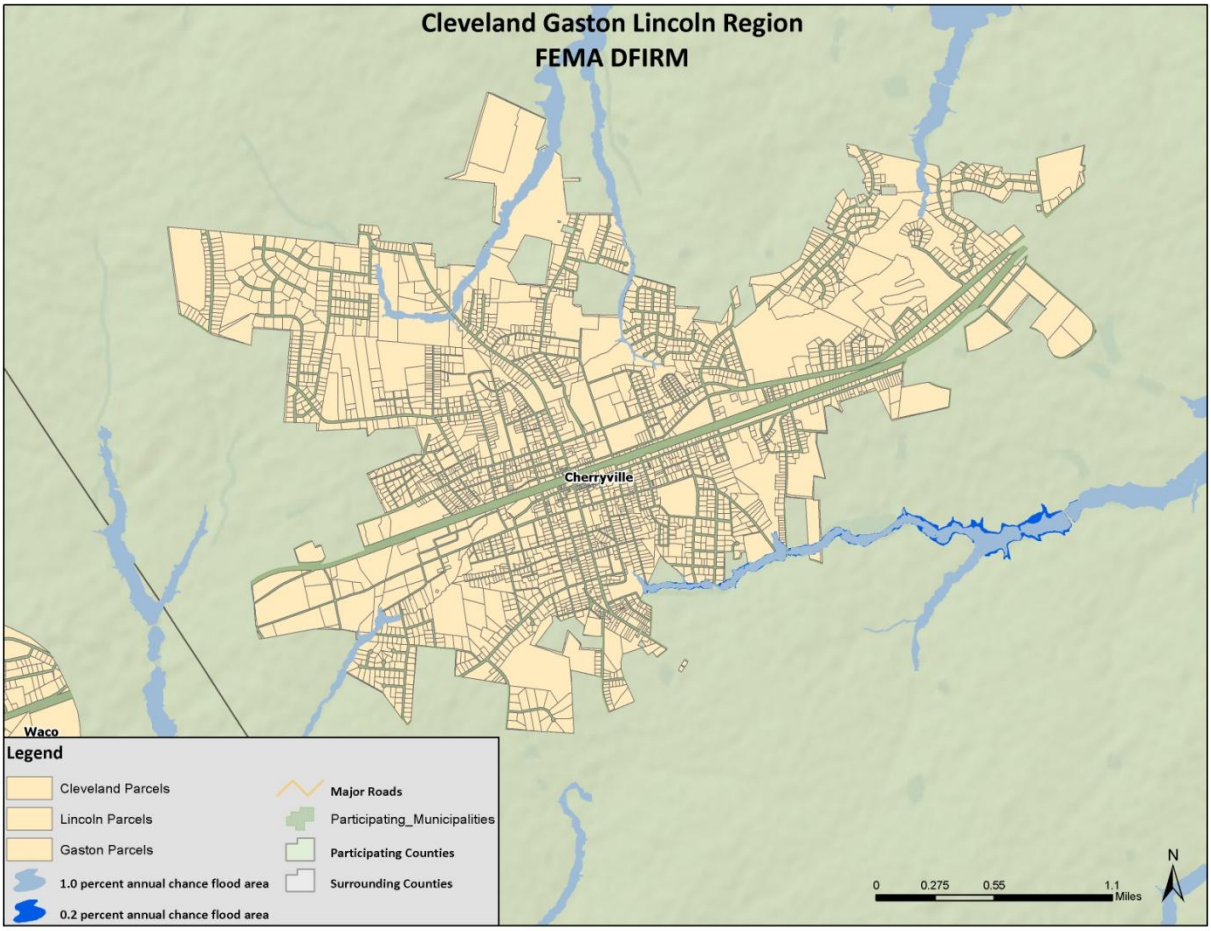
Source: Federal Emergency Management Agency

FIGURE B.9: SPECIAL FLOOD HAZARD AREAS IN BESSEMER CITY



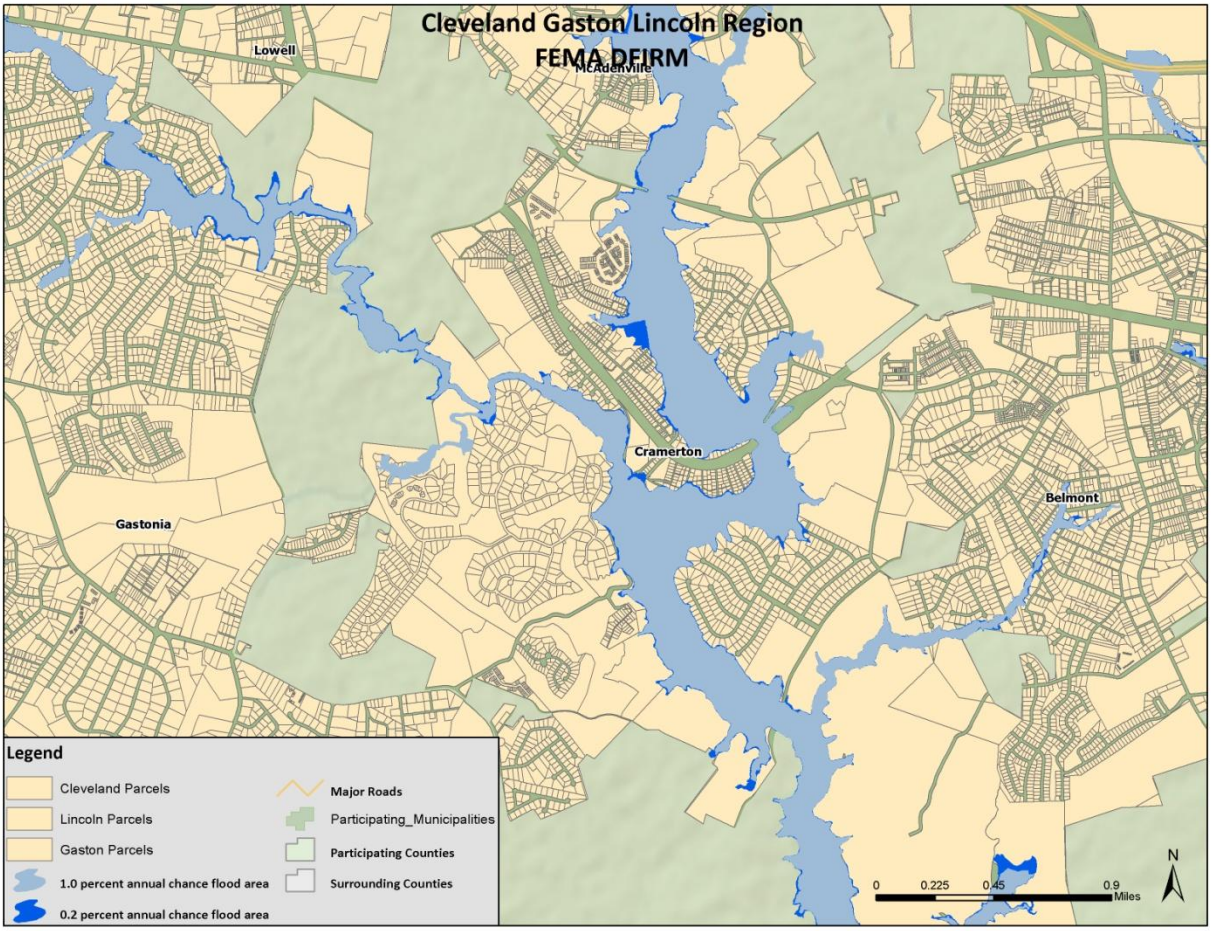
Source: Federal Emergency Management Agency

FIGURE B.10: SPECIAL FLOOD HAZARD AREAS IN CHERRYVILLE



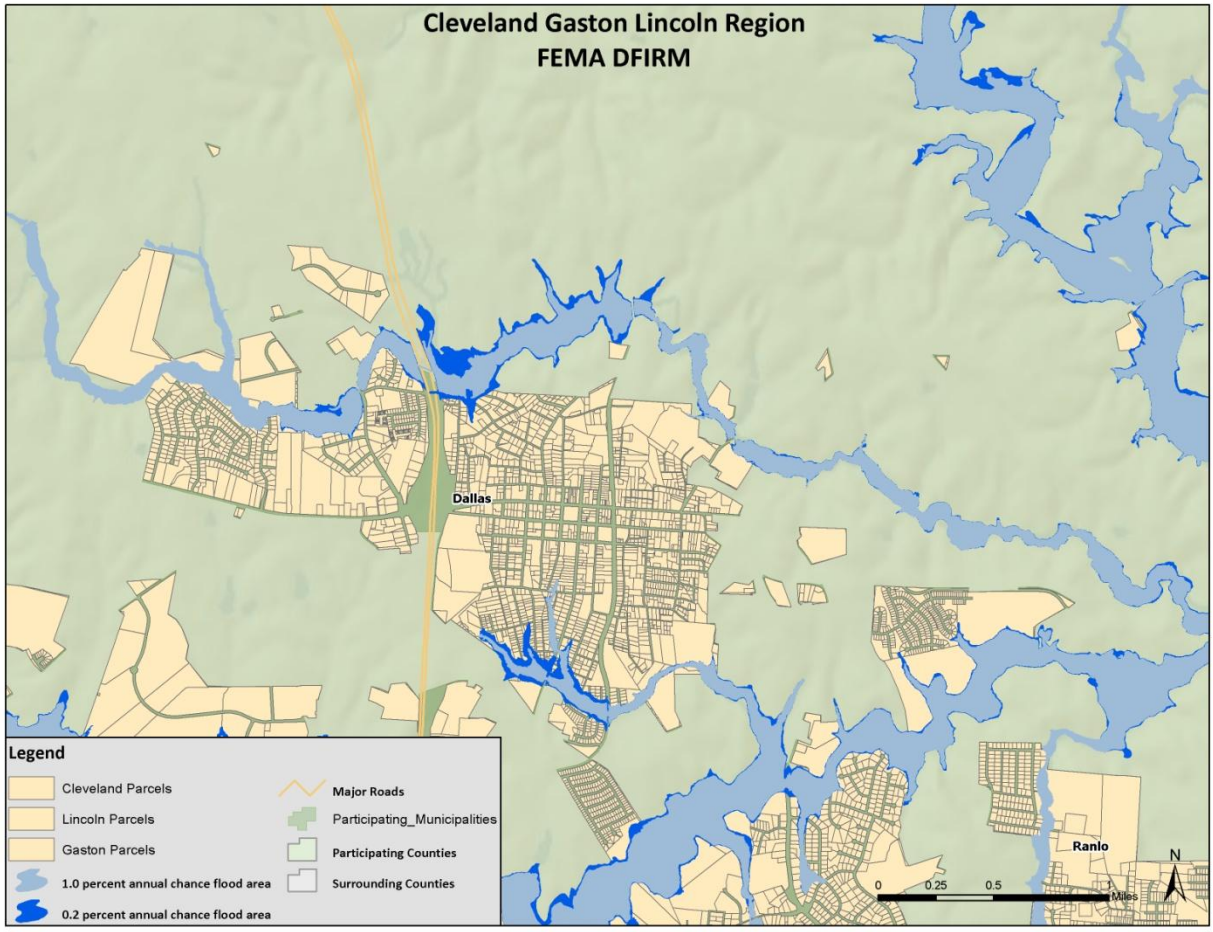
Source: Federal Emergency Management Agency

FIGURE B.11: SPECIAL FLOOD HAZARD AREAS IN CRAMERTON



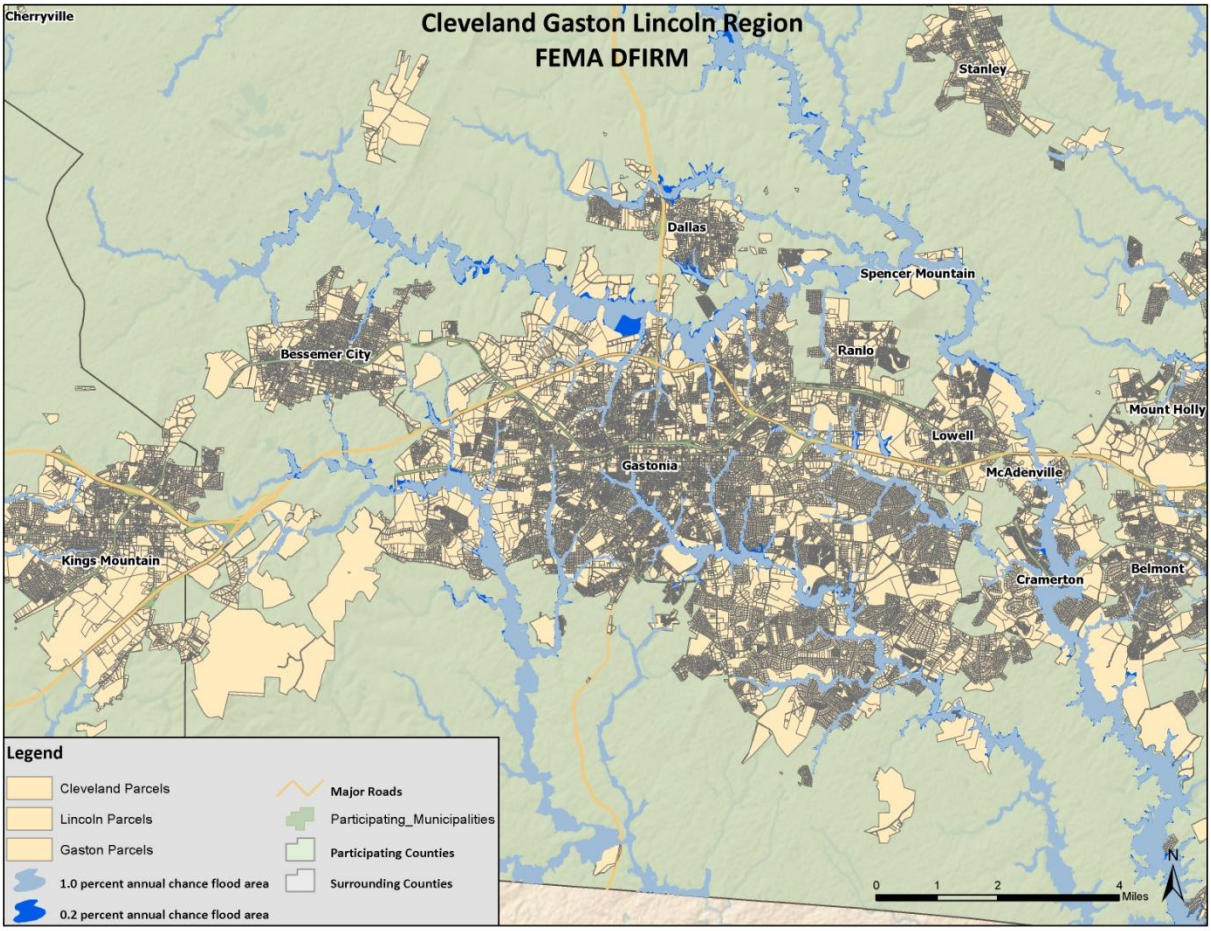
Source: Federal Emergency Management Agency

FIGURE B.12: SPECIAL FLOOD HAZARD AREAS IN DALLAS



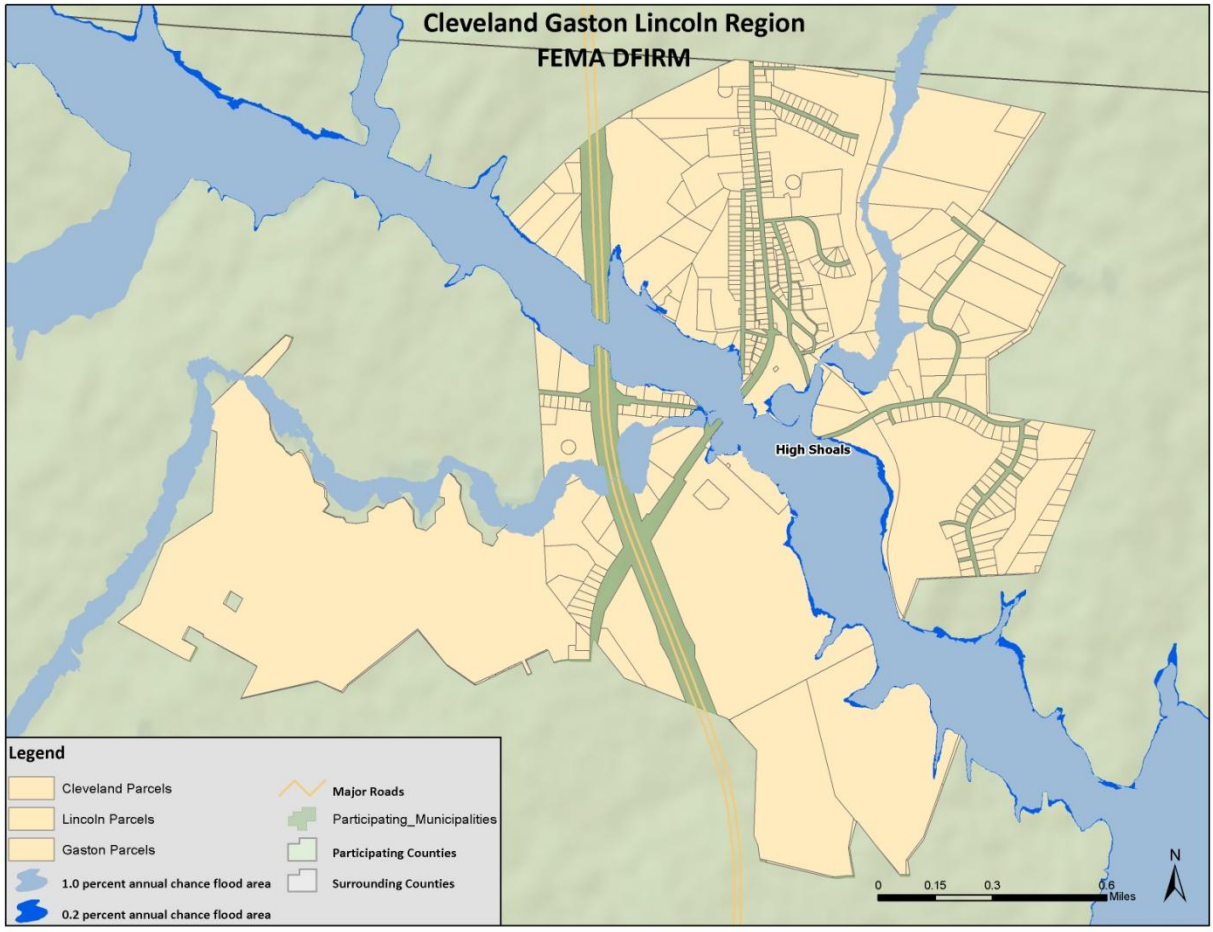
Source: Federal Emergency Management Agency

FIGURE B.13: SPECIAL FLOOD HAZARD AREAS IN GASTONIA



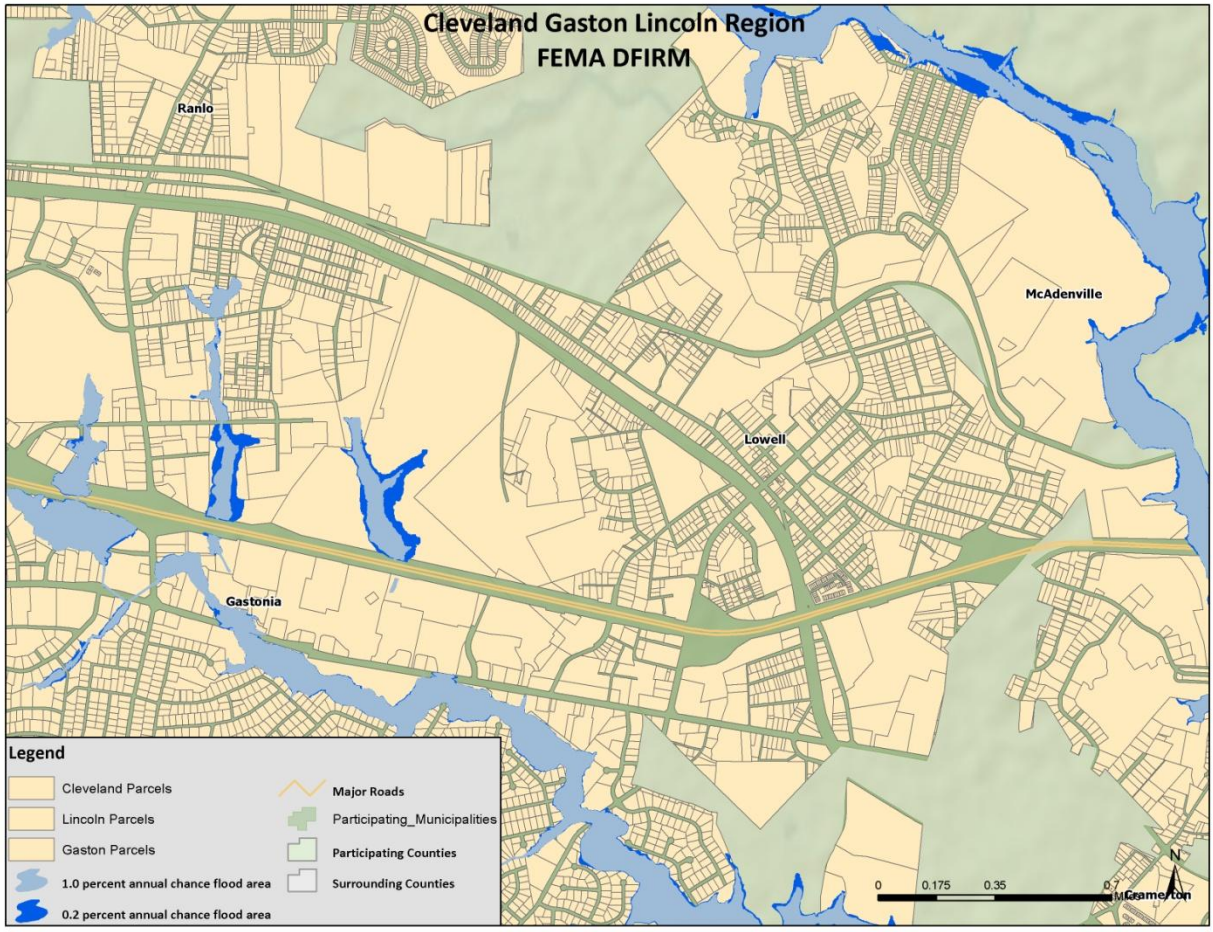
Source: Federal Emergency Management Agency

FIGURE B.14: SPECIAL FLOOD HAZARD AREAS IN HIGH SHOALS



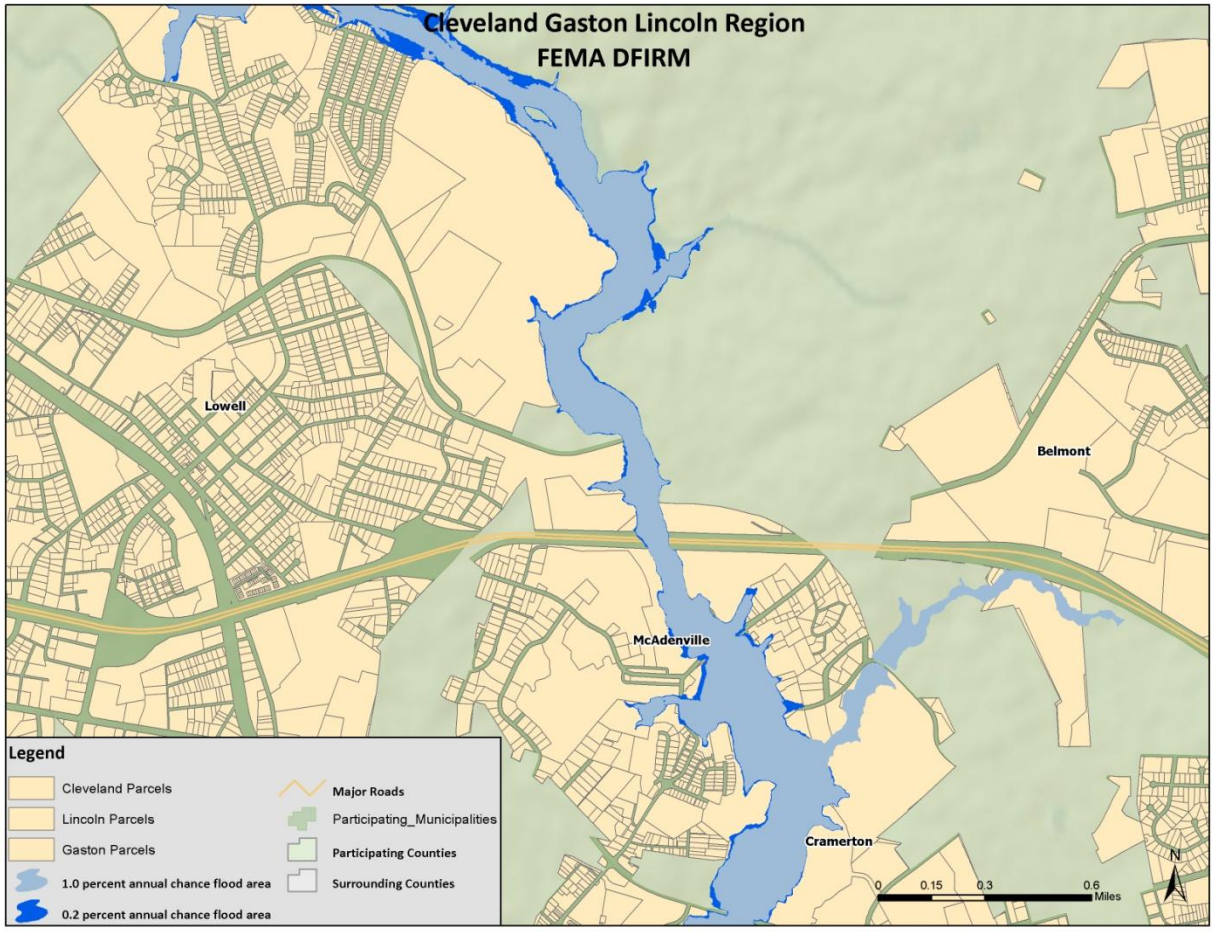
Source: Federal Emergency Management Agency

FIGURE B.15: SPECIAL FLOOD HAZARD AREAS IN LOWELL



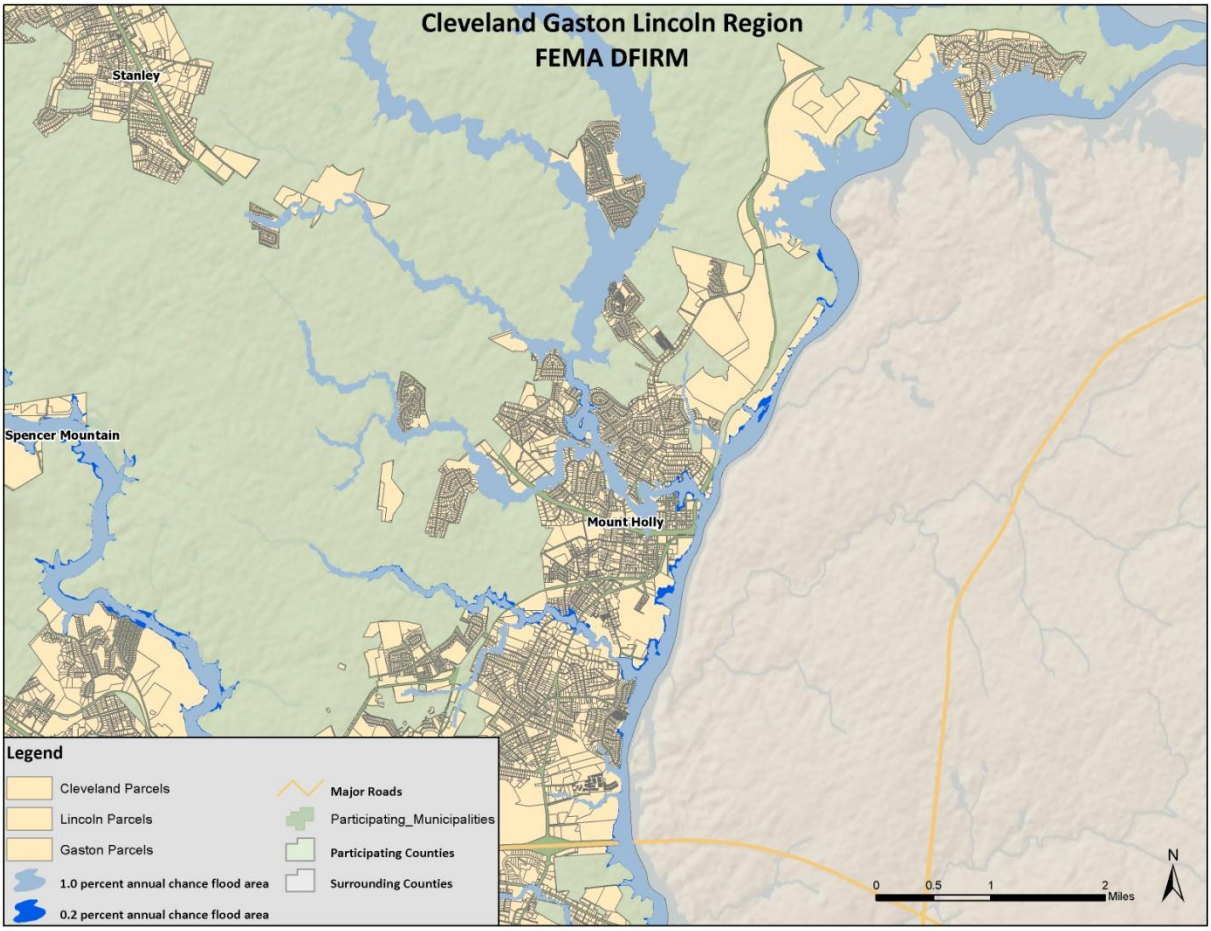
Source: Federal Emergency Management Agency

FIGURE B.16: SPECIAL FLOOD HAZARD AREAS IN MCADENVILLE



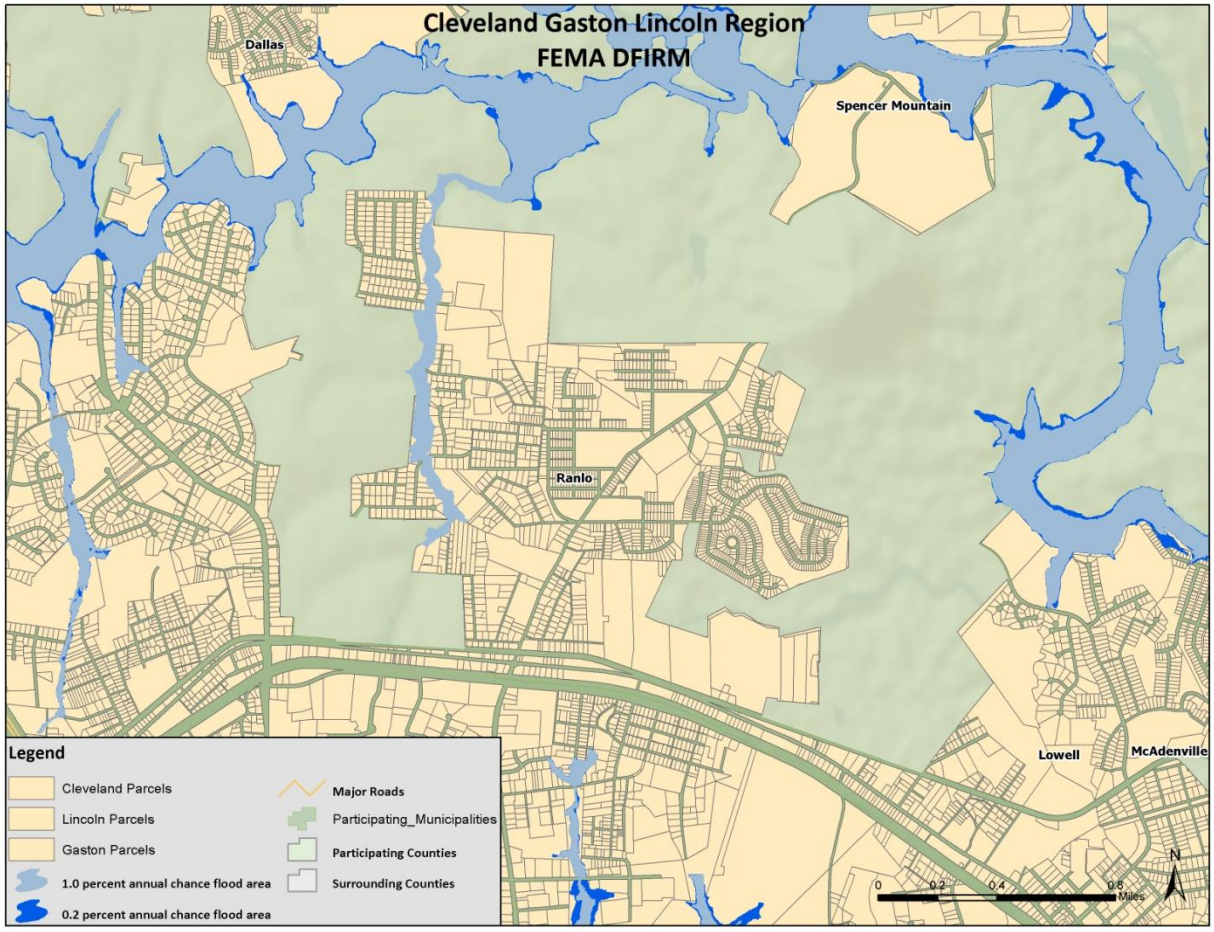
Source: Federal Emergency Management Agency

FIGURE B.17: SPECIAL FLOOD HAZARD AREAS IN MOUNT HOLLY



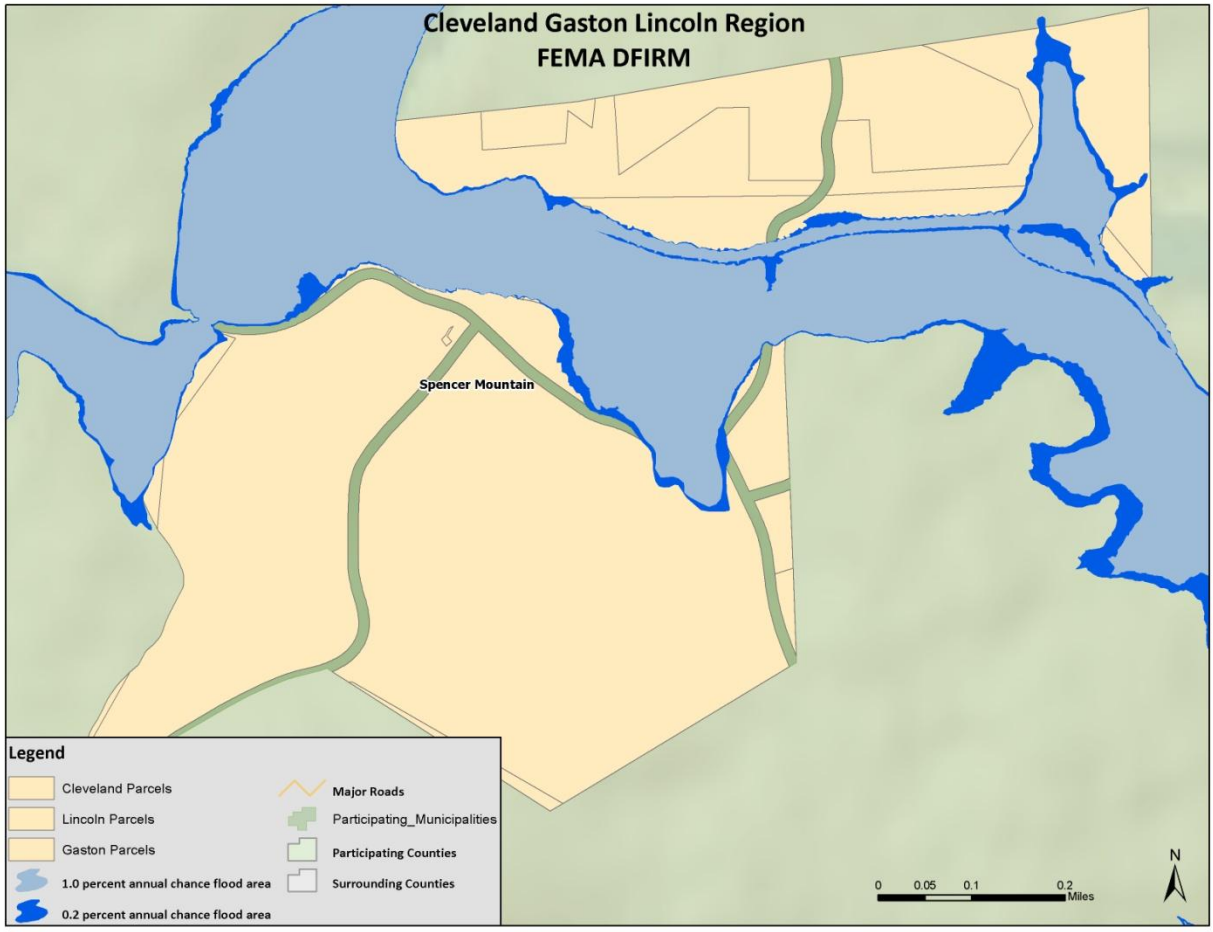
Source: Federal Emergency Management Agency

FIGURE B.18: SPECIAL FLOOD HAZARD AREAS IN RANLO



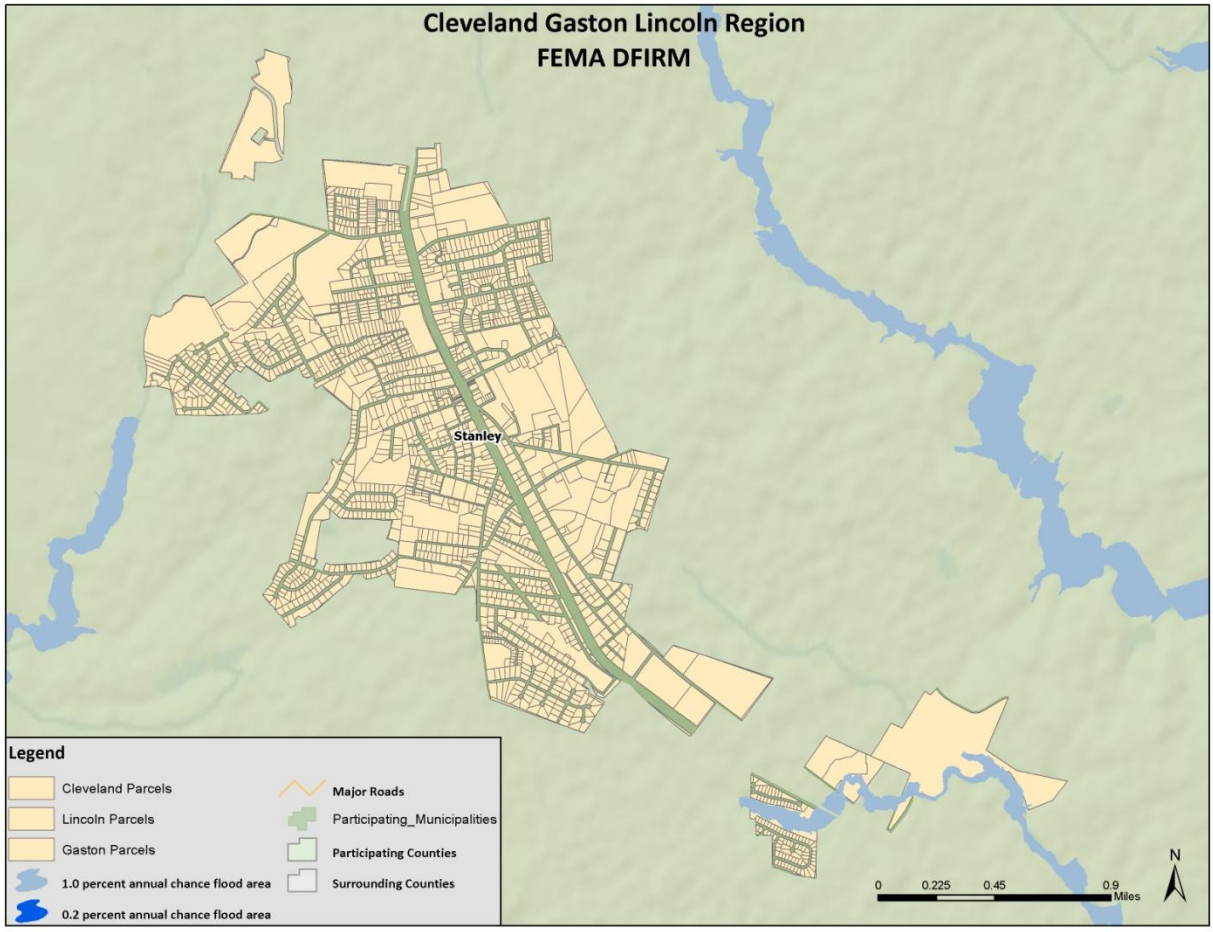
Source: Federal Emergency Management Agency

FIGURE B.19: SPECIAL FLOOD HAZARD AREAS IN SPENCER MOUNTAIN



Source: Federal Emergency Management Agency

FIGURE B.20: SPECIAL FLOOD HAZARD AREAS IN STANLEY



Source: Federal Emergency Management Agency

Historical Occurrences

Information from the National Climatic Data Center was used to ascertain historical flood events. The National Climatic Data Center reported a total of 20 events in Gaston County since 1993.[17] A summary of these events is presented in **Table B.22**. These events accounted for over $2.7 million (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 GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	0	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$0

[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)
Cramerton	0	0/0	$0
Dallas	1	0/0	$0
Gastonia	6	0/0	$3,914
High Shoals	1	0/0	$53,045
Lowell	1	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	1	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	7	0/0	$2,687,833
GASTON COUNTY TOTAL	**20**	**0/0**	**$2,744,792**

Source: National Climatic Data Center

TABLE B.23: HISTORICAL FLOOD EVENTS IN GASTON COUNTY

	Date	Type	Deaths / Injuries	Property Damage*
Belmont				
None Reported	--	--	--	--
Bessemer City				
None Reported	--	--	--	--
Cherryville				
CHERRYVILLE	26-MAY-06	FLASH FLOOD	0/0	$0
CHERRYVILLE	27-AUG-08	FLASH FLOOD	0/0	$0
Cramerton				
None Reported	--	--	--	--
Dallas				
DALLAS	28-APR-97	FLOOD	0/0	$0
Gastonia				
Gastonia	22-JUN-95	FLASH FLOOD	0/0	
GASTONIA	05-AUG-96	FLASH FLOOD	0/0	
GASTONIA	13-JUN-97	FLASH FLOOD	0/0	
GASTONIA	24-JUL-99	URBAN/SML STREAM FLD	0/0	
GASTONIA	14-JUN-04	FLASH FLOOD	0/0	$3,914
GASTONIA	09-JUN-05	FLASH FLOOD	0/0	
High Shoals				
HIGH SHOALS	05-AUG-11	FLASH FLOOD	0/0	$53,045
Lowell				
LOWELL	03-SEP-00	FLASH FLOOD	0/0	$0
McAdenville				
None Reported	--	--	--	--
Mount Holly				
MT HOLLY	10-JUN-98	FLASH FLOOD	0/0	$0

	Date	Type	Deaths / Injuries	Property Damage*
Ranlo				
RANLO	05-FEB-10	FLOOD	0/0	$0
Spencer Mountain				
None Reported	--	--	--	--
Stanley				
None Reported	--	--	--	--
Unincorporated Area				
South Fork	23-MAR-93	FLOOD	0/0	
GASTON COUNTY	23-MAR-93	FLASH FLOODS	0/0	
GASTON COUNTY	20-MAR-03	FLOOD	0/0	$2,687,833
GASTON COUNTY	10-APR-03	FLOOD	0/0	
GASTON COUNTY	22-MAY-03	FLOOD	0/0	
GASTON COUNTY	07-SEP-04	FLOOD	0/0	
GASTON COUNTY	10-DEC-04	FLOOD	0/0	

*Property damage is reported in 2013 dollars; All damage may not have been reported.
Source: National Climatic Data Center

The flood event described below is not reported above because it occurred during the development of this plan.

July 28, 2013
Heavy rain and thunderstorms caused the South Fork Catawba River to flood. The Town of Cramerton was especially hard hit as the river expanded at an alaraming rate. The South Fork crested above the major flood category at a height of 17.3 feet in Cramerton, which is the third highest crest in the town. However, roads all across Gaston County were flooded as result of this event.

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of July 2013, there have been 21 flood losses reported in Gaston County through the National Flood Insurance Program (NFIP) since 1978, totaling over $108,000 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 Gaston County were either uninsured, denied claims payment, or not reported.

TABLE B.24: SUMMARY OF INSURED FLOOD LOSSES IN GASTON COUNTY

Location	Flood Losses	Claims Payments
Belmont	1	$8,067
Bessemer City	0	$0
Cherryville	0	$0
Cramerton	0	$0
Dallas	2	$12,879
Gastonia	12	$60,869
High Shoals	0	$0
Lowell	0	$0

Location	Flood Losses	Claims Payments
McAdenville	0	$0
Mount Holly	2	$5,952
Ranlo	0	$0
Spencer Mountain	0	$0
Stanley	0	$0
Unincorporated Area	4	$20,282
GASTON COUNTY TOTAL	**21**	**$108,049**

Source: FEMA, NFIP

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 October 2013, there is one non-mitigated repetitive loss property located in Gaston County, which accounted for two losses and more than $25,000 in claims payments under the NFIP. The average claim amount for this property is $12,769. 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 Gaston County.

TABLE B.25: REPETITIVE LOSS PROPERTIES IN GASTON COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Belmont	0	--	0	$0	$0	$0	$0
Bessemer City	0	--	0	$0	$0	$0	$0
Cherryville	0	--	0	$0	$0	$0	$0
Cramerton	0	--	0	$0	$0	$0	$0
Dallas	0	--	0	$0	$0	$0	$0
Gastonia	1	residential	2	$23,907.22	$1,630.14	$25,537.36	$12,768.68
High Shoals	0	--	0	$0	$0	$0	$0
Lowell	0	--	0	$0	$0	$0	$0
McAdenville	0	--	0	$0	$0	$0	$0
Mount Holly	0	--	0	$0	$0	$0	$0
Ranlo	0	--	0	$0	$0	$0	$0
Spencer Mountain	0	--	0	$0	$0	$0	$0
Stanley	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
GASTON COUNTY TOTAL	**1**		**2**	**$23,907.22**	**$1,630.14**	**$25,537.36**	**$12,768.68**

Source: National Flood Insurance Program

Probability of Future Occurrences

Flood events will remain a threat in areas prone to flooding in Gaston 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).

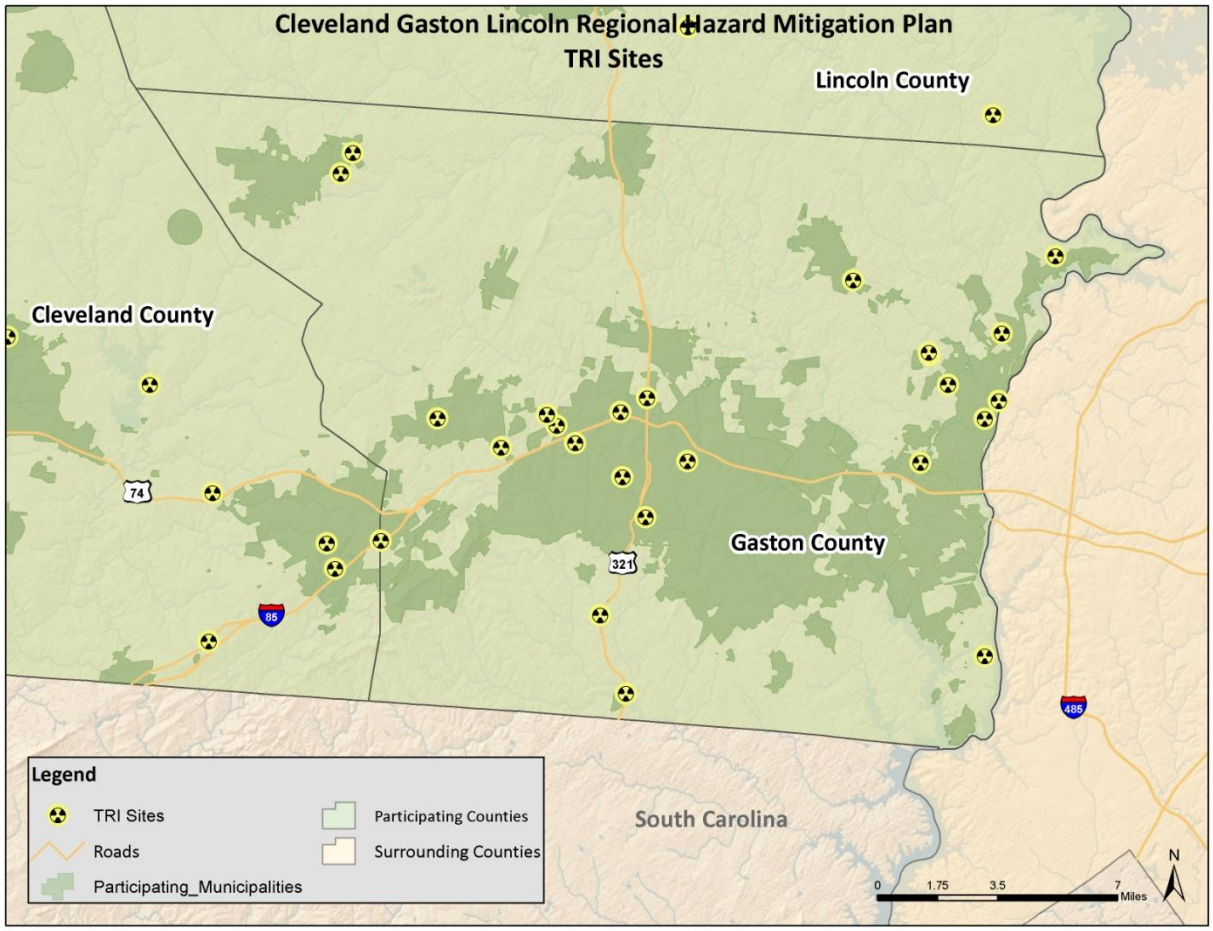
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, Cramerton, High Shoals, and McAdenville have more floodplain and thus a higher risk of flood than many of the other municipalities. Flood is not the greatest hazard of concern but will continue 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

Gaston County has 23 TRI sites. These sites are shown in **Figure B.21.**

FIGURE B.21: TOXIC RELEASE INVENTORY (TRI) SITES IN GASTON COUNTY



Source: EPA

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are narrow, making hazardous material transport in the

area especially treacherous. All roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of 12 recorded HAZMAT incidents in Gaston County since 1982 (**Table B.26**). **Table B.27** presents detailed information on historic HAZMAT incidents in Gaston 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 GASTON COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Belmont	1	0/0	$0
Bessemer City	0	0/0	$0
Cherryville	10	0/0	$0
Cramerton	0	0/0	$0
Dallas	0	0/0	$0
Gastonia	0	0/0	$0
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	1	0/0	$0
GASTON COUNTY TOTAL	**12**	**0/0**	**$0**

Source: National Climatic Data Center

TABLE B.27: HAZMAT INCIDENTS IN GASTON COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities/ Injuries	Damages ($)*	Quantity Released
Belmont							
I-1982090546	9/16/1982	BELMONT	Highway	No	0/0	$0	1 LGA
Cherryville							
I-1974080021	7/18/1974	CHERRYVILLE	Highway	No	0/0	$0	0
I-1974100526	10/13/1974	CHERRYVILLE	Highway	No	0/0	$0	0
I-1975030009	2/21/1975	CHERRYVILLE	Highway	No	0/0	$0	0
I-1989060125	5/28/1989	CHERRYVILLE	Highway	No	0/0	$0	2 LGA
I-1991050675	5/20/1991	CHERRYVILLE	Highway	No	0/0	$0	1 LGA
I-1991060980	6/8/1991	CHERRYVILLE	Highway	No	0/0	$0	0.125 LGA
I-1992030510	3/7/1992	CHERRYVILLE	Highway	No	0/0	$0	0.125 LGA
I-1992060484	6/2/1992	CHERRYVILLE	Highway	No	0/0	$0	0.0625 LGA
I-1993030157	2/13/1993	CHERRYVILLE	Highway	No	0/0	$0	1 LGA
I-1995050340	4/26/1995	CHERRYVILLE	Highway	No	0/0	$0	1 LGA
Cramerton							

Report Number	Date	City	Mode	Serious Incident?	Fatalities/ Injuries	Damages ($)*	Quantity Released
None Reported	--	--	--	--	--	--	--
Dallas							
None Reported	--	--	--	--	--	--	--
Gastonia							
None Reported	--	--	--	--	--	--	--
High Shoals							
None Reported	--	--	--	--	--	--	--
Lowell							
None Reported	--	--	--	--	--	--	--
McAdenville							
None Reported	--	--	--	--	--	--	--
Mount Holly							
None Reported	--	--	--	--	--	--	--
Ranlo							
None Reported	--	--	--	--	--	--	--
Spencer Mountain							
None Reported	--	--	--	--	--	--	--
Stanley							
None Reported	--	--	--	--	--	--	--
Unincorporated Area							
I-2000030378	11/11/1999	GASTON	Highway	No	0/0	$0	50 LGA

*Property damage is reported in 2013 dollars.
Source: USDOT PHMSA

Probability of Future Occurrences

Given the location of 23 toxic release inventory sites in Gaston County and several 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.

Although there are just three TRI sites and a limited record of previous events in the county, hazardous materials incidents will continue to be a threat. The county may also be impacted by neighboring counties which also face risk due to TRI sites and hazardous roadways.

B.2.15 Wildfire

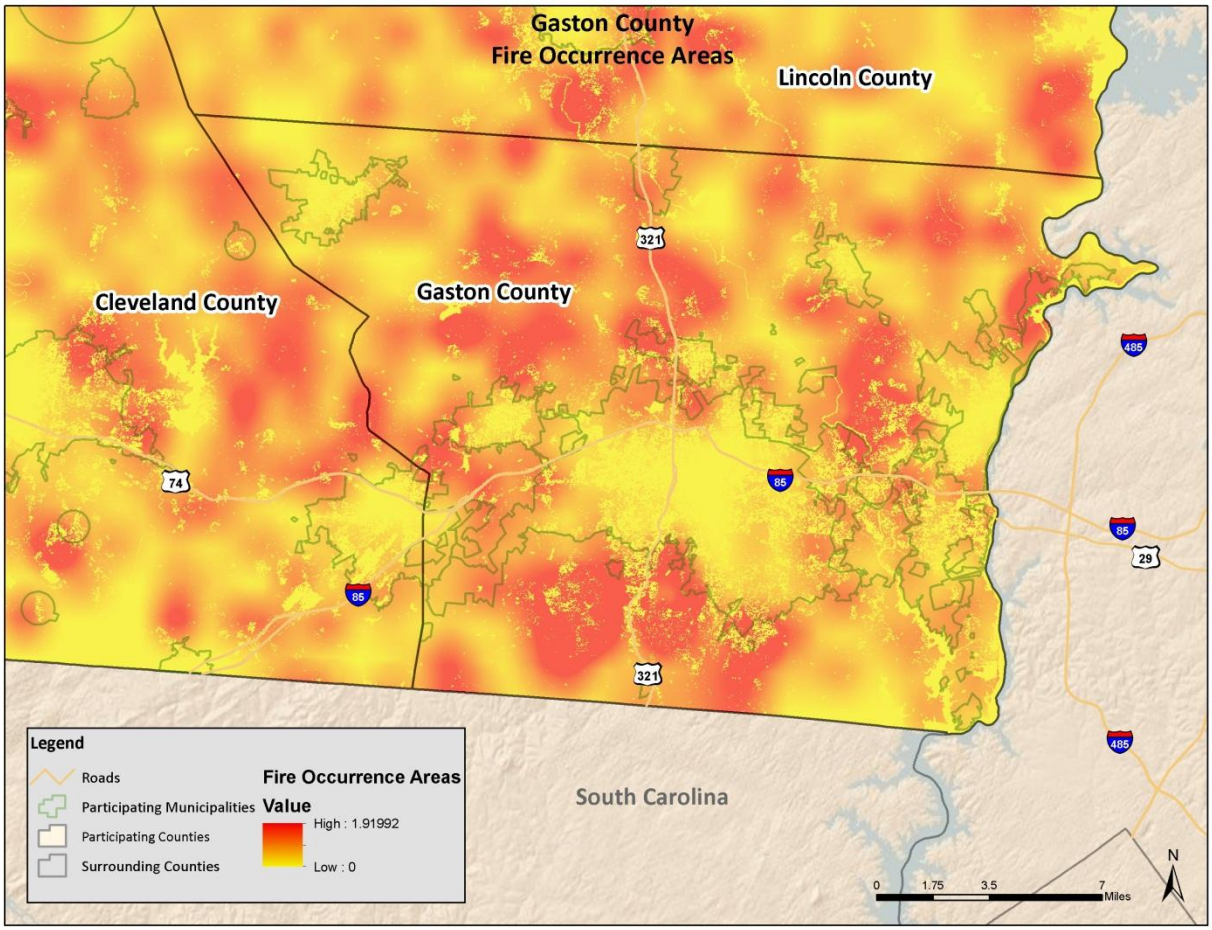
Location and Spatial Extent

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.22 shows the Fire Occurrence Areas (FOA) in Gaston 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.22: HISTORIC WILDFIRE EVENTS IN GASTON COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Gaston County experienced an average of 53 wildfires annually which burn an average of 66 acres per year. The data indicates that most of these fires are small, averaging one acre 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 GASTON COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Gaston County										
Number of Fires	41	68	59	69	79	31	40	38	58	51
Number of Acres	42.1	56.7	159.2	109.7	68.4	79.7	36.1	17.4	54.5	34.1

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Gaston 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. In this case, the participating jurisdictions appear to have a similar risk to the surrounding areas. The probability assigned to Gaston County for future wildfire events is likely (10 to 100 percent annual probability).

B.2.16 Nuclear Accident

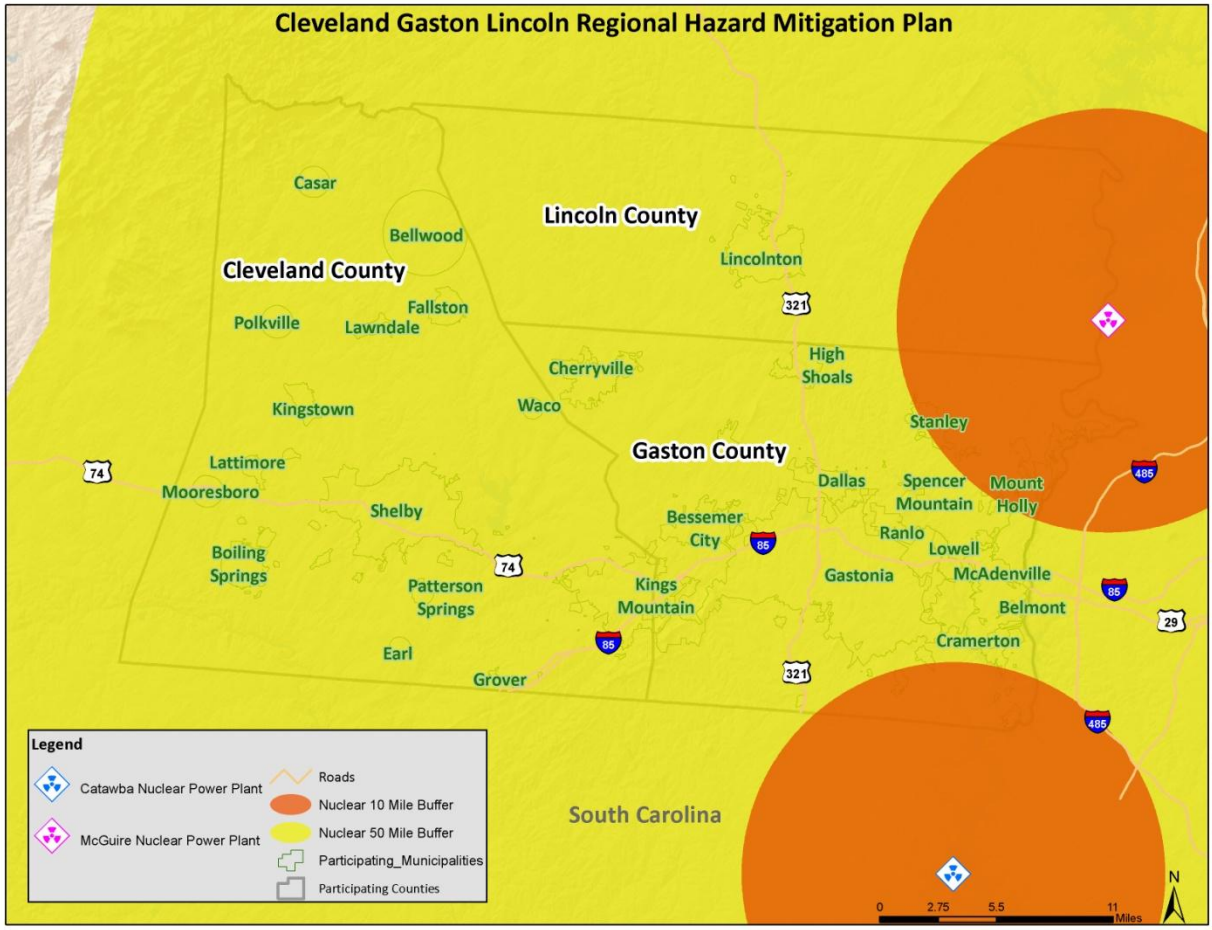
Location and Spatial Extent

The entire county is at risk to a nuclear incident. However, areas in the northeastern part of Gaston County are more susceptible due to their proximity to the McGuire Nuclear Station and areas in the southeastern part are more susceptible due to their proximity to the Catawba 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.23**). All other areas of the county are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

Historical Occurrences

Although there have been no major nuclear events at the McGuire or Catawba Nuclear Stations, 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.

FIGURE B.23: MCGUIRE NUCLEAR POWER STATION INCIDENT HAZARD ZONES



Source: Southern Wildfire Risk Assessment

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).

B.2.17 Conclusions on Hazard Risk

The hazard profiles presented above were developed using best available data and results 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.29 describes the extent of each natural hazard identified for Gaston County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE B.29 EXTENT OF GASTON 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. Gaston 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 Gaston County is 107 degrees Fahrenheit in Gastonia on June 27, 1954.
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Gaston County was 4.5 inches (reported on April 3, 1974). 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 hurricanes to traverse directly through Gaston County were Hurricane Gracie in 1959 which reached a maximum wind speed of 53 knots in the region and Hurricane Hugo in 1989 which carried tropical force winds of 48 knots. Although the county is much more likely to be impacted by the remnants of a hurricane or tropical storm, these events demonstrate that Category 3 or 4 storms can and have impacted the county directly.
Lightning	According to the Vaisala flash density map (Figure 5.5), Gaston 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 63-year history from the National Climatic Data Center, the strongest recorded wind event in Gaston County was reported on April, 5 2011 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 5.5) as well as the Fujita/Enhanced Fujita Scale (Tables 5.15 and 5.16). The greatest magnitude reported was an F2 (reported on May 9, 2008).
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 Gaston County was 15 inches in Gastonia on February 16, 1969. Due to extreme variations in elevation 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 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from Gaston County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was reported in the Town of Dallas with a MMI of VII (very strong) with a correlating Richter Scale measurement of approximately 6.1.

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 between moderate and high in Gaston County. There is also 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 105 dams in Gaston County, 29 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 Gaston 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 8.5 percent of the total land area in Gaston 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 South Fork Catawba River at the Town of Lowell in 1940. Water reached a discharge of 34,000 cubic feet per second and the stream gage height was recorded at 21.3 feet.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 50 LGA released on the highway in Unincorporated Gaston County on November 11, 1999. 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 Gaston County in any year was 79 in 2007. The greatest number of acres to burn in the county in a single year occurred in 2005 when 159 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 McGuire or Catawba Nuclear Stations, 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 McGuire or Catawba is possible.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Gaston 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 5.18.2.

Table B.30 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 Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE B.30: SUMMARY OF PRI RESULTS FOR GASTON 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	Possible	Minor	Large	More than 24 hours	Less than 1 week	**2.1**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Possible	Critical	Large	More than 24 hours	Less than 24 hours	**2.6**
Lightning	Highly Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	**2.5**
Thunderstorm/High Wind	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.0**
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Landslide	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	**2.1**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	12 to 24 hours	Less than 24 hours	**2.3**
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	**2.7**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	More than 1 week	**2.4**
Nuclear Accident	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**

B.2.18 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Gaston County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table B.31**). 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 Gaston 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.31: CONCLUSIONS ON HAZARD RISK FOR GASTON COUNTY

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

B.3 GASTON COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Gaston 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.32 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Gaston County and its participating jurisdictions (study area of vulnerability assessment).[19]

[19] 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.32: IMPROVED PROPERTY IN GASTON COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Belmont	4,991	$894,136,569	3,802	$647,702,940
Bessemer City	3,002	$228,322,683	2,231	$181,177,915
Cherryville	3,037	$284,917,965	3,462	$225,921,967
Cramerton	2,142	$354,674,994	1,744	$270,164,399
Dallas	1,993	$193,197,225	1,629	$142,049,566
Gastonia	29,769	$4,541,200,695	24,830	$3,393,344,264
High Shoals	362	$20,641,312	257	$15,077,370
Lowell	1,749	$199,084,760	1,449	$143,297,849
McAdenville	322	$53,447,501	228	$40,372,702
Mount Holly	6,631	$896,498,584	5,311	$687,024,307
Ranlo	1,466	$144,425,144	1,315	$113,366,274
Spencer Mountain	5	$50,843	2	$5,625
Stanley	1,694	$200,801,259	1,330	$150,069,165
Unincorporated Area	44,790	$5,070,673,907	32,176	$3,408,278,601
GASTON COUNTY TOTAL	**101,953**	**$13,082,073,441**	**79,766**	**$9,417,852,944**

Table B.33 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in Gaston 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.24** shows the locations of essential facilities in Gaston County. **Table B.45**, 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.

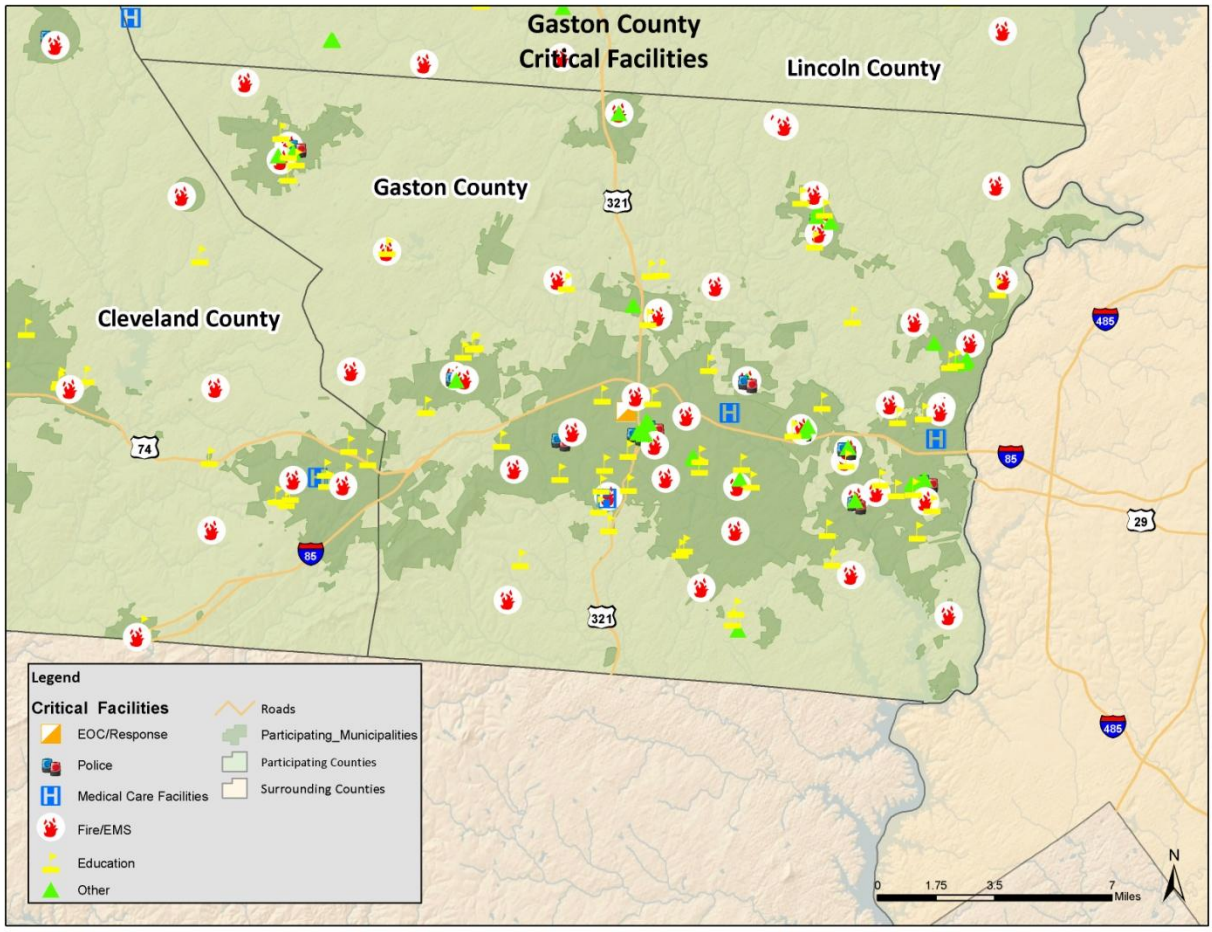
TABLE B.33: CRITICAL FACILITY INVENTORY IN GASTON COUNTY

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Belmont	1	1	0	0	4	4
Bessemer City	2	1	0	0	4	2
Cherryville	2	1	0	0	4	3
Cramerton	2	1	0	0	2	1
Dallas	3	1	0	0	1	3
Gastonia	10	3	2	1	16	15
High Shoals	1	0	0	0	0	1
Lowell	2	1	0	0	1	2
McAdenville	2	1	0	0	2	1
Mount Holly	5	0	1	0	4	4
Ranlo	1	2	0	0	0	1
Spencer Mountain	0	0	0	0	0	0
Stanley	1	2	0	0	3	3
Unincorporated Area	11	0	0	0	11	1

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
GASTON COUNTY TOTAL	43	14	3	1	52	41

Source: Local Governments, Hazus-MH

FIGURE B.24: CRITICAL FACILITY LOCATIONS IN GASTON 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 Gaston County that are potentially at risk to these hazards.

Table B.34 lists the population by jurisdiction according to U.S. Census 2010 population estimates. Unfortunately, estimates were not available at the census block level, limited the results to county-wide estimates. The total population in Gaston County according to Census data is 206,086 persons. Additional population estimates are presented above in Section B.1.

TABLE B.34: TOTAL POPULATION IN GASTON COUNTY

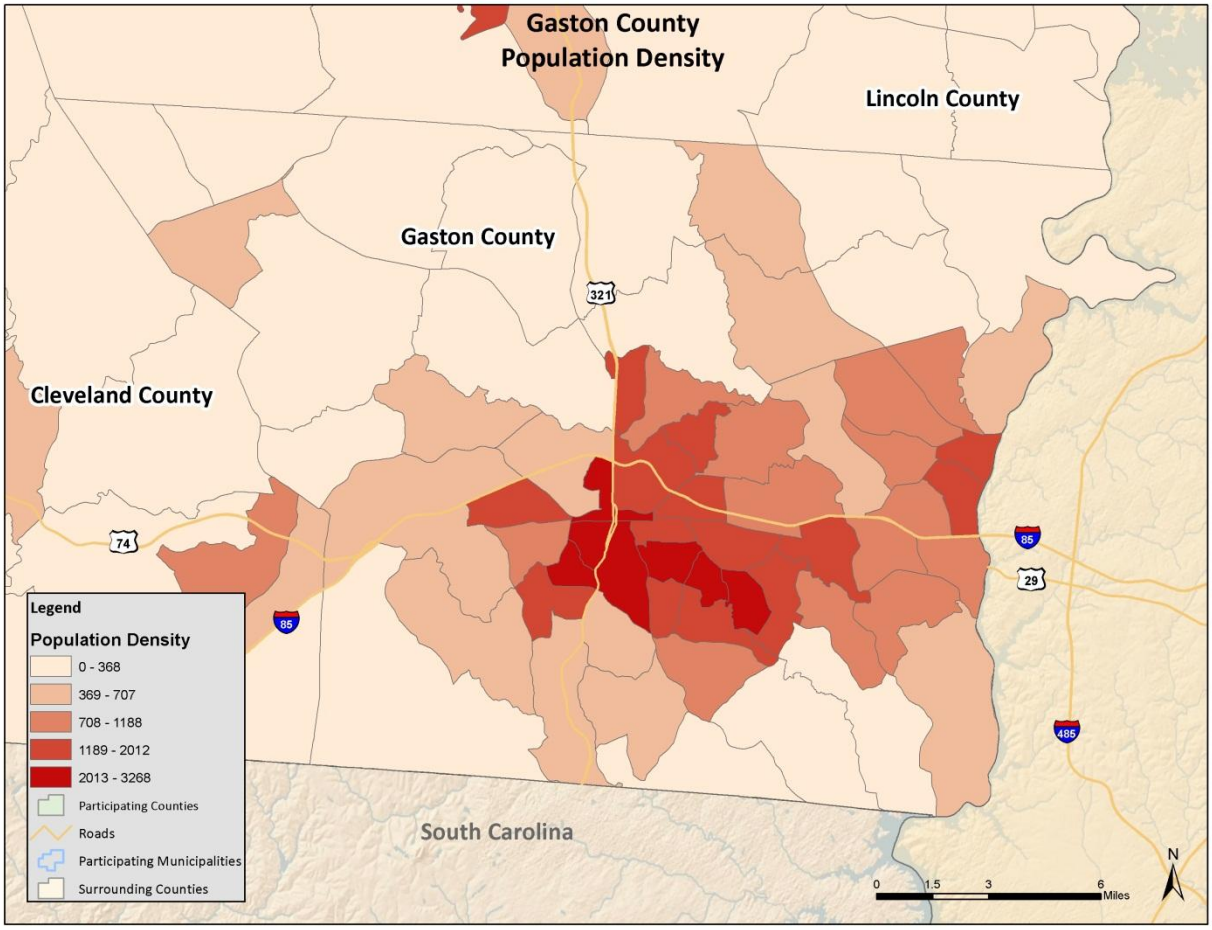
Jurisdiction	2010 Census Population
Gaston County	**206,086**
City of Belmont	10,076
City of Bessemer City	5,340
City of Cherryville	5,760
Town of Cramerton	4,165
Town of Dallas	4,488
City of Gastonia	71,741
City of High Shoals	696
City of Lowell	3,526
Town of McAdenville	651
City of Mount Holly	13,656
Town of Ranlo	3,434
Town of Spencer Mountain	37
Town of Stanley	3,556

Source: U.S. Census 2010

In addition, **Figure B.25** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.[20]

[20] Population by census block was not available at the time this plan was completed.

FIGURE B.25: POPULATION DENSITY IN GASTON COUNTY



Source: U.S. Census Bureau, 2010

B.3.3 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 Gaston County, are presented here. All other hazards are assumed to impact the entire planning region (drought, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total county exposure, and thus risk, was presented in **Table B.32**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table B.45.**

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

Hurricane and Tropical Storm

Historical evidence indicates that Gaston 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.3.3.

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.35.** Only losses to buildings 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.35: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Gaston County	$805,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table B.36.**

TABLE B.36: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Belmont	62	72	91	98
Bessemer City	60	70	89	97
Cherryville	60	70	88	97
Cramerton	62	72	91	98
Dallas	61	70	90	97
Gastonia	62	72	91	99
High Shoals	60	70	89	96
Lowell	62	71	91	98
McAdenville	62	71	91	98
Mount Holly	62	71	91	98
Ranlo	61	71	90	97
Spencer Mountain	61	71	90	97
Stanley	61	70	90	96
Unincorporated Area	62	71	90	98
MAXIMUM WIND SPEED REPORTED	**62**	**72**	**91**	**98**

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 Gaston 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.45** 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 Gaston 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 Gaston 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.37** summarizes the findings.

TABLE B.37: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Gaston County	$79,000

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.45**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Gaston 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 Gaston 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.3.9), county level tax parcel data, and GIS analysis. **Table B.38** presents the potential at-risk property where available. All areas of Gaston County are identified as low to high incidence areas by the USGS landslide data. All areas are also of moderate or high landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE B.38: 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	High	Moderate	High	Moderate	High
Belmont	2,396	2,595	1,693	2,109	$290,612,888	$357,090,052
Bessemer City	2,279	723	1,683	548	$125,672,330	$55,505,585
Cherryville	0	3,037	0	2,462	$0	$225,921,967
Cramerton	1,886	256	1,512	232	$244,601,175	$25,563,224
Dallas	0	1,993	0	1,629	$0	$142,049,566
Gastonia	10,162	19,607	8,618	16,212	$1,416,768,429	$1,976,575,835
High Shoals	0	362	0	257	$0	$15,077,370
Lowell	0	1,749	0	1,449	$0	$143,297,849
McAdenville	0	322	0	228	$0	$40,372,702
Mount Holly	0	6,631	0	5,311	$0	$687,024,307
Ranlo	0	1,466	0	1,315	$0	$113,366,274
Spencer Mountain	0	5	0	2	$0	$5,625
Stanley	0	1,694	0	1,330	$0	$150,069,165
Unincorporated Area	16,985	27,805	12,498	19,678	$1,351,555,525	$2,056,723,076
GASTON COUNTY TOTAL	33,708	68,245	26,004	52,762	$3,429,210,347	$5,988,642,597

Source: USGS

Social Vulnerability
Given high susceptibility across the entire county, it is assumed that the total population is at risk.

Critical Facilities
All critical facilities are located in a moderate or high susceptibility area. Gaston County has 119 critical facilities located within a high susceptibility area. Of note, critical facilities in high susceptibility areas of Gaston County tend to be located in the municipalities rather than the unincorporated county. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Gaston 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 Gaston County is susceptible to flood events. A total of 20 flood events have been reported by the National Climatic Data Center resulting in $2.7 million dollars in damages. On an annualized level, these damages amounted to $161,132 for Gaston 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.39** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE B.39: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

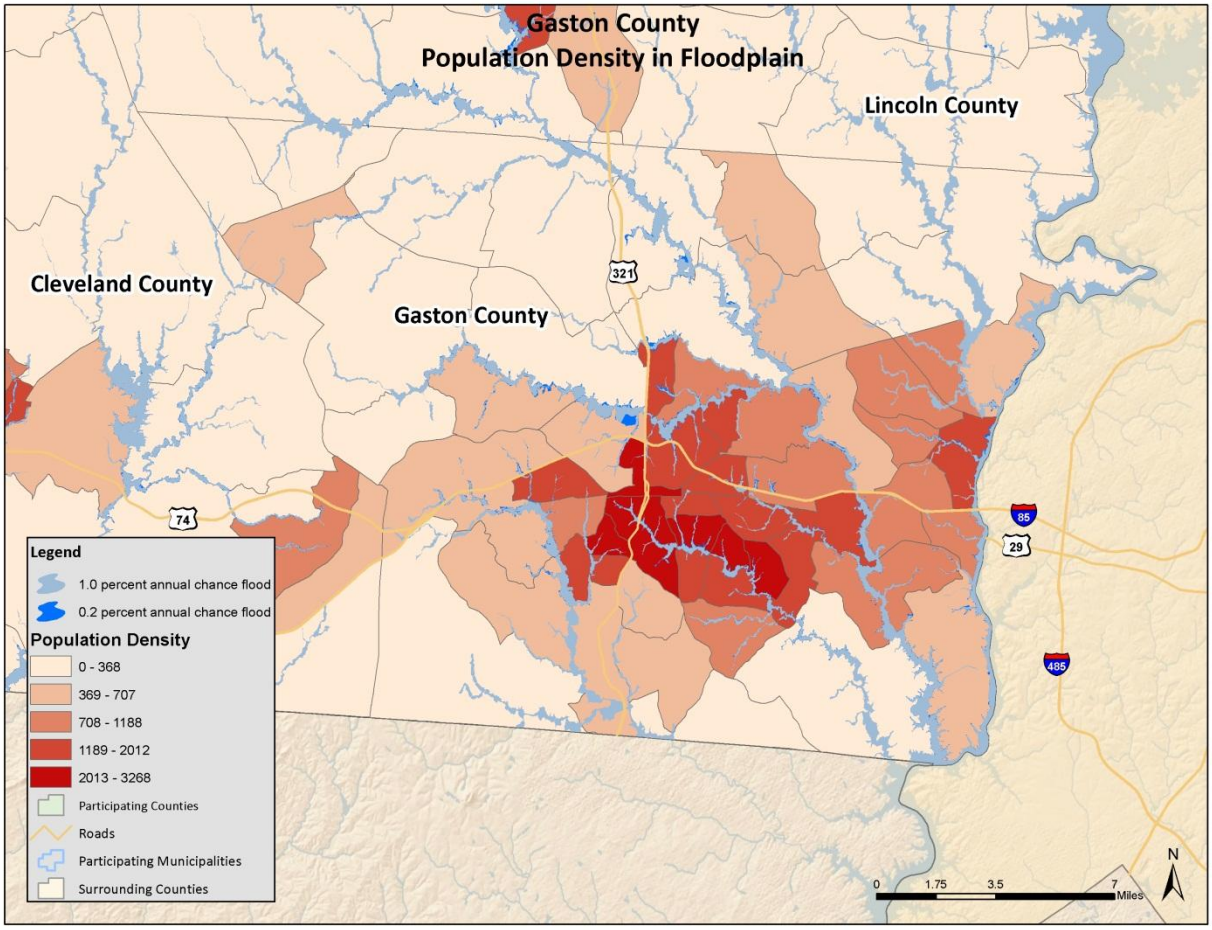
	1.0-percent ACF			0.2-percent ACF		
Location	**Approx. Number of Parcels**	**Approx. Number Improved Buildings**	**Approx. Improved Value of Buildings**	**Approx. Number of Parcels**	**Approx. Number Improved Buildings**	**Approx. Improved Value of Buildings**
Belmont	230	125	$53,933,676	30	21	$4,143,973
Bessemer City	31	19	$1,513,543	4	2	$131,179
Cherryville	52	35	$6,167,691	0	0	$0
Cramerton	251	154	$29,057,672	34	30	$3,336,691
Dallas	119	88	$5,734,219	62	53	$2,278,722
Gastonia	2,277	1,511	$396,883,714	213	182	$27,373,513
High Shoals	40	26	$2,180,957	1	1	$116,555
Lowell	5	0	$0	19	9	$1,146,072
McAdenville	32	14	$3,507,098	5	4	$551,697
Mount Holly	586	360	$75,146,873	46	39	$3,385,868
Ranlo	47	31	$3,050,651	0	0	$0
Spencer Mountain	4	2	$5,625	0	0	$0
Stanley	6	1	$135,825	0	0	$0
Unincorporated Area	3,993	2,184	$431,485,542	164	100	$11,983,467
GASTON COUNTY TOTAL	**7,673**	**4,550**	**$1,008,803,086**	**578**	**441**	**$54,447,737**

Source: FEMA DFIRM

Social Vulnerability

Since 2010 population was available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure B.26** is presented to gain a better understanding of at risk population.

FIGURE B.26 : POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, U.S. Census 2010

Critical Facilities

The critical facility analysis revealed that there is one critical facility located in the Gaston County 1.0-percent annual chance floodplain and 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.45** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Gaston 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 Gaston County is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to

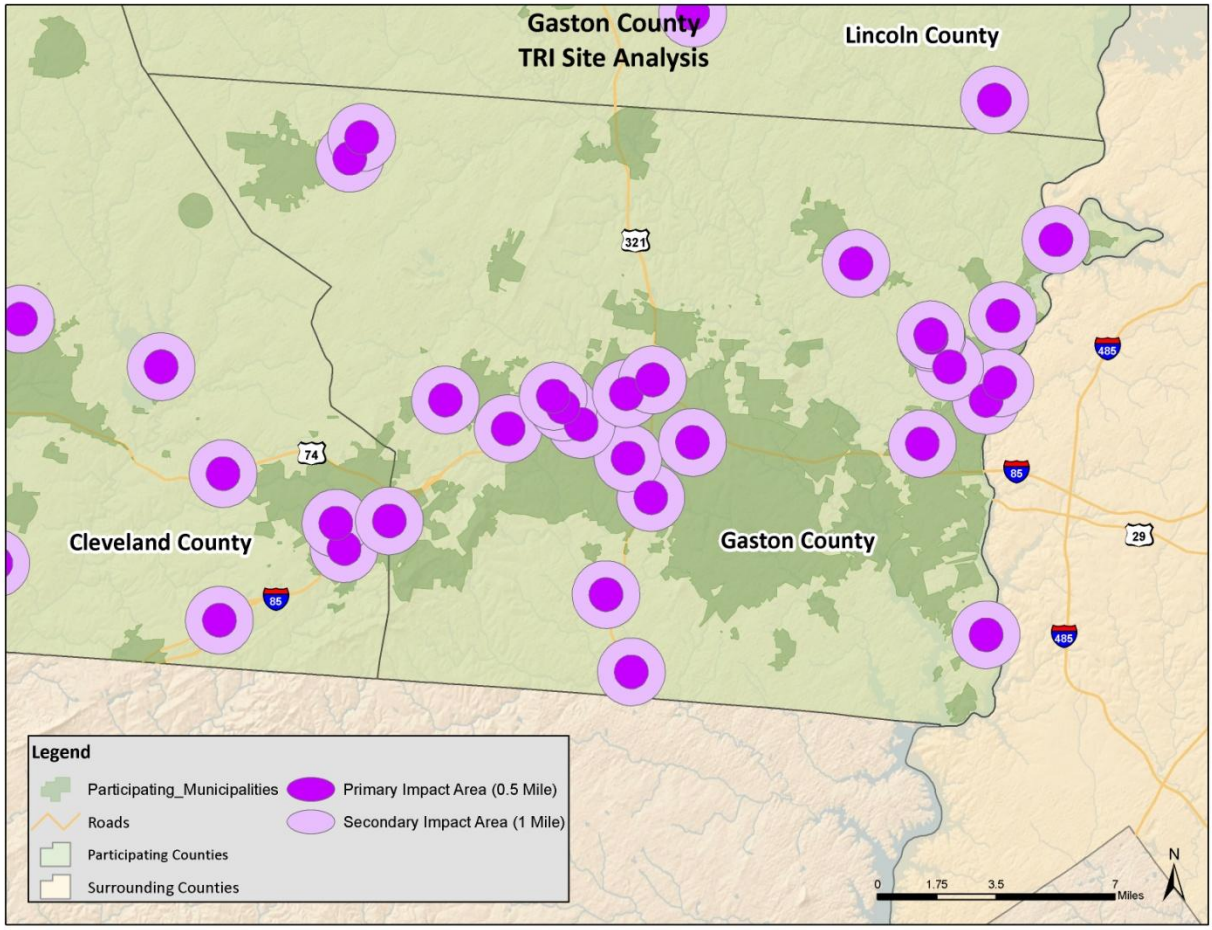
calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Gaston County.

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.[21] In both scenarios, two sizes of buffers—0.5 mile and 1 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 Gaston County, along with buffers, were used for analysis as shown in **Figure B.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 B.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 B.40** (fixed sites), **Table B.41** (mobile road sites) and **Table B.42** (mobile railroad sites).[22]

[21] This type of analysis will likely yield conservative results (generally higher than what is actually reported after an event).
[22] Note that parcels included in the 1 mile analysis are also included in the 0.5 mile analysis.

FIGURE B.27 : TOXIC RELEASE INVENTORY SITES WITH BUFFERS IN GASTON COUNTY



Source: EPA

TABLE B.40: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

	0.5-mile buffer			1.0-mile buffer		
Location	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**
Belmont	120	102	$27,307,300	437	361	$72,631,847
Bessemer City	728	420	$38,690,804	2,030	1,464	$113,792,742
Cherryville	180	123	$14,393,093	474	351	$38,391,462
Cramerton	0	0	$0	0	0	$0
Dallas	0	0	$0	15	15	$1,876,762
Gastonia	3,651	2,957	$290,660,503	12,547	10,229	$1,086,269,719
High Shoals	0	0	$0	0	0	$0
Lowell	0	0	$0	0	0	$0
McAdenville	0	0	$0	0	0	$0
Mount Holly	1,486	1,033	$144,083,324	4,773	3,789	$467,878,845
Ranlo	0	0	$0	0	0	$0
Spencer Mountain	0	0	$0	0	0	$0
Stanley	239	152	$28,997,699	609	419	$70,046,774

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	1,389	1,009	$211,495,470	6,466	4,675	$580,327,527
GASTON COUNTY TOTAL	**7,793**	**5,796**	**$755,628,193**	**27,351**	**21,303**	**$2,431,215,678**

FIGURE B.28 : MOBILE HAZMAT BUFFERS IN GASTON COUNTY

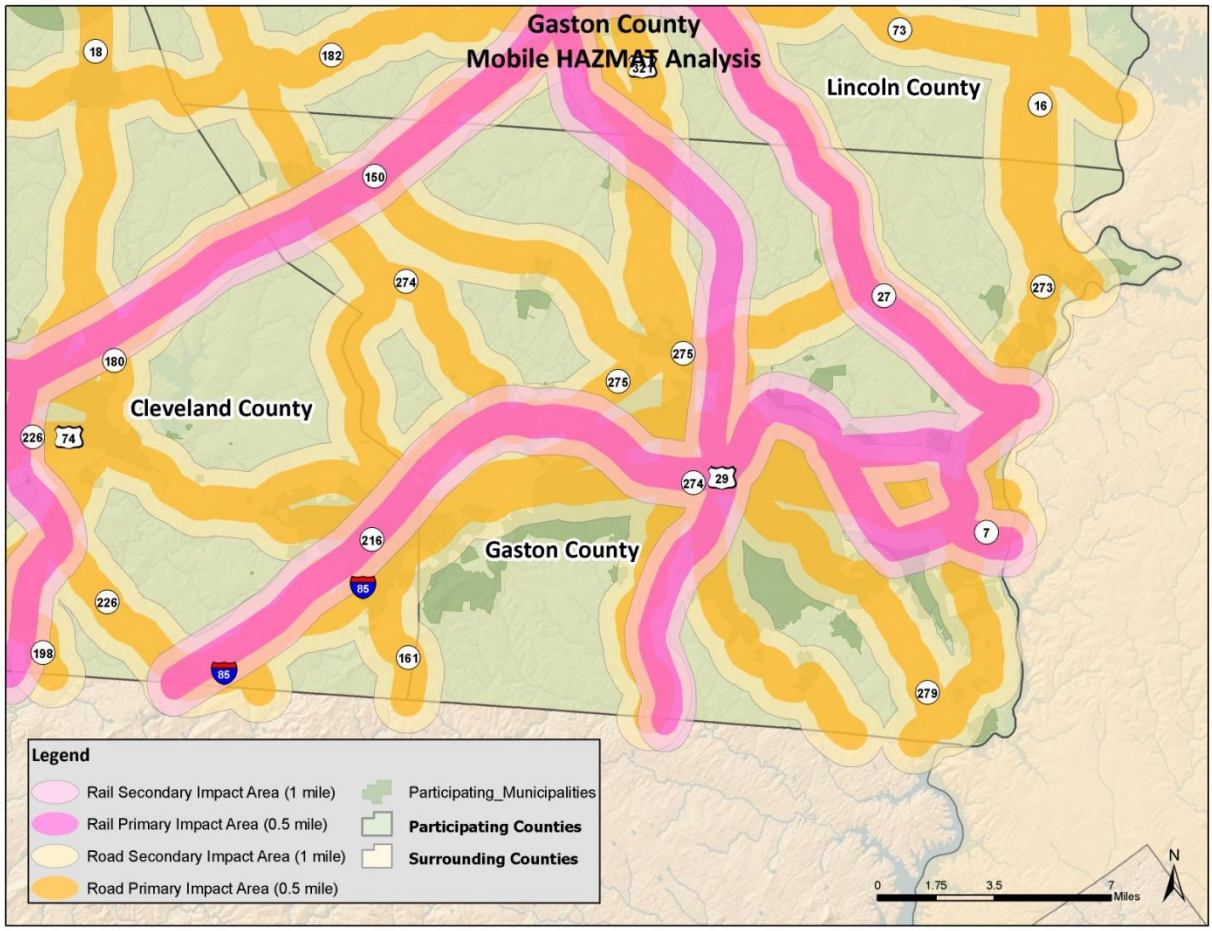


TABLE B.41: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Belmont	3,221	2,570	$451,174,397	4,606	3,569	$612,150,561
Bessemer City	2,681	1,982	$156,954,306	3,002	2,231	$181,177,915
Cherryville	2,642	2,143	$188,375,147	3,035	2,461	$225,836,206
Cramerton	1,019	851	$117,799,977	1,859	1,518	$235,897,950
Dallas	1,809	1,487	$134,992,881	1,993	1,629	$142,049,566
Gastonia	20,429	16,902	$2,304,367,155	27,159	22,481	$3,015,156,394

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
High Shoals	317	247	$14,022,949	362	257	$15,077,370
Lowell	1,225	971	$90,558,446	1,591	1,311	$124,957,609
McAdenville	316	225	$34,147,043	322	228	$40,372,702
Mount Holly	4,650	3,733	$408,482,658	6,074	4,884	$612,785,487
Ranlo	440	403	$31,458,818	1,403	1,259	$108,807,423
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,562	1,217	$137,318,458	1,694	1,330	$150,069,165
Unincorporated Area	19,687	14,042	$1,699,258,359	30,883	22,185	$2,475,084,342
GASTON COUNTY TOTAL	**59,998**	**46,773**	**$5,768,910,594**	**83,983**	**65,343**	**$7,939,422,690**

TABLE B.42: 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
Belmont	2,858	2,219	$373,616,253	3,949	3,111	$504,148,709
Bessemer City	2,314	1,671	$131,026,033	2,907	2,148	$174,317,624
Cherryville	1,967	1,611	$152,500,703	2,632	2,141	$191,130,724
Cramerton	1,280	1,099	$115,174,114	1,817	1,505	$216,673,389
Dallas	520	386	$21,278,686	1,175	939	$62,866,952
Gastonia	8,811	7,199	$835,180,254	15,123	12,309	$1,409,836,737
High Shoals	326	223	$12,857,053	362	257	$15,077,370
Lowell	1,358	1,139	$108,709,392	1,749	1,449	$143,297,849
McAdenville	35	27	$11,142,966	250	184	$37,284,381
Mount Holly	3,082	2,512	$275,613,675	4,729	3,923	$434,823,289
Ranlo	1,155	1,037	$95,590,838	1,450	1,300	$112,220,627
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,442	1,116	$127,601,921	1,656	1,292	$145,450,939
Unincorporated Area	6,757	4,921	$607,363,269	14,640	10,704	$1,156,976,033
GASTON COUNTY TOTAL	**31,905**	**25,160**	**$2,867,655,157**	**52,439**	**41,262**	**$4,604,104,623**

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 forty-seven Gaston County facilities located in a HAZMAT risk zone. The primary impact zone includes just seven facilities, 2 medical care facilities, 1 school, 1 fire station, and two others. The remaining facilities are in the secondary, 1 mile zone. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

Mobile Analysis:
The critical facility analysis for road and railroad transportation corridors in Gaston County revealed that there are 150 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 113 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for railroad and/or the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table B.45** at the end of this section.

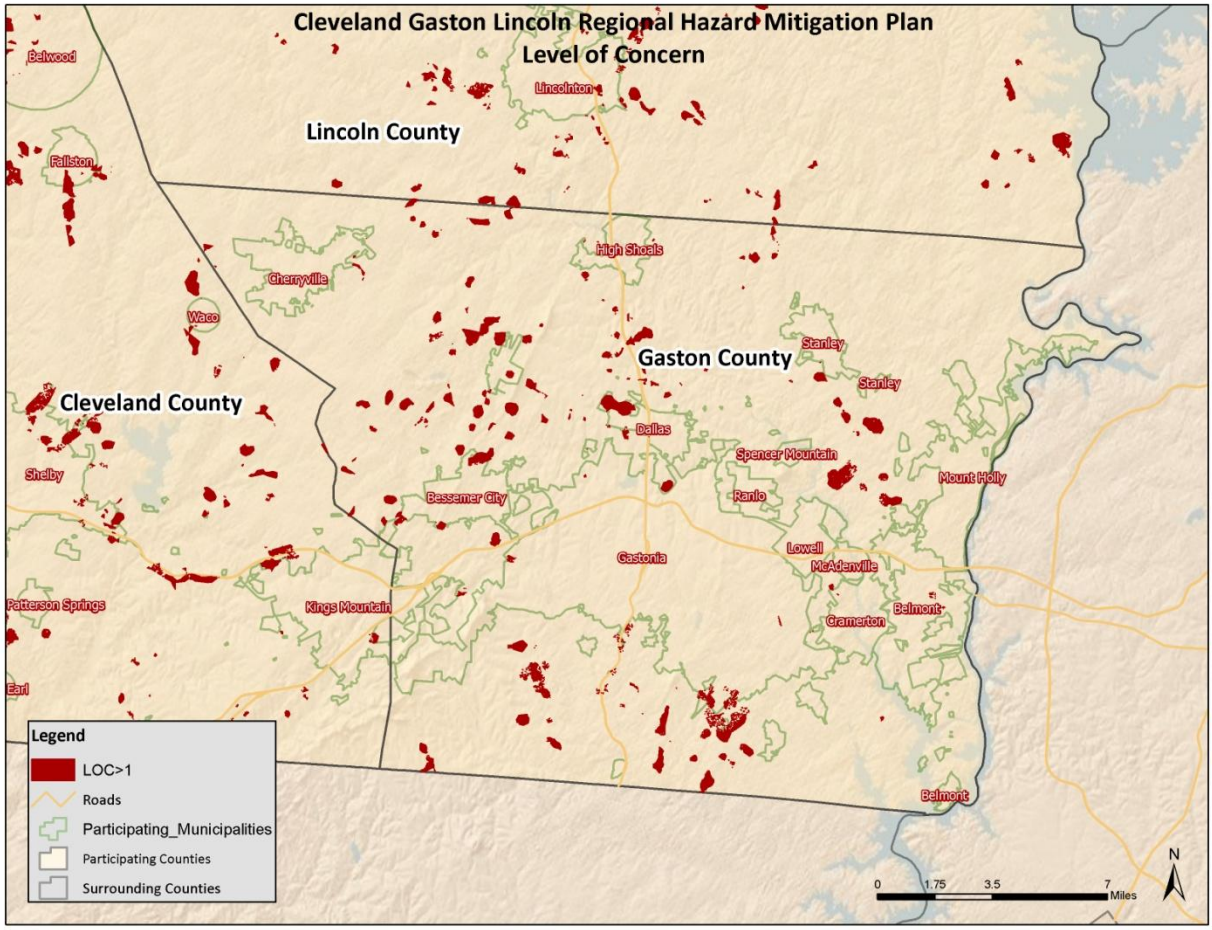
In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in Gaston County. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could 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 Gaston County is susceptible to wildfire events, there are few reports of 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.29**, **Figure B.30**, **Figure B.31**, **Figure B.32**, **Figure B.33**, **Figure B.34**, **Figure B.35**, **Figure B.36**, **Figure B.37**, **Figure B.38**, **Figure B.39**, **Figure B.40**, **Figure B.41**, and **Figure B.42** 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). Six was the highest level recorded in the Cleveland Gaston Lincoln planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The region contains some lands where the value falls into the at-risk category, though the region has somewhat less land labeled as at-risk compared to other regions of North Carolina. Since all of this land area is on the lower tenth of the overall LOC scale, there is likely considerably less risk in the region than in other areas of the country.

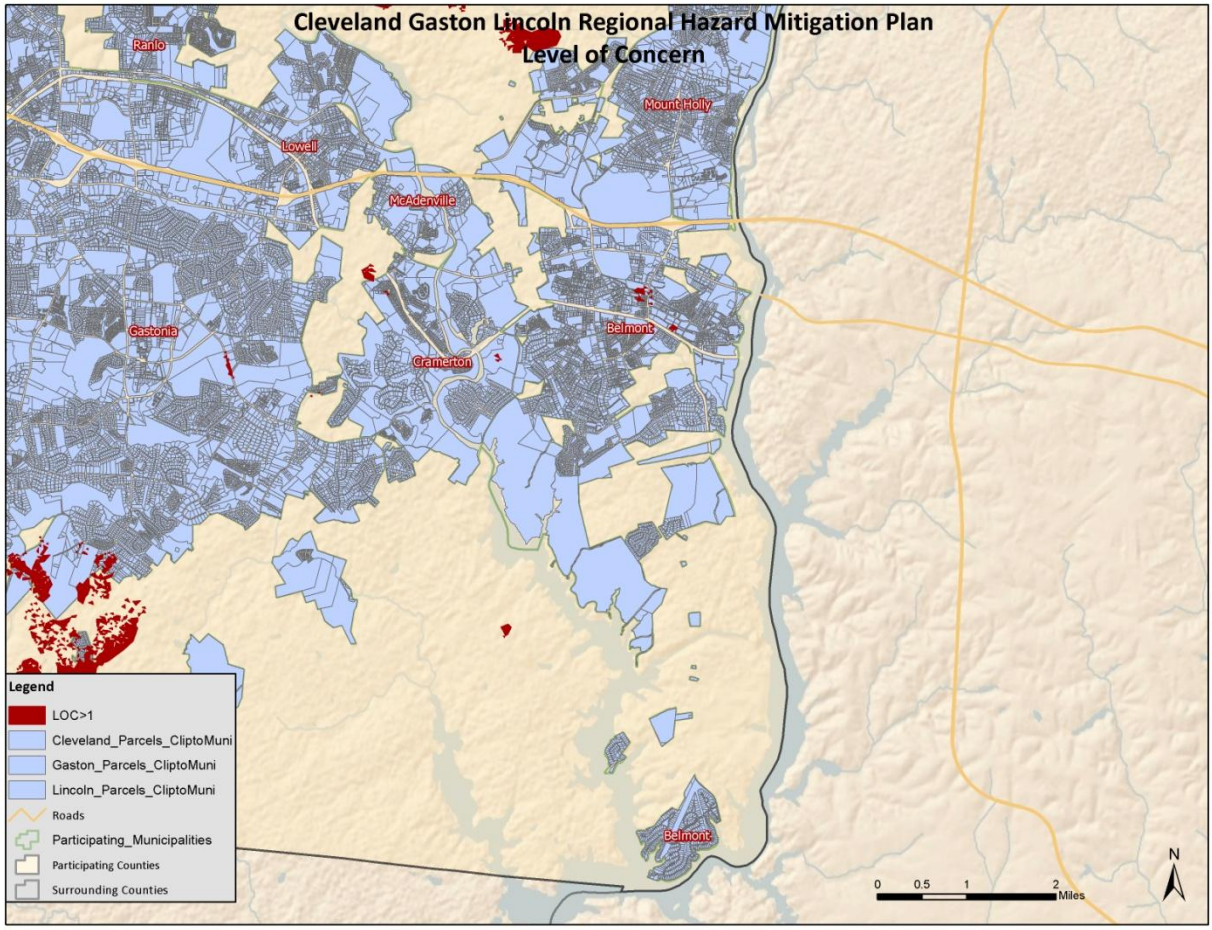
Table B.43 shows the results of the analysis.

FIGURE B.29: WILDFIRE RISK AREAS IN GASTON COUNTY



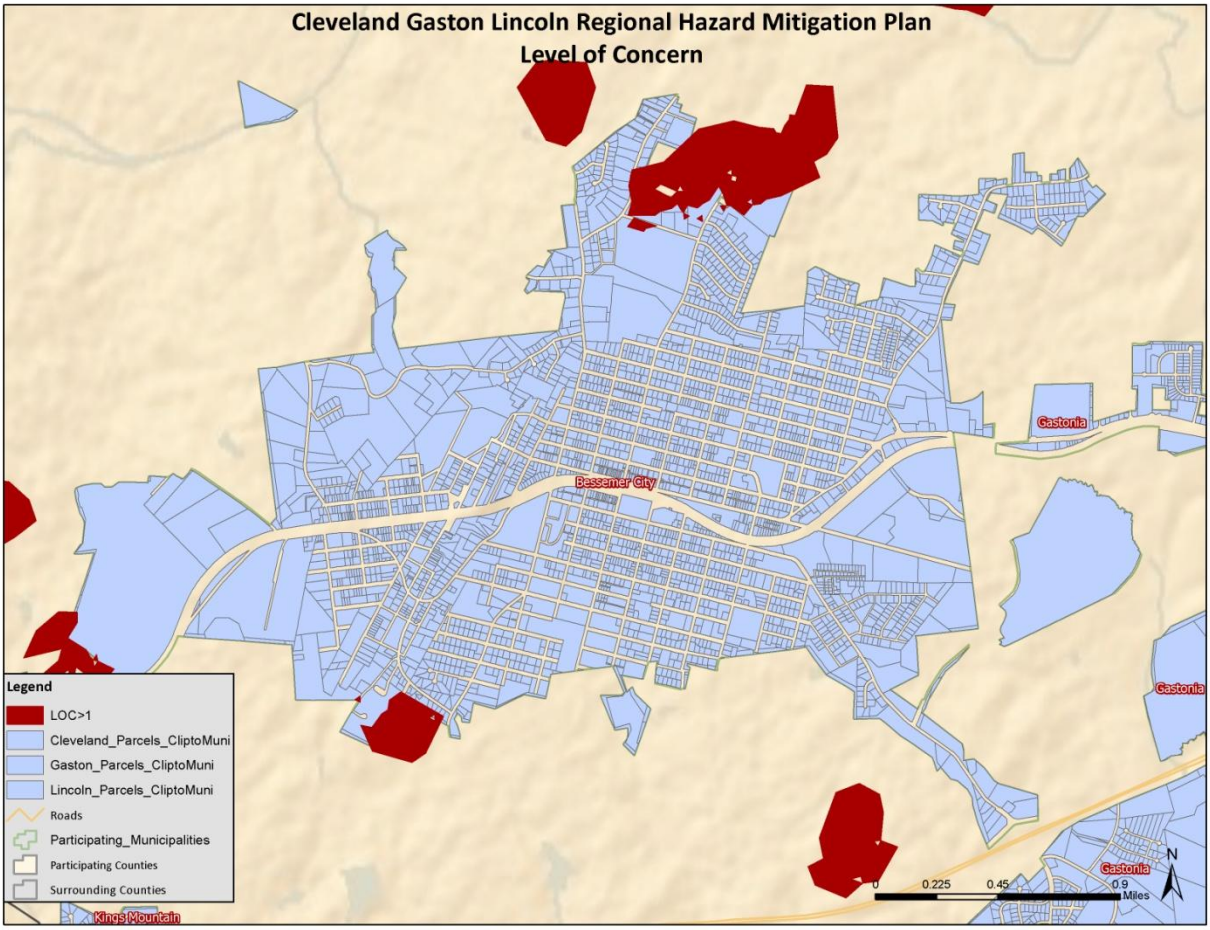
Source: Southern Wildfire Risk Assessment Data

FIGURE B.30: WILDFIRE RISK AREAS IN BELMONT



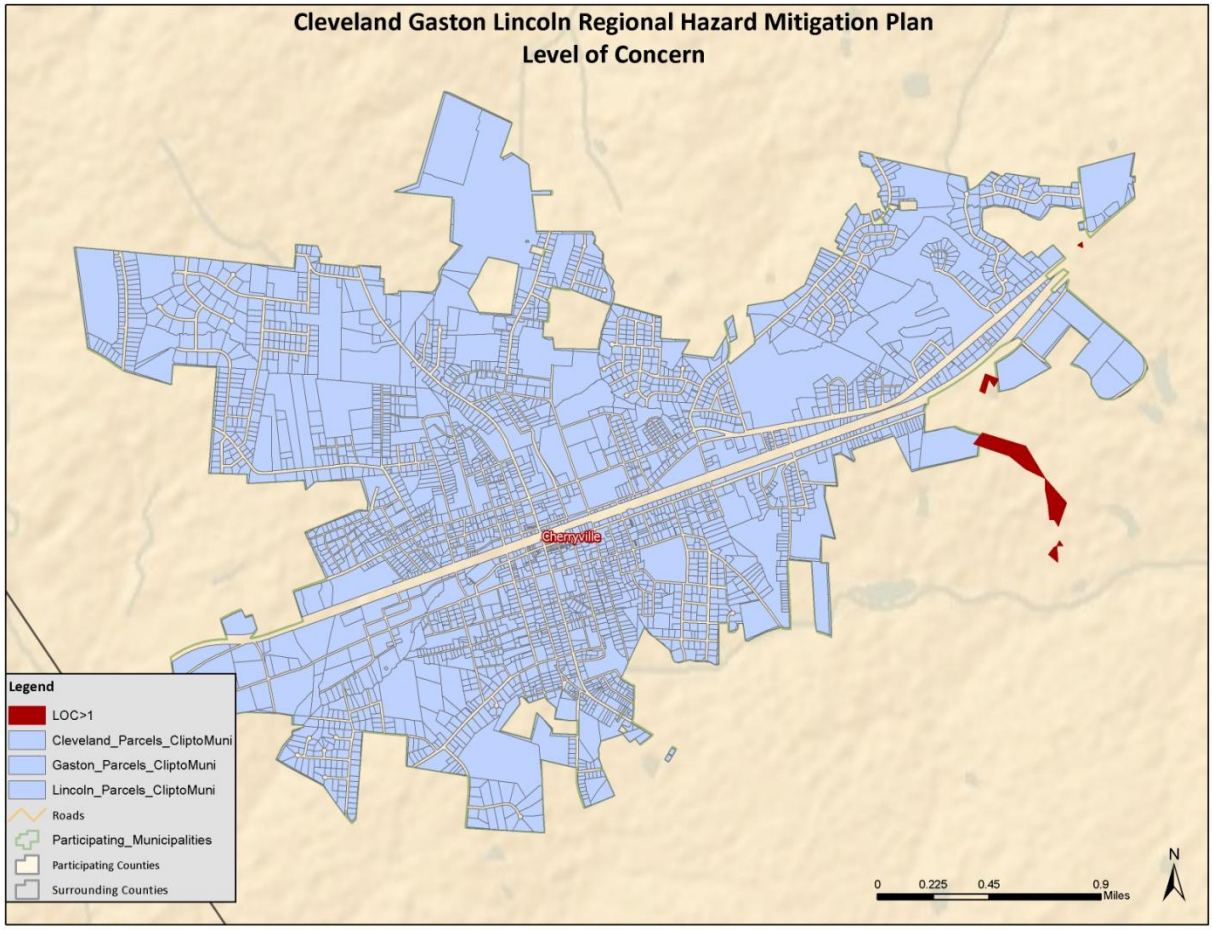
Source: Southern Wildfire Risk Assessment Data

FIGURE B.31: WILDFIRE RISK AREAS IN BESSEMER CITY



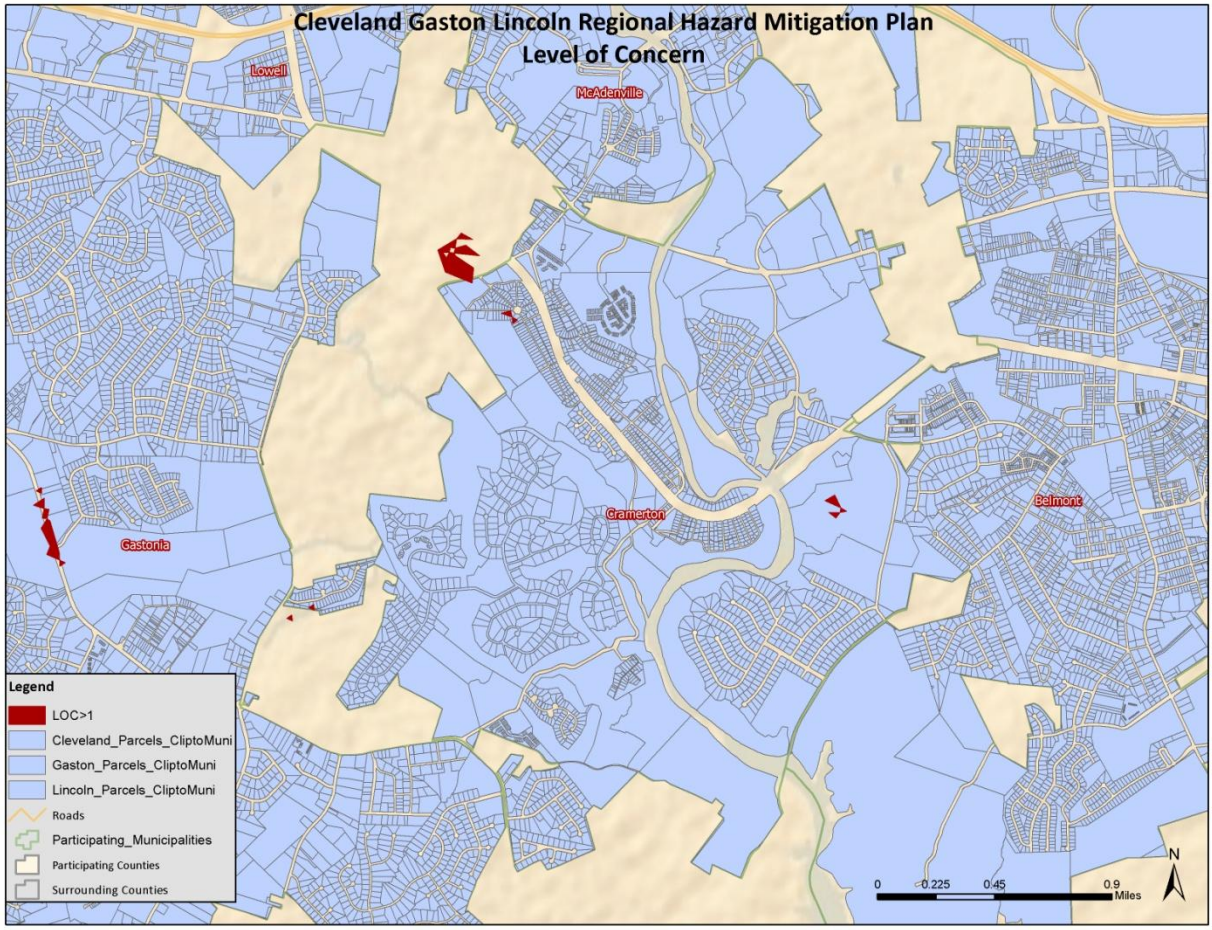
Source: Southern Wildfire Risk Assessment Data

FIGURE B.32: WILDFIRE RISK AREAS IN CHERRYVILLE



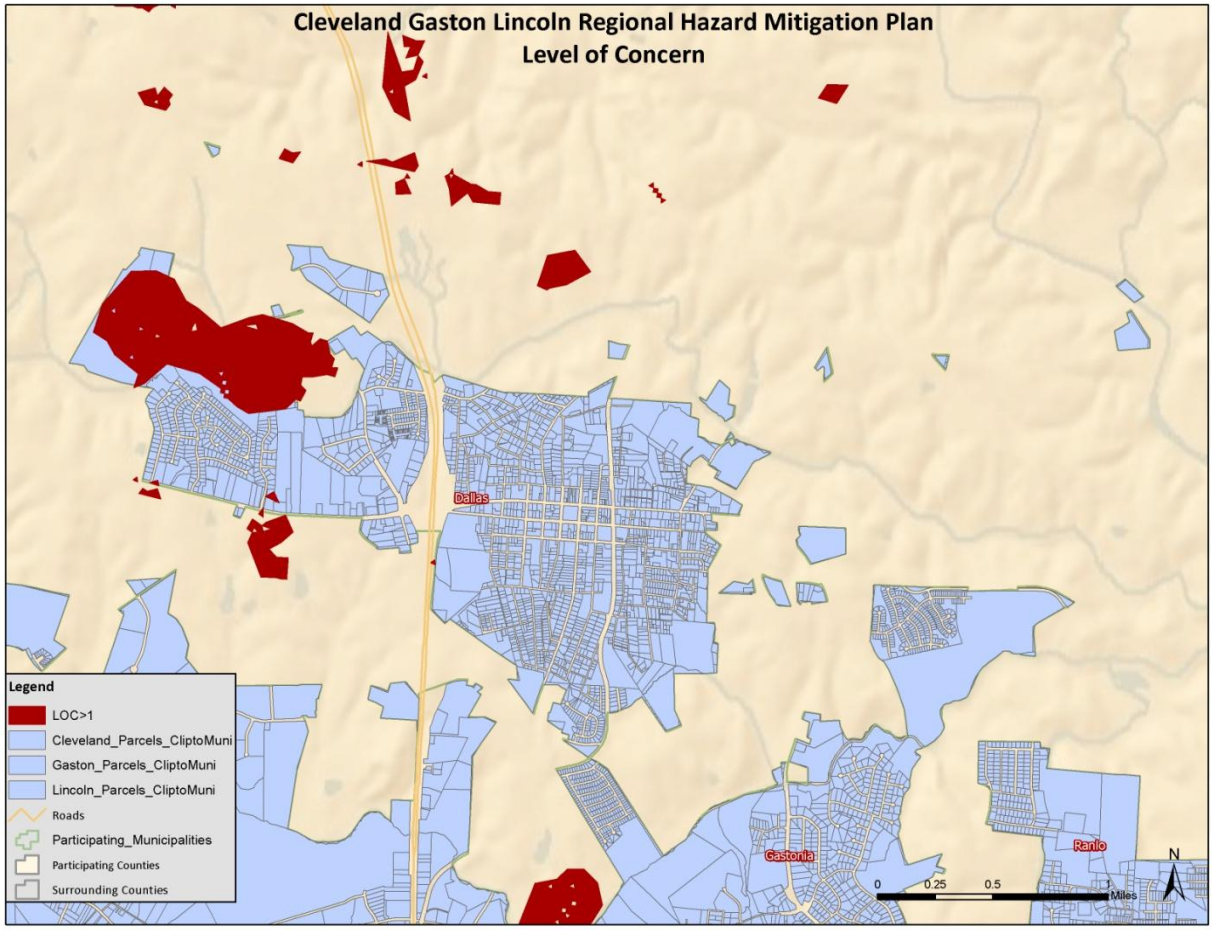
Source: Southern Wildfire Risk Assessment Data

FIGURE B.33: WILDFIRE RISK AREAS IN CRAMERTON



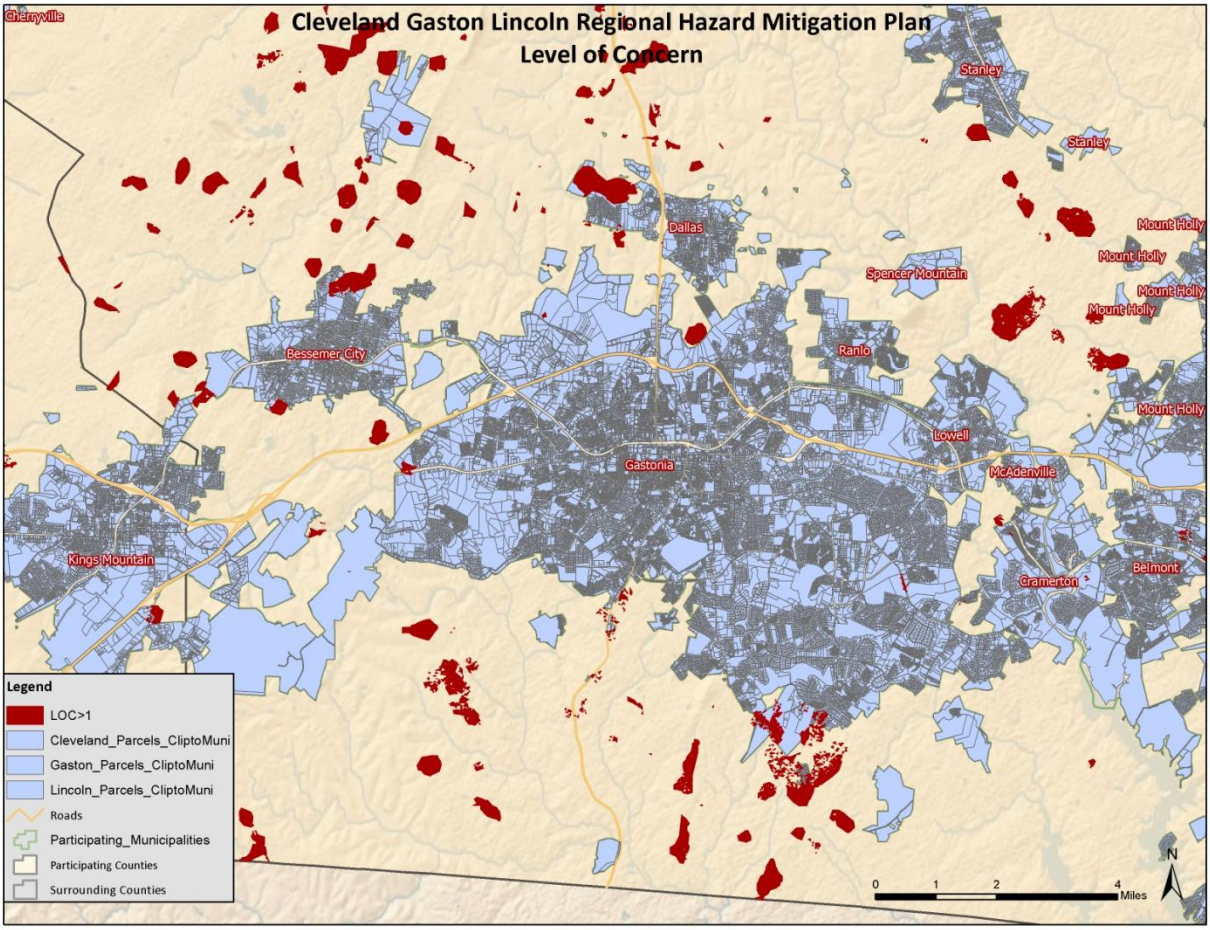
Source: Southern Wildfire Risk Assessment Data

FIGURE B.34: WILDFIRE RISK AREAS IN DALLAS



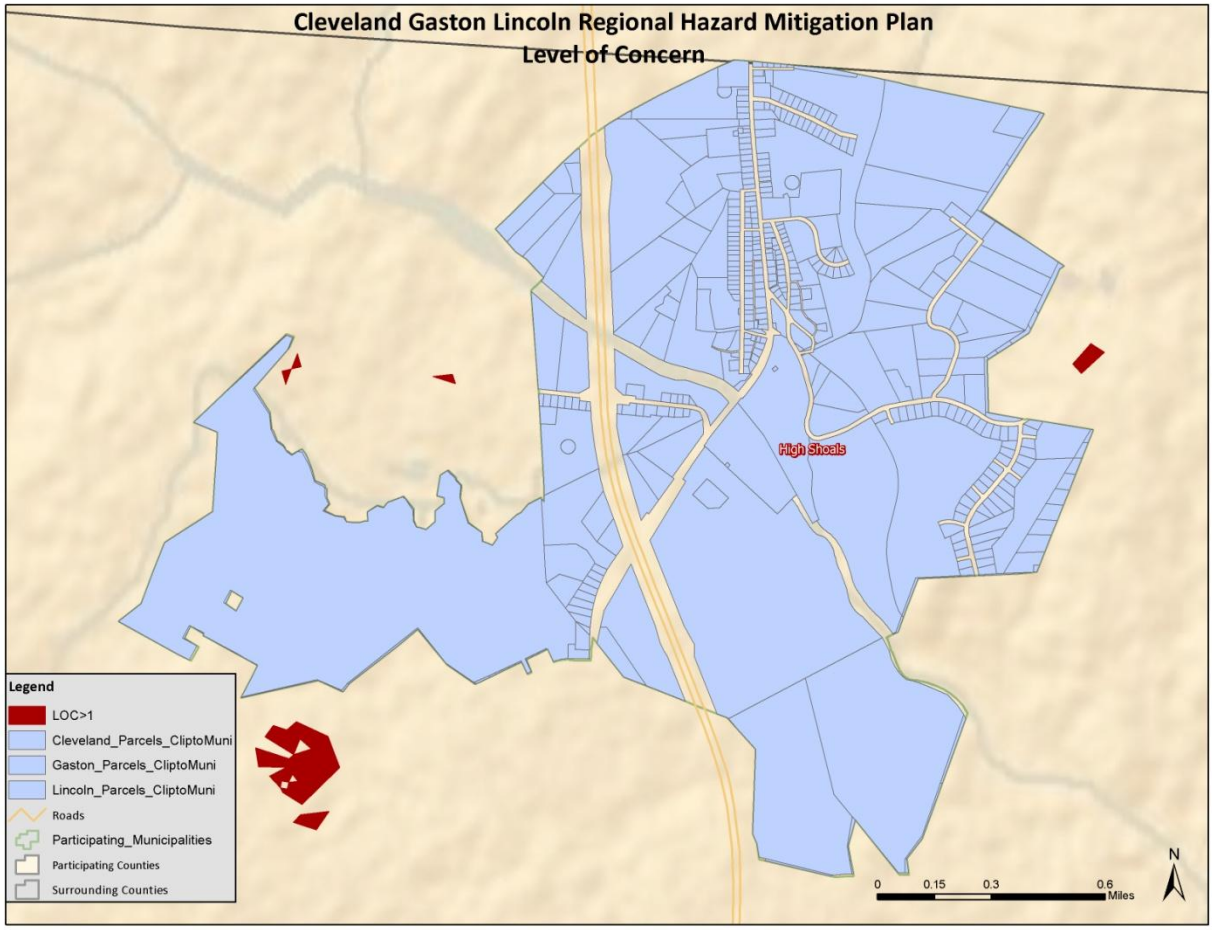
Source: Southern Wildfire Risk Assessment Data

FIGURE B.35: WILDFIRE RISK AREAS IN GASTONIA



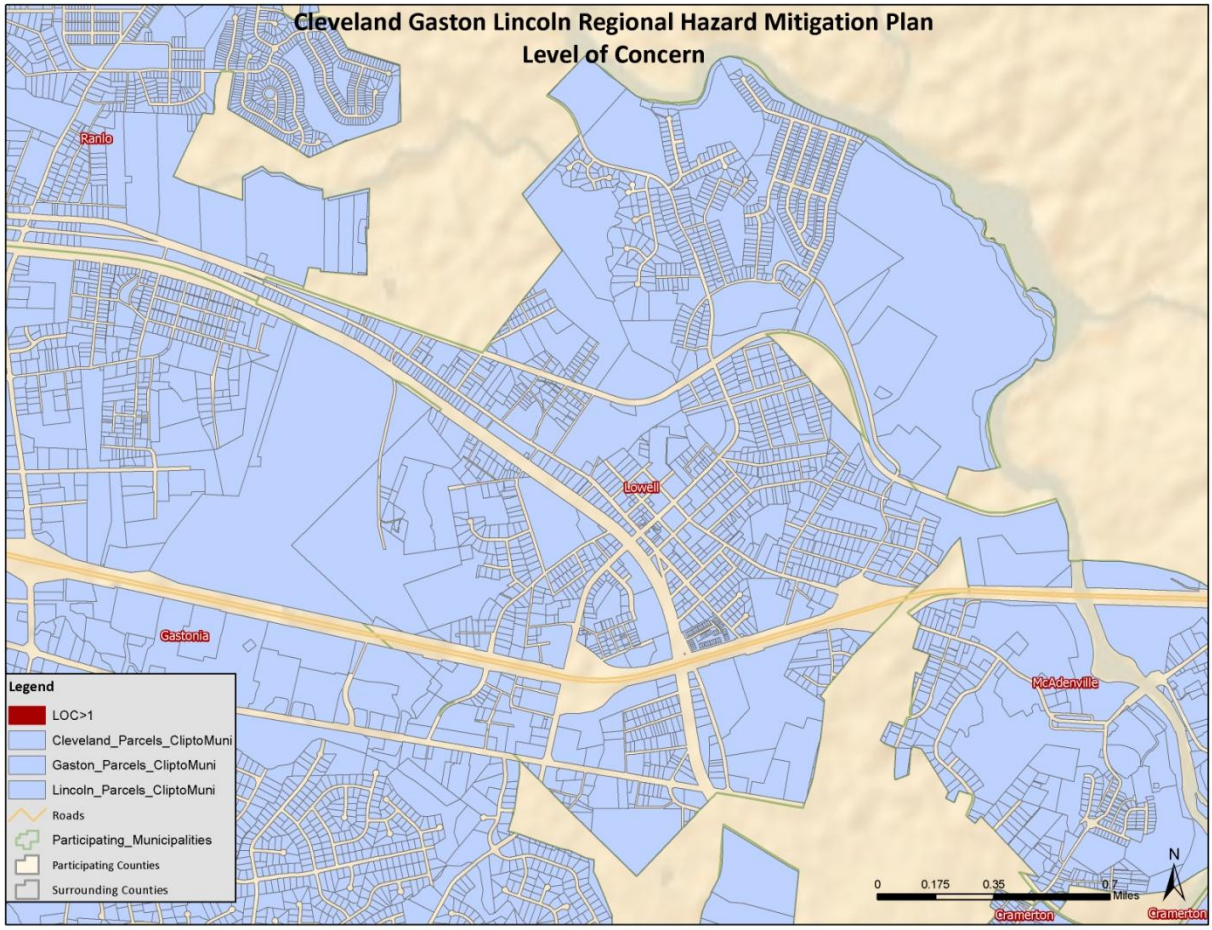
Source: Southern Wildfire Risk Assessment Data

FIGURE B.36: WILDFIRE RISK AREAS IN HIGH SHOALS



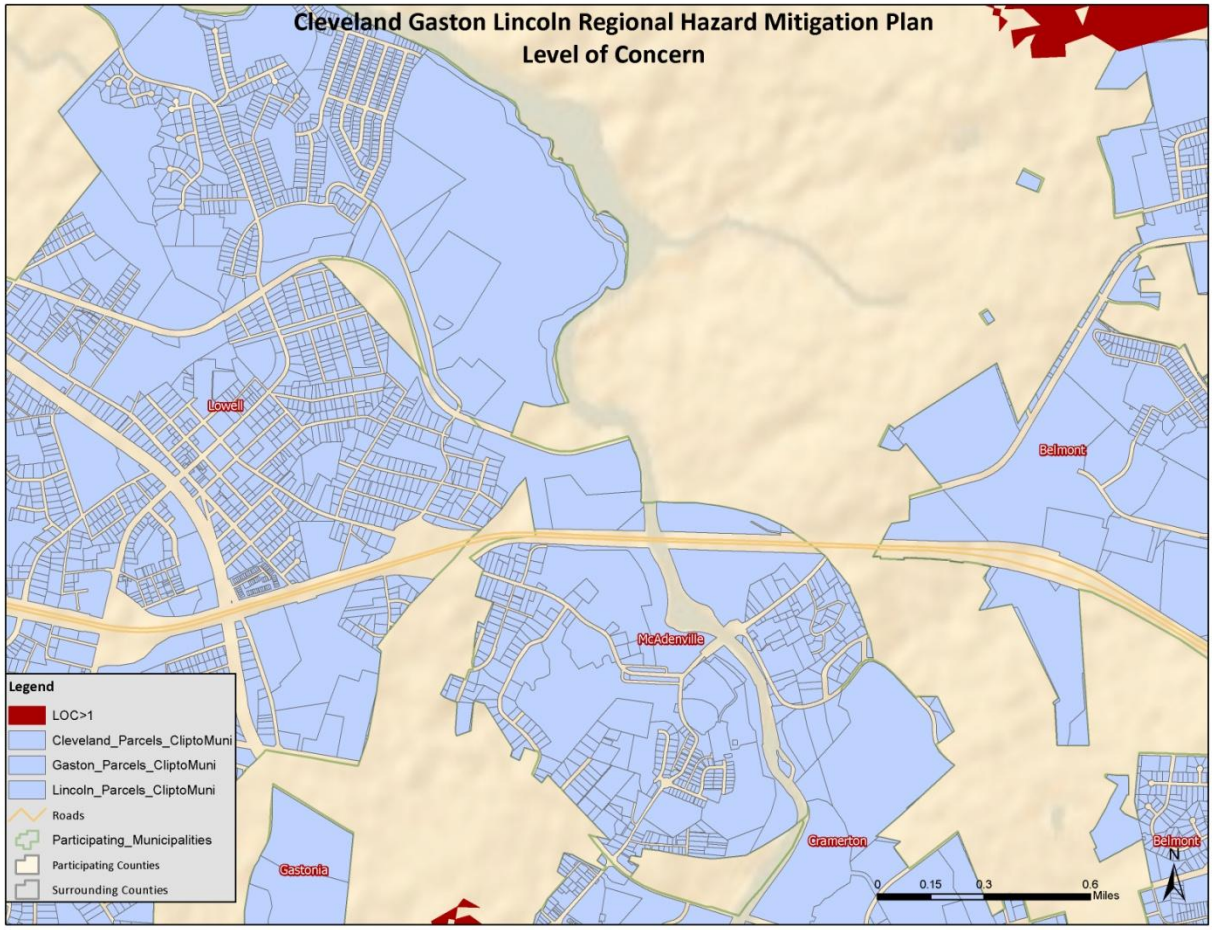
Source: Southern Wildfire Risk Assessment Data

FIGURE B.37: WILDFIRE RISK AREAS IN LOWELL



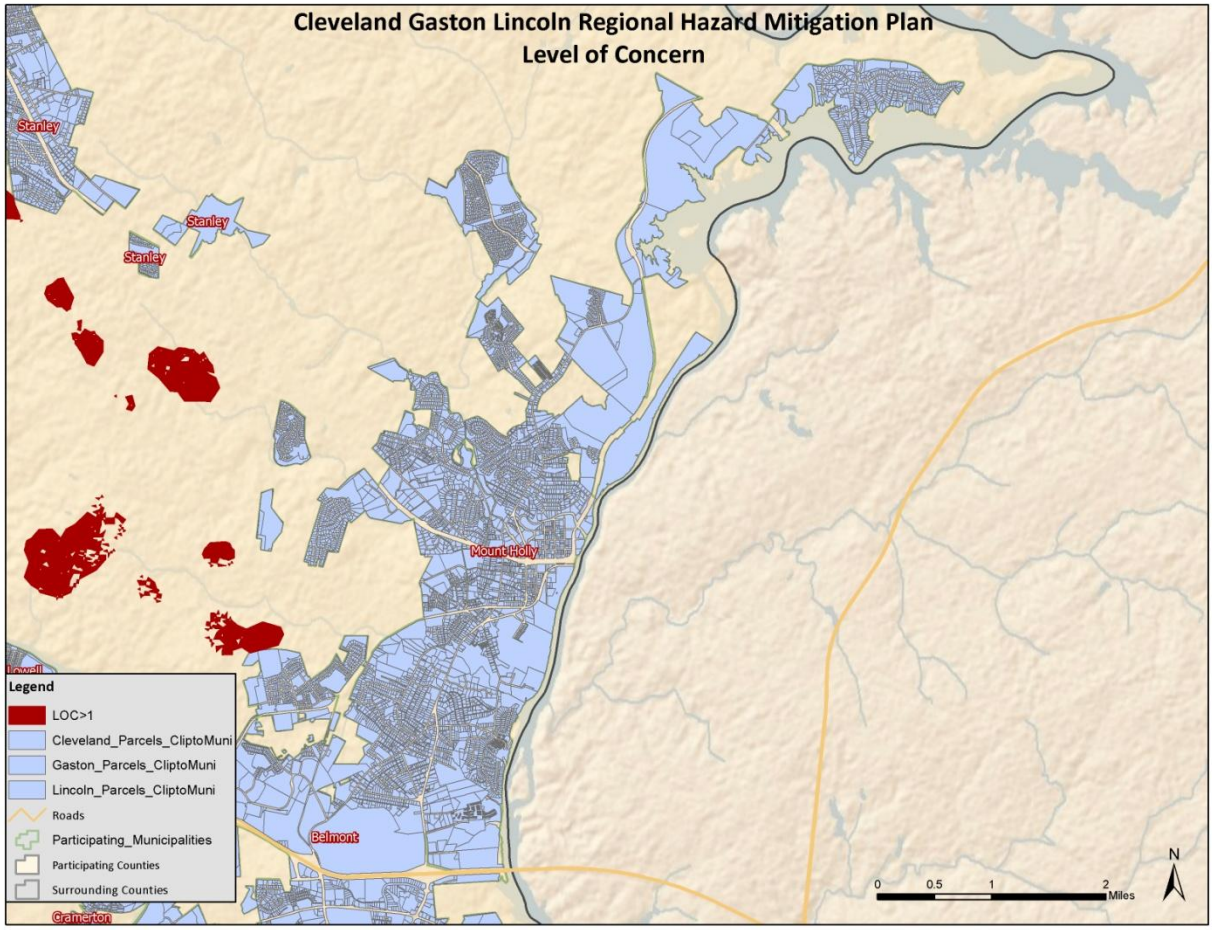
Source: Southern Wildfire Risk Assessment Data

FIGURE B.38: WILDFIRE RISK AREAS IN MCADENVILLE



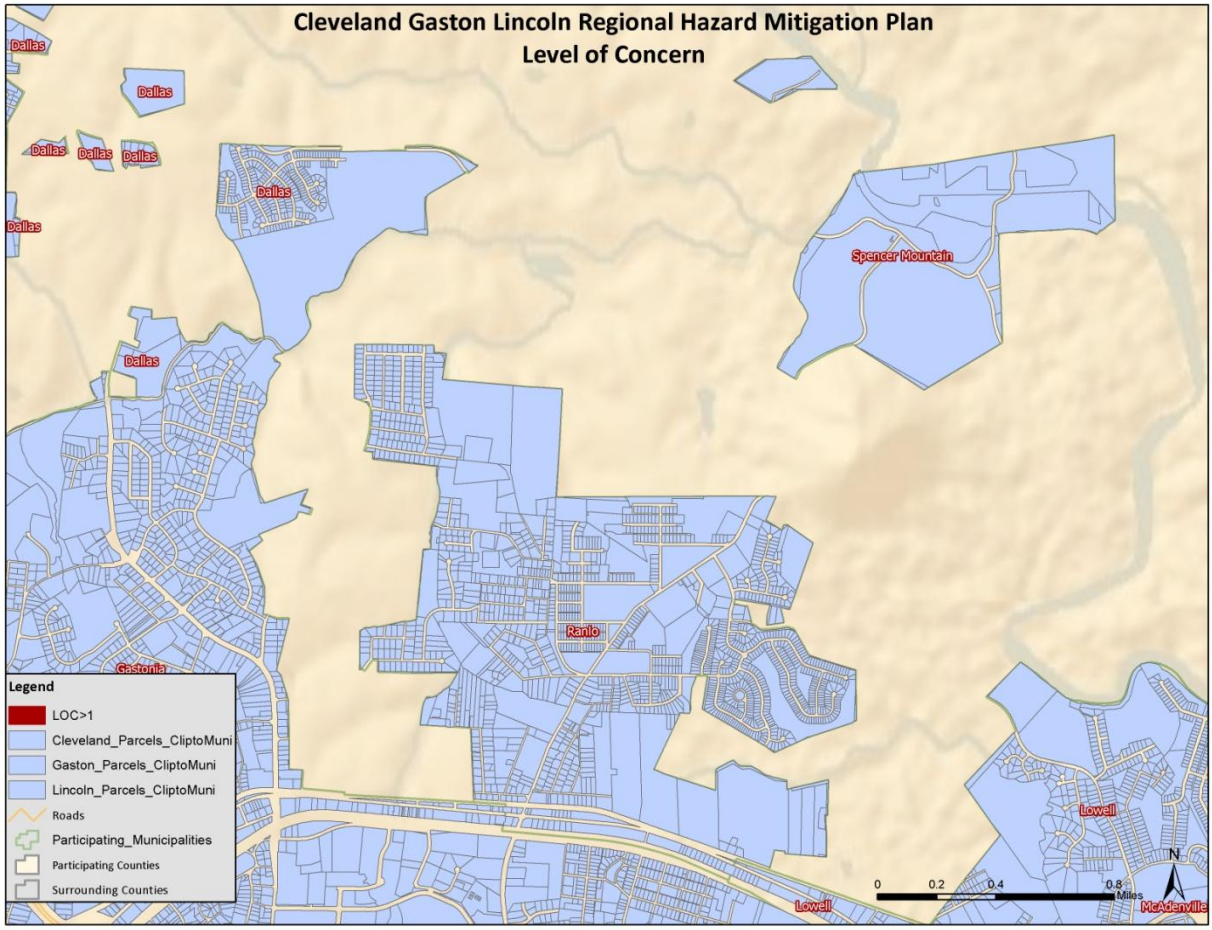
Source: Southern Wildfire Risk Assessment Data

FIGURE B.39: WILDFIRE RISK AREAS IN MOUNT HOLLY



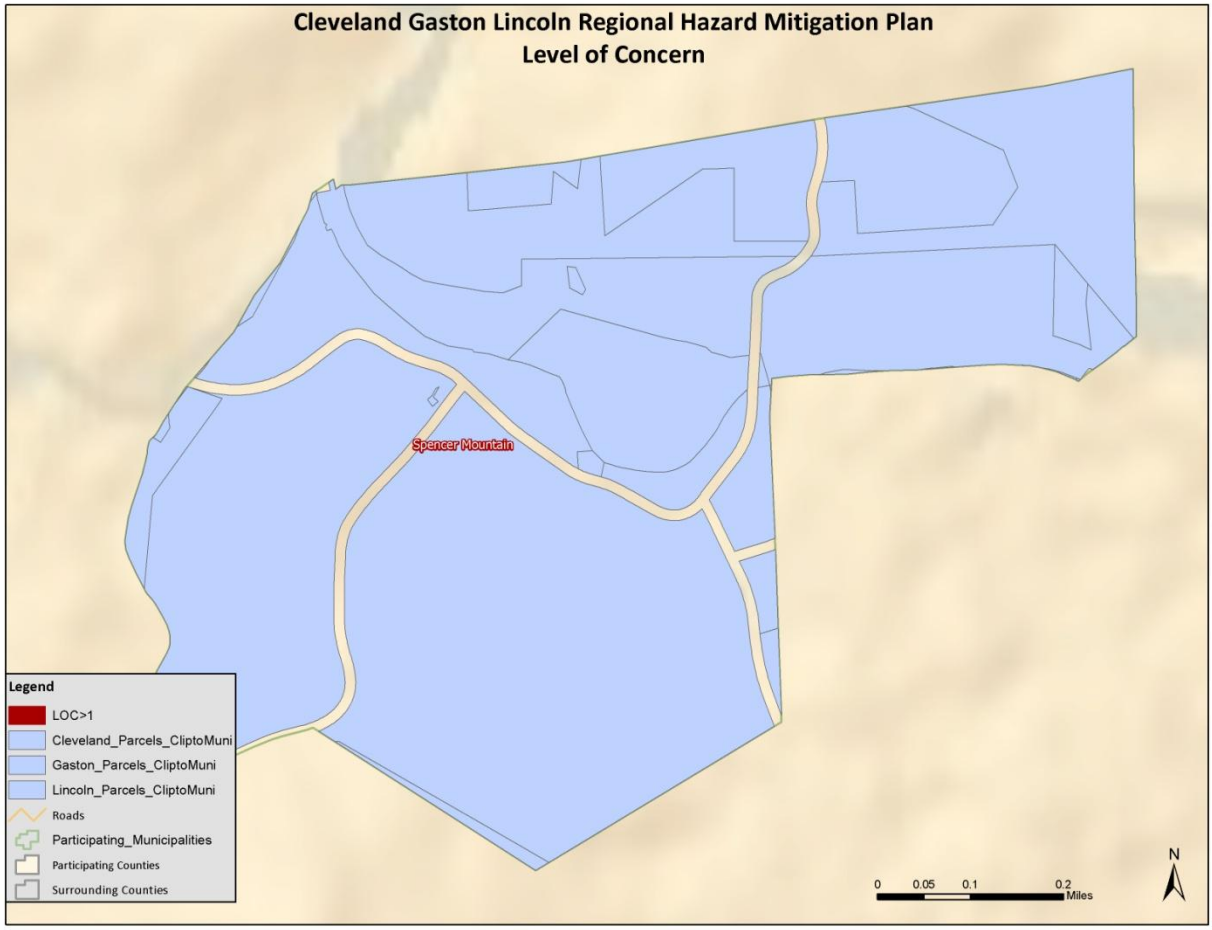
Source: Southern Wildfire Risk Assessment Data

FIGURE B.40: WILDFIRE RISK AREAS IN RANLO



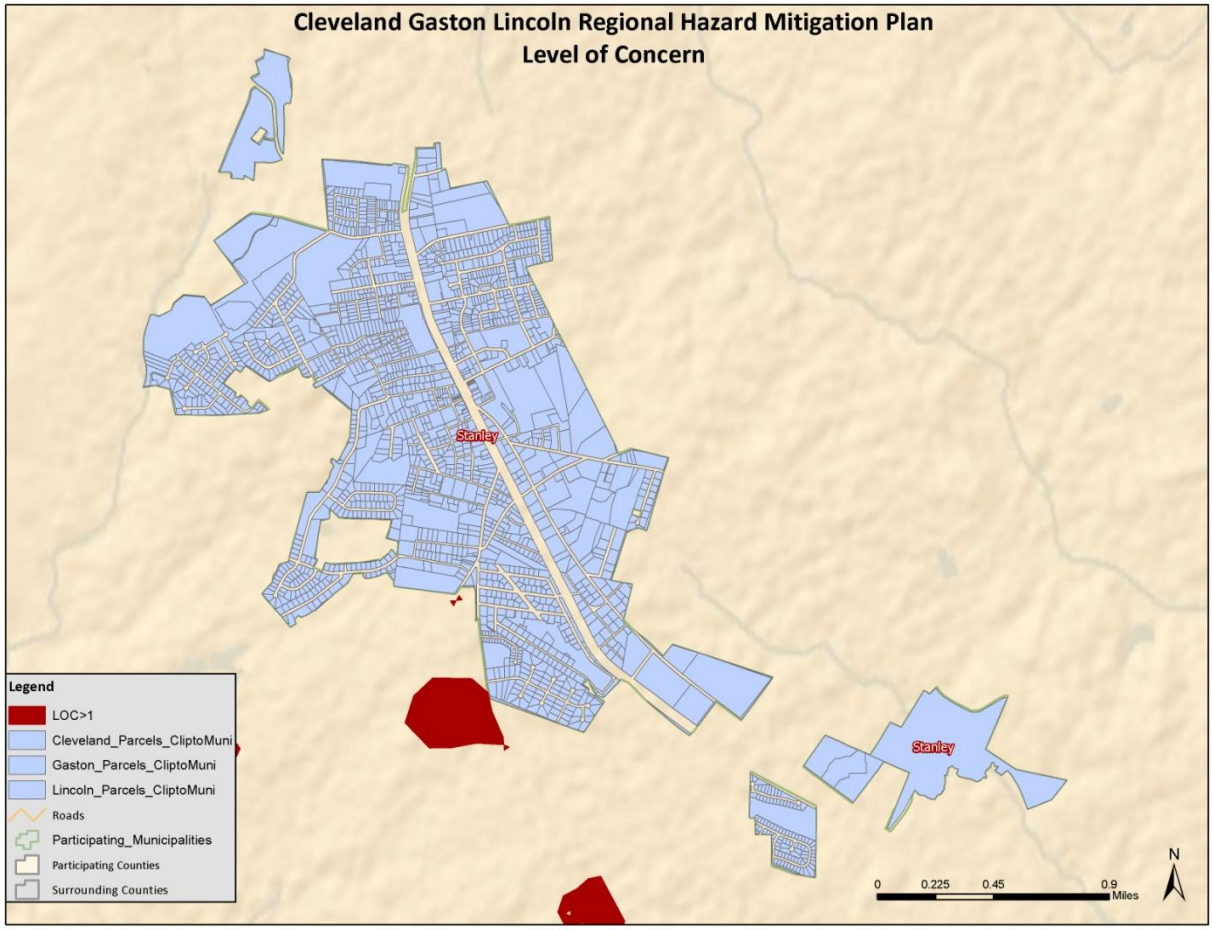
Source: Southern Wildfire Risk Assessment Data

FIGURE B.41: WILDFIRE RISK AREAS IN SPENCER MOUNTAIN



Source: Southern Wildfire Risk Assessment Data

FIGURE B.42: WILDFIRE RISK AREAS IN STANLEY



Source: Southern Wildfire Risk Assessment Data

TABLE B.43: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value**
Graham County	2,637	1,966	$264,540,492
Belmont	31	26	$7,870,009
Bessemer City	19	16	$9,913,893
Cherryville	0	0	$0
Cramerton	10	8	$2,931,535
Dallas	5	3	$951,400
Gastonia	80	62	$17,604,741
High Shoals	0	0	$0
Lowell	0	0	$0
McAdenville	0	0	$0
Mount Holly	1	0	$0
Ranlo	0	0	$0
Spencer Mountain	0	0	$0

	HIGH WILDFIRE RISK AREA		
Location	Approx. Number of Parcels	Approx. Number of Buildings	Approx. Improved Value
Stanley	0	0	$0
Unincorporated Area	2,491	1,851	$225,268,914
GASTON COUNTY TOTAL	**2,637**	**1,966**	**$264,540,492**

Looking at jurisdictional level, unincorporated areas of the county face the highest level of concern areas. While the jurisdictions report a fairly low level of concern, each should mindful that they are susceptible to wildfire occurrences and fire may quickly spread to those lower areas of concern.

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 no critical facilities located in wildfire areas of concern. 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 B.45** 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 Gaston County.

Conclusions on Hazard Vulnerability

Table B.44 presents a summary of annualized loss for each hazard in Gaston 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 B.44: ANNUALIZED LOSS FOR GASTON COUNTY

Event	Gaston County
Dam Failure	$197
Drought	Negligible
Extreme Heat	Negligible
Erosion	Negligible
Hail	$26,878
Hurricane & Tropical Storm	$805,000
Landslide	Negligible
Lightning	$38,033
Thunderstorm Wind / High Wind	$35,104

Event	Gaston County
Tornado	$1,442,814
Winter Storm & Freeze	$1,141,609
Flood	$161,132
Earthquake	$79,000
HAZMAT Incident	Negligible
Wildfire	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, 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.45** 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.45: AT-RISK CRITICAL FACILITIES IN GASTON COUNTY

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
Gaston County																				
CRAMERTON VFD #41	Fire/EMS	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	
CRAMERTON TOWN HALL & PD	Police	X	X	X	X	X	X	X	X		X					X	X	X	X	
SOUTHPOINT RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
USPS CRAMERTON	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
STUART W. CRAMER HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
CRAMERTON MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
LIBRARY	Other	X	X	X	X	X	X	X	X	X							X		X	
SHIELD MUSEUM	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
GFS #6	Fire/EMS	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
RADIO SHOP	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GCPD	Police	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
CHESTER ST COMPLX	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GASTONIA POLICE DEPT	Police	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
HUMAN SERVICES BLDG.	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
COURTHOUSE	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
WATER PLANT	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
JAIL ANNEX	Other	X	X	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	X	X	
ERWIN PARK	Other	X	X	X	X	X	X	X	X	X							X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
EMERGENCY SERVICES	EOC/Response	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
ADMINISTRATION BUILDING	Other	X	X	X	X	X	X	X	X	X					X		X	X	X	
GFS #5	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
HEALTH DEPT	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	
GFS #7	Fire/EMS	X	X	X	X	X	X	X	X		X									
NCHP STATION	Police	X	X	X	X	X	X	X	X	X							X			
GFS #1	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X		X	
GFS #8	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
GASTONIA LIFE SAVING	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GFS #3	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GFS #4	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
GASTONIA CITY HALL	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GARLAND CENTER	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
USPS GASTONIA (MAIN)	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
USPS ANNEX	Other	X	X	X	X	X	X	X	X	X							X			
GFD #2	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X		X	
GASTON MEMORIAL HOSPITAL	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
ASHBROOK HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
HUNTER HUSS HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
YORK CHESTER MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X		X	
GRIER MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
SOUTHWEST MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
BROOKSIDE ELEMENTARY	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
WOODHILL ELEMENTARY	Education	X	X	X	X	X	X	X	X	X							X		X	
RHYNE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X		X	
ROBINSON ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X					X	X			
GARDNER PARK ELEMENTARY	Education	X	X	X	X	X	X	X	X	X							X			
FOREST HEIGHTS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
EDWARD D SADLER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X				X		X			
PLEASANT RIDGE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X		X			
LINGERFELDT ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X		X		X	
SHERWOOD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
HAWKS NEST ELEEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
HIGH SHOALS VFD #21	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
HIGH SHOALS CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE VFD # 73	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
CHERRYVILLE CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE RESCUE & GEMS #6	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS CHERRYVILLE	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
JOHN CHAVIS MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
CHERRYVILLE ELEMENTARY	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
W B BEAM INTERMEDIATE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY CD RESCUE & GEMS #8	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
STANLEY LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY VFD #22	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
STANLEY TOWN HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS STANLEY	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
STANLEY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
KISER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
SPRINGFIELD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
MOUNT HOLLY FD # 35	Fire/EMS	X	X	X	X	X	X	X	X	X					X		X			
EAST GASTON VFD # 30	Fire/EMS	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
FD #34	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
OLD POLICE	Other	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
OLD CITY HALL	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
LIBRARY	Other	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
GEMS #7	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
FD #33	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS MOUNT HOLLY	Other	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	
CAROLINAS REHABILITATION	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
MT HOLLY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
CATAWBA HEIGHTS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
IDA RANLIN ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
PINEWOOD ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X		X			
DALLAS PD	Police	X	X	X	X	X	X	X	X	X							X		X	
DALLAS TOWN HALL	Other	X	X	X	X	X	X	X	X	X							X		X	
USPS DALLAS	Other	X	X	X	X	X	X	X	X	X							X			
DALLAS LIBRARY	Other	X	X	X	X	X	X	X	X	X							X		X	
NEW- DALLAS VFD	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
DALLAS VFD #	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
CARR ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
BESSEMER CITY VFD # 62	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
CITY HALL & POLICE	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY LIBRARY	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BC RESCUE, GEMS & FIRE	Fire/EMS	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
USPS BESSEMER CITY	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
BESSEMER CITY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
BESSEMER CITY PRIMARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	X
BESSEMER CITY CENTRAL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	X
RANLO VFD # 19	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RANLO RESCUE	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
RANLO TOWN HALL	Other	X	X	X	X	X	X	X	X	X							X		X	
RANLO POLICE	Police	X	X	X	X	X	X	X	X	X							X		X	
LOWELL VFD # 17	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL PD	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL TOWN HALL & GEMS #5	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS LOWELL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
LOWELL LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
HOLBROOK MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
GEMS STATION #4	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	
McADENVILLE VFD # 40	Fire/EMS	X	X	X	X	X	X	X	X	X							X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
McADENVILLE TOWN HALL & PD	Police	X	X	X	X	X	X	X	X	X							X		X	
USPS McADENVILLE	Other	X	X	X	X	X	X	X	X	X							X		X	
MCADENVILLE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
LOWELL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
POLICE	Police	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT CITY HALL	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT PLANNING	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT LIBRARY	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
USPS BELMONT 28012	Other	X	X	X	X	X	X	X	X	X						X	X	X	X	
BELMONT VFD # 43	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
SOUTH POINT HIGH SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
BELMONT MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
PAGE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
BELMONT CENTRAL ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
UNION VFD #51	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
CROWDERS MTN VFD & RESCUE #53	Fire/EMS	X	X	X	X	X	X	X	X		X									
CHESTNUT RIDGE VFD # 71	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
SPENCER MTN VFD	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
ALEXIS VFD #20	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
LUCIA RIVER BEND VFD # 31	Fire/EMS	X	X	X	X	X	X	X	X	X							X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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
COMMUNITY VFD # 32	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X	X	
SOUTHPOINT VFD	Fire/EMS	X	X	X	X	X	X	X	X		X				X		X			
NEW HOPE VFD # 50	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
UNION RD. LIBRARY	Other	X	X	X	X	X	X	X	X		X						X			
AG CENTER VFD # 61	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
TRYONOTA VFD # 70	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
HUGHS POND VFD #72	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
EAST GASTON HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X										
FORESTVIEW HIGH SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
NORTH GASTON HIGH SCHOOL	Education	X	X	X	X	X	X	X	X	X							X		X	
W C FRIDAY MIDDLE SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
TRYON ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
COSTNER ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X							X			
HH BEAM ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X		X	
CHAPEL GROVE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X									
NEW HOPE ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			
W A BESS ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X		X						X			X
NORTH BELMONT ELEMENTARY SCHOOL	Education	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	

B.4 GASTON COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Gaston 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.46 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Gaston 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan.

TABLE B.46: 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
GASTON COUNTY	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	✓
Belmont	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Bessemer City	✓	✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Cherryville	✓	✓		✓				✓				✓	✓		✓	✓	✓			✓	✓	✓	
Cramerton	✓	✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Dallas	✓	✓		✓				✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
Gastonia	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	
High Shoals	✓							✓					✓		✓	✓	✓			✓	✓	✓	
Lowell	✓	✓		✓				✓					✓		✓	✓	✓	✓		✓	✓	✓	

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
McAdenville	✓			✓				✓					✓		✓	✓				✓	✓	✓	
Mount Holly	✓	✓		✓				✓				✓	✓		✓	✓	✓			✓	✓	✓	
Ranlo	✓							✓					✓		✓	✓	✓			✓	✓	✓	
Spencer Mountain	✓												✓		✓					✓	✓	✓	
Stanley	✓	✓						✓					✓		✓	✓	✓			✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Gaston County has previously adopted a hazard mitigation plan. All of the participating municipalities were also included in this plan.

Emergency Operations Plan
Gaston County maintains an emergency operations plan through its Emergency Management Department. This plan includes all of the municipalities in the county except Spencer Mountain.

General Planning

Comprehensive Land Use Plan
Gaston County has adopted a comprehensive plan. Each of the participating municipalities in the county has also adopted a land use or comprehensive plan except High Shoals, McAdenville, Ranlo, and Spencer Mountain.

Capital Improvements Plan
Gaston County, Belmont, Bessemer City, Cherryville, Cramerton, Dallas, Gastonia, and Mount Holly have capital improvement plans.

Zoning Ordinance
Gaston County and all of its municipalities except Spencer Mountain have adopted and enforce separate zoning ordinances.

Subdivision Ordinance
Gaston County and all of its municipalities except McAdenville and Spencer Mountain have adopted and enforce separate subdivision regulations.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Gaston County provides building code inspections and enforcement to all municipalities within the county, with the exception of Gastonia, which enforces building codes within its jurisdiction.

Floodplain Management

Table B.47 provides NFIP policy and claim information for each participating jurisdiction in Gaston County.

TABLE B.47: 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
GASTON COUNTY†	05/01/80	11/04/09	58	$15,074,500	4	$20,282
Belmont	11/01/79	11/04/09	16	$3,317,300	1	$8,067
Bessemer City	03/03/03	11/04/09	3	$428,000	0	$0
Cherryville	05/15/07	11/04/09	3	$875,000	0	$0
Cramerton	05/21/92	11/04/09	22	$4,488,400	0	$0
Dallas	05/01/94	11/04/09	9	$1,214,000	2	$12,879
Gastonia	02/01/78	11/04/09	142	$28,659,500	12	$60,869
High Shoals	05/20/10	11/04/09	0	$0	0	$0
Lowell	03/05/90	11/04/09	1	$280,000	0	$0
McAdenville	06/01/87	11/04/09	2	$2,000,000	0	$0
Mount Holly	09/28/79	11/04/09	54	$12,091,200	2	$5,952
Ranlo	03/03/03	11/04/09	1	$350,000	0	$0
Spencer Mountain	05/10/10	11/04/09	0	$0	0	$0
Stanley	08/27/10	11/04/09	1	$350,000	0	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 7/22/13; NFIP claims and policy information as of 5/31/13

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Gaston County and its municipalities all participate in the NFIP and have adopted flood damage prevention regulations.

Community Rating System
Gaston County participates in the CRS and has a Class 9 rating.

Open Space Management Plan
Gaston County and all of its municipalities except High Shoals, Spencer Mountain, and Stanley have signed resolutions of support for the Carolina Thread Trail Master Plan for Gaston County Communities to work with neighboring communities and with the Carolina Thread Trail to plan, design, and build trails to connect communities.

Although Gaston County has not adopted an open space management plan, the county's unified development ordinance promotes green space and open space and its subdivision ordinances includes a provision requiring that major subdivision tie into existing neighboring trails for connectivity purposes. In addition, Gastonia has adopted a city Parks and Recreation Long Range Plan while Mount Holly has adopted a city Parks and Recreation Master Plan.

Stormwater Management Plan
Although Gaston County and its municipalities do not have stormwater management plans in place, the county, Belmont, and Gastonia have adopted stormwater management regulations through various local ordinances.

B.4.2 Administrative and Technical Capability

Table B.48 provides a summary of the capability assessment results for Gaston 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.48: 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
GASTON COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	

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
Belmont	✓	✓		✓	✓		✓	✓	✓	
Bessemer City	✓	✓	✓	✓	✓		✓	✓	✓	
Cherryville	✓	✓	✓	✓	✓		✓	✓	✓	
Cramerton	✓	✓		✓	✓		✓	✓	✓	
Dallas	✓	✓	✓	✓	✓		✓	✓	✓	
Gastonia	✓	✓		✓	✓		✓	✓	✓	✓
High Shoals		✓		✓	✓		✓	✓	✓	
Lowell	✓	✓	✓	✓	✓		✓	✓	✓	
McAdenville		✓		✓	✓		✓	✓	✓	
Mount Holly	✓	✓		✓	✓		✓	✓	✓	
Ranlo		✓		✓	✓		✓	✓	✓	
Spencer Mountain		✓		✓	✓		✓	✓	✓	
Stanley		✓		✓	✓		✓	✓	✓	

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.49 provides a summary of the results for Gaston 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.49: 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: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.
GASTON COUNTY	✓	✓	✓						✓	✓
Belmont	✓	✓	✓						✓	✓
Bessemer City	✓	✓	✓			✓			✓	✓
Cherryville	✓	✓	✓						✓	✓
Cramerton	✓	✓	✓						✓	✓
Dallas	✓	✓	✓						✓	✓
Gastonia	✓	✓	✓			✓			✓	✓
High Shoals	✓	✓	✓						✓	✓
Lowell	✓	✓	✓						✓	✓
McAdenville	✓	✓	✓						✓	✓
Mount Holly	✓	✓	✓			✓			✓	✓
Ranlo	✓	✓	✓						✓	✓
Spencer Mountain	✓	✓	✓						✓	✓
Stanley	✓	✓	✓						✓	✓

B.4.4 Political Capability

Gaston County is currently a participant in the National Flood Insurance Program and has adopted the required Flood Hazard Ordinance, a Sedimentation and Erosion Control Ordinance, and Surface Water Supply Watershed Ordinance. The previous hazard mitigation plan indicates that this demonstrates to some extent both favorable political support and a willingness to adopt hazard mitigation efforts in an active manner. However, limited resources will restrict mitigation efforts, especially in light of the down turn of economic conditions that took place in 2007/2008.

B.4.5 Conclusions on Local Capability

Table B.50 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 jurisdictions is 30.5, which falls into the moderate capability ranking.

TABLE B.50: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
GASTON COUNTY	45	High
Belmont	34	Moderate
Bessemer City	35	Moderate
Cherryville	32	Moderate
Cramerton	32	Moderate
Dallas	33	Moderate
Gastonia	38	Moderate
High Shoals	23	Moderate
Lowell	33	Moderate
McAdenville	22	Moderate
Mount Holly	33	Moderate
Ranlo	23	Moderate
Spencer Mountain	19	Limited
Stanley	25	Moderate

B.5 GASTON COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Gaston 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 Council 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

Gaston County developed five mitigation goals in coordination with the other participating Cleveland Gaston Lincoln Region jurisdictions. The regional mitigation goals are presented in **Table B.51**.

TABLE B.51: CLEVELAND GASTON LINCOLN REGIONAL MITIGATION GOALS

	Goal
Goal #1	Protect the health, safety, and welfare of residents and visitors.
Goal #2	Protect buildings, critical facilities, and infrastructure through cost-effective mitigation actions.
Goal #3	Increase public awareness of hazards and mitigation.
Goal #4	Enhance capabilities of local governments to reduce future impacts and improve effectiveness of mitigation actions.
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.

B.5.2 Mitigation Action Plan

The mitigation actions proposed by Gaston County, the City of Belmont, the City of Bessemer City, City of Cherryville, Twon of Cramerton, Town of Dallas, City of Gastonia, City of High Shoals, City of Lowell, Town of McAdenville, City of Mount Holly, Town of Ranlo, Town of Spencer Mountain, and Town of Stanley are listed in the following individual Mitigation Action Plans.

Gaston 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	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Emergency Management, Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Public Works	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	Planning & Development Services	Local	2014, Completed	Completed. Mapping of critical facilities occurred during this plan update.
P-4	Require underground utilities and suggest removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Planning, Emergency Management Fire Marshall, Building Inspections	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Institute and maintain a regional communicable disease surveillance system.	All Hazards	High	Health Dept, State	Local Funding & State Funding	Completed	Active and On-Going. Communication and monitoring occurs with the NCHAN (North Carolina Health Alert Network) System. It is a state-wide surveillance system. This action will be removed from the next update.
P-6	Institute and maintain a County-wide communicable disease plan that includes a surveillance system to readily detect and isolate communicable diseases.	All Hazards	High	Health Dept, State	Local Funding & State Funding	Completed	Active and On-Going. The Preparedness Coordinator communicates and monitors the NCHAN (North Carolina Health Alert Network) System with the state. Communication to the public is thru media, social media, fax, email, and reverse 911. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Implement restrictions on animal contact to prevent disease transfer when necessary.	All Hazards	High	Health Dept, State, Animal Control	Local Funding & State Funding	This will be implemented when there is an event	For day to day operations, the County follows the state laws/rules regarding domestic pets and vaccination requirements such as rabies, bite quarantines, etc. In addition, the county has access to portable kennels should the need to open a shelter arises as a result of an evacuation of a particular area due to flooding, and domestic pets were loose and eventually captured by animal control. The pets would be housed separate from the human shelter and would be used for holding the pets until owners are reunited.
P-8	Determine Alternative Water Sources. Alternatives may include industrial sources, additional surface intakes, additional impoundments, wells, recycling, etc pending local requirements and conditions.	Drought/Heat Wave	Low	Public Works	Local Funding, Grants, as available	2017	The county is not a water provider, but collaboration with municipalities is currently viable and will be implemented. Some alternatives have been identified over the past 5 years, but more will need to be identified going forward.
P-9	Identify programs to provide financial and physical assistance to citizens who experience dry wells for both residential and animal locations.	Drought/Heat Wave	Low	Grants	Local Funding, Grants, as available	Start at Adoption of this plan; complete by 2019	Pending, the governing board would likely pursue grant opportunities during severe drought period to aid citizens in the rural areas.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-10	Update countywide land use plan.	Drought/Heat Wave	Medium	Planning, County Commission	Local Funding	Comp Plan in place, Future update year is uncertain but aim is for 2018	Discussions and strategic planning for a future update is active and on-going pending funding staff resources and political will. Last update of comp plan was in 2002.
P-11	Implement County-wide water system.	Drought/Heat Wave	Low	Gaston County Commission	Local Funding, Grants, as available	2019	Gaston County has created a Water & Sewer District for the un-incorporated areas of the County (1999), however, no construction has taken place to date. This will continue to be a goal.
P-12	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Codes, Municipalities	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-14	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Fire Marshall, Municipalities	Local Funding, as available	Review and update annually	Reviewed and updated participation in State and County Mutual Aid agreements. These agreements will be re-evaluated and updated regularly..
P-15	Establish elevation markers, (flood levels markers) along bridges and other structures to indicate the rise of water levels along creeks and rivers in potential flood prone areas.	Flood	Medium	Emergency Management, DOT	Local Funding, State, Grants ,as available	Pending DOT & Funding, maybe 2018	Attempting to work with DOT on allowing County Building Inspections to enforce state building code within flood hazard areas based upon state building code. Will then seek funding to complete addition of elevation markers. Over the past 5 years, this has not been implemented.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Codes	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-17	Ensure communications with operators of major dams (Duke Power).	Dam Failure	High	Emergency Management, Communications	Local Funding, Grants	Completed	Plan is in place with Duke Energy's Dam Operators to make contact if and when certain conditions are detected. This would be thru the 704-866-3300 land line to our County's 911 Center. This action will be removed from the next update.
P-18	Identify areas of closed or abandon mines or other sites where sinkholes are possible.	Earthquake, Landslide, Sinkhole	Medium	Planning/Land Records	Local Funding	2019	Aware of seven (7) mines in County per NCDENR and assessing data from US Mining. Will look for more as time/funding allow.
P-19	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Medium	Planning/Land Records	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-20	Strengthen building codes so structures are "survivable". 'Safe Rooms may be included.	Tornado, Thunderstorm	Low	Emergency Management, Codes, Inspections	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-21	Require underground utilities for new subdivision construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Planning, Codes, Building Inspections	Local Funding	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-22	Emergency Management (EM) will coordinate the collection of storm damage assessment data in GIS format for each natural hazard event, which causes death, injury and or property damage. Data will be stored within the County's GIS system, allowing multiple access and retrieval. RSDE and other software to be used.	All Hazards	High	Emergency Management, Planning, Tax	Local Funding	2017	A Damage Assessment plan is in place in the County to access if and when needed. EM and GIS have worked together on several events over the past 5 years to collect damage assessment data and map it.
P-23	County to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding and other Disasters	High	Planning	Local Funding	2015	Active and on-going. Community Participant in NFIP, and annual participant in Community Rating System (CRS), which is not mandated, but voluntary. Local information is provided through brochures in the County Administrative Building, and a flood section of information is found on the County Website. The county will annually participate in CRS visits and reviews of the program to improve it.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-24	Determine locations and post signage defining inundation limits resulting from failure of Cowan's Ford Dam and /or Mountain Island Lake Dam.	Flooding Due to Dam Failure	High	Emergency Management w/ Belmont & Mount Holly	Local Funding, Grants as available	Completed	GIS maps are in hand to show these areas and are shared with Mt. Holly and Belmont. Install of signage will be pending funding and other cities will.
Natural Resource Protection							
NRP-1	Enforce forestry laws, regulations and programs.	Wildfire	Medium	County Forester	Local Funding	Completed	Pending funding, staff resources and political will. All forestry laws have been enforced over the past 5 years. This action will be removed in the next update
NRP-2	Continue to sample and study potentially contaminated areas.	All Hazards	Medium	Health Dept.	Local Funding as available	Completed	On-going monitoring from State Level-DWQ-Public Water Supply Branch. Samples conducted regularly and reported to locals. Sites prioritized for potential state funding. This action will be removed in the next update
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	EM	Private	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Assist in construct of additional interconnects and extensions to facilitate water interchange between municipal systems as needed.	Drought/Heat Wave	Medium	Public Works, Municipalities	Local Funding, Grants, as available	2017	From time to time will assist financially and technically with interconnects and with elevated storage tanks. Over the past 5 years, this has not happened very frequently, but has occurred on occasion. The county will continue to try to identify additional areas for interconnects or extensions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Emergency Management	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Emergency Management	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-3	Educate citizens to maintain 72-hour self-preservation capabilities. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze, Hurricane	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-4	Educate citizens as to dangers of cold and to properly maintain and vent heating systems. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-5	Educate public as to potential risks of ground water contamination. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	Medium	Health Public Information Officer, Health Dept., Natural Resources, Cooperative Extension, COG	Local Funding as Available	2015 with Annual review and update	Pending funding. Hand delivery of notice(s) occurs, use of the media, use of the Government Access Channel partner with Public Information Officer, and other appropriate agencies when required. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Educate the general public as to the potential for dam failure and flash flooding. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Flood, Dam Failure	Low	Emergency Management	Local Funding as Available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-7	Educate the public as to health hazards and risks associated with extreme heat. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Drought/Heat Wave	High	Emergency Management	Local Funding as Available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-8	Notify all property owners having construction in the 100-year flood zone of the benefits of flood insurance. Will require mass mailing to all property owners within flood hazard areas.	Flood	Low	Planning	Local Funding or grants as available	2017	Pending funding. Advisement to insurance occurs during permit phase. Provisions are not in place to conduct mass mailings pertaining to flood hazard areas. Will look for funding in the future to carry out mass mailings. Combine with other PEA actions in next update.
PEA-9	Educate Citizens as to potential for an Earthquake and Educate citizens to maintain 72-hour self-preservation capabilities. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Earthquake	High	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-10	Educate public to the potential need to reduce electrical consumption, to avoid brown outs and black outs in time of extreme heat and/or drought. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Drought/Heat Wave	High	Emergency Management	Local Funding as available, partnership with Electric Companies possible	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-11	Encourage Best Land use Practices. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Erosion	Medium	Natural Resources, Development Services	Local Funding as available	2015 with Annual review and update	Pending funding. Including outreach to schools, conduct annual training workshops, and provide other public information. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-12	Encourage removal of trees that would down power lines in the event of High Winds and or Snow & Ice. Education can take form of Public Service Messages on government Access TV Channel, Posters and Fliers.	Winter Storm and Freeze, Tornado	High	Emergency Management, Fire Marshall, Development Services	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-13	Educate residents downstream of dams, of potential situations that could result in harm to them. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Dam Failure	Medium	Emergency Management	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-14	Develop and promulgate public education initiatives for prevention and transfer of diseases such as rabies prevention, flue, west Nile Virus, and other naturally occurring biological health hazards including pandemics. Education can take form of Public Service on Government Access TV Channel, Posters and Fliers.	Biological	High	Public Information Officer, Health Dept.	Local Funding as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-15	Notifications about Flood Hazards, Flood Insurance and flood protection to residents in Special Flood Hazard Areas.	Flood	Low to Medium	Planning	Local Funding, Grants as available	2017	Active and on-going. Community Participant in NFIP, and annual participant in Community Rating System (CRS), which is not mandated, but voluntary. Local information is provided through brochures in the County Administrative Office, and a section designated to flood information is found on the County Website. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.
PEA-16	Enhance the ability of government to notify citizens by phone within a given geographic area with the use of the Reverse 911 call system, by allowing residents to input their telephone number (land line or cell) and location into the system to help ensure that they can be notified of a local emergency or hazard. This is an enhancement of the current City Watch System used by the County.	All	Low to Medium	Emergency Management	Local Funding, Grants if available	2017	Local funding to support a reverse call system has been lost. Until funding is once again obtained we use emergency vehicles with PA to alert as can. These materials will be reviewed and updated annually going forward. Combine with other PEA actions in next update.

City of Belmont Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Belmont	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Belmont	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Belmont	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Belmont	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flooding	High	Codes, Belmont	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Belmont	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-9	Require underground utilities for new construction.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	Gaston County Planning, Codes and Building Inspections, Belmont	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-10	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Belmont	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.
P-11	Belmont to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding	High	Belmont Planning Dept.	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Strengthen Flood Damage Prevention Ordinance to include unstudied streams, CLOMR requirements and other measures to mitigate flood damages.	Flooding	Medium	Belmont Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
P-13	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Planning, Belmont	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Combine with P-9 in next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Belmont City Council	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Belmont	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Belmont	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate. This action will be removed in the next update
Structural Projects							
S-1	Reinforce and strengthen City's raw water intake facility and structure(s) in/at the Catawba River.	Flood, Hurricane	High	Belmont Public Works	Local, State, Federal Funding and/ or Grants, as available	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Belmont	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Belmont Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Belmont Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Bessemer 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	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major city buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
P-3	Maintain inventory of water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Bessemer City	Local Funding as available	2017	Pending funding and staff time. These have not been inventoried over the past 5 years.
P-4	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Bessemer City	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Continue to enforce uniform water use restriction ordinances and criteria when to enact these.	Drought/Heat Wave	Medium	Bessemer City	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-6	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Bessemer City	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-7	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Bessemer City	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-9	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Bessemer City	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-10	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-11	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Bessemer City	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-12	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Bessemer City	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-13	Bessemer City to participate in FEMA's Community Rating System (CRS) in order to continue mitigation strategies and to reduce Flood Insurance Rates for residents within National Flood Insurance Program (NFIP) guidelines.	Flooding	High	Bessemer City Planning Dept.	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-14	Enhance Flood Damage Prevention Regulations to better control development in flood prone areas. Such to include unstudied streams, CLOMR requirements. Also review potential of future conditions FIRMs in future updates.	Flooding	Medium	Bessemer City Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Bessemer City	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Bessemer City	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Maintain interconnects to facilitate water interchange between municipal systems.	Drought/Heat Wave	Medium	Gaston County Public Works, Bessemer City	Local Funding	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Bessemer City	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Bessemer City Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Bessemer City Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Cherryville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Emergency Management, Code Enforcement,	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Maintain water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Public Works, City of Cherryville	Local Funding and/ or Grants, as available	2018	Interchange water connection previously established with Lincoln County Complete and studying agreements with other local municipalities to determine if additional interconnects are possible.
P-3	Maintain Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Emergency Management, City of Cherryville	Local Funding as available	Completed	Critical facilities have generators including one at the Cherryville FD (Emergency Operations Center) capable of supplying the entire primary fire district. This action will be removed in the next update.
P-4	To trim tree limbs and keep water, sewer, and electrical rights of ways clear and free from obstructions.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	City of Cherryville	Local Funding, Grants, as available	Completed	City Public Works continually monitors. The City also has contracted services for regular tree trimming for electrical lines. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Enforce uniform water use restriction ordinances and criteria when to enact these. Create a drought committee to monitor conditions as needed.	Drought/Heat Wave	Medium	City of Cherryville	Local Funding	Completed	City has an ordinance in place for water restriction use. A committee including City Manager, Public Works Director, Water Dept. Superintendent, and Fire Chief. This ordinance has been enforced over the past 5 years and is constantly evaluated for necessary updates. This action will be removed in the next update.
P-6	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Codes, City of Cherryville	Local Funding, Grants, as available	Completed	On-going through the City Planning and Zoning Director and Fire Marshal. This action will be removed from the next update.
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Emergency Management, Fire Chief, City of Cherryville	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-8	Train city employees to the proper level of training to comply with the National Incident Management System (NIMS).	All Hazards	High	City of Cherryville	Local Funding	Completed	Appropriate City employees are trained through the Fire Dept. in compliance with NIMS.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-9	Develop partnerships with Gaston County Emergency Management, State Emergency Management and FEMA as well as other local organizations to promote disaster mitigation and preparedness strategies.	All Hazards	High	Emergency Management, City of Cherryville	Local Funding and Grants	Completed	Continue to foster relationships with the county, state, and federal organizations with the Fire Dept. being the lead agency. Over the past 5 years, the city has coordinated with county, state, and federal partners on a number of projects. This action will be removed from the next update.
P-10	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Codes, Cherryville	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-11	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Emergency Management, Cherryville	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Emergency Management, Cherryville	Local Funding, Grants, as available	Completed	The Fire Dept. has identified locations that will be open during times of Tornado Watches with the Fire Dept. and First Baptist Church Community Outreach Center. This action will be removed in the next update.
P-13	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Emergency Management, Belmont	Local Funding, Grants, as available	Completed	The Fire Dept. and Public Works have identified a personnel pool with four wheel drive capability for ice/snow events. This action will be removed in the next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	All Hazards	Medium	EM	City of Cherryville	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Public Works, Cherryville	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Fire Chief	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-5	Equip new fire facility with an emergency operations center for emergencies within the City of Cherryville jurisdiction.	All Hazards	High	City of Cherryville	Local Funding	Completed	The Fire Dept. is already equipped and serves as the emergency operations center for the City. This action will be removed in the next update
Structural Projects							
S-1	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Cherryville	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City of Cherryville Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City of Cherryville Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-3	Establish a relationship with local radio stations to distribute public information messages regarding preparedness and mitigation and to provide "official" emergency information.	All Weather Related Hazards	High	City of Cherryville Fire Dept	Local Funding, Grants	Completed	The Fire Dept. has previously developed relationships with local radio stations to distribute "official" emergency information and will continue to maintain these relationships. This action will be removed in the next update

Town of Cramerton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Cramerton	Local Funding as available	2015, Annual review and update	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but there will always be a need to re-evaluate and monitor.
P-2	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	2015, annually	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
P-3	Determine Alternative Water Sources. Alternatives may include industrial sources, additional surface intakes, additional impoundments, wells, recycling, etc pending local requirements and conditions.	Drought/Heat Wave	Low	Gaston County Public Works, Cramerton	Local Funding, Grants, as available	2017	Not a water provider, but collaboration with municipalities is currently viable. Some alternatives have been identified over the past 5 years, but more will need to be identified going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Develop uniform water use restriction ordinances and criteria when to enact these.	Drought/Heat Wave	Medium	Gaston County Planning, Cramerton	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Cramerton	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Cramerton	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-8	Provide alternative sheltering locations that open during times of Tornado Watches.	Tornado	Medium	Gaston County Emergency Management, Cramerton	Local Funding, Grants, as available	Deleted	Gaston County deleted this action in the 2010 plan. They stated that shelter locations have been identified and locations completed.
P-9	Enhance Flood Damage Prevention Regulations to better control development in flood prone areas. Such to include unstudied streams, CLOMR requirements. Also review potential of future conditions FIRMs in future updates.	Flood	Medium	Gaston County Planning Dept.	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Cramerton	Local Funding and/ or Grants, as available	2017	Pending funding, staff resources and political will. Limited backup power is available at several of the major county buildings particularly at the emergency response departments. No additional connections have been added over the past 5 years.
ES-3	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Cramerton	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Maintenance of water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Gaston County Public Works, Cramerton	Local Funding and/ or Grants, as available	Deleted	Action deleted – too dependent on funding.
S-2	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Cramerton	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Cramerton Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Cramerton Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Dallas Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	Dallas	Local Funding as available	2017	Pending funding and staff time. These have not been inventoried over the past 5 years.
P-3	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Dallas	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Dallas	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-5	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-6	Actively participate in mutual aid programs to strengthen suppression capabilities.	Fire	High	Gaston County Emergency Management, Fire Marshal, Dallas	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly..

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Dallas	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-8	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-9	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Dallas	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-10	Continue to require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Dallas	Local Funding, Grants, as available	Completed	Pending funding, staff resources and political will. Underground utilities have been required over the past 5 years, and have been implemented in cases of new construction. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Enhance Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Gaston County Planning	N/A	2019	Pending funding, staff resources and political will. During site plan review these items are suggested, but the ordinance has not been enforced over the past 5 years.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	N/A	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Dallas, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane, Winter Storm and Freeze, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Fire Marshall	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
ES-4	Identify a cadre of persons with 4 wheel drive vehicles that are willing to provide transportation services during ice/snow events.	Winter Storm and Freeze	Low	Gaston County Emergency Management, Dallas	Local Funding, Grants, as available	Deleted	Strategy deleted due to Command & control and insurance considerations. Current Emergency Vehicles should be adequate.
Structural Projects							
S-1	Implement a program to seal and vent sewer system components, i.e., manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Dallas	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional projects.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Dallas Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Dallas Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Gastonia Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Implement existing Water Restriction Ordinance, when warranted.	Drought/Heat Wave	Low	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Emergency Water Conservation Regulations are part of the City Utility Ordinance and are implemented when a water shortage is declared. These regulations have been updated regularly throughout the past 5 years and will continue to be updated going forward. This action will be removed in the next update.
P-2	Implement "Maximizing Raw Water Availability" Improvement Program.	Drought/Heat Wave	Low	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Pending funding, staff resources and political will. The MRWA program was implemented over the past 5 years and will continue to be implemented going forward. This action will be removed in the next update.
P-3	Member of the Catawba-Wateree Drought Management Group which coordinates drought response among municipalities.	Drought/Heat Wave	Medium	COG – Utility Dept.	Local Funding	2015, At least annual meetings	Continues to participate as a member. The group met several times over the past 5 years to discuss coordinated drought response.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to maintain an up-to date snow removal plan; install GPS units in PWU vehicles used for disaster management.	Winter Storm and Freeze,	High	COG – Public Works Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The existing plan is maintained and kept up to date. GPS units are installed as funding allows. The plan has been updated several times over the past 5 years. This action will be removed in the next update.
P-5	Continue to implement tree trimming policies around City owned power lines. Increase the number of tree trimming crews.	Winter Storm and Freeze, Hurricane, Tornado	Medium	COG – Electrical Dept, Code Enforcement & Public Works	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Tree trimming policies are implemented and the number of tree trimming crews are increased as funding allows. Tree trimming crews over the past 5 years have been added when needed, but generally remained constant. This action will be removed in the next update.
P-6	Discourage the planting of canopy trees where they may grow into power lines; Implement project "Evergreen" encouraging plantings of under lower story trees.	Winter Storm and Freeze,	Medium	COG – Code Enforcement & Electrical	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. This project has not been implemented over the last 5 years.
P-7	Maintain partnership between the building inspectors and the City Fire Department.	Wildfire	Medium	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City building inspectors and Fire Department have an continuing partnership. Over the past 5 years, these groups have worked together and met several times to build this partnership. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-8	Continue implementation of the Flood Plain Management Plan.	Flood	High	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Review and update annually	This plan has been reviewed and updated on an annual basis. Will continue to implement and update the Floodplain Management Plan as necessary.
P-9	Continue to identify areas within the flood zone, and/or who have had repetitive damage due to flooding, and develop mitigation strategies on a case-by-case basis.	Flood	Medium	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding, staff resources and political will. Many areas have been identified that are prone to flooding over the past 5 years. This will continue to be evaluated and updated as more information become available and maps are updated
P-10	Pursue funding to implement mitigation strategies in identified vulnerable areas.	Flood	Medium	COG – Public Works and Utilities Engineering, & Planning	Local Funding and/or Grants, Relief Funds, etc. as available	Annually as funding is available in conjunction with NCEM	To be completed in the future pending funding, staff resources and political will. Areas have been identified, but in the past 5 years, no mitigation grant funding was awarded.
P-11	Continue with Clean Sweep program for streams within the City.	Flood	Medium	COG – Keep Gastonia Beautiful & Zoning	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Big Sweep national waterway cleanup takes place on the first Saturday in October and has for the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Continue to enforce the Flood Management Ordinance.	Flood	High	COG – Public Works and Utilities Zoning, Engineering, & Planning	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administrator is responsible for enforcing the Flood Management Ordinance and has enforced it over the past 5 years. This action will be removed in the next update.
P-13	Continue to implement and enforce the Stormwater Management Plan.	Flood	High	COG – Public Works and Utilities & Engineering	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City maintains its Stormwater Drainage Improvement Policy and has enforced it over the past 5 years. This action will be removed in the next update.
P-14	Continue to enforce stormwater detention requirements.	Flood	High	COG – Planning, Engineering, & Public Works and Utilities	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Stormwater detention requirements are included in the UDO General Provisions which have been enforced over the past 5 years. This action will be removed in the next update.
P-15	Continue to enforce planning and zoning ordinances.	Hurricane, Tornado	High	COG –Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The Unified Development Administrator is responsible for administration and enforcement of the UDO. The Administrator has enforced this ordinance over the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-16	Continue to enforce water impoundment ordinance.	Dam Failure	Medium	COG –Public Works and Utilities; Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Stormwater detention requirements are included in the UDO General Provisions. These have been enforced over the past 5 years. This action will be removed in the next update.
Property Protection							
PP-1	Continue to enforce the NC building, housing, and fire codes.	Wildfire	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	City Building Permits and Inspections enforces building codes, the Code Enforcement Division of Development Services enforces minimum housing standards, and the Bureau of Fire Prevention in the City Fire Department enforces the fire code. These codes have been enforced over the past 5 years. This action will be removed in the next update.
PP-2	Encourage fire suppression systems.	Wildfire	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2018	To be completed in the future pending funding, staff resources and political will. During the past 5 years, outreach efforts have been implemented to encourage fire suppression systems, but more efforts will need to be made to include these in buildings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Continue to enforce NC State building and Minimum Housing codes.	Flood, Hurricane, Tornado, Earthquake, Sinkhole, Landslide	High	COG - Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	City Building Permits and Inspections enforces building codes, the Code Enforcement Division of Development Services enforces minimum housing standards. These codes have all been enforced over the past 5 years. This action will be removed in the next update.
PP-4	Continue to inspect buildings and implement the Flood Damage Prevention Ordinance.	Flood	High	COG - Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The designated Floodplain Administrator is responsible for enforcing the Flood Damage Prevention Ordinance. The FDPO has been implemented and enforced over the past 5 years. This action will be removed in the next update.
Natural Resource Protection							
NRP-1	Implement the EPA Phase II Stormwater regulation as applicable	Flood	High	COG – Engineering, & Public Works	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	The City maintains its Stormwater Drainage Improvement Policy and has implemented it over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Maintain the City's Emergency Operations Plan, including creating and maintaining emergency equipment lists and contacts.	All Hazards	High	COG – Each Dept. and is compiled to a central list by the Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Annual update and review required	To be completed at the next update of the Emergency Operations Plan – contingent on funding. The plan has been updated regularly over the past 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Install SCADA System in City Electric Department for power outage response coordination.	Winter Storm and Freeze, Tornado, Earthquake, Landslide, Sinkhole	High	COG - Electric Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding, staff resources and political will. This system was not installed in the past 5 years.
ES-3	Pursue standard connections throughout City Departments for emergency generators.	All Hazards	Medium	COG – Public Works & Utilities, Police, Fire, & Technology Services	Local Funding and/or Grants, Relief Funds, etc. as available	2018	Pending funding, staff resources and political will. Some standardization of connections has been enacted over the past 5 years, but this task still needs to be completed.
ES-4	Maintain permanent Emergency Operations Center to coordinate services during natural disasters.	Hurricane, Tornado Earthquake, Landslide, Sinkhole	High	Police Department	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be completed in the future pending funding. There is a current EOC area maintained, but a permanent area has not been established. The city will continue to look to do this in the future.
Structural Projects							
S-1	Maintain existing interconnects.	Drought/Heat Wave	High	COG – Utility Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	Completed	Pending funding, staff resources and political will. The city has maintained existing interconnects over the past 5 years. This action will be removed in the next update.
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/Heat Wave	High	COG – Utility Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2018	Pending funding, staff resources and political will. The city has added some additional interconnects over the past 5 years, but more are still needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
S-4	Encourage buried utilities where technologically and economically feasible.	Winter Storm and Freeze, Hurricane, Tornado	Low	COG – Electrical & Planning Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2019	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.
S-5	Continue to implement stream management activities, i.e., culvert/bridge management, and other applicable procedures.	Flood	High	COG – Public Works & Utilities & Zoning	Local Funding and/or Grants, Relief Funds, etc. as available	2015, Annual reviews	Pending funding. The city has managed bridge and culvert management activities over the past 5 years in several cases and will continue to do so going forward by annually performing evaluations on culverts and bridges

City of High Shoals Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Join Community Rating System (CRS) to make citizens and politicians aware of the benefits of reducing flood insurance rates by having stricter regulations and reduce damages of flooding.	Flood	Medium	High Shoals City Council	N/A	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-2	Adopt changes to County Flood Damage Regulations to mirror County's more restrictive ordinance, as per the interlocal for administration of flood damage ordinance by Gaston County.	Flood	Medium	High Shoals City Council	N/A	2018	No work has been completed on this as of 2014, but this is still a goal going forward.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	High Shoals Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	High Shoals Fire Dept.	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Kings Mountain Mitigation Action Plan

All Mitigation Actions for the City of Kings Mountain can be found in the Cleveland County portion of the Mitigation Action Plan and in the Cleveland County Annex.

City of Lowell Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Lowell	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Lowell	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and review criteria when to enact these, as needed.	Drought/Heat Wave	Medium	Lowell	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Lowell	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Lowell	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly.
P-9	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Lowell	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-10	Continue to require underground utilities for new construction.	Winter Storm and Freeze Hurricane, Thunderstorm	Medium	Gaston County Planning, Lowell	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-11	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-12	Amend current Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Gaston County Planning	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in the next update.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	Lowell, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	Provide water system interconnects to increase reliability of fire protection water supply.	Wildfire	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	2018	Continuation, on-going initiative pending funding and staff time. Water system connections to some facilities were installed over the past 5 years, but more still remain to be done.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Require underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Lowell	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Unground utilities have not been required over the past 5 years, but have been implemented in some cases.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Lowell	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City Planner	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	City Planner	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of McAdenville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, McAdenville	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, McAdenville	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Gaston County Fire Marshal, McAdenville	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly
P-6	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, McAdenville	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-8	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, McAdenville	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.
P-9	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	McAdenville	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-10	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-11	Amend current Flood Ordinance to match County Ordinance and place tighter restrictions on development within flood prone areas.	Flood	Medium	Manager	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in 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	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County Emergency Management	McAdenville, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, McAdenville	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Require underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, McAdenville	Local Funding, Grants, as available	2015, annually reviewed	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc. Unground utilities have not been required over the past 5 years, but have been implemented in some cases.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	McAdenville	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	McAdenville Police and Fire	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	McAdenville Police and Fire	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

City of Mount Holly Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Mount Holly	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Maintain monitors at the City's Mountain Island Lake water intake, in order to monitor lake and intake conditions continually. Mount Holly is responsible and the project is short term and on-going after installation. Project is low cost with potentially high benefits and is considered to have a high priority.	All Hazards	High	Police	Local Funding	Completed	Pending funding. Over the past 5 years, the city has enacted this monitoring of water intake and will continue to do so going forward. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and evaluate criteria as needed.	Drought	Medium	Mount Holly	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Mount Holly	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Mount Holly	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly.
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Mount Holly	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Mount Holly	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Mount Holly	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flood	High	Mount Holly Planning Dept.	Local Funding	2016	Pending funding, staff resources and political will. The ordinance has not been enforced over the past 5 years and will need to be re-examined to determine effectiveness.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Mount Holly, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Lowell	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update
ES-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Mount Holly	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
ES-4	With the assistance a grant from Duke Energy, install two (2) generators as emergency backup for water pumps supplying water to the City and the Town of Stanley. Project cost is High to Medium with potentially high benefits. Project is short term with a high priority.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Public Works, Mount Holly	Local Funding, Duke Energy and/ or Grants, as available	2019	Pending funding and staff resources. The project has not been completed over the past 5 years, but the town hopes to implement over the next 5 years.
ES-5	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Mount Holly	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Mount Holly	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional projects.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Ranlo Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Ranlo	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Ranlo	Local Funding as available	2015, Annual review and update	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but there will always be a need to re-evaluate and update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce uniform water use restrictions as needed and continue to evaluate criteria when to enact these regulations.	Drought	Medium	Ranlo Manager	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Ranlo	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Ranlo	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Ranlo	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Ranlo	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Ranlo	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flood	High	Ranlo Planning Dept.	Local Funding	2016	Pending funding, staff resources and political will. The ordinance has not been enforced over the past 5 years and will need to be re-examined to determine effectiveness.
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Ranlo, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Fire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Ranlo	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Ranlo	Local Funding, Grants ,as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Spencer Mountain Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Spencer Mountain	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Spencer Mountain to adopt and enforce regulatory ordinances for future growth.	All Hazards	High	Spencer Mountain Town Council	Local Funding, Grants, as available	2017	Pending funding, staff resources and political will. The town has adopted some regulatory ordinances over the past 5 years as per the county, however, more will be evaluated and potentially adopted going forward.
P-3	Amend current Flood Damage Prevention Ordinance to tighten restrictions on development in flood Prone Areas. Specifically to mirror County ordinance which is more restrictive and includes provisions for un-studied streams.	Flood	High	Spencer Mountain Town Council	N/A	Completed	City Flood Damage Prevention Ordinance includes higher standards such as 3-ft freeboard requirement and unstudied streams. This ordinance was enforced over the past 5 years. This action will be removed in the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Spencer Mountain	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
Public Education and Awareness							
PEA-1	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Town of Stanley Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failure	High	Gaston County Emergency Management, Gaston County Code Enforcement, Stanley	Local Funding	2015, Annual assessments	Pending funding, staff resources and political will. We are in contact with NC-DENR and are alerted if and when issues are identified during the inspections required from NC-DENR. Dam assessments have been carried out regularly over the past 5 years.
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Stanley	Local Funding as available	Implement directly after an event	Streets in cities are being covered by locals and DOT is called in for other highways. We do use local Fire to assist in initial clearing of roads. Over the past 5 years, roads have been cleared in advance of all storm events.
P-3	Identify programs to provide financial and physical assistance to citizens who experience dry wells for both residential and animal locations.	Drought	Low	Grants, Stanley	Local Funding, Grants, as available	Start at Adoption of this plan; complete by 2019	Pending, the governing board would likely pursue grant opportunities during severe drought period to aid citizens in the rural areas.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-4	Continue to enforce water use restriction ordinances and evaluate criteria as needed.	Drought	Medium	Stanley	Local Funding	Completed	On-going and enforced as needed pending staff resources. The uniform water use restriction has been in effect over the past 5 years and was enforced. It is being evaluated constantly for new criteria. This action will be removed in the next update.
P-5	Enforce building, zoning and minimum housing codes.	Earthquake	Low	Gaston County Codes, Stanley	Local Funding, Grants, as available	Completed	Active and on-going. Building Inspections would enforce and approve building permit based upon Seismic Requirements based upon state building code. The Planning Office would enforce and approve the local zoning permit based upon local authorization. This action will be removed from the next update.
P-6	Enforcement of Erosion & Sedimentation Ordinances.	Erosion & Sedimentation	High	Gaston County Natural Resources	Local Funding	Completed	Active and on-going for the county jurisdiction and all municipalities in addition to enforcement of Stormwater Phase II where applicable for all the municipalities, except for the portion of Kings Mountain boundary located within Gaston County, which is covered by Cleveland County in the CGL Plan. This action will be removed from the next update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Gaston County Emergency Management, Fire Marshal, Stanley	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated and updated regularly,.
P-8	Enforce zoning and building codes to prevent construction within the flood zone.	Flood	High	Gaston County Codes, Stanley	Local Funding	Completed	Active and on-going in addition to outreach/education through information provided through brochures in the County Administrative Office, and a designated flood section of information provided on the County Website. County Building Inspections would enforce state building code within flood hazard areas based upon state building code. This action will be removed from the next update.
P-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	2019	County Bldg. Inspections would require review of compaction by third party prior to construction. Will continue to look at educating inspectors.
P-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Stanley	Local Funding	2019	No action has been taken on this over the past several years. This is pending political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Stanley	Local Funding, Grants, as available	2019	Underground utilities have not been required over the past 5 years, but have been implemented in some cases. Pending funding, staff resources and political will.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2019	The City continues to evaluate the feasibility of joining the CRS. There are a limited number of NFIP policy holders in the City, but that number may increase with new mapping. Therefore, this action will be retained and evaluated when new maps come out
Emergency Services							
ES-1	Institute regulations requiring long-term care facilities to provide emergency generation and self-sustainability capability on-site for at least 72 hours. May require local amendments to Building Codes, Zoning and or separate Ordinance.	Winter Storm and Freeze, Hurricane, Tornado, Hurricane, Thunderstorm	Medium	Gaston County EM	Stanley, EM	2018	Suggestions are being made to facilities but no mandated requirement as of now from State's overseers of certain facilities. Goal is to complete by 2018.
ES-2	Provide generator connections to vital facilities and inventory generators capable of supplying 25% of these facilities simultaneously.	All Hazards	High	Gaston County Public Works, Stanley	Local Funding and/ or Grants, as available	Completed	The City has numerous generators capable of supplying more than twenty five percent of vital facilities. This action will be removed in the next update

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Gaston County Emergency Management, Stanley	Local Funding as available	2017	Pending funding staff resources and political will. The inventory of pumping/sewer facilities has been started over the past 5 years, but the action has not been completed so it will continue to be pursued going forward.
ES-4	A mass, trained and equipped strong fire suppression force capable of intervening in fires during incipient stages.	Wildfire	Medium	Gaston County Emergency Management	Local Funding, Grants, as available	Completed	Over the past 5 years, the fire suppression force has undertaken additional training and improved its overall capability to reduce risk of wildfire. This action will be removed in the next update
Structural Projects							
S-1	Encourage underground utilities and removal of trees that could down power lines. Besides education, codes & planning can make such suggestions in the field during normal site inspections.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Gaston County Planning, Stanley	Local Funding, Grants, as available	2019	During site plan review these items are suggested. Though not a utility matter, the County's UDO does require that a major subdivision with more than 75 lots install two entrances, which could be critical if one access point is blocked by a downed tree or power line, etc.
S-2	Implement a program to seal and vent sewer system components, i.e. manhole covers that are located in the 100-year flood plain or other areas identified as highly probable for flooding.	Flood	Medium	Stanley	Local Funding, Grants, as available	2015, Annual evaluation	Continuation, on-going strategy. Some work has been done on this action over the past 5 years, but since sewer system components are always being added or changed, the city will continue to evaluate it for additional 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	Educate the public to take shelter and /or appropriate actions when the potential for development of high winds, tornadoes, thunderstorms, winter storms, floods, hurricanes, etc is present and watches and warnings are issued by the National Weather Service. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. PSAs are being sent out thru news media and other means such as Facebook when possible and also pamphlets are placed in certain locations as well as links to FEMA and State EM posted on our webpage. These materials will be reviewed and updated annually going forward
PEA-2	Encourage purchase and use of weather alert radios. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	All Hazards	High	Fire Dept	Local Funding, Grants, as available	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.

Annex C
Lincoln County

This annex includes jurisdiction-specific information for Lincoln County and its participating municipality. It consists of the following five subsections:

- C.1 Lincoln County Community Profile
- C.2 Lincoln County Risk Assessment
- C.3 Lincoln County Vulnerability Assessment
- C.4 Lincoln County Capability Assessment
- C.5 Lincoln County Mitigation Strategy

C.1 LINCOLN COUNTY COMMUNITY PROFILE

C.1.1 Geography and the Environment

Lincoln County is located in the southern portion of western North Carolina just northwest of Charlotte. There is one municipality, the City of Lincolnton, located in the County as well as many small unincorporated communities.

The county is situated in the foothills of the Appalachian Mountains and is named for a famous general from the American Revolutionary War. The total area of the county is 307 square miles, 8 square miles of which is water area.

From March through May, temperatures have an average high in the mid-sixties and an average low in the lower forties. Typically, the weather is milder by late April and warm in May. In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon highs reaching the upper 80s in July and August.

September through mid-November is typified by clear skies and cooler weather that alternates between warm days and cool nights. Daytime highs are usually in the 70s and 80s during September but fall to the 50s and 60s by early November. The first frost often occurs in late September and the lows are near freezing by November. During these autumn months, there are only occasional rain showers making it the driest period of the year.

C.1.2 Population and Demographics

According to the 2010 Census, Lincoln County has a population of 78,265 people. The county has seen almost 23% growth between 2000 and 2010, and the average population density is 263 people per square mile. Population counts from the US Census Bureau for 1990, 2000, and 2010 for the county and both of the participating jurisdictions are presented in **Table C.1**.

TABLE C.1: POPULATION COUNTS FOR LINCOLN COUNTY

Jurisdiction	1990 Census Population	2000 Census Population	2010 Census Population	% Change 2000-2010
Lincoln County	**50,319**	**63,780**	**78,265**	**22.7%**
City of Lincolnton	6,847	9,965	10,486	5.2%

Source: US Census Bureau

Based on the 2010 Census, the median age of residents of Lincoln County is 40.4 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 over 89 percent of the population.

TABLE C.2: DEMOGRAPHICS OF LINCOLN 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)*
Lincoln County	**89.4%**	**5.5%**	**0.3%**	**0.5%**	**0.0%**	**2.7%**	**1.6%**	**6.7%**
City of Lincolnton	76.6%	13.7%	0.3%	0.6%	0.0%	6.1%	2.8%	16.0%

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

C.1.3 Housing

According to the 2010 US Census, there are 33,641 housing units in Lincoln County, the majority of which are single family homes or mobile homes. Housing information for the county and city is presented in **Table C.3**. As shown in the table, the city has a slightly lower percentage of seasonal housing units compared to the unincorporated county.

TABLE C.3: HOUSING CHARACTERISTICS OF LINCOLN COUNTY

Jurisdiction	Housing Units (2000)	Housing Units (2010)	Seasonal Units, Percent (2010)	Median Home Value (2007-2011)
Lincoln County	**25,717**	**33,641**	**1.6%**	**$151,900**
City of Lincolnton	4,146	4,842	0.5%	$124,300

Source: US Census Bureau

C.1.4 Infrastructure

Transportation

There are several major highways that cross Lincoln County. The main route is US-321, which runs north/south through the County.

Charlotte-Douglas International Airport is the largest airport in the state and is the primary airport used by residents of Lincoln County. The airport currently offers non-stop commercial flights on nine airlines to cities around the country and the world. This airport is less than 50 miles from most areas in the

region and served over 41 million passengers in 2012, nearly doubling the number of passengers it served in 2000. A smaller airport that also serves the county is the Lincolnton-Lincoln County Regional Airport.

Utilities

Electrical power in Lincoln County is provided by two public utilities and several electricity cooperatives. Duke Energy and Energy United provide service to the county and Rutherford Electric Membership Corporation is also present in several parts of the county.

Water and sewer service is provided by many of the towns in Lincoln County as well as by Cleveland County Water which is a regional water supplier to parts of the county. Although parts of the region 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 buildings and community facilities located throughout Cleveland County. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 19 fire stations, 5 police stations, and 28 public schools located within the county.

There are 14 medical care facilities located in Lincoln County. The largest is Carolinas Medical Center, a 101-bed short term acute center located in Shelby.

Lincoln County contains numerous local parks and recreation areas, including Beatty's Ford Park, West Lincoln Park, East Lincoln Park, McBee Street Park, and Vale Recreation Park. These facilities offer recreational opportunities to area residents and many visitors each year.

C.1.5 Land Use

Lincoln County is a quickly developing county due to its proximity to the major metropolitan area of Charlotte. Although there is only one incorporated municipality located in the county, Lincolnton has grown significantly in recent years and is 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 areas.

Due to increasing development in the area, Lincoln County's land use policy has been modified in recent years to better reflect these changes. Especially important in the decision-making process has been the increased pressure for development that has resulted from the Charlotte metropolitan area's expansion. Lincoln County has faced difficult decisions when it comes to land use as the conflict between growth and preservation of the county's natural resources have been an important topic of discussion when it comes to land use planning. As the county continues to grow, land use planning will play a critical role in the county's future.

C.1.6 Employment and Industry

Lincoln County had an average annual employment of 35,460 workers in 2012. According to the NCESC, in 2011, the Manufacturing industry was again the largest employment sector with 21.8 percent of the

County's workforce. The other leading industries were Retail Trade (13.9%); Accommodation and Food Services (8.6%); and Educational Services (8.3%). The average annual median household income in Lincoln County was $50,276 from 2007 to 2011.

C.2 LINCOLN COUNTY RISK ASSESSMENT

This subsection includes hazard profiles for each of the significant hazards identified in Section 4: *Hazard Identification* as they pertain to Lincoln 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. According to the Palmer Drought Severity Index (**Figure 5.2**), Lincoln County 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 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, Lincoln County has had drought occurrences in each of the last fourteen years (2000-2012). **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 LINCOLN COUNTY

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

	Lincoln County
2000	EXTREME
2001	EXTREME
2002	EXCEPTIONAL
2003	ABNORMAL
2004	MODERATE
2005	MODERATE
2006	SEVERE
2007	EXCEPTIONAL
2008	EXCEPTIONAL
2009	SEVERE
2010	MODERATE
2011	SEVERE
2012	SEVERE

2013	MODERATE

Source: North Carolina Drought Monitor (through July 2013)

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that Lincoln 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. The entire 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 the Lincoln County. One event was reported:

August 1, 1999 – *Excessive Heat* – Maximum temperatures reached around 100 degrees Fahrenheit and extremely high humidity caused at least one case of heat stroke.

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 1952. The recorded maximum for Lincoln County can be found below in **Table C.5**.

TABLE C.5: HIGHEST RECORDED TEMPERATURE IN LINCOLN COUNTY

Location	Date	Temperature (F)
Lincolnton 4 W	7/29/1952	105
LINCOLN COUNTY MAXIMUM	--	**105**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in Lincolnton. **Table C.6** shows the average maximum temperatures from 1971 to 2000 at the Lincolnton 4 W observation station which can be used as a general comparison for the county.

TABLE C.6: AVERAGE MAXIMUM TEMPERATURE IN LINCOLNTON 4 W, LINCOLN COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	50.0	55.0	63.4	72.2	78.7	85.1	88.5	86.8	81.1	71.8	61.5	52.5

Source: State Climate Office of North Carolina

Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of Lincoln County has a probability level of possible (1 to 10 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 Lincoln 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, 115 recorded hailstorm events have affected Lincoln County since 1962.[1] **Table C.7** is a summary of the hail events in Lincoln County. **Table C.8** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in over $1.6 million (2013 dollars) in property damages, all of which were reported in the county's unincorporated area. 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 C.7: SUMMARY OF HAIL OCCURRENCES IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	36	0/0	$6,921
Unincorporated Area	79	0/0	$1,633,708
LINCOLN COUNTY TOTAL	**115**	**0/0**	**$1,640,629**

Source: National Climatic Data Center

TABLE C.8: HISTORICAL HAIL OCCURRENCES IN LINCOLN COUNTY

	Date	Magnitude	Deaths/Injuries	Property Damage*
Lincolnton				
Lincolnton	13-MAY-93	1.00 in.	0/0	$0
LINCOLNTON	16-MAR-96	1.50 in.	0/0	$0
LINCOLNTON	24-MAY-96	0.75 in.	0/0	$0
LINCOLNTON	28-JUL-97	1.50 in.	0/0	$0
LINCOLNTON	08-JAN-98	1.00 in.	0/0	$0
LINCOLNTON	03-MAR-99	0.75 in.	0/0	$0
LINCOLNTON	02-MAY-00	0.75 in.	0/0	$0
LINCOLNTON	02-MAY-00	1.75 in.	0/0	$0
LINCOLNTON	13-MAY-00	0.75 in.	0/0	$0
LINCOLNTON	10-AUG-00	1.00 in.	0/0	$0
LINCOLNTON	01-JUN-02	1.00 in.	0/0	$6,921
LINCOLNTON	03-JUL-02	0.75 in.	0/0	$0
LINCOLNTON	04-JUL-02	0.75 in.	0/0	$0
LINCOLNTON	02-MAY-03	0.75 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 Lincoln 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*
LINCOLNTON	15-MAY-03	1.75 in.	0/0	$0
LINCOLNTON	15-MAY-03	1.75 in.	0/0	$0
LINCOLNTON	16-JUL-03	0.75 in.	0/0	$0
LINCOLNTON	05-AUG-03	0.75 in.	0/0	$0
LINCOLNTON	20-MAY-05	0.75 in.	0/0	$0
LINCOLNTON	19-JUN-05	1.00 in.	0/0	$0
LINCOLNTON	14-MAY-06	0.88 in.	0/0	$0
LINCOLNTON	14-MAY-06	1.75 in.	0/0	$0
LINCOLNTON	26-MAY-06	0.88 in.	0/0	$0
LINCOLNTON	26-MAY-06	0.88 in.	0/0	$0
LINCOLNTON	10-JUN-06	0.75 in.	0/0	$0
LINCOLNTON	12-JUN-07	0.75 in.	0/0	$0
LINCOLNTON	14-JUN-07	0.75 in.	0/0	$0
LINCOLNTON	24-JUN-07	0.75 in.	0/0	$0
LINCOLNTON	11-MAY-08	2.00 in.	0/0	$0
LINCOLNTON	11-MAY-08	2.50 in.	0/0	$0
LINCOLNTON	11-MAY-08	1.00 in.	0/0	$0
LINCOLNTON	09-JUN-08	0.75 in.	0/0	$0
LINCOLNTON	22-JUN-08	0.75 in.	0/0	$0
LINCOLNTON	06-JUL-08	1.00 in.	0/0	$0
LINCOLNTON	06-JUL-08	1.00 in.	0/0	$0
LINCOLNTON	25-SEP-11	2.00 in.	0/0	$0
Unincorporated Area				
LINCOLN COUNTY	17-MAY-62	1.75 in.	0/0	$0
LINCOLN COUNTY	16-MAY-63	2.00 in.	0/0	$0
LINCOLN COUNTY	21-AUG-79	1.00 in.	0/0	$0
LINCOLN COUNTY	16-JUN-80	1.75 in.	0/0	$0
LINCOLN COUNTY	01-AUG-80	0.75 in.	0/0	$0
LINCOLN COUNTY	06-MAY-84	0.75 in.	0/0	$0
LINCOLN COUNTY	15-MAY-85	0.75 in.	0/0	$0
LINCOLN COUNTY	05-JUN-85	0.75 in.	0/0	$0
LINCOLN COUNTY	06-JUN-85	1.75 in.	0/0	$0
LINCOLN COUNTY	07-JUN-85	0.75 in.	0/0	$0
LINCOLN COUNTY	07-JUN-85	0.75 in.	0/0	$0
LINCOLN COUNTY	06-AUG-86	0.75 in.	0/0	$0
LINCOLN COUNTY	24-APR-87	1.00 in.	0/0	$0
LINCOLN COUNTY	03-MAY-88	0.75 in.	0/0	$0
LINCOLN COUNTY	23-MAY-88	1.25 in.	0/0	$0
LINCOLN COUNTY	27-APR-89	1.75 in.	0/0	$0
LINCOLN COUNTY	01-APR-90	0.75 in.	0/0	$0
LINCOLN COUNTY	21-MAY-90	0.75 in.	0/0	$0
LINCOLN COUNTY	08-JUN-90	1.00 in.	0/0	$0
LINCOLN COUNTY	08-SEP-90	0.75 in.	0/0	$0
Boger City	31-MAR-93	0.75 in.	0/0	$0
LINCOLN COUNTY	04-MAY-93	0.75 in.	0/0	$0
Western	13-MAY-93	1.00 in.	0/0	$0
Iron Station	13-MAY-93	0.75 in.	0/0	$0

	Date	Magnitude	Deaths/Injuries	Property Damage*
Crouse	11-MAY-95	0.75 in.	0/0	$0
DENVER	16-MAR-96	0.75 in.	0/0	$0
BOGER CITY	24-MAY-96	1.75 in.	0/0	$0
VALE	24-MAY-96	1.00 in.	0/0	$1,609,110
BOGER CITY	16-APR-98	1.00 in.	0/0	$0
BOGER CITY	03-JUN-98	1.75 in.	0/0	$0
DENVER	03-JUN-98	1.75 in.	0/0	$0
LOWESVILLE	03-JUN-98	1.00 in.	0/0	$0
DENVER	02-MAY-00	0.75 in.	0/0	$0
REEPSVILLE	26-AUG-00	0.75 in.	0/0	$0
BOGER CITY	01-JUN-02	1.00 in.	0/0	$0
TOLUCA	29-APR-03	1.50 in.	0/0	$0
TOLUCA	02-MAY-03	0.75 in.	0/0	$0
DENVER	02-MAY-03	0.75 in.	0/0	$0
VALE	10-MAY-05	0.75 in.	0/0	$0
TOLUCA	03-APR-06	0.88 in.	0/0	$0
VALE	14-MAY-06	1.75 in.	0/0	$0
DENVER	14-MAY-06	1.75 in.	0/0	$24,597
CROUSE	26-MAY-06	1.00 in.	0/0	$0
CROUSE	26-MAY-06	1.00 in.	0/0	$0
CROUSE	26-MAY-06	1.00 in.	0/0	$0
IRON STATION	10-JUN-06	0.88 in.	0/0	$0
DENVER	12-MAY-07	1.00 in.	0/0	$0
DENVER	12-JUN-07	1.00 in.	0/0	$0
IRON STATION	12-JUN-07	1.00 in.	0/0	$0
VALE	09-JUL-07	0.75 in.	0/0	$0
BOGER CITY	27-JUL-07	1.00 in.	0/0	$0
PUMPKIN CENTER	19-APR-08	0.75 in.	0/0	$0
DENVER	09-MAY-08	0.88 in.	0/0	$0
VALE	11-MAY-08	1.75 in.	0/0	$0
BOGER CITY	11-MAY-08	1.75 in.	0/0	$0
PUMPKIN CENTER	11-MAY-08	1.75 in.	0/0	$0
PUMPKIN CENTER	05-JUL-08	2.00 in.	0/0	$0
IRON STATION	08-JUL-08	0.75 in.	0/0	$0
PUMPKIN CENTER	09-MAY-09	0.75 in.	0/0	$0
DENVER	13-JUL-10	1.00 in.	0/0	$0
REEPSVILLE	05-APR-11	1.00 in.	0/0	$0
DENVER LITTLE MTN AR	05-JUN-11	1.00 in.	0/0	$0
ELAY	05-JUN-11	0.88 in.	0/0	$0
ELAY	09-JUN-11	0.75 in.	0/0	$0
CAT SQUARE	09-JUN-11	1.00 in.	0/0	$0
ELAY	09-JUN-11	1.00 in.	0/0	$0
CROUSE	21-JUN-11	0.88 in.	0/0	$0
LINCOLNTON LNCLN ARP	24-MAR-12	1.00 in.	0/0	$0
DENVER	24-MAR-12	0.75 in.	0/0	$0

	Date	Magnitude	Deaths/Injuries	Property Damage*
LINCOLNTON LNCLN ARP	24-MAR-12	0.75 in.	0/0	$0
DENVER	24-MAR-12	1.00 in.	0/0	$0
LINCOLNTON LNCLN ARP	24-MAR-12	0.75 in.	0/0	$0
DENVER	24-MAR-12	0.75 in.	0/0	$0
ELAY	16-MAY-12	0.88 in.	0/0	$0
PUMPKIN CENTER	22-JUN-12	0.88 in.	0/0	$0
TOLUCA	22-JUN-12	1.00 in.	0/0	$0
SALEM	01-JUL-12	1.75 in.	0/0	$0
IRON STATION	05-JUL-12	0.88 in.	0/0	$0
ELAY	28-JUL-12	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 Lincoln 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 Lincoln County. The entire county is equally susceptible to hurricane and tropical storms.

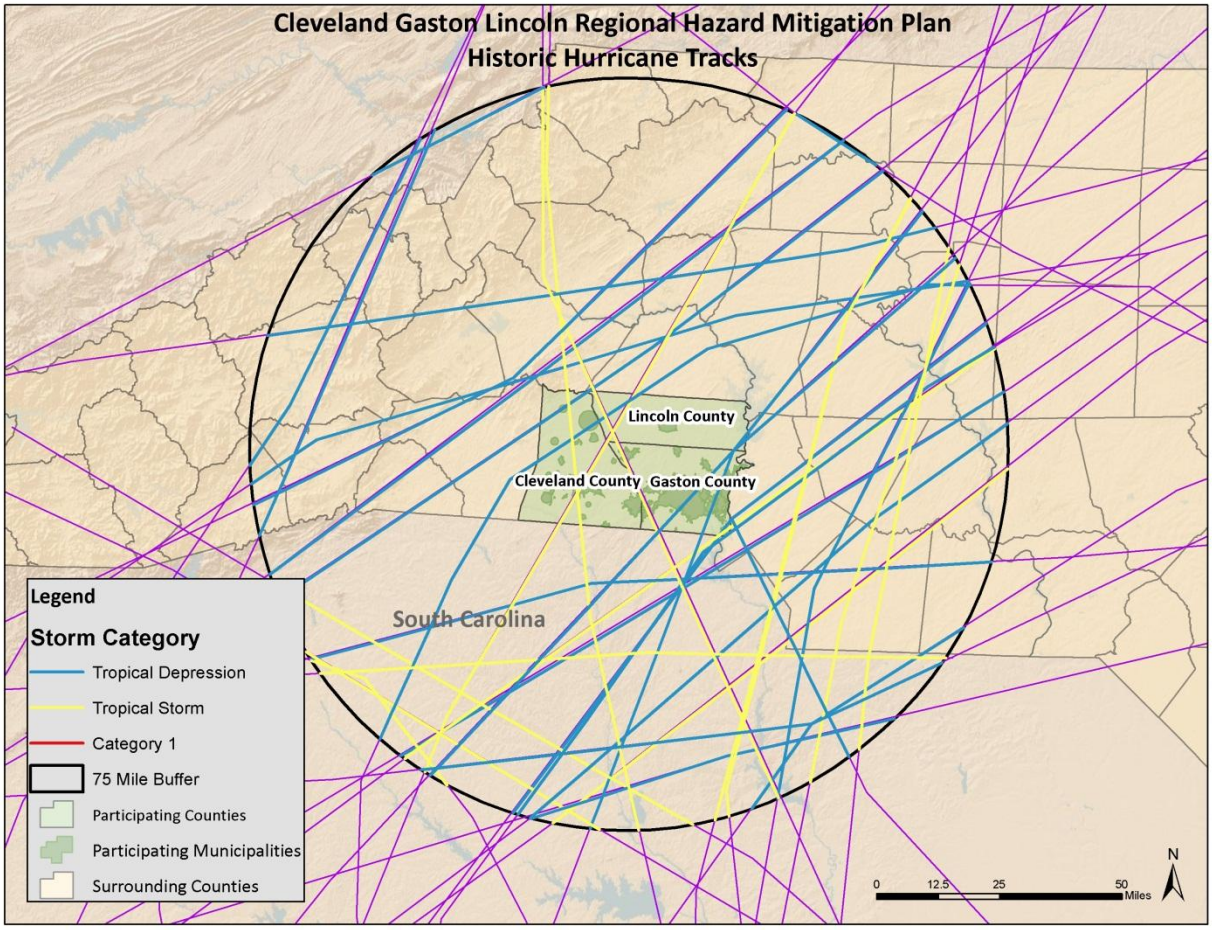
Historical Occurrences

According to the National Hurricane Center's historical storm track records, 35 hurricane or tropical storm tracks have passed within 75 miles of Lincoln County since 1850.[2] This includes thirteen tropical storms and twenty-two tropical depressions.

Of the recorded storm events, two tropical storms and three tropical depressions have traversed directly through Lincoln County as shown in **Figure C.1**. **Table C.9** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Cleveland Gaston Lincoln Region) and Category of the storm based on the Saffir-Simpson Scale.

[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.1: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF LINCOLN COUNTY



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE C.9: HISTORICAL STORM TRACKS WITHIN 75 MILES OF LINCOLN COUNTY (1850–2008)

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
9/17/1859	NOT NAMED	35	Tropical Storm
6/22/1886	NOT NAMED	31	Tropical Depression
9/24/1889	NOT NAMED	40	Tropical Storm
1891	NOT NAMED	-	Tropical Depression
7/13/1901	NOT NAMED	26	Tropical Depression
10/11/1902	NOT NAMED	31	Tropical Depression
9/18/1906	NOT NAMED	35	Tropical Storm
9/23/1907	NOT NAMED	31	Tropical Depression
8/31/1911	NOT NAMED	22	Tropical Depression
6/14/1912	NOT NAMED	31	Tropical Depression
9/4/1913	NOT NAMED	22	Tropical Depression
8/3/1915	NOT NAMED	31	Tropical Depression
7/15/1916	NOT NAMED	40	Tropical Storm
10/3/1927	NOT NAMED	31	Tropical Depression

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
8/11/1928	NOT NAMED	26	Tropical Depression
5/30/1934	NOT NAMED	22	Tropical Depression
8/18/1939	NOT NAMED	22	Tropical Depression
10/9/1946	NOT NAMED	26	Tropical Depression
8/28/1949	NOT NAMED	35	Tropical Storm
8/31/1952	NOT NAMED	40	Tropical Storm
9/30/1959	GRACIE	53	Tropical Storm
8/30/1964	CLEO	22	Tropical Depression
6/9/1968	CELESTE	22	Tropical Depression
9/8/1977	BABE	22	Tropical Depression
9/5/1979	DAVID	40	Tropical Storm
7/25/1985	ONE-C	40	Tropical Storm
8/18/1985	BOB	22	Tropical Depression
9/22/1989	HUGO	48	Tropical Storm
5/21/1990	NOT NAMED	26	Tropical Depression
7/21/1994	BERYL	13	Tropical Depression
8/17/1994	NOT NAMED	13	Tropical Depression
7/24/1997	DANNY	18	Tropical Depression
9/17/2004	IVAN	18	Tropical Depression
9/28/2004	JEANNE	18	Tropical Depression
7/7/2005	CINDY	18	Tropical Depression

Source: National Hurricane Center

The National Climatic Data Center did not report any events associated with a hurricane or tropical storm in Lincoln County between 1950 and 2011. However, federal records indicate that two disaster declarations were made in 1989 (Hurricane Hugo) and 2004 (Tropical Storm Frances) for the county.[3]

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in Lincoln County. Most events do not carry winds that are above that of the winter storms and straight line winds received by the county. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm. Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

[3] All of the participating counties were declared disaster areas for these storms particular storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

Tropical Storm Frances – September 7-8, 2004
Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across much of western North Carolina with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph in many areas and numerous trees were downed. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

Probability of Future Occurrences
Given the inland location of the county, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to Lincoln County due to induced events like flooding and landsliding. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas in the county are equally exposed to this hazard. However, when the county is impacted, the damage could be catastrophic, 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 Lincoln County is uniformly exposed to lightning.

Historical Occurrences
According to the National Climatic Data Center, there have been 18 recorded lightning events in Lincoln County since 1999, as listed in summary **Table C.10**.[4] These events resulted in over $106,000 (2013 dollars) in damages and caused 1 injury. A complete listing of those events can be found in **Table C.**11. 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.10: SUMMARY OF LIGHTNING OCCURRENCES IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	4	0/0	$40,001
Unincorporated Area	6	0/1	$66,376
LINCOLN COUNTY TOTAL	**10**	**0/1**	**$106,377**

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 Lincoln 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 C.11: HISTORIC LIGHTNING OCCURRENCES IN LINCOLN COUNTY

	Date	Deaths / Injuries	Property Damage*	Details
Lincolnton				
LINCOLNTON	31-AUG-03	0/0	$67,196	Lightning ignited a fire at a church, causing significant damage.
LINCOLNTON	09-MAY-04	0/0	$13,048	Lightning ignited fires at several homes.
LINCOLNTON	02-JUN-06	0/0	$307,468	Lightning struck a church, igniting a fire that almost completely destroyed the building and its contents.
LINCOLNTON	22-JUN-06	0/0	$12,299	
Unincorporated Area				
VALE	09-SEP-99	0/0		A line of thunderstorms crossed the foothills and piedmont during the afternoon, producing a large amount of lightning, gusty winds and hail. A few storms became severe briefly as they produced dime size hail or damaging wind. A large oak tree was downed across power lines on Sherrills Ford Road west of Salisbury. Another tree was blown down and blocked a lane on Interstate 85 near Spencer. Three trees were downed in the Mt Pleasant vicinity and one house under construction was destroyed when collapsed by the wind. A combination of lightning activity and gusty winds near 50 mph at times caused scattered power outages and trees limbs to fall. These reports came mainly from southern Cleveland county through western Lincoln county and into Catawba county.
VALE	26-JUN-02	0/0	$207,635	Lightning struck a business and ignited a fire, which destroyed the building and its contents.
DENVER	07-JUL-05	0/0	$126,677	Lightning ignited a house fire, which caused significant damage to the structure.
DENVER	13-MAY-06	0/0	$491,950	Lightning ignited a fire which caused significant damage to a vacant home.
BOGER CITY	13-JUL-10	0/1		Lightning struck and injured a man on Bethel Church Rd.

	Date	Deaths / Injuries	Property Damage*	Details
CROUSE	18-APR-12	0/0	$103,000	Lightning struck a home on Oakdale Rd, starting a fire that destroyed the structure.

*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 Lincoln 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®), Lincoln 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.

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, Lincoln County typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that Lincoln County has uniform exposure to an event and the spatial extent of an impact could be large.

Historical Occurrences

Severe storms have not resulted in any disaster declarations in Lincoln County.[5] According to NCDC, there have been 128 reported thunderstorm wind and high wind events since 1968 in Lincoln County.[6] These events caused over $800,000 (2013 dollars) in damages. There were reports of one injury. **Table C.12** summarizes this information. **Table C.13** presents detailed thunderstorm wind and high wind event reports including date, magnitude, and associated damages for each event.[7]

TABLE C.12: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	43	0/1	$240,872
Unincorporated Area	85	0/0	$570,622

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

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
LINCOLN COUNTY TOTAL	**128**	**0/1**	**$811,494**

Source: National Climatic Data Center

TABLE C.13: HISTORICAL THUNDERSTORM / HIGH WIND OCCURRENCES IN LINCOLN COUNTY

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
Lincolnton					
Lincolnton	01-SEP-95	THUNDERSTORM WINDS	64 kts.	0/0	$0
LINCOLNTON	29-MAY-96	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	18-JUL-96	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	21-FEB-97	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	28-JUL-97	TSTM WIND	50 kts.	0/1	$78,651
LINCOLNTON	10-JUN-99	TSTM WIND	60 kts.	0/0	$0
LINCOLNTON	10-JUN-99	TSTM WIND	60 kts.	0/0	$0
LINCOLNTON	02-MAY-00	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	02-MAY-00	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	13-MAY-00	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	18-AUG-00	TSTM WIND	65 kts.	0/0	$0
LINCOLNTON	18-AUG-00	TSTM WIND	60 kts.	0/0	$0
LINCOLNTON	13-MAY-02	TSTM WIND	56 kts.	0/0	$69,212
LINCOLNTON	01-JUN-02	TSTM WIND	55 kts.	0/0	$13,842
LINCOLNTON	24-AUG-02	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	02-MAY-03	TSTM WIND	50 kts.	0/0	$13,439
LINCOLNTON	31-MAY-03	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	08-JUN-03	TSTM WIND	50 kts.	0/0	$1,344
LINCOLNTON	09-JUL-03	TSTM WIND	50 kts.	0/0	$1,344
LINCOLNTON	12-JUL-03	TSTM WIND	50 kts.	0/0	$1,344
LINCOLNTON	17-AUG-03	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	19-NOV-03	TSTM WIND	50 kts.	0/0	$1,344
LINCOLNTON	09-MAY-04	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	30-JUN-04	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	17-APR-06	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	22-APR-06	TSTM WIND	55 kts.	0/0	$0
LINCOLNTON	26-MAY-06	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	26-MAY-06	TSTM WIND	50 kts.	0/0	$0
LINCOLNTON	22-JUN-06	TSTM WIND	55 kts.	0/0	$0
LINCOLNTON	01-JAN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	13-JUN-07	THUNDERSTORM WIND	60 kts.	0/0	$2,388
LINCOLNTON	24-JUN-07	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	21-AUG-07	THUNDERSTORM WIND	55 kts.	0/0	$0
LINCOLNTON	22-JUN-08	THUNDERSTORM WIND	45 kts.	0/0	$57,964
LINCOLNTON	28-JUN-08	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	29-JUN-08	THUNDERSTORM WIND	40 kts.	0/0	$0
LINCOLNTON	09-JUL-08	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	22-JUL-08	THUNDERSTORM WIND	55 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
LINCOLNTON	09-MAY-09	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	13-JUN-10	THUNDERSTORM WIND	55 kts.	0/0	$0
LINCOLNTON	13-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	09-APR-11	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLNTON	25-SEP-11	THUNDERSTORM WIND	55 kts.	0/0	$0
Unincorporated Area					
LINCOLN COUNTY	10-AUG-56	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	22-JUL-60	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	16-MAY-63	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	21-JUN-70	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	18-FEB-76	TSTM WIND	90 kts.	0/0	$0
LINCOLN COUNTY	21-AUG-79	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	21-AUG-79	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	26-JUL-84	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	15-MAY-85	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	05-JUN-85	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	13-JUL-86	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	07-AUG-86	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	29-MAY-87	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	03-JUN-87	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	13-JUL-87	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	21-JUN-88	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	22-JUN-88	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	06-MAY-89	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	05-JUN-89	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	12-JUN-89	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	15-JUN-89	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	10-FEB-90	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	10-FEB-90	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	28-APR-90	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	13-JUL-90	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	29-APR-91	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	08-AUG-91	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	12-AUG-92	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	12-AUG-92	TSTM WIND	0 kts.	0/0	$0
LINCOLN COUNTY	22-NOV-92	TSTM WIND	0 kts.	0/0	$0
Denver	10-JUL-94	THUNDERSTORM WINDS	0 kts.	0/0	$8,523
Crouse	10-MAY-95	THUNDERSTORM WINDS	0 kts.	0/0	$0
LINCOLN COUNTY	18-JAN-96	HIGH WIND	0 kts.	0/0	$5,028
VALE	24-MAY-96	TSTM WIND	50 kts.	0/0	$1,609
LINCOLN COUNTY	24-FEB-98	HIGH WIND	50 kts.	0/0	$1,936
LINCOLN COUNTY	03-MAR-99	HIGH WIND	60 kts.	0/0	$151,259
LINCOLN COUNTY	15-SEP-99	HIGH WIND	45 kts.	0/0	$0
DENVER	02-MAY-00	TSTM WIND	50 kts.	0/0	$0
LINCOLN COUNTY	20-MAR-01	HIGH WIND	55 kts.	0/0	$67,893
TRIANGLE	01-APR-01	TSTM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*
LOWESVILLE	22-JUN-01	TSTM WIND	50 kts.	0/0	$0
LINCOLN COUNTY	04-FEB-02	HIGH WIND	50 kts.	0/0	$0
DENVER	02-MAY-03	TSTM WIND	50 kts.	0/0	$1,344
VALE	02-MAY-03	TSTM WIND	50 kts.	0/0	$4,032
LINCOLN COUNTY	07-MAR-04	HIGH WIND	65 kts.	0/0	$55,815
VALE	22-APR-06	TSTM WIND	60 kts.	0/0	$0
CROUSE	04-JUL-06	TSTM WIND	55 kts.	0/0	$0
CROUSE	07-AUG-06	TSTM WIND	50 kts.	0/0	$0
LINCOLN COUNTY	16-APR-07	HIGH WIND	60 kts.	0/0	$0
VALE	09-JUL-07	THUNDERSTORM WIND	50 kts.	0/0	$0
BOGER CITY	27-JUL-07	THUNDERSTORM WIND	60 kts.	0/0	$0
VALE	22-AUG-07	THUNDERSTORM WIND	50 kts.	0/0	$0
IRON STATION	29-AUG-07	THUNDERSTORM WIND	50 kts.	0/0	$0
LINCOLN COUNTY	10-FEB-08	HIGH WIND	55 kts.	0/0	$0
DENVER	27-JUN-08	THUNDERSTORM WIND	55 kts.	0/0	$0
PUMPKIN CENTER	05-JUL-08	THUNDERSTORM WIND	55 kts.	0/0	$0
LOWESVILLE	08-SEP-08	THUNDERSTORM WIND	50 kts.	0/0	$0
CROUSE	11-FEB-09	THUNDERSTORM WIND	50 kts.	0/0	$0
JOHNSTOWN	11-FEB-09	THUNDERSTORM WIND	50 kts.	0/0	$0
JOHNSTOWN	05-AUG-09	THUNDERSTORM WIND	50 kts.	0/0	$0
REEPSVILLE	08-APR-10	THUNDERSTORM WIND	50 kts.	0/0	$0
SALEM	15-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
CROUSE	28-JUN-10	THUNDERSTORM WIND	50 kts.	0/0	$0
DENVER	13-JUL-10	THUNDERSTORM WIND	70 kts.	0/0	$273,182
REEPSVILLE	13-JUL-10	THUNDERSTORM WIND	50 kts.	0/0	$0
REEPSVILLE	25-OCT-10	THUNDERSTORM WIND	50 kts.	0/0	$0
SINE	25-OCT-10	THUNDERSTORM WIND	50 kts.	0/0	$0
REEPSVILLE	16-NOV-10	THUNDERSTORM WIND	50 kts.	0/0	$0
ELAY	05-APR-11	THUNDERSTORM WIND	65 kts.	0/0	$0
DENVER LITTLE MTN AR	05-JUN-11	THUNDERSTORM WIND	60 kts.	0/0	$0
ELAY	09-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
JOHNSTOWN	22-JUN-11	THUNDERSTORM WIND	50 kts.	0/0	$0
BOGER CITY	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SALEM	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
BOGER CITY	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SALEM	13-JUL-11	THUNDERSTORM WIND	50 kts.	0/0	$0
HENRY	14-AUG-11	THUNDERSTORM WIND	50 kts.	0/0	$0
SALEM	25-SEP-11	THUNDERSTORM WIND	50 kts.	0/0	$0
LABORATORY	24-JUN-12	THUNDERSTORM WIND	50 kts.	0/0	$0
BOGER CITY	01-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
IRON STATION	05-JUL-12	THUNDERSTORM WIND	51 kts.	0/0	$0
SALEM	05-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
DENVER	16-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
PUMPKIN CENTER	19-JUL-12	THUNDERSTORM WIND	50 kts.	0/0	$0
IRON STATION	01-SEP-12	THUNDERSTORM WIND	50 kts.	0/0	$0

	Date	Type	Magnitude	Deaths / Injuries	Property Damage*

*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 the Lincoln 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 Lincoln County is uniformly exposed to this hazard.

Historical Occurrences

Tornadoes have resulted in two disaster declarations in Lincoln County in 1974 and 1989.[8] According to the National Climatic Data Center, there have been a total of 19 recorded tornado events in Lincoln County since 1968 (**Table C.14**), resulting in nearly $55 million (2013 dollars) in property damages.[9] In addition, 4 deaths and 30 injuries were reported (**Table C.15**). The magnitude of these tornadoes ranges from F0 to F4 in intensity, although an 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 63 years.

TABLE C.14: SUMMARY OF TORNADO OCCURRENCES IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	3	0/0	$67,196
Unincorporated Area	16	4/30	$54,420,743
LINCOLN COUNTY TOTAL	**19**	**4/30**	**$54,487,939**

Source: National Climatic Data Center

TABLE C.15: HISTORICAL TORNADO IMPACTS IN LINCOLN COUNTY

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
Lincolnton					
LINCOLNTON	16-OCT-03	F1	0/0	$67,196	This weak tornado touched down in the Arden Oaks development. Numerous trees were snapped off or uprooted and power lines were

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[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 Lincoln County. As additional local data becomes available, this hazard profile will be amended.

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					blown down. Some of the snapped trees were blown distances of up to 120 feet. A couple of homes received minor roof damage. At another home, some siding was stripped off and the garage door was blown away. Some sheet rock was torn from the roof of the garage.
LINCOLNTON	13-JUL-05	F1	0/0	$0	Tornado touched down near exit 20 off highway 321 producing mainly F0 damage, with some intermittent F1. A number of trees were snapped off and there was damage to a cornfield.
LINCOLNTON	15-NOV-06	F0	0/0	$0	An NWS survey found a short damage track near the highway 73 and highway 16 intersection consistent with a tornado.
Unincorporated Area					
LINCOLN COUNTY	12-MAR-68	F1	0/0	$181,206	
LINCOLN COUNTY	27-MAY-73	F0	0/0	$142,148	
LINCOLN COUNTY	03-AUG-74	F0	0/0	$12,811	
LINCOLN COUNTY	02-OCT-88	F0	0/0	$5,335	
LINCOLN COUNTY	05-MAY-89	F4	4/19	$50,921,206	
LINCOLN COUNTY	07-MAR-92	F1	0/0	$449,975	
VALE	07-MAY-98	F2	0/0	$328,365	The same supercell that produced the tornado in McDowell county spawned a strong tornado in the Vale and Cat Square area. Four homes were destroyed, 50 homes were damaged, a church roof was partially blown off and numerous trees were downed. Supercell thunderstorms developed in a highly sheared atmosphere in eastern Tennessee then moved east across the mountains, foothills and western piedmont of North Carolina. These long-lived, cyclic supercells produced a considerable amount of large hail and some damaging winds in the mountains. The first tornado of the day in western North Carolina occurred in Madison county. Numerous reports of hail as large as golf balls were reported from the mountains. In Madison and Yancey counties, hail covered roads. More supercell thunderstorms developed behind the previous ones and followed similar tracks. In northern Buncombe county, the town of Barnardsville had three separate severe storms cross overhead and

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					drop hail on the ground to a depth of 3 inches. Yancey county also had 3 separate storms move across the county that accumulated hail to 6 inches in depth. The hail was still on the ground the next morning. As the supercells moved into the foothills, they began to curve a little to the right, indicative of strong mesocyclonic circulations present. One supercell produced several tornadoes from Alexander county to Davie county. Another storm produced a tornado that tracked from western Caldwell county into south-central Alexander county. A third supercell that emerged out of the mountains in McDowell county produced several tornadoes from the southern part of that county to northern Mecklenburg county. Damage was fairly significant across western North Carolina with numerous homes either damaged or destroyed. Fortunately, no one was killed. However, 2 people were injured as a result of the violent F4 tornado in eastern Caldwell county. One person received minor injuries from a lightning strike in Yancey county later in the evening. The storms continued to reform in eastern Tennessee until very late in the evening and still produced large hail as they crossed the border into the mountain counties of North Carolina, before weakening shortly after midnight.
DENVER	07-MAY-98	F0	0/0	$30,978	A weak tornado developed once again from the same supercell that produced the tornado earlier near Vale. The tornado tracked east-southeast from Denver and became a waterspout as it crossed Lake Norman and moved into Mecklenburg county. Trees and power lines were downed with some falling on homes. Supercell thunderstorms developed in a highly sheared atmosphere in eastern Tennessee then moved east across the mountains, foothills and western piedmont of North Carolina. These long-lived, cyclic supercells produced a considerable amount of large hail

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					and some damaging winds in the mountains. The first tornado of the day in western North Carolina occurred in Madison county. Numerous reports of hail as large as golf balls were reported from the mountains. In Madison and Yancey counties, hail covered roads. More supercell thunderstorms developed behind the previous ones and followed similar tracks. In northern Buncombe county, the town of Barnardsville had three separate severe storms cross overhead and drop hail on the ground to a depth of 3 inches. Yancey county also had 3 separate storms move across the county that accumulated hail to 6 inches in depth. The hail was still on the ground the next morning. As the supercells moved into the foothills, they began to curve a little to the right, indicative of strong mesocyclonic circulations present. One supercell produced several tornadoes from Alexander county to Davie county. Another storm produced a tornado that tracked from western Caldwell county into south-central Alexander county. A third supercell that emerged out of the mountains in McDowell county produced several tornadoes from the southern part of that county to northern Mecklenburg county. Damage was fairly significant across western North Carolina with numerous homes either damaged or destroyed. Fortunately, no one was killed. However, 2 people were injured as a result of the violent F4 tornado in eastern Caldwell county. One person received minor injuries from a lightning strike in Yancey county later in the evening. The storms continued to reform in eastern Tennessee until very late in the evening and still produced large hail as they crossed the border into the mountain counties of North Carolina, before weakening shortly after midnight.
REEPSVILLE	15-MAY-03	F1	0/0	$67,196	This tornado destroyed a barn and caused roof damage to several houses and mobile homes. The porch

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					of a church was destroyed. Numerous trees were also blown down.
DENVER	15-NOV-06	F2	0/0		NWS survey found tornado damage path on the western shores of Lake Norman near Denver. Most of the damage was concentrated in the Lake Shore Rd and Blade Trail areas. Hundreds of trees were downed, many blocking roads, with some down on homes.
ELAY	19-APR-08	F1	0/0		EVENT NARRATIVE: This tornado mainly tracked through Cleveland County, where it did minor damage to homes and uprooted several trees. The tornado briefly tracked into extreme southwestern Lincoln County before lifting. Damage in Lincoln County was confined to fallen trees and power lines.
JOHNSTOWN	19-APR-08	F1	0/0	$150,706	A tornado damage path was surveyed west of Lincolnton from Guy Heavner Rd to Reepsville Rd. Structural damage was mainly confined to areas from Guy Heavner Rd to Howards Creek Rd, where several homes received mainly minor roof damage. A chicken house was severely damaged on Guy Heavner Rd, with an estimated 10,000 chickens destroyed. A mobile home was lifted from its foundation and destroyed on Hauss Rd. Numerous trees and power lines were also blown down along the path.
CAT SQUARE	11-MAY-08	F0	0/0		EVENT NARRATIVE: A tornado touched down briefly in an open field in the Cat Square area.
DENVER	13-JUL-10	F1	0/0	$273,182	A tornado briefly touched down near the intersection of Cindy Lane and Harmattan Dr and lifted near the intersection of Cindy Ln and Belford Ln. Numerous trees were uprooted or snapped as the tornado tracked northeast. Some trees fell on homes, causing significant damage.
KIDVILLE	13-JUL-10	F1	0/0	$546,364	A tornado path began on Wingate Hill Rd just east of the Fay Jones Rd intersection. The tornado traveled east northeast, causing intermittent damage to tree tops before affecting two subdivisions on Forney Hill Rd and Saint James Rd in Denver. Numerous trees were uprooted or

	Date	Magnitude	Deaths/ Injuries	Property Damage*	Details
					snapped off, some of which fell on homes. Some homes received minor roof damage and damage to gutters and flashing as well.
TOLUCA	26-OCT-10	F2	0/11	$1,311,272	This strong tornado touched down near the intersection of Locust Trail and Tola Houser Lane. Several homes at the beginning of the track received major damage to the roof and exterior wall. One home was shifted off its foundation by nearly 20 feet, with an upstairs room removed. Two vehicles at this location were rolled several yards. The tornado moved northeast across Northbrook III School Rd. Several homes were damaged or destroyed and numerous trees snapped off or uprooted just north of the Reeps Grove Church Rd intersection. The damage path at this point was nearly 200 yards wide. The tornado continued northeast, crossing Macedonia Church Rd, Peeler Rd and Patriot Way, with additional homes as well as barns and a chicken house damaged or destroyed. Numerous trees were uprooted or snapped off in this area as well. As the tornado continued east northeast, damage became more intermittent in the area around Palm Tree Church Rd, where only the tops of trees were snapped. The tornado entered into Catawba County in the vicinity of Dansbury Lane. Eleven people were injured, two seriously.

*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 Lincoln County experience a direct tornado strike. The probability of future tornado occurrences affecting Lincoln 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. Lincoln County is accustomed to severe winter weather conditions and frequently receives severe 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

Severe winter weather has resulted in two disaster declarations in Lincoln County. This includes snow storms in 1977 and 1993, the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002.[10] According to the National Climatic Data Center, there have been a total of 49 recorded winter storm events in Lincoln County since 1993 (**Table C.16**).[11] These events resulted in almost $16 million (2013 dollars) in damages. Detailed information on the recorded winter storm events can be found in **Table C.17**.[12]

TABLE C.16: SUMMARY OF WINTER STORM EVENTS IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincoln County	49	0/0	$15,929,196

Source: National Climatic Data Center

TABLE C.17: HISTORICAL WINTER STORM IMPACTS IN LINCOLN COUNTY

	Date	Type of Storm	Deaths / Injuries	Property Damage*
Lincolnton				
None Reported	--	--	--	--
Unincorporated Area				
Statewide	12-MAR-93	WINTER STORM	2/10†	$874,516
Northern Interior and	10-FEB-94	ICE STORM	0/0	$0
LINCOLN COUNTY	06-JAN-96	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	11-JAN-96	WINTER STORM	0/0	$0
LINCOLN COUNTY	26-JAN-96	ICE STORM	0/0	$0
LINCOLN COUNTY	02-FEB-96	ICE STORM	0/0	$2,011,388
LINCOLN COUNTY	03-FEB-96	SNOW	0/0	$0
LINCOLN COUNTY	16-FEB-96	SNOW	0/0	$0
LINCOLN COUNTY	09-JAN-97	ICE STORM	0/0	$149,811
LINCOLN COUNTY	15-JAN-97	Snow	0/0	$0

[10] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Profiles*.
[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 Lincoln 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*
LINCOLN COUNTY	13-FEB-97	WINTER STORM	0/0	$0
LINCOLN COUNTY	13-FEB-97	ICE STORM	0/0	$0
LINCOLN COUNTY	29-DEC-97	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	23-DEC-98	FREEZING RAIN/SLEET	0/0	$0
LINCOLN COUNTY	24-DEC-98	ICE STORM	0/0	$0
LINCOLN COUNTY	02-JAN-99	ICE STORM	0/0	$0
LINCOLN COUNTY	01-FEB-99	FREEZING RAIN	0/0	$0
LINCOLN COUNTY	19-FEB-99	SNOW	0/0	$0
LINCOLN COUNTY	24-FEB-99	SNOW	0/0	$0
LINCOLN COUNTY	09-MAR-99	SNOW AND SLEET	0/0	$0
LINCOLN COUNTY	18-JAN-00	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	22-JAN-00	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	24-JAN-00	SNOW	0/0	$0
LINCOLN COUNTY	29-JAN-00	FREEZING RAIN	0/0	$0
LINCOLN COUNTY	19-NOV-00	SNOW	0/0	$0
LINCOLN COUNTY	13-DEC-00	FREEZING RAIN	0/0	$0
LINCOLN COUNTY	13-DEC-00	FREEZING RAIN	0/0	$0
LINCOLN COUNTY	22-FEB-01	SNOW/SLEET	0/0	$0
LINCOLN COUNTY	17-APR-01	SNOW SHOWERS	0/0	$0
LINCOLN COUNTY	03-JAN-02	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	04-DEC-02	ICE STORM	0/0	$12,583,944
LINCOLN COUNTY	16-JAN-03	WINTER WEATHER/MIX	0/0	$0
LINCOLN COUNTY	23-JAN-03	HEAVY SNOW	0/0	$0
LINCOLN COUNTY	16-FEB-03	SLEET STORM	0/0	$0
LINCOLN COUNTY	27-FEB-03	WINTER WEATHER/MIX	0/0	$0
LINCOLN COUNTY	25-JAN-04	SLEET STORM	0/0	$0
LINCOLN COUNTY	26-FEB-04	HEAVY SNOW	0/0	$255,246
LINCOLN COUNTY	27-MAR-04	FROST/FREEZE	0/0	$0
LINCOLN COUNTY	29-JAN-05	WINTER STORM	0/0	$0
LINCOLN COUNTY	29-JAN-05	WINTER WEATHER/MIX	0/0	$0
LINCOLN COUNTY	08-DEC-05	WINTER WEATHER	0/0	$0
LINCOLN COUNTY	15-DEC-05	ICE STORM	0/0	$54,290
LINCOLN COUNTY	15-DEC-05	WINTER WEATHER	0/0	$0
LINCOLN COUNTY	16-DEC-05	FREEZING FOG	0/0	$0
LINCOLN COUNTY	20-MAR-06	WINTER WEATHER	0/0	$0
LINCOLN COUNTY	18-JAN-07	WINTER WEATHER	0/0	$0
LINCOLN COUNTY	01-FEB-07	WINTER WEATHER	0/0	$0
LINCOLN COUNTY	08-APR-07	FROST/FREEZE	0/0	$0
LINCOLN COUNTY	16-JAN-08	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 Lincoln County. The text below describes one of the major events and associated impacts on the county. Similar impacted can be expected with severe winter weather.

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

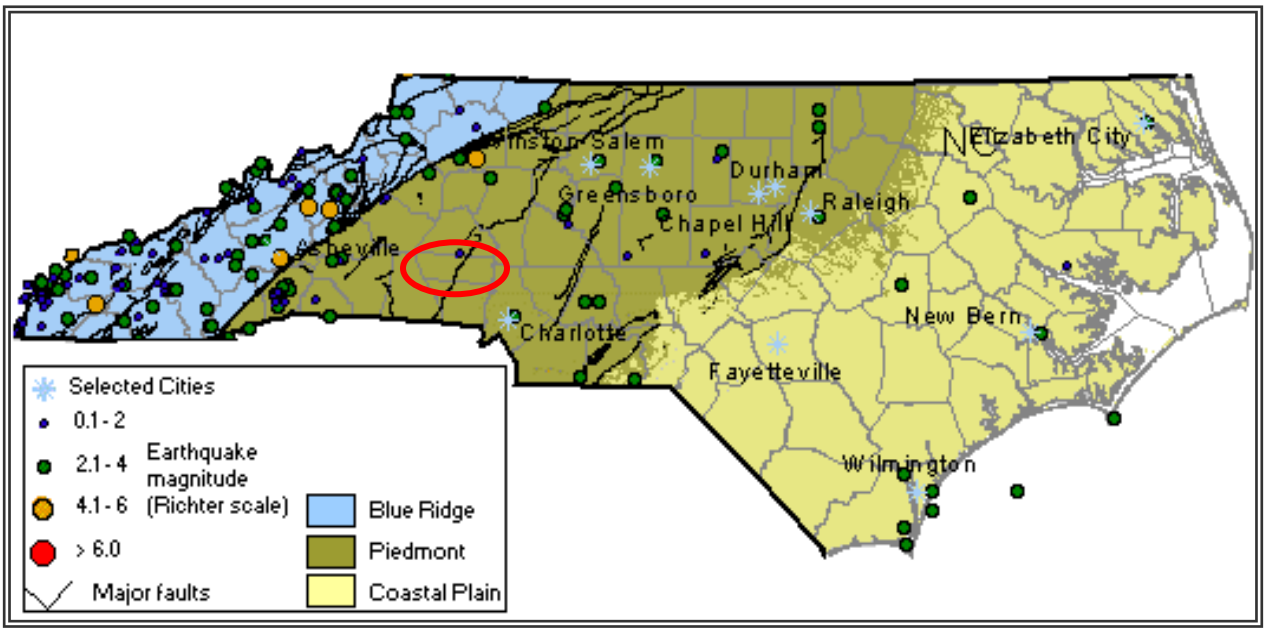
Winter storms throughout the planning area have several negative externalities including hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could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

Probability of Future Occurrences
Winter storm events will remain a regular occurrence in Lincoln County due to its location in the western part of the state. According to historical information, Lincoln County generally experiences several 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.2** is a map showing geological and seismic information for North Carolina.

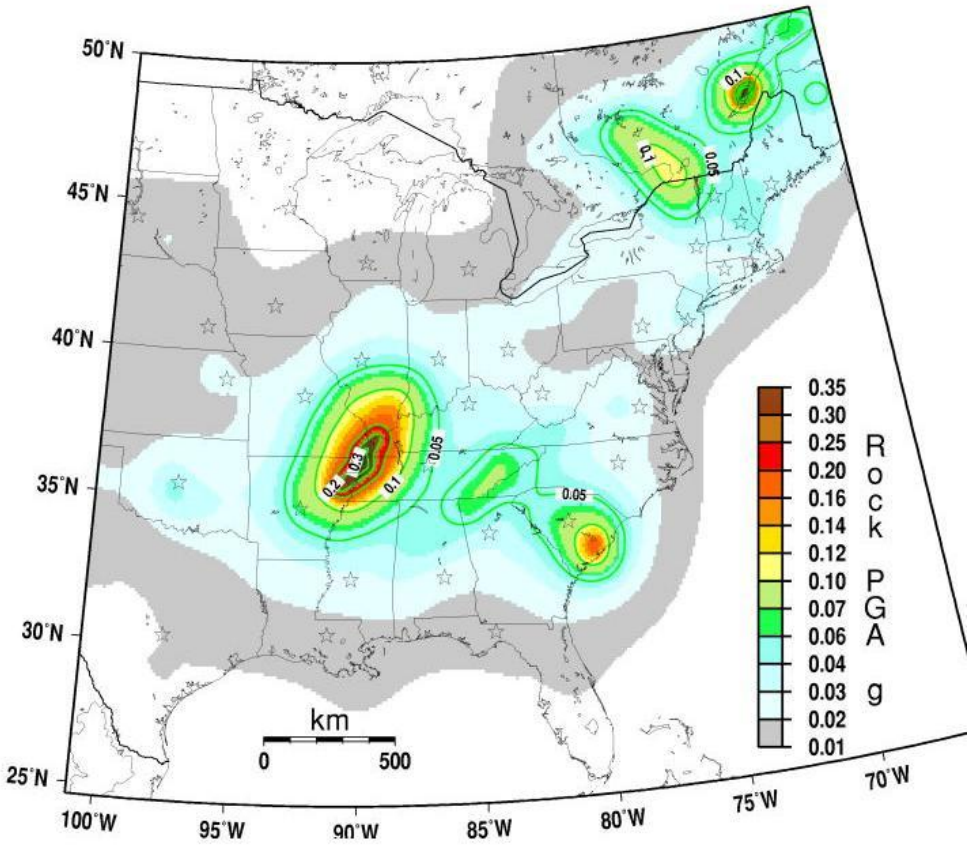
FIGURE C.2: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure C.3 shows the intensity level associated with Lincoln 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, Lincoln County lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the county exists within an area of moderate seismic risk.

FIGURE C.3: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: USGS, 2008

Historical Occurrences

At least 7 earthquakes are known to have affected Lincoln County since 1886. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table C.18** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table C.19** presents a detailed occurrence of each event including the date, distance for the epicenter, magnitude, and Modified Mercalli Intensity (if known). [13]

TABLE C.18: SUMMARY OF SEISMIC ACTIVITY IN LINCOLN COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Lincolnton	5	VI	< 5.4
Unincorporated Area	2	V	< 4.8
LINCOLN COUNTY TOTAL	**7**	**VI**	**< 5.4**

Source: National Climatic 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 C.19: SIGNIFICANT SEISMIC EVENTS IN LINCOLN COUNTY (1638 -1985)

Location	Date	Epicentral Distance	Magnitude	MMI
Lincolnton				
Lincolnton	9/1/1886	308.0 km	5	VI
Lincolnton	2/21/1916	112.0 km	4	V
Lincolnton	8/26/1916	63.0 km	2	II
Lincolnton	11/3/1928	134.0 km	4	IV
Lincolnton	5/13/1957	73.0 km	4	V
Unincorporated Area				
Denver	5/13/1957	90.0 km	4	V
Iron Station	5/13/1957		4	III

Source: National Geophysical Data Center

Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting Lincoln County is unlikely. However, it is likely 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 and 10 percent (possible).

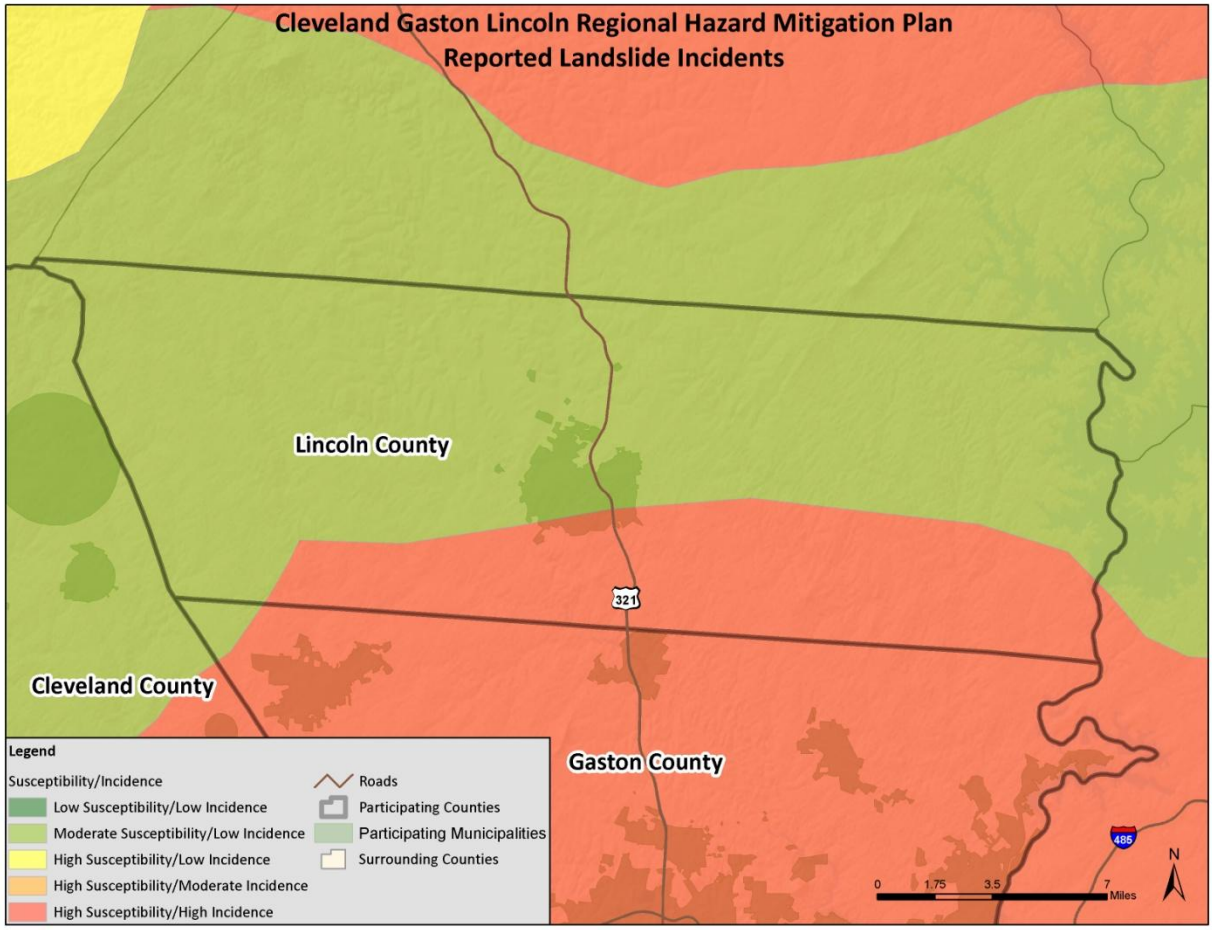
C.2.10 Landslide

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 Lincoln County.

According to **Figure C.4** below, the majority of the county has moderate landslide activity. The remaining portion of the county, along the east and west county boundaries, has a high incidence occurrence rate. There is high susceptibility throughout the county.

FIGURE C.4: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP OF LINCOLN COUNTY



Source: USGS

Historical Occurrences

Steep topography throughout Lincoln County makes the planning area 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. **Table C.20** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey[14]. The georeferenced locations of the landslide events presented in the aforementioned tables are presented in **Figure C.5**. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Lincoln County.

TABLE C.20: SUMMARY OF LANDSLIDE ACTIVITY IN LINCOLN COUNTY

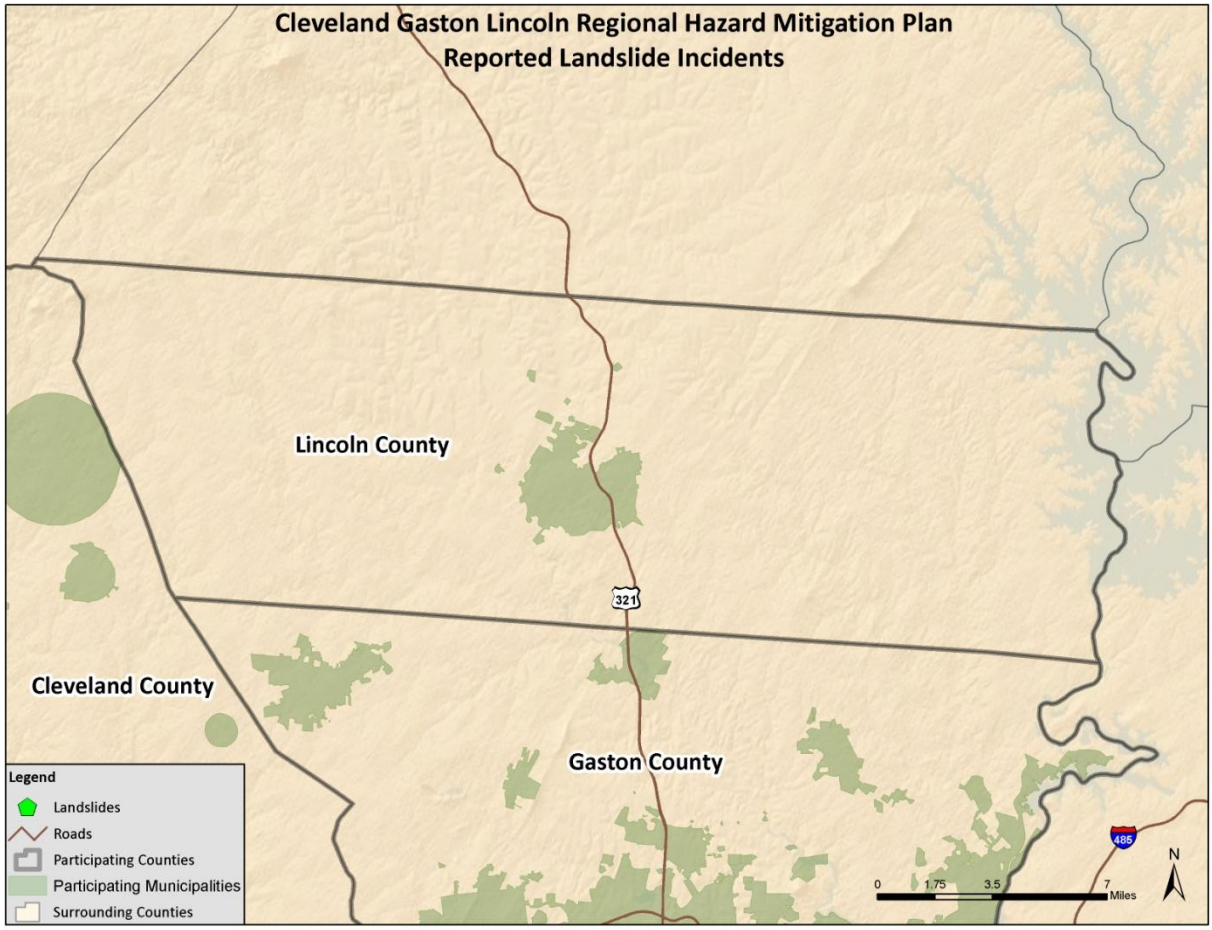
Location	Number of Occurrences
Lincolnton	0
Unincorporated Area	0

[14] 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. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

Location	Number of Occurrences
LINCOLN COUNTY TOTAL	0

Source: North Carolina Geological Survey

FIGURE C.5: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN LINCOLN COUNTY



Source: North Carolina Geological Survey

Probability of Future Occurrences

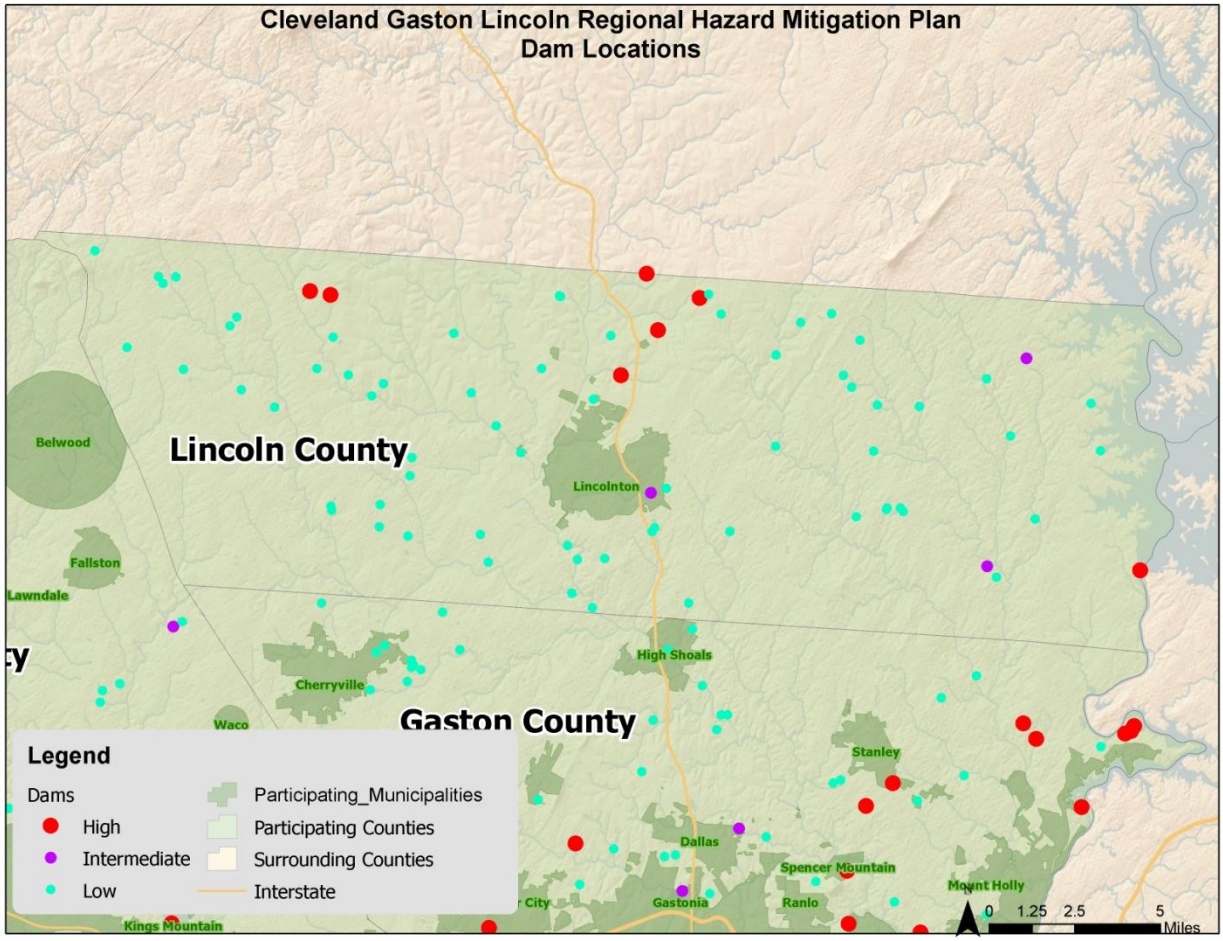
Based on historical information and the USGS susceptibility index, the probability of future landslide events is possible (1 to 10 percent probability). The USGS data indicates that all areas in the Cleveland Gaston Lincoln Region have high susceptibility to landsliding occurrence. However, some areas are reported as having a lower, "moderate" incidence ranking. Both areas are reported in Lincoln County, with the southern portion located in the high incidence area. 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 Lincoln 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 Land Management there are 76dams in Lincoln County.[15] **Figure C.6** 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 C.21**.

FIGURE C.6: LINCOLN COUNTY DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Land Resources, 2012

TABLE C.21: LINCOLN COUNTY HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	Owner Type
Lincoln County				
Cowens Ford Dam	High	0	0	Utility
Horseshoe Pond Dam	High	5	40	Private

[15] The February 8, 2012 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
Kaylor Pond Dam	High	0.9	4	
National Fruit Products Dam	High	8.5	24	Private
Leatherman Pond Dam	High	3	26	Private
Gladden Pond Dam	High	1	87	Private
Glen Oaks Golf Course Dam B	High	1.4	9	Private

Source: North Carolina Division of Land Resources, 2012

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

According to the North Carolina Division of Land Resources, there have been no dam breeches reported in Lincoln 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.

Lincoln County

No information on past dam failure events 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.

C.2.12 Erosion

Location and Spatial Extent

Erosion in Lincoln County is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine grained particles such as sand, Lincoln 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 committee.

Historical Occurrences

Several sources were vetted to identify areas of erosion in Lincoln County. This includes searching local newspapers, interviewing local officials, and reviewing the previous hazard mitigation plan. Little information could be found and erosion was not addressed in the previous Lincoln County hazard mitigation plan.

Probability of Future Occurrences

Erosion remains a natural, dynamic, and continuous process for Lincoln 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

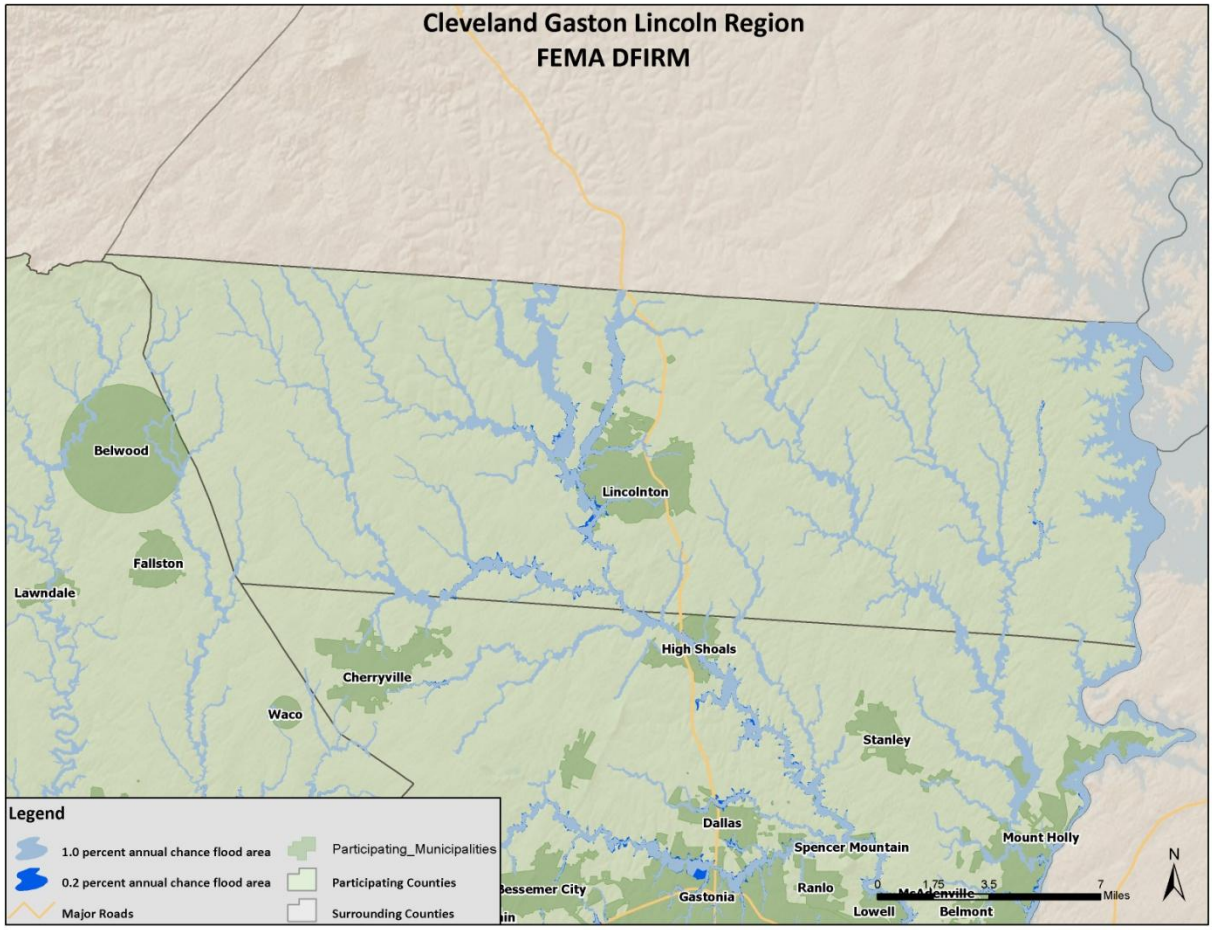
Location and Spatial Extent

There are areas in Lincoln 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).[16] 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 307 square miles that make up Lincoln County, there are 27.7 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 0.6 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

These flood zone values account for 9.2 percent of the total land area in Lincoln 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.7** and **Figure C.8** illustrate the location and extent of currently mapped special flood hazard areas for Lincoln County and the City of Lincolnton based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

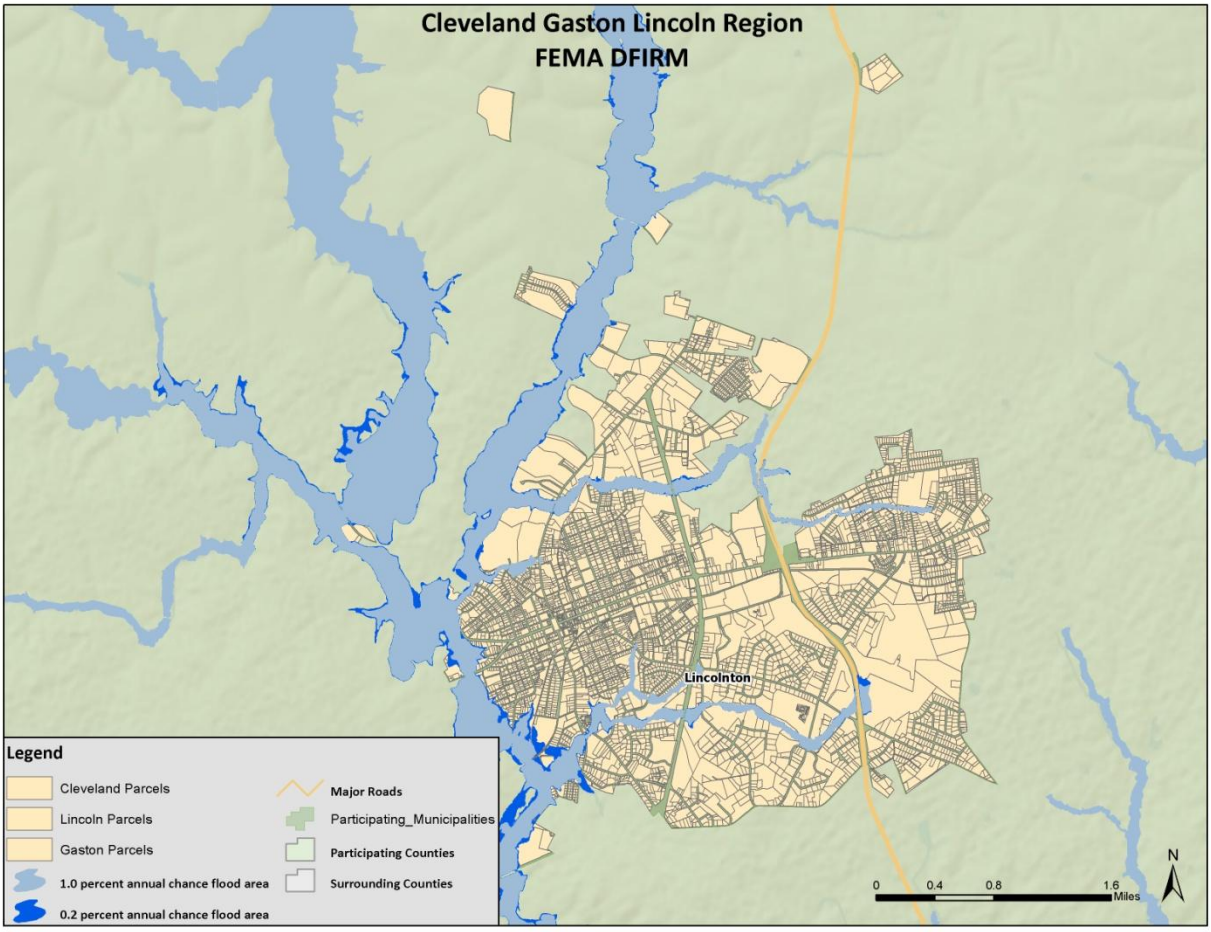
[16] The county-level DFIRM data used for Lincoln County were updated in 2009.

FIGURE C.7: SPECIAL FLOOD HAZARD AREAS IN LINCOLN COUNTY



Source: Federal Emergency Management Agency

FIGURE C.8: SPECIAL FLOOD HAZARD AREAS IN LINCOLNTON



Source: Federal Emergency Management Agency

Historical Occurrences

Information from the National Climatic Data Center was used to ascertain historical flood events. The National Climatic Data Center reported a total of 22 events in Lincoln County since 1993.[17] A summary of these events is presented in **Table C.22**. These events accounted for over $918,000 million (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 C.23**.

TABLE C.22: SUMMARY OF FLOOD OCCURRENCES IN LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	10	0/0	$57,776
Unincorporated Area	12	0/0	$860,721

[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)
LINCOLN COUNTY TOTAL	**22**	**0/0**	**$918,497**

Source: National Climatic Data Center

TABLE C.23: HISTORICAL FLOOD EVENTS IN LINCOLN COUNTY

	Date	Type	Deaths/ Injuries	Property Damage*
Lincolnton				
Lincolnton	04-OCT-95	FLASH FLOOD	0/0	$0
LINCOLNTON	07-JUN-03	FLASH FLOOD	0/0	$13,439
LINCOLNTON	12-JUL-03	FLASH FLOOD	0/0	$0
LINCOLNTON	09-MAY-04	FLASH FLOOD	0/0	$0
LINCOLNTON	14-JUN-04	FLASH FLOOD	0/0	$0
LINCOLNTON	03-JUL-05	FLASH FLOOD	0/0	$19,002
LINCOLNTON	13-JUL-05	FLASH FLOOD	0/0	$25,335
LINCOLNTON	24-JAN-10	FLASH FLOOD	0/0	$0
LINCOLNTON	26-JAN-10	FLOOD	0/0	$0
LINCOLNTON	05-AUG-11	FLASH FLOOD	0/0	$0
Unincorporated Area				
LINCOLN COUNTY	23-MAR-93	FLASH FLOODS	0/0	$0
IRON STATION	28-APR-97	FLASH FLOOD	0/0	$0
COUNTYWIDE	27-JAN-98	FLOOD	0/0	$0
TRIANGLE	24-JUL-02	FLASH FLOOD	0/0	$69,212
LINCOLN COUNTY	20-MAR-03	FLOOD	0/0	$671,958
COUNTYWIDE	20-MAR-03	FLASH FLOOD	0/0	$0
LINCOLN COUNTY	10-APR-03	FLOOD	0/0	$0
LINCOLN COUNTY	22-MAY-03	FLOOD	0/0	$0
LINCOLN COUNTY	13-JUL-03	FLOOD	0/0	$0
LINCOLN COUNTY	13-JUL-03	FLOOD	0/0	$0
LINCOLN COUNTY	08-SEP-04	FLOOD	0/0	$81,548
LINCOLN COUNTY	07-OCT-05	FLOOD	0/0	$38,003

*Property damage is reported in 2013 dollars; All damage may not have been reported.
Source: National Climatic Data Center

The flood event described below is not reported above because it occurred during the development of this plan.

July 27 and 28, 2013
Heavy rainfall on July 27 and 28 caused multiple basins in Lincoln County to flood. As much as 10 inches or greater of rain fell in the northwestern part of the County. Numerous roads and bridges were washed out and some buildings received damages.

Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of July 2013, there have been no flood losses reported in Lincoln County through the National Flood Insurance Program (NFIP) since 1978. 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 Lincoln County were either uninsured, denied claims payment, or not reported.

TABLE C.24: SUMMARY OF INSURED FLOOD LOSSES IN LINCOLN COUNTY

Location	Flood Losses	Claims Payments
Lincolnton	0	$0
Unincorporated Area	0	$0
LINCOLN COUNTY TOTAL	**0**	**$0**

Source: FEMA, NFIP

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 October 2013, there are no non-mitigated repetitive loss properties located in Lincoln County. **Table C.25** presents detailed information on repetitive loss properties and NFIP claims and policies for Lincoln County.

TABLE C.25: REPETITIVE LOSS PROPERTIES IN LINCOLN COUNTY

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Lincolnton	0	--	0	$0	$0	$0	$0
Unincorporated Area	0	--	0	$0	$0	$0	$0
LINCOLN 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 Lincoln 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).

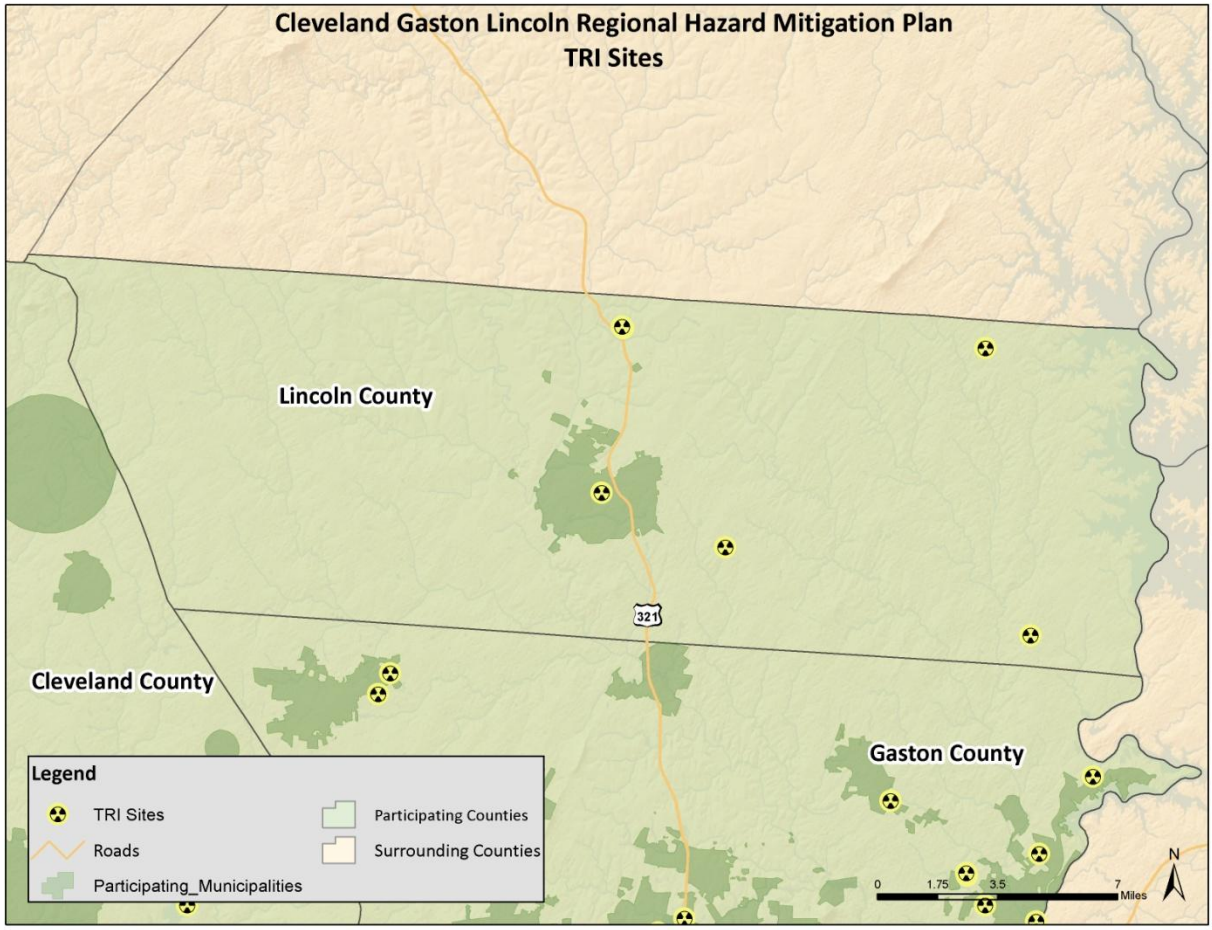
It can be inferred from the floodplain location maps, previous occurrences, and repetitive loss properties that risk varies throughout the county and participating jurisdictions. For example, the western portion of Lincolnton has more floodplain and thus a higher risk of flood than the eastern portion. Flood is not the greatest hazard of concern but will continue occur and cause damage. Therefore, mitigation actions may be warranted, particularly for repetitive loss properties.

C.2.14 Hazardous Materials Incidents

Location and Spatial Extent

Lincoln County has five TRI sites. These sites are shown in **Figure C.9.**

FIGURE C.9: TOXIC RELEASE INVENTORY (TRI) SITES IN LINCOLN COUNTY



Source: EPA

In addition to "fixed" hazardous materials locations, hazardous materials may also impact the county via roadways and rail. Many roads in the county are narrow and winding, making hazardous material transport in the area especially treacherous. All roads that permit hazardous material transport are considered potentially at risk to an incident.

Historical Occurrences

There have been a total of two recorded HAZMAT incidents in Lincoln County since 1998 (**Table C.26**). **Table C.27** presents detailed information on historic HAZMAT incidents in Lincoln 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 LINCOLN COUNTY

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2013)
Lincolnton	2	0/0	$2,396
Unincorporated Area	0	0/0	$0
LINCOLN COUNTY TOTAL	**2**	**0/0**	**$2,396**

Source: USDOT PHMSA

TABLE C.27: HAZMAT INCIDENTS IN LINCOLN COUNTY

Report Number	Date	City	Mode	Serious Incident?	Fatalities/ Injuries	Damages ($)*	Quantity Released
Lincolnton							
I-1998030107	2/5/1998	LINCOLNTON	Highway	Yes	0/0	$0	2,000 LGA
E-2009110139	10/13/2009	LINCOLNTON	Highway	No	0/0	$2,396	2.40624 GCF
Lincolnton							
None Reported	--	--	--	--	--	--	--

*Property damage is reported in 2013 dollars.
Source: USDOT PHMSA

Probability of Future Occurrences

Given the location of five toxic release inventory sites in Lincoln County and several 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 and hazardous roadways.

C.2.15 Wildfire

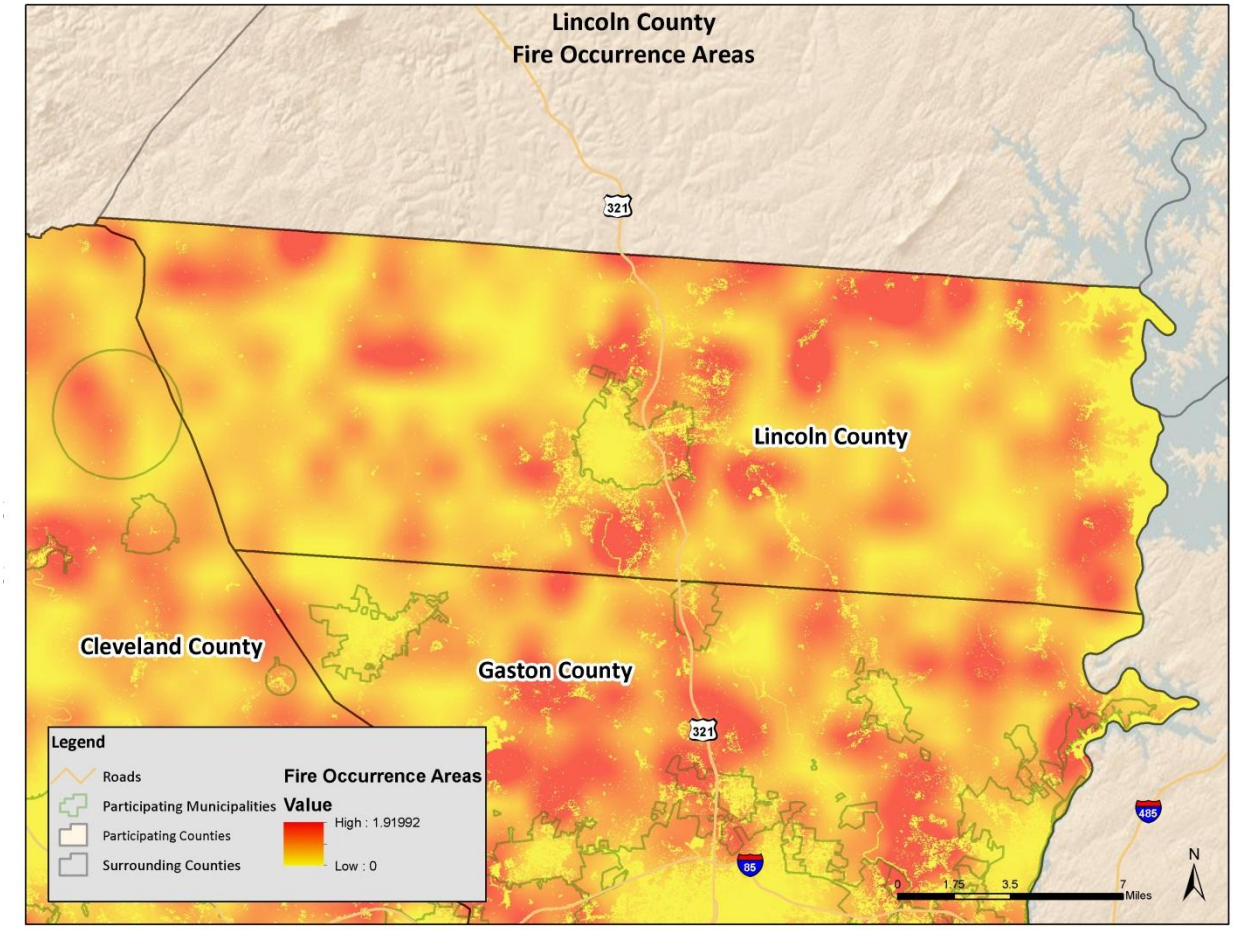
Location and Spatial Extent

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.10 shows the Fire Occurrence Areas (FOA) in Lincoln 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.10: HISTORIC WILDFIRE EVENTS IN LINCOLN COUNTY



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2012, Lincoln County experienced an average of 45 wildfires annually which burn an average of 32 acres per year. The data indicates that most of these fires are small, averaging one acre 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 LINCOLN COUNTY

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Lincoln County										
Number of Fires	34	56	40	69	66	42	32	26	44	39
Number of Acres	27.2	30.4	37.3	26.3	36.3	57.9	14.9	24.5	28.9	34.9

Source: North Carolina Division of Forest Resources

Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in Lincoln 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. In this case, the participating jurisdictions appear to have a similar risk to the surrounding areas. The probability assigned to Lincoln County for future wildfire events is likely (10 to 100 percent annual probability).

A.2.16 Nuclear Accident

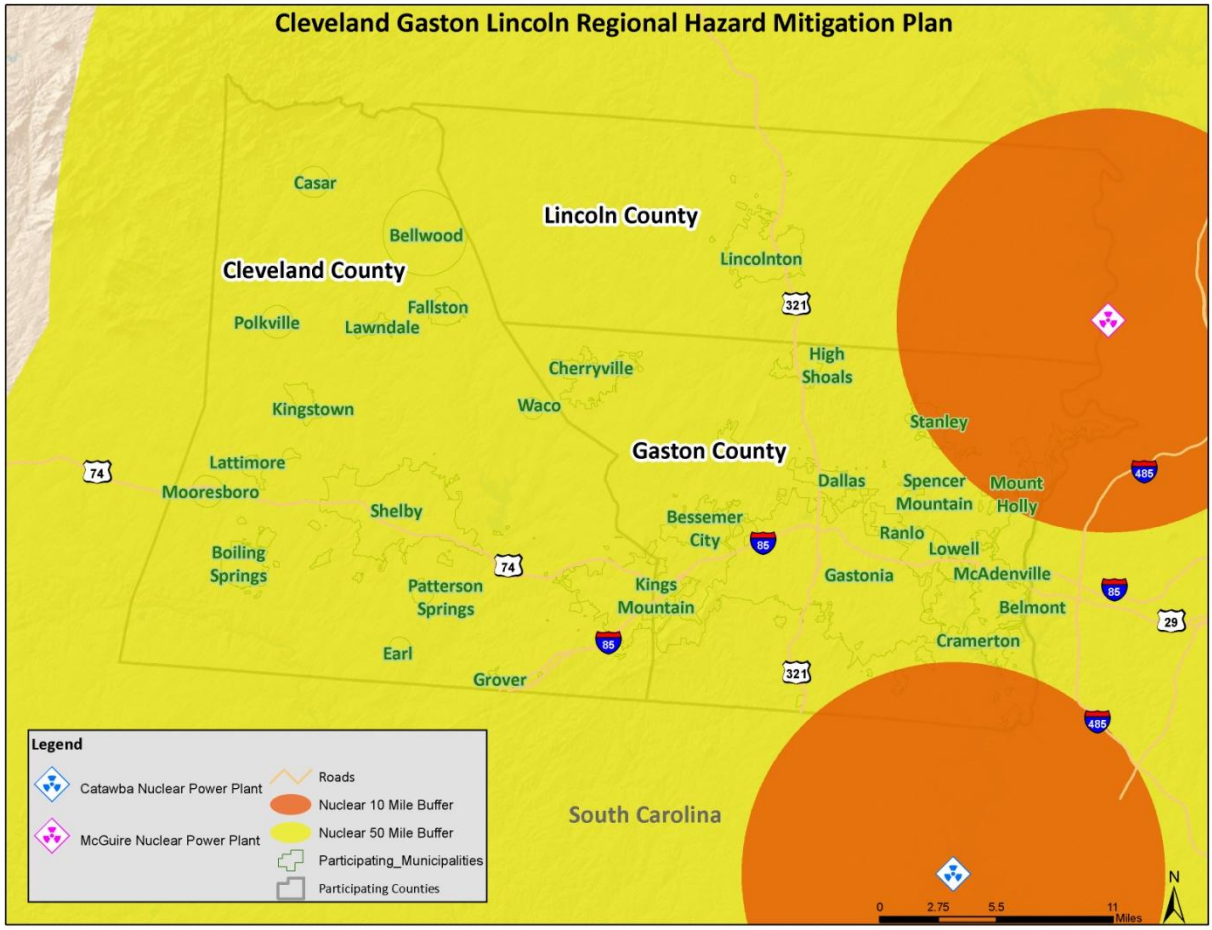
Location and Spatial Extent

The entire county is at risk to a nuclear incident. However, areas in the eastern part of Lincoln County are more susceptible due to their proximity to the McGuire 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.11**). All areas of the county are located within the 50 mile radius that is still considered to be at risk from a nuclear incident.

Historical Occurrences

Although there have been no major nuclear events at the McGuire or Catawba 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.

FIGURE C.11: MCGUIRE NUCLEAR POWER STATION INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

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).

C.2.17 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.29 describes the extent of each natural hazard identified for Lincoln County. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE C.29 EXTENT OF LINCOLN 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. Lincoln 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 the Lincoln County is 105 degrees Fahrenheit in Lincolnton on July 29, 1952.
Hailstorm	Hail extent can be defined by the size of the hail stone. The largest hail stone reported in Lincoln County was 2.5 inches (last reported on July 5, 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 hurricanes to traverse directly through Lincoln County were Hurricane Gracie in 1959 which reached a maximum wind speed of 53 knots in the region and Hurricane Hugo in 1989 which carried tropical force winds of 48 knots. Although the county is much more likely to be impacted by the remnants of a hurricane or tropical storm, these events demonstrate that Category 3 or 4 storms can and have impacted the county directly.
Lightning	According to the Vaisala flash density map (Figure 5.5), Lincoln 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 63-year history from the National Climatic Data Center, the strongest recorded wind event in Lincoln County was reported on July 13, 2010 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 5.5) as well as the Fujita/Enhanced Fujita Scale (Tables 5.15 and 5.16). The greatest magnitude reported was an F4 (reported on May 5, 1989).
Winter Storm and Freeze	extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in Lincoln County was 14.5 inches in Lincolnton on January 22, 1987. Due to extreme variations in elevation 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 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from Lincoln County. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the county was reported in the City of Lincolnton with a MMI of VI (strong) with a correlating Richter Scale measurement of approximately 5.4.

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 between moderate and high in Lincoln County. There is also 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 76 dams in Lincoln County, 7 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 Lincoln 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 9.2percent of the total land area in Lincoln 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 Indian Creek near Laboratory in 1929. Water reached a discharge of 9,920 cubic feet per second.
Other Hazards	
Hazardous Materials Incident	According to USDOT PHMSA, the largest hazardous materials incident reported in the county was 2,000 LGA released on the highway in Lincolnton on February 5, 1998. 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 Lincoln County in any year was 69 in 2006. The greatest number of acres to burn in the county in a single year occurred in 2008 when 58 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 McGuire or Catawba 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 McGuire or Catawba is possible.

Priority Risk Index Results

In order to draw some meaningful planning conclusions on hazard risk for Lincoln 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 5.18.2.

Table C.30 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 Council. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE C.30: SUMMARY OF PRI RESULTS FOR LINCOLN 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	Possible	Minor	Large	More than 24 hours	Less than 1 week	**2.1**
Hailstorm	Highly Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Hurricane and Tropical Storm	Possible	Critical	Large	More than 24 hours	Less than 24 hours	**2.6**
Lightning	Highly Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	**2.5**
Thunderstorm/High Wind	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	**2.8**
Tornado	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Winter Storm and Freeze	Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.0**
Geologic Hazards						
Earthquake	Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.0**
Landslide	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	**2.1**
Hydrologic Hazards						
Dam and Levee Failure	Unlikely	Critical	Moderate	12 to 24 hours	Less than 24 hours	**2.3**
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	**2.7**
Other Hazards						
Hazardous Materials Incident	Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Wildfire	Likely	Minor	Small	Less than 6 hours	More than 1 week	**2.4**
Nuclear Accident	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**

C.2.18 Final Determinations on Hazard Risk

The conclusions drawn from the hazard profiling process for Lincoln County, including the PRI results and input from the Regional Hazard Mitigation Council, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table C.31**). 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 Lincoln 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.31: CONCLUSIONS ON HAZARD RISK FOR LINCOLN COUNTY

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

C.3 LINCOLN COUNTY VULNERABILITY ASSESSMENT

This subsection identifies and quantifies the vulnerability of Lincoln 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.32 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for Lincoln County and its participating jurisdictions (study area of vulnerability assessment).[19]

[19] 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.32: IMPROVED PROPERTY IN LINCOLN COUNTY

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Lincolnton	4,574	$999,657,332	3,564	$476,809,193
Unincorporated Area	42,312	$5,700,507,679	25,948	$3,915,072,556
LINCOLN COUNTY TOTAL[20]	**46,886**	**$6,700,165,011**	**29,512**	**$4,391,881,749**

Table C.33 lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in Lincoln 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 C.12** shows the locations of essential facilities in Lincoln County. **Table C.45**, 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.

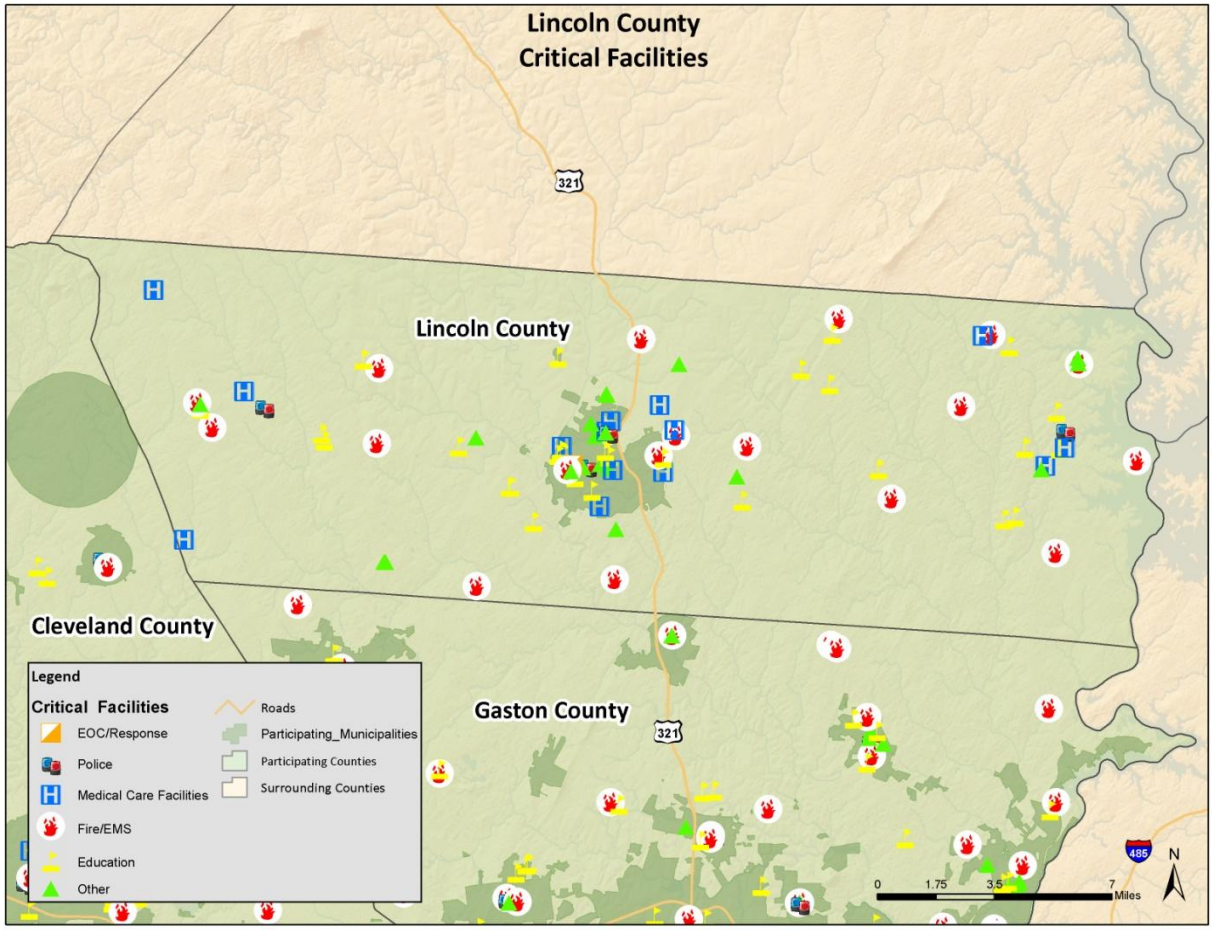
TABLE C.33: CRITICAL FACILITY INVENTORY IN LINCOLN COUNTY

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Lincolnton	2	1	4	1	8	12
Unincorporated Area	17	4	10	0	20	13
LINCOLN COUNTY TOTAL	**19**	**5**	**14**	**1**	**28**	**25**

Source: Hazus-MH

[20] Number of buildings for the county is based on the number of parcels with an improved building value greater than zero.

FIGURE C.12: CRITICAL FACILITY LOCATIONS IN LINCOLN COUNTY



Source: Hazus-MH 2.1

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 Lincoln County that are potentially at risk to these hazards.

Table C.34 lists the population by jurisdiction according to U.S. Census 2010 population estimates. Unfortunately, estimates were not available at the census block level, limited the results to county-wide estimates. The total population in Lincoln County according to Census data is 78,265 persons. Additional population estimates are presented above in Section C.1.

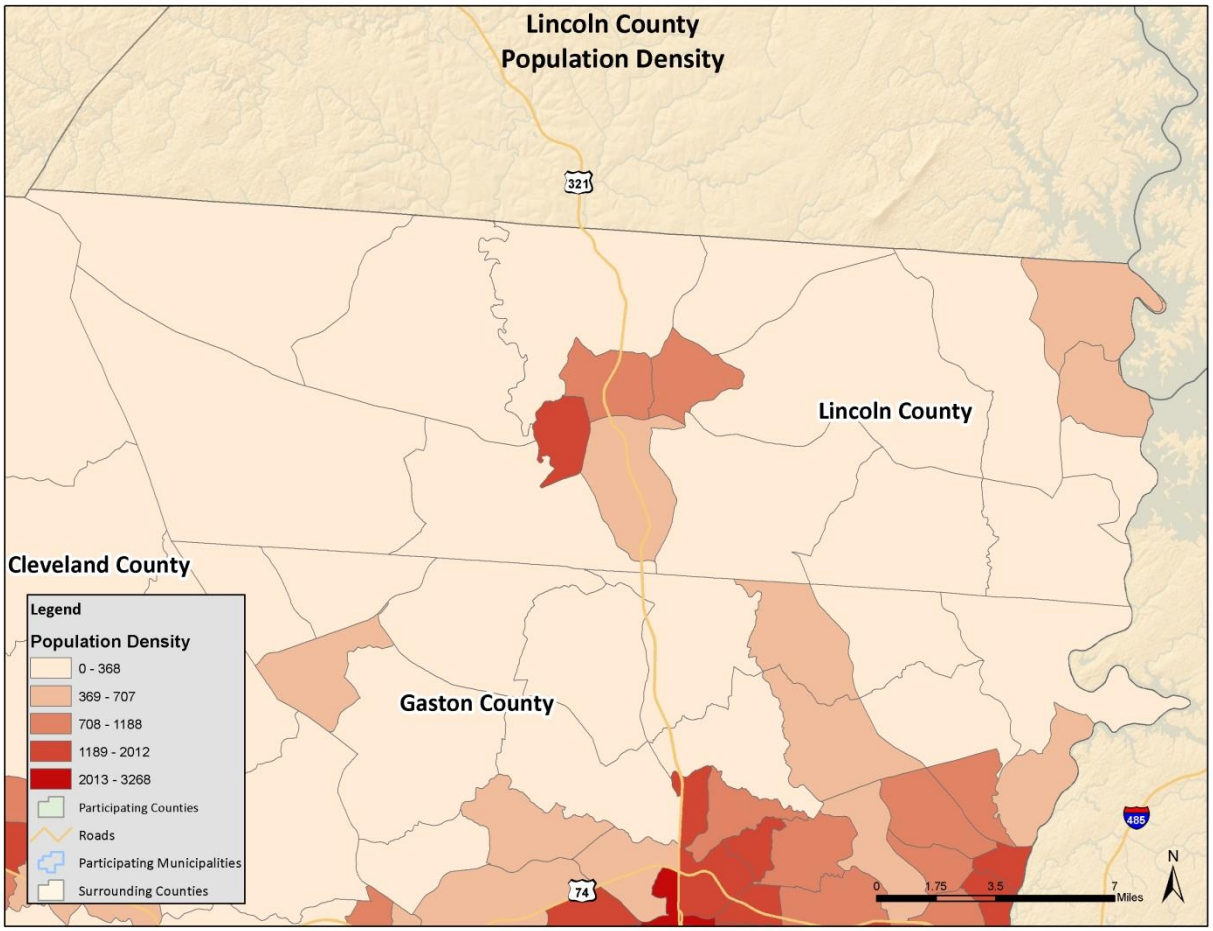
TABLE C.34: TOTAL POPULATION IN LINCOLN COUNTY

Jurisdiction	2010 Census Population
Lincoln County	**78,265**
City of Lincolnton	10,486

Source: U.S. Census 2010

In addition, **Figure C.13** illustrates the population density by census tract as it was reported by the U.S. Census Bureau in 2010.[21]

FIGURE C.13: POPULATION DENSITY IN LINCOLN COUNTY



Source: U.S. Census Bureau, 2010

C.3.3 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 Lincoln County, are presented here. All other hazards are assumed to impact the entire planning region (drought, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze) or, due to lack of data, analysis would not lead to credible results (erosion, dam and levee failure). The total county exposure, and thus risk, was presented in **Table C.32**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table C.45.**

[21] Population by census block was not available at the time this plan was completed.

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

Hurricane and Tropical Storm

Historical evidence indicates that Lincoln 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.3.3.

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.35.** Only losses to buildings 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.35: ANNUALIZED LOSS ESTIMATIONS FOR HURRICANE WIND HAZARD

Location	Total Annualized Loss
Lincoln County	$233,000

Source: Hazus-MH 2.1

In addition, probable peak wind speeds were calculated in Hazus. These are shown below in **Table C.36.**

TABLE C.36: PROBABLE PEAK HURRICANE / TROPICAL STORM WIND SPEEDS (MPH)

Location	50-year event	100-year event	500-year event	1,000-year event
Lincolnton	60	70	89	96
Unincorporated Area	62	72	91	99
MAXIMUM WIND SPEED REPORTED	**62**	**72**	**91**	**99**

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 Lincoln 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.45** 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 Lincoln 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 Lincoln 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.37** summarizes the findings.

TABLE C.37: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD

Location	Total Annualized Loss
Lincoln County	$25,000

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.45**.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in Lincoln 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 Lincoln 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.3.9), county level tax parcel data, and GIS analysis. **Table C.38** presents the potential at-risk property where available. All areas of Lincoln County are identified as moderate or high incidence areas by the USGS landslide data. All areas are also of high landslide susceptibility. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE C.38: 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**	**High**	**Moderate**	**High**	**Moderate**	**High**

Location	Number of Parcels At Risk		Number of Improvements At Risk		Total Value of Improvements At Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Lincolnton	3,939	635	3,228	469	$890,710,878	$108,946,454
Unincorporated Area	30,675	11,637	20,159	7,779	$4,241,290,019	$1,459,217,660
LINCOLN COUNTY TOTAL	**120,444**	**86,883**	**85,621**	**65,026**	**$12,685,813,743**	**$8,002,406,540**

Source: USGS

Social Vulnerability

Given high susceptibility across the entire county, it is assumed that the total population is at risk.

Critical Facilities

All critical facilities are located in a high susceptibility area. Thirteen facilities in Lincoln County are located in the high incidence area (high susceptibility). The remaining critical facilities are located in the moderate landslide incidence/susceptibility area. A list of specific critical facilities and their associated risk can be found in **Table C.45** at the end of this section.

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in Lincoln 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 Lincoln County is susceptible to flood events. A total of 22 flood events have been reported by the National Climatic Data Center resulting in $918,000 dollars in damages. On an annualized level, these damages amounted to $46,246 for Lincoln 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 C.39** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE C.39: ESTIMATED EXPOSURE OF PARCELS TO THE FLOOD HAZARD

	1.0-percent ACF			0.2-percent ACF		
Location	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
Lincolnton	275	178	$39,295,831	31	37	$8,748,177
Unincorporated Area	4,945	2,808	$700,966,633	67	23	$2,071,543

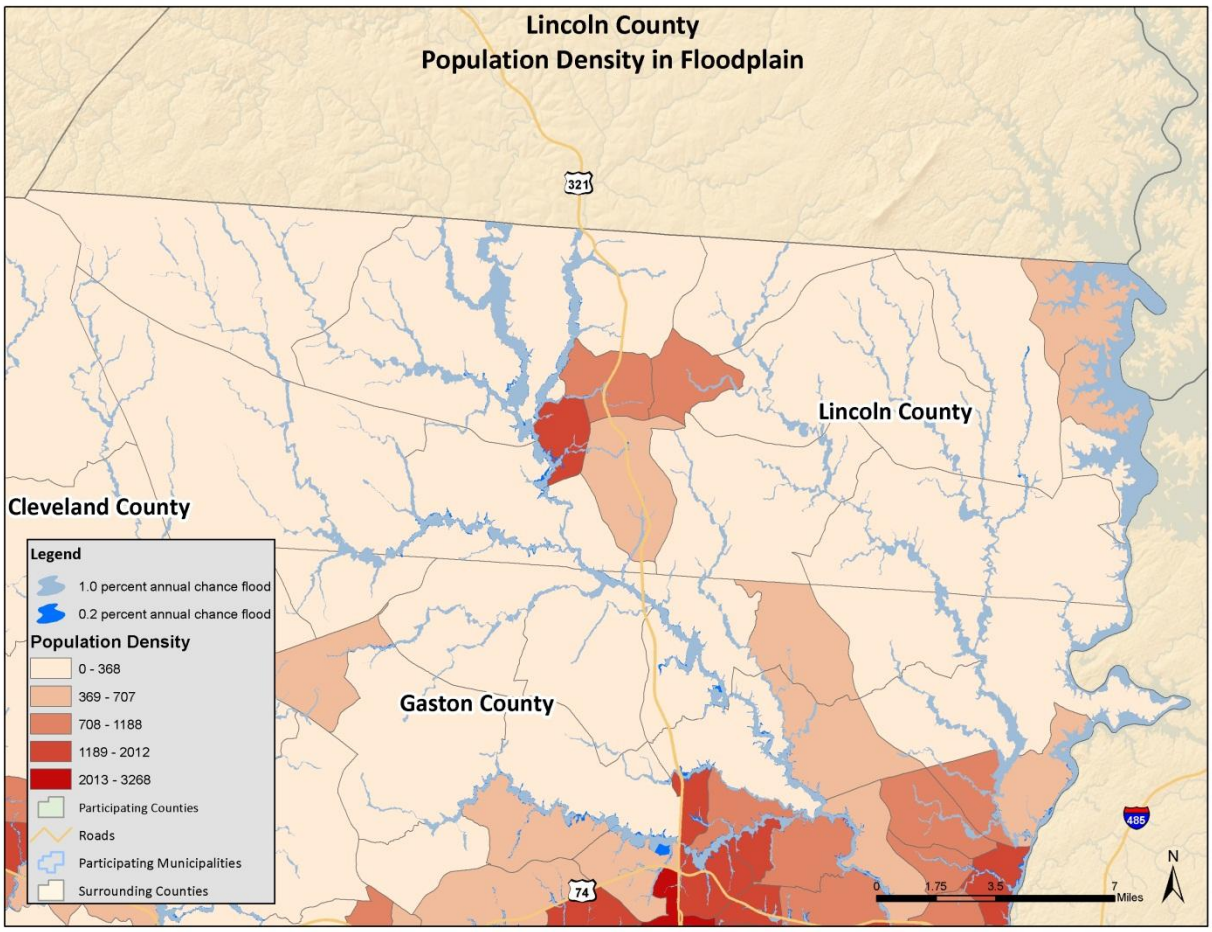
	1.0-percent ACF			0.2-percent ACF		
Location	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number Improved Buildings	Approx. Improved Value of Buildings
LINCOLN COUNTY TOTAL	5,220	2,986	$740,262,464	98	60	$10,819,720

Source: FEMA DFIRM

Social Vulnerability

Since 2010 population was available at the tract level, it was difficult to determine a reliable figure on population at-risk to flood due to tract level population data. **Figure C.14** is presented to gain a better understanding of at risk population.

FIGURE C.14 : POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, U.S. Census 2010

Critical Facilities

The critical facility analysis revealed that there are a no critical facilities located in the Lincoln County 1.0-percent annual chance floodplain and 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 C.45** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings and populations in Lincoln 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

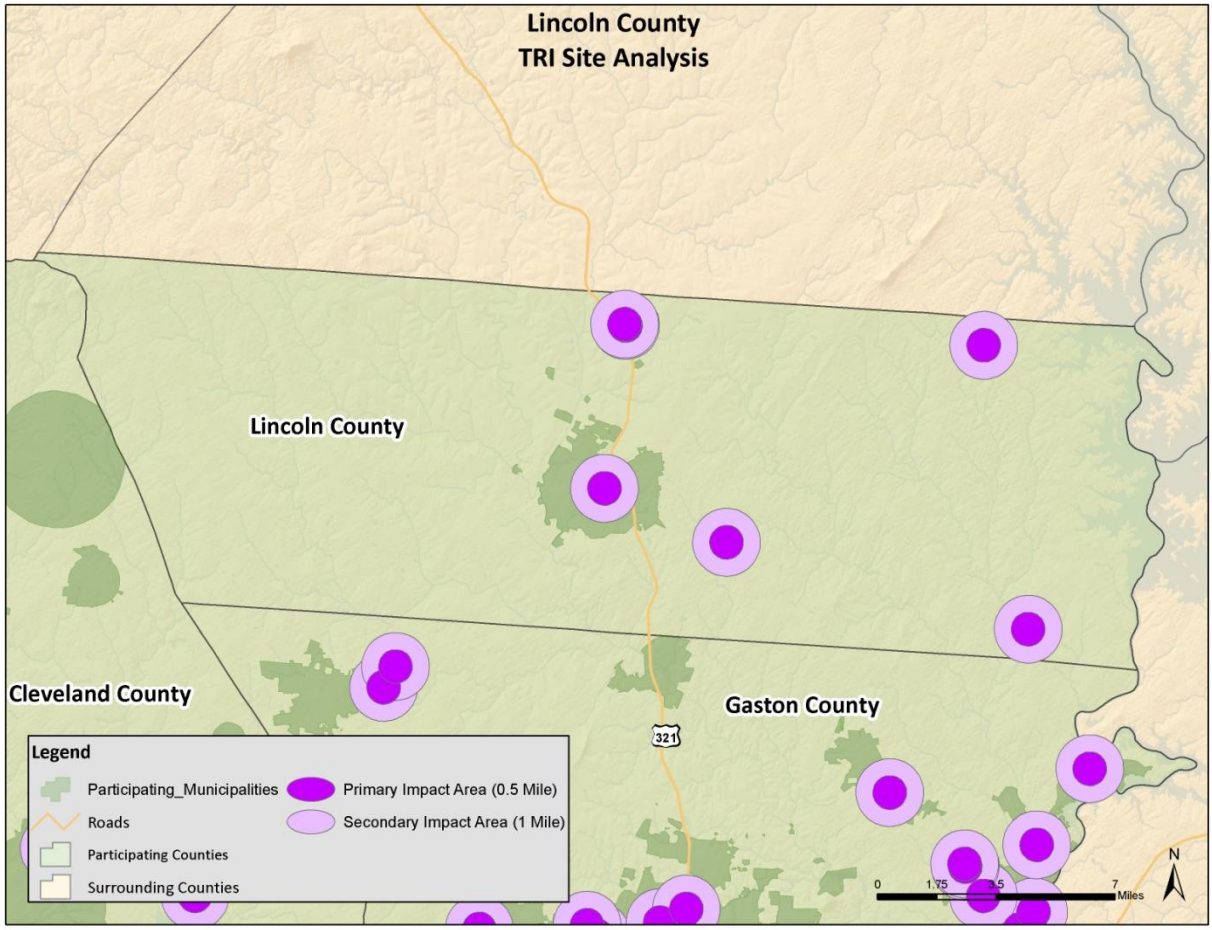
Although historical evidence and existing Toxic Release Inventory sites indicate that Lincoln County is susceptible to hazardous materials events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. It is assumed that while one major event could result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annualized loss estimate for Lincoln 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 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 Lincoln County, along with buffers, were used for analysis as shown in **Figure C.15.** 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.16** 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.40** (fixed sites), **Table C.41** (mobile road sites) and **Table C.42** (mobile railroad sites).[23]

[22] This type of analysis will likely yield conservative results (generally higher than what is actually reported after an event).
[23] Note that parcels included in the 1 mile analysis are also included in the 0.5 mile analysis.

FIGURE C.15 : TRI SITES WITH BUFFERS IN LINCOLN COUNTY



Source: EPA

TABLE C.40: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)

	0.5-mile buffer			1.0-mile buffer		
Location	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**
Lincolnton	344	248	$158,188,767	1,635	1,292	$411,028,229
Unincorporated Area	772	563	$291,851,805	2,639	1,747	$556,249,045
LINCOLN COUNTY TOTAL	**1,116**	**811**	**$450,040,572**	**4,274**	**3,039**	**$967,277,274**

FIGURE C.16 : MOBILE HAZMAT BUFFERS IN LINCOLN COUNTY

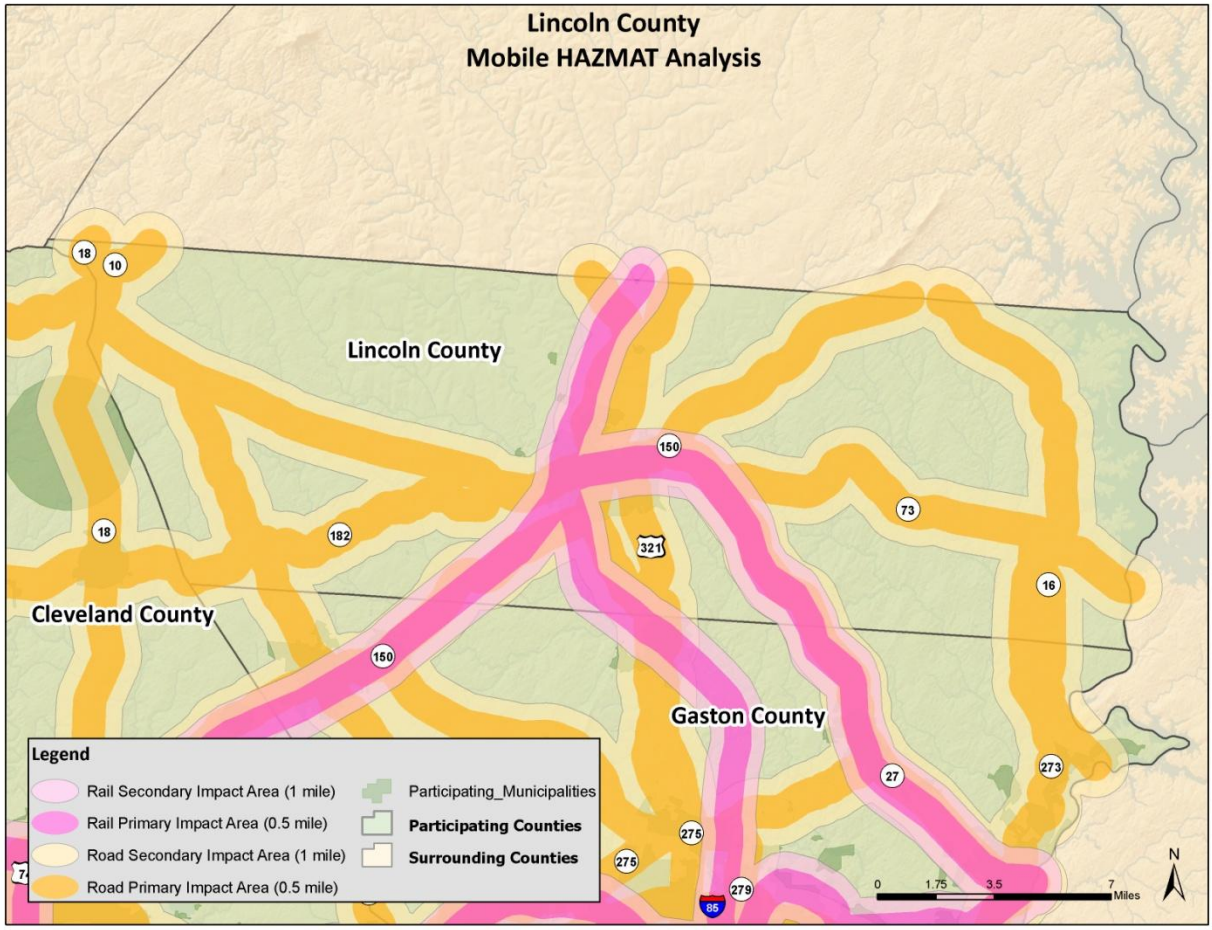


TABLE C.41: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - ROAD)

	0.5-mile buffer			1.0-mile buffer		
Location	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**
Lincolnton	4,228	3,411	$927,450,041	4,563	3,686	$997,156,902
Unincorporated Area	18,065	12,174	$2,679,272,888	28,082	18,756	$3,857,814,244
LINCOLN COUNTY TOTAL	**22,293**	**15,585**	**$3,606,722,929**	**32,645**	**22,442**	**$4,854,971,146**

TABLE C.42: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS - RAILROAD)

	0.5-mile buffer			1.0-mile buffer		
Location	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**	**Approx. Number of Parcels**	**Approx. Number Improved**	**Approx. Improved Value**
Lincolnton	3,434	2,812	$800,368,350	4,277	3,461	$953,902,234
Unincorporated Area	3,859	2,653	$596,179,058	7,031	4,814	$1,064,621,336

	0.5-mile buffer			1.0-mile buffer		
Location	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
LINCOLN COUNTY TOTAL	7,293	5,465	$1,396,547,408	11,308	8,275	$2,018,523,570

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 thirteen Lincoln County facilities located in a HAZMAT risk zone. The primary impact zone includes six facilities: 2 medical care facilities, 1 fire station, 1 school, and 2 others. The remaining facilities are in the secondary, 1 mile zone. A list of specific critical facilities and their associated risk can be found in **Table C.45** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors in Lincoln County revealed that there are 81 critical facilities located in the primary and secondary mobile HAZMAT buffer areas for roads and 40 critical facilities located in the railroad HAZMAT buffer areas. It should be noted that many of the facilities located in the buffer areas for road are also located in the buffer areas for railroad and/or the fixed site analysis. A list of specific critical facilities and their associated risk can be found in **Table C.45** 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 Lincoln 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.

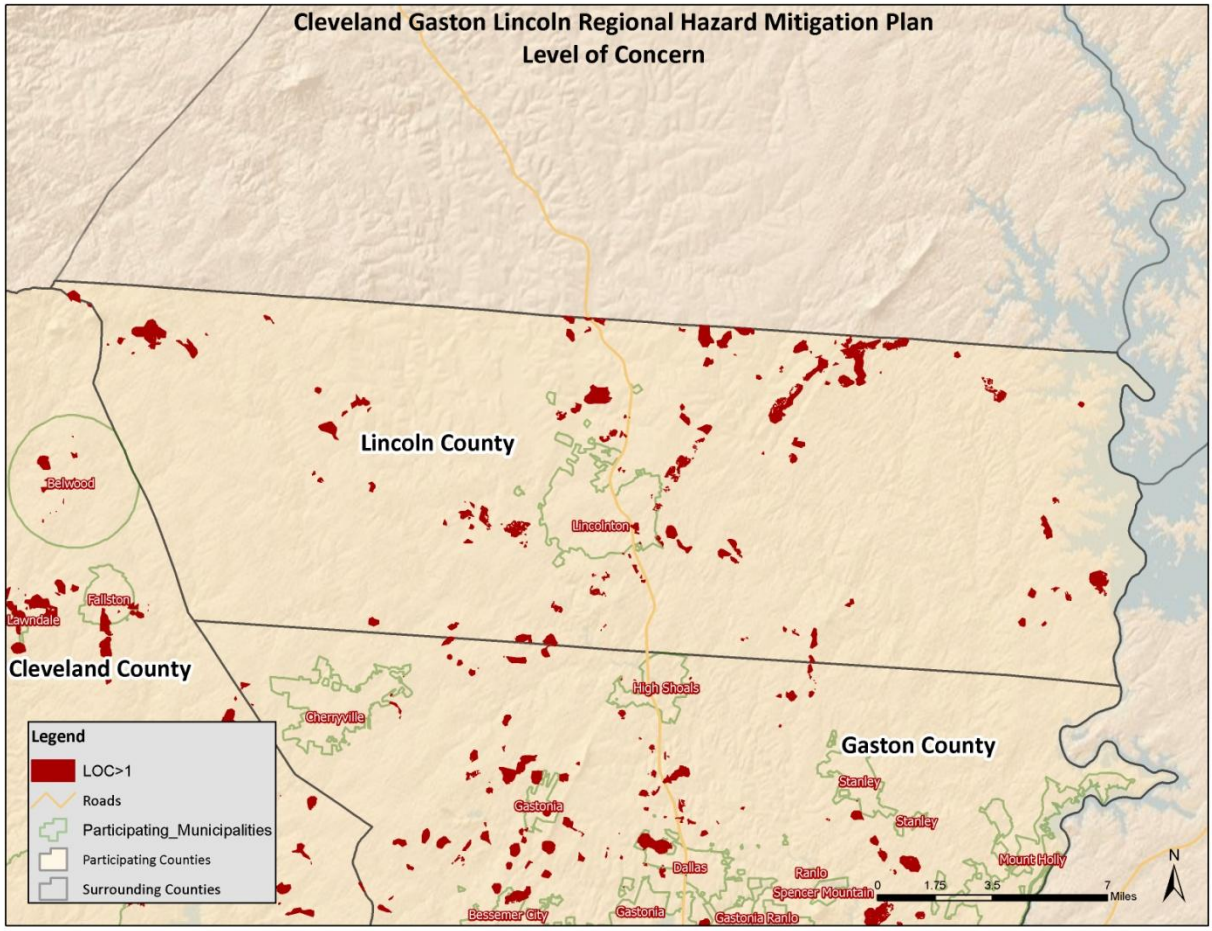
Wildfire

Although historical evidence indicates that Lincoln County is susceptible to wildfire events, there are few reports of 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.17** and **Figure C.18** 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). Six was the highest level recorded in the Cleveland Gaston Lincoln planning area. Therefore, areas with a value above 1 were chosen to be displayed as areas of risk. The region contains some lands where the value falls into the at-risk category, though the region has somewhat less land labeled as at-risk compared to other regions of North Carolina. Since all of this land area is on the lower tenth of the overall LOC scale, there is likely considerably less risk in the region than in other areas of the country.

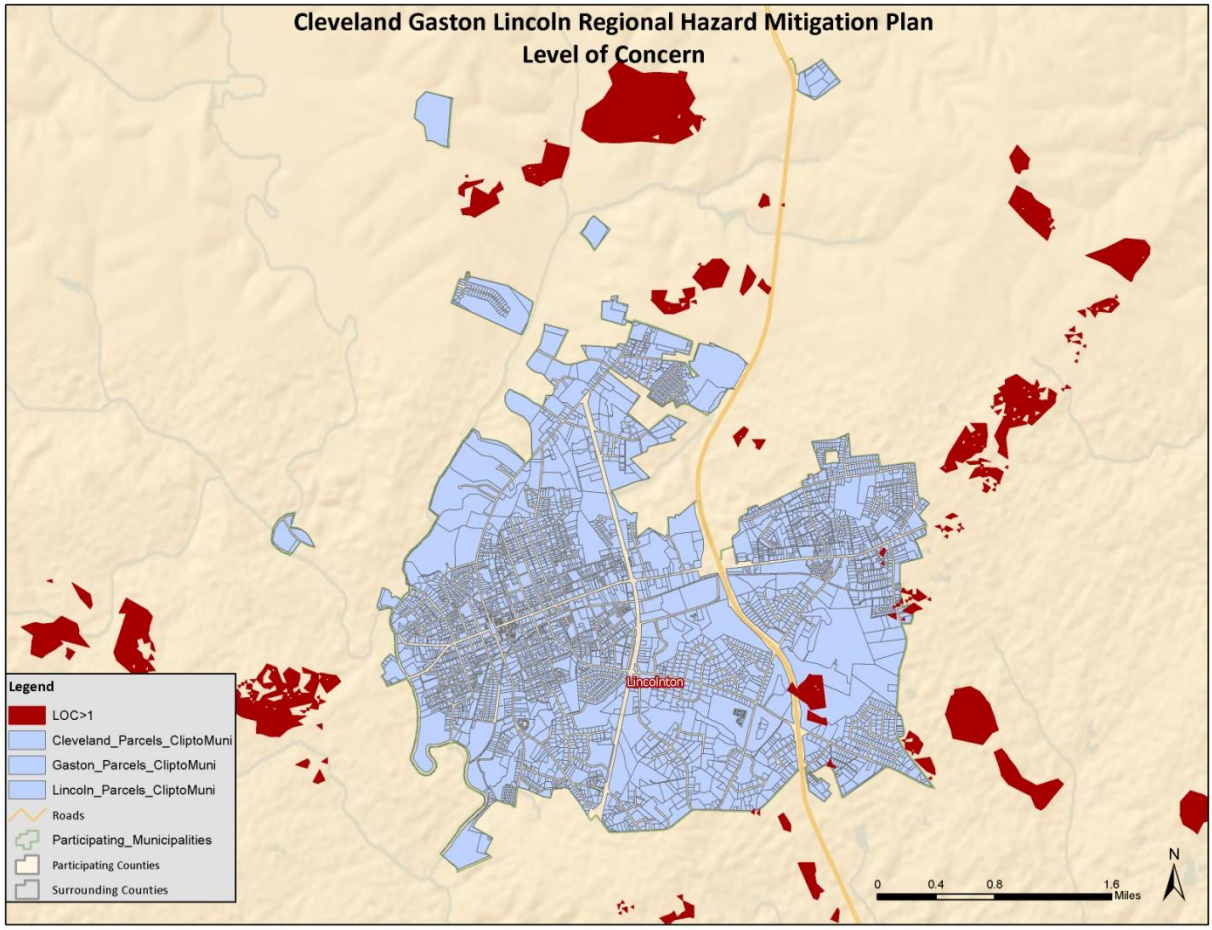
Table C.43 shows the results of the analysis.

FIGURE C.17: WILDFIRE RISK AREAS IN LINCOLN COUNTY



Source: Southern Wildfire Risk Assessment Data

FIGURE C.18: WILDFIRE RISK AREAS IN LINCOLNTON



Source: Southern Wildfire Risk Assessment Data

TABLE C.43: EXPOSURE OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN

	HIGH WILDFIRE RISK AREA		
Location	**Approx. Number of Parcels**	**Approx. Number of Buildings**	**Approx. Improved Value**
Lincolnton	33	29	$5,895,898
Unincorporated Area	2,112	1,509	$430,583,207
LINCOLN COUNTY TOTAL	**2,145**	**1,538**	**$436,479,105**

Looking at jurisdictional level, unincorporated areas of the county face the highest level of concern areas. While Lincolnton reports a fairly low level of concern, it should mindful that it is susceptible to wildfire and fire may quickly spread to those lower areas of concern.

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 six critical facilities located in wildfire areas of concern. 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 C.45** 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 Lincoln County.

Conclusions on Hazard Vulnerability

Table C.44 presents a summary of annualized loss for each hazard in Lincoln 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 C.44: ANNUALIZED LOSS FOR LINCOLN COUNTY

Event	Lincoln County
Dam Failure	Negligible
Drought	Negligible
Extreme Heat	Negligible
Erosion	Negligible
Hail	$32,380
Hurricane & Tropical Storm	$233,000
Landslide	Negligible
Lightning	$106,377
Thunderstorm Wind / High Wind	$23,393
Tornado	$1,216,069
Winter Storm & Freeze	$796,460
Flood	$46,246
Earthquake	$25,000
HAZMAT Incident	Negligible
Wildfire	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to atmospheric hazards including drought, 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.45** 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.45: AT-RISK CRITICAL FACILITIES IN LINCOLN COUNTY

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
Lincoln County																				
Gaston College	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
CARILLON ASSISTED LIVING OF LINCOLNTON	Medical Care Facilities	X	X	X	X	X	X	X	X		X					X	X	X	X	
Community Service Work Program	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
City of Lincolnton Police Department	Police	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
Social Services	Other	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Board of Education	Other	X	X	X	X	X	X	X	X		X						X		X	
BRIAN CENTER HEALTH AND RETIREMENT - LINCOLNTON	Medical Care Facilities	X	X	X	X	X	X	X	X	X							X		X	
Lincolnton	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
James W. Warren Citizens Center	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Transportation Lincoln County	Other	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
CARDINAL HEALTHCARE AND REHABILITATION CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X					X	X	X	X	
Registry of Deeds	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Mental Health	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
J D Kiser	Education	X	X	X	X	X	X	X	X		X						X		X	
G.E. Massey	Education	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Lincoln Economic Development	Other	X	X	X	X	X	X	X	X		X				X	X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
Association																				
Appraisal Office	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
Battleground	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
Health Department	Other	X	X	X	X	X	X	X	X		X					X	X		X	
Environmental Health / Planning Inspections	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
LINCOLN NURSING CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	
Rescue Squad	EOC/Response	X	X	X	X	X	X	X	X		X					X	X	X	X	
LINCOLNTON 2	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
LINCOLNTON / MEDIC 1 & 11	Fire/EMS	X	X	X	X	X	X	X	X		X					X	X	X	X	
Lincoln County Court House	Other	X	X	X	X	X	X	X	X		X					X	X	X	X	
School of Technology	Education	X	X	X	X	X	X	X	X		X				X	X	X	X	X	
S Ray Lowder	Education	X	X	X	X	X	X	X	X		X						X		X	
Asbury	Education	X	X	X	X	X	X	X	X		X					X	X	X	X	
East Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
CROUSE	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
Saint James	Education	X	X	X	X	X	X	X	X		X									
Lincoln County Police/Sheriff	Police	X	X	X	X	X	X	X	X		X						X			
AMAZING GRACE REST HOME	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
Norris S Childers	Education	X	X	X	X	X	X	X	X		X						X			
HEATH HOUSE	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
Catawba Springs	Education	X	X	X	X	X	X	X	X	X							X			
Lincoln Charter	Education	X	X	X	X	X	X	X	X		X						X			
BOGER CITY	Fire/EMS	X	X	X	X	X	X	X	X		X						X		X	
LAKEWOOD CARE CENTER	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
Lincoln County Schools Maintance	Other	X	X	X	X	X	X	X	X		X						X		X	
PUMPKIN CENTER VFD MEDIC 8	Fire/EMS	X	X	X	X	X	X	X	X		X						X			X
BOGER CITY REST HOME	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
SHIPLEY	Fire/EMS	X	X	X	X	X	X	X	X		X									
East Lincoln	Education	X	X	X	X	X	X	X	X	X							X			
HOWARDS CREEK VFD	Fire/EMS	X	X	X	X	X	X	X	X		X						X			X
North Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
Lincolnton	Education	X	X	X	X	X	X	X	X		X									
SOUTH FORK	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	
MEDIC 2 & 12	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
Pumpkin Center	Education	X	X	X	X	X	X	X	X		X									
West Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
EAST LINCOLN	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
DENVER 2	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
AIRPORT	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
Car Farm Convenience Site	Other	X	X	X	X	X	X	X	X		X									
Lincoln County Sherriffs Department	Police	X	X	X	X	X	X	X	X		X						X			
Love Memorial	Education	X	X	X	X	X	X	X	X	X						X	X	X	X	
ALEXIS 2 MEDIC 17	Fire/EMS	X	X	X	X	X	X	X	X	X							X			
ESL Center	Other	X	X	X	X	X	X	X	X		X						X		X	
Tin Mine Convenience Site	Other	X	X	X	X	X	X	X	X	X							X			
NORTH BROOK SUB STATION	Fire/EMS	X	X	X	X	X	X	X	X		X						X			
UNION VFD / MEDIC 6	Fire/EMS	X	X	X	X	X	X	X	X		X									
DENVER 3	Fire/EMS	X	X	X	X	X	X	X	X		X									
Optimist Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
Crouse Convenience Site	Other	X	X	X	X	X	X	X	X	X										
Pumpkin Center	Education	X	X	X	X	X	X	X	X		X						X			
North Brook	Education	X	X	X	X	X	X	X	X		X						X			
Union	Education	X	X	X	X	X	X	X	X		X									X
Iron Station	Education	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X
NORTH BROOK	Fire/EMS	X	X	X	X	X	X	X	X		X						X			

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
Rock Springs	Education	X	X	X	X	X	X	X	X		X				X		X			X
Lincoln County Public Works Office	Other	X	X	X	X	X	X	X	X		X						X			
Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
Airport Convenience Site	Other	X	X	X	X	X	X	X	X		X						X		X	
CMC Lincoln	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X		X	
MEDIC 3	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
NC 27	Police	X	X	X	X	X	X	X	X		X						X			
Animal Services	Other	X	X	X	X	X	X	X	X		X						X		X	
Owls Den Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
NC 16	Police	X	X	X	X	X	X	X	X		X						X			
North Brook Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
Lincoln Charter Denver	Education	X	X	X	X	X	X	X	X		X						X			
MEDIC 4 & 14	Medical Care Facilities	X	X	X	X	X	X	X	X		X						X			
West Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
DENVER / MEDIC 5 & 15	Fire/EMS	X	X	X	X	X	X	X	X		X			X	X		X			
East Lincoln	Education	X	X	X	X	X	X	X	X		X						X			
ALEXIS	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X	X	

		ATMOSPHERIC							GEOLOGIC			HYDROLOGIC		OTHER						
FACILITY NAME	FACILITY TYPE	Drought	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 buffer	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
LANDFILL	Other	X	X	X	X	X	X	X	X	X										
WEXFORD HOUSE	Medical Care Facilities	X	X	X	X	X	X	X	X		X			X	X		X			
Webs Convenience Site	Other	X	X	X	X	X	X	X	X		X						X			
NORTH 321	Fire/EMS	X	X	X	X	X	X	X	X		X				X		X			
NORTH BROOK REST HOME INCORPORATED	Medical Care Facilities	X	X	X	X	X	X	X	X		X									X

C.4 LINCOLN COUNTY CAPABILITY ASSESSMENT

This subsection discusses the capability of Lincoln 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.46 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for Lincoln 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 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan.

TABLE C.46: 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
LINCOLN COUNTY	✓	✓		✓	✓			✓				✓			✓	✓	✓	✓		✓	✓	✓	
Lincolnton	✓	✓		✓	✓			✓				✓	✓		✓	✓	✓	✓		✓	✓	✓	

A more detailed discussion on the county's planning and regulatory capabilities follows.

Emergency Management

Hazard Mitigation Plan
Lincoln County has previously adopted a hazard mitigation plan. Lincolnton was also included in this plan.

Emergency Operations Plan
Lincoln County maintains an emergency operations plan through its Emergency Management Department.

General Planning

Comprehensive Land Use Plan
Lincoln County has adopted a county comprehensive land use plan. Lincolnton has also adopted a city land use plan.

Capital Improvements Plan
Lincoln County and Lincolnton have capital improvement plans in place.

Zoning Ordinance
Lincoln County and Lincolnton both have zoning ordinances in place.

Subdivision Ordinance
Lincoln County and Lincolnton both have subdivision regulations in place.

Building Codes, Permitting, and Inspections
North Carolina has a state compulsory building code which applies throughout the state. Lincoln County enforces the building code within city and county jurisdictions.

Floodplain Management

Table C.47 provides NFIP policy and claim information for each participating jurisdiction in Lincoln County.

TABLE C.47: 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
LINCOLN COUNTY†	12/01/81	03/02/09	83	$23,854,700	0	$0
Lincolnton	12/01/81	03/02/09	16	$3,288,300	0	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of 7/22/13; NFIP claims and policy information as of 5/31/13

Flood Damage Prevention Ordinance
All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. Lincoln County and Lincolnton both participate in the NFIP and have adopted flood damage prevention regulations.

Open Space Management Plan
Lincoln County and Lincolnton have signed resolutions of support for the Carolina Thread Trail Master Plan for Lincoln County Communities to work with neighboring communities and with the Carolina Thread Trail to plan, design, and build trails to connect communities.

Stormwater Management Plan
Although Lincoln County and Lincolnton do not have stormwater management plans in place, they both have adopted stormwater management regulations through various local ordinances.

C.4.2 Administrative and Technical Capability

Table C.48 provides a summary of the capability assessment results for Lincoln 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.48: 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
LINCOLN COUNTY	✓	✓	✓	✓	✓		✓	✓	✓	
Lincolnton	✓	✓	✓	✓	✓		✓	✓	✓	

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.49 provides a summary of the results for Lincoln 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.49: 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: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.
LINCOLN COUNTY	✓	✓	✓						✓	✓
Lincolnton	✓	✓	✓						✓	✓

C.4.4 Political Capability

Lincoln County is currently a participant in the National Flood Insurance Program and has adopted the required flood damage prevention ordinance. Additionally, the county has adopted a water supply watershed protection ordinance, a sedimentation and erosion control ordinance, and streamside buffer regulations. These efforts show to some extent both favorable political support and a willingness to adopt hazard mitigation efforts in an active manner.

C.4.5 Conclusions on Local Capability

Table C.50 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 jurisdictions is 38.5, which falls into the moderate capability ranking.

TABLE C.50: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
LINCOLN COUNTY	41	High
Lincolnton	36	Moderate

C.5 LINCOLN COUNTY MITIGATION STRATEGY

This subsection provides the blueprint for Lincoln 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 Council 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

Lincoln County developed five mitigation goals in coordination with the other participating Cleveland Gaston Lincoln Region jurisdictions. The regional mitigation goals are presented in **Table C.51**.

TABLE C.51: CLEVELAND GASTON LINCOLN REGIONAL MITIGATION GOALS

	Goal
Goal #1	Protect the health, safety, and welfare of residents and visitors.
Goal #2	Protect buildings, critical facilities, and infrastructure through cost-effective mitigation actions.
Goal #3	Increase public awareness of hazards and mitigation.
Goal #4	Enhance capabilities of local governments to reduce future impacts and improve effectiveness of mitigation actions.
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.

C.5.2 Mitigation Action Plan

The mitigation actions proposed by Lincoln County and the City of Lincoln are listed in the following individual Mitigation Action Plans.

Lincoln 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	Encourage developers not to modify flood plain and the work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	This action has been completed and is continuously implemented through the enforcement of the County's Streamside Buffer Ordinance.
P-2	Post areas in parks that are subject to the inundation of flood water that warn people of the potential dangers.	Flood	Medium	Recreation	Local	Completed	This action has been implemented in existing County parks and continues to be implemented as new parks are built.
P-3	Develop working relationship with local, state and federal agencies with interests related to emergency management and hazard mitigation, with technologies from which we can all benefit.	All	High	Emergency Management	Local	Completed	This action takes place through County staff's participation in meetings and trainings. One example of implementation is through the County's participation in the development of this regional hazard mitigation plan. Other opportunities for implementation will be monitored and executed pending funding, staff resources and political will.
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2019	LEDA continues to examine this policy. It will be implemented in the future if it is determined to be needed/feasible. It will be reviewed on an annual basis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-5	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	GIS	Local	Completed	This action has been completed. All areas have been identified and mapped, but the action will remain in the plan since updates will be necessary in future updates.
P-6	Maintain inventory of all water and sewer facilities.	All	High	Public Works	Local	Completed	This action has been completed and continues to be implemented as new water/sewer facilities are built. The facilities are inventoried using GIS w/ use of iPads.
P-7	Designate sites for the disposal of debris.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Public Works, Emergency Management	Local	2017	This is a goal of the department going forward. No new debris sites were identified during the last 5 years.
P-8	Annual meetings with critical services, agencies and utilities.	All	High	Emergency Management	Local	2015, Bi-annually	Emergency Management staff holds meetings twice a year with critical services, agencies and utilities and have done so over the past 5 years.
P-9	Determine alternative water sources.	Drought	High	Public Works	Local, Grants	2018	Over the past 5 years, some alternative water sources were identified. The County has interconnections w/ City of Lincolnton, but more should be identified.
P-10	Enforce building codes.	Earthquake	High	P&ID	Local	Completed	The County continues to enforce building codes on a daily basis. The County has hired 2 new inspectors that will come on board within the year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-11	Identify and map areas of steep slopes in the county.	Landslide	High	GIS	Local	Completed	Map created
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Landslide	High	P&ID	Local	2019	Pending funding and staff time. This is a goal of the department. Over the past 5 years, these regulations were not developed.
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All	High	Emergency Management, GIS	Local, Grants	2019	Pending funding and staff time. Requires further data Mining/Digitizing. Over the past 5 years, tracking hazards was done to some extent, but more work is needed to complete.
P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flood	Medium	P&ID	Local	2017	Pending funding and staff time. This is a goal of the department. Implement through Regional Planning Process. Over the past 5 years, this was not achieved
P-15	Organize regular meetings with local fire officials and the North Carolina Division of Forest Resources.	Wildfire	High	Emergency Management, County Forester	Local	2015, Annually	Pending funding and staff time. The County EM holds monthly meetings with local fire officials and NC Div of Forest Resources staff.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans	All	High	County Planning, All Departments	Local	2017	Implementing this action is a goal of the LEPC. Over the past 5 years, some references have been made to mitigation in public policy documents, but much more is necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
P-17	Increase the number of USGS streamflow gages in the county.	Flood	Medium	USGS	Grants, Federal	2018	USGS continues to try to install additional streamflow gages across the state but no new gages in Lincoln County over the past 5 years.
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Works	Local, Grants	2018	Incomplete, little progress over the past 5 years, pending funding. Currently not funded, but we will continue to pursue funding.
P-19	Solicit the support of local representatives to advocate for the support of the General Assembly to include drought as a declarable natural hazard under the Stafford Act.	Drought	Medium	County	Local	2017	Implementing this action is a goal of the LEPC. The LEPC has been advocating this over the past 5 years, but no change has been made yet.
Property Protection							
PP-1	Purchase property located in repetitively flooded areas.	Flood	Low	County	PDM, HMGP Grants	2018	Potential Soil & Water. Over the past 5 years, the county has attempted to acquire funding from NCEM for purchase of property in the floodplain but it has generally not been available.
PP-2	Locate future facilities outside of identified hazard areas.	Flood, Landslide	High	All Departments	Local	Completed	Complete through the enforcement of County Ordinances/Policies.. As of 2014, this action is complete, but it will need to be updated going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PP-3	Continue to prohibit construction in the 100-year flood plain.	Flood	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
PP-4	Encourage the dedication areas that are a part of subdivisions and located in Special Flood Hazard Areas or contain steep slopes to be dedicated as Common Open Space.	Flood, Landslide	High	P&ID	Local	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be continued going forward.
Natural Resource Protection							
NRP-1	Enforce forestry laws, regulations and programs.	Wildfire	High	County Forester	State	Completed	Complete through the enforcement of County Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially near critical facilities.	Winter Storm and Freeze, Hurricane, Thunderstorm	High	NCDOT	Local	Implement directly after storm event	Implemented through existing NCDOT policies and procedures. NCDOT initiates road clearing efforts as early as possible and plans to continue to do so.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
ES-2	Assist in development of plans for backup fuel and power generation	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2019	Implemented through an existing Generator Agreement w/ State and Local vendors. No additional updates to agreement over past 5 years. A Fuel Plan is being developed by County Manager's Office pending staff time. Fuel plan should be completed by 2019.
Structural Projects							
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flood	Medium	NCDOT	State	2015, Apply annually for funding to complete projects	Pending funding. Although funding is not always available, NCDOT continues to attempt to address repetitive problem areas and has done so in some cases over the past 5 years.
S-2	Require underground utilities be installed in all new subdivisions.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	P&ID	Local	Completed	Action completed County Ordinance requires utilities in new subdivisions be located underground.
S-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2017	As of 2014, currently active w/ City of Lincolnton, exploring other opportunities going forward.
Public Education and Awareness							
PEA-1	Educate property owners whose property lies within Special Flood Hazard Areas of the dangers of modification of those areas.	Flood	Medium	P&ID	Local, Grants	2016, Re-educate as new maps are produced	Completed, but this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-2	Notify all property owners with structures located in the 100-year flood plain of the importance of flood insurance.	Flood	Low	P&ID	Local, Grants	2016, Re-educate as new maps are produced ing	Completed, this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.
PEA-3	Encourage purchase of Weather Alert Radios.	All	Medium	Emergency Management	Local, Grants	2015 with Annual review and update	Pending funding. Weather Alert radios were given out several years ago to key facilities. To provide more radios is pending funding but there will be another campaign to attempt to encourage weather radio use.
PEA-4	Educate citizens of the dangers of flash flooding on their property and along roadways.	Flood	Medium	Emergency Management	Local	Completed	Education Outreach Annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet.
PEA-5	Educate citizens about the importance of water conservation and the methods which are most effective.	Drought	High	Public Works	Local	Completed	Pending funding Clean Water Management Trust Fund, New Rate Structure, Website information. Outreach has been performed through a number of mediums including TV, radio, print, and internet.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Encourage the removal or trees and branches that could down power lines.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding Local Power Companies conduct survey of all power lines annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-7	Publicize and properly sign the location of emergency shelters.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding All shelter locations are responsibility of the Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-8	Educate public of road clearing priorities through use of a map.	Winter Storm and Freeze	Medium	NCDOT	State	2018	Pending funding Although a map is not available, an explanation of how prioritization works is available on NCDOT's website. Outreach has been performed through a number of mediums including TV, radio, print, and internet. A map is in the works.

City of Lincolnton Mitigation Action Plan

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Prevention							
P-1	Encourage developers not to modify flood plain and to work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	This action has been completed and is continuously implemented through the enforcement of the County's Streamside Buffer Ordinance.
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P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2019	LEDA continues to examine this policy. It will be implemented in the future if it is determined to be needed/feasible. It will be reviewed on an annual basis.

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P-5	Identify and map critical facilities and locations and determine their proximity to hazard areas.	All	High	GIS	Local	Completed	This action has been completed. All areas have been identified and mapped, but the action will remain in the plan since updates will be necessary in future updates.
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P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flood	Medium	P&ID	Local	2017	Pending funding and staff time. This is a goal of the department. Implement through Regional Planning Process. Over the past 5 years, this was not achieved
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PEA-5	Educate citizens about the importance of water conservation and the methods which are most effective.	Drought	High	Public Works	Local	Completed	Pending funding Clean Water Management Trust Fund, New Rate Structure, Website information. Outreach has been performed through a number of mediums including TV, radio, print, and internet.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
PEA-6	Encourage the removal or trees and branches that could down power lines.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding Local Power Companies conduct survey of all power lines annually. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
PEA-7	Publicize and properly sign the location of emergency shelters.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2015, Annual review and update of outreach strategies	Pending funding All shelter locations are responsibility of the Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, but new mediums will be evaluated.
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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 Cleveland, Gaston, and Lincoln 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 three-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 October 4, 2013 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 *Cleveland Gaston Lincoln 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 Cleveland County
- ❑ Unincorporated Gaston County
- ❑ Unincorporated Lincoln County
- ❑ Belmont
- ❑ Belwood
- ❑ Bessemer City
- ❑ Boiling Springs
- ❑ Casar
- ❑ Cherryville
- ❑ Cramerton
- ❑ Dallas
- ❑ Earl
- ❑ Fallston
- ❑ Gastonia
- ❑ Grover
- ❑ High Shoals (Gaston Co.)
- ❑ High Shoals (Lincoln Co.)
- ❑ Kings Mountain (Cleveland Co.)
- ❑ Kings Mountain (Gaston Co.)
- ❑ Kingston
- ❑ Lattimore
- ❑ Lawndale
- ❑ Lincolnton
- ❑ Lowell
- ❑ Maiden
- ❑ McAdenville
- ❑ Mooresboro
- ❑ Mount Holly
- ❑ Patterson Springs
- ❑ Polkville
- ❑ Ranlo
- ❑ Shelby
- ❑ Spencer Mountain
- ❑ Stanley
- ❑ Waco
- ❑ Other

Have you ever experienced or been impacted by a disaster?

- ❑ Yes
- ❑ No

a. If "Yes," please explain:

2. How concerned are you about the possibility of our community being impacted by a disaster?

- ❑ Extremely concerned
- ❑ Somewhat concerned
- ❑ Not concerned

3. Please select the <u>one</u> hazard you think is the *highest threat* to your neighborhood:

- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Earthquake
- ❑ Erosion
- ❑ Flood
- ❑ Hailstorm
- ❑ HAZMAT
- ❑ Hurricane / Tropical Storm
- ❑ Land Subsidence / Sink Holes
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter / Ice Storm
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildfire

4. Please select the <u>one</u> hazard you think is the *second highest threat* to your neighborhood:

- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Earthquake
- ❑ Erosion
- ❑ Flood
- ❑ Hailstorm
- ❑ HAZMAT
- ❑ Hurricane / Tropical Storm
- ❑ Land Subsidence / Sink Holes
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter / Ice Storm
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildfire

5. Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

- ❑ Yes (please explain): _____
- ❑ No

6. Is your home located in a floodplain?

- ❑ Yes
- ❑ No
- ❑ I don't know

7. 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): _____

8. Have you taken any actions to make your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

b. If "Yes," please explain:

9. Are you interested in making your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

10. Do you know what office to contact regarding reducing your risks to hazards in your area?

- ❑ Yes
- ❑ No

11. 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): _____

12. 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?

13. 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?

14. 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
Cleveland, Gaston, Lincoln 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 the Cleveland Gaston Lincoln Region will consider to reduce the negative effects 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 Council 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 no later than December 13, 2013 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

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

Cleveland, Gaston, Lincoln, Regional Hazard Mitigation Plan
Hazard Mitigation Council Meeting

July 9, 2013
10:00 PM – Noon

1) **Introductions**

2) **Overview of Mitigation/Icebreaker Exercise**

3) **Project Overview**
   a) Key Objectives
   b) Project Tasks
   c) Project Schedule
   d) Project Staffing

4) **Data Collection**
   a) GIS Data Inventory
   b) Capability Assessment Survey
   c) Public Participation Survey
   d) Existing Mitigation Actions

5) **Roles & Responsibilities**
   a) Atkins
   b) County Leads
   c) Participating Jurisdictions

6) **Next Steps**
   a) Data collection efforts
   b) Begin public outreach
   c) Discuss next Hazard Mitigation Council meeting

7) **Questions, Issues, or Concerns**

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AGENDA

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan
Hazard Mitigation Council Mitigation Strategy Meeting

November 19, 2013
10:00 AM – 12:00 PM

1) **Introductions**

2) **Mitigation Overview**

3) **Project Schedule**

4) **Risk Assessment Findings**

5) **Capability Assessment Findings**

6) **Public Involvement Activities**

7) **Mitigation Strategy**

8) **Next Steps**

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Meeting Minutes
Cleveland Gaston Lincoln Regional Hazard Mitigation Plan
Project Kickoff Meeting
July 9, 2013

Nathan Slaughter. Project Manager from the project consulting team, Atkins started the meeting by welcoming the representatives from the Counties, participating municipal jurisdictions and other stakeholders. Mr. Slaughter led the kickoff meeting and began by providing 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, project description, and presentation slides). He then asked each of the meeting attendees to introduce themselves. Following introductions, he provided a brief overview of mitigation and discussed the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

He discussed the key objectives of the planning process and gave a list of the participating jurisdictions for the regional plan and asked if there were any changes that needed to be made to the list. There was discussion about whether or not Spencer Mountain should be included in the plan because they do not have a governing body that could adopt the plan. It was determined that we will move forward as if they are participating and if they decide not to participate, we will address that issue when the time comes.

Mr. Slaughter then explained the six different categories of mitigation techniques (emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection) and gave examples of each. This explanation culminated to an Ice Breaker Exercise for the attendees.

Mr. Slaughter instructed attendees on how to complete the exercise. Attendees were given an equal amount of fictitious FEMA money and asked to spend it in the various mitigation categories. Money could be thought of grant money that communities received towards mitigation. Attendees were asked to target their money towards areas of mitigation that are of greatest concern for their community. Ideally, the exercise helps pinpoint areas of mitigation that the community may want to focus on when developing mitigation grants. The Ice Breaker Exercise results were to be reviewed and presented at the conclusion of the meeting.

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 and action plan, and plan maintenance procedures.

The project schedule was presented along with the project staffing chart, which demonstrates the number of experienced individuals that will be working on this project. Mr. Slaughter then reviewed the roles and responsibilities of Atkins, the counties, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development, which included determining the members of the Hazard Mitigation Planning Team that should be present for the next meeting, addressing issues of regulation compliance, and fulfilling data collection needs.

The meeting was adjourned.

Meeting Minutes
Cleveland Gaston Lincoln Regional Hazard Mitigation Plan
Mitigation Strategy Meeting
November 19, 2013

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

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

- EXTREME HEAT. There has only been one recorded extreme heat event reported since 1999 that resulted in one injury. Additional significant heat waves were reported in 1980, 1998, 2000, 2007 and 2012. Future occurrences are possible.

- HAILSTORM. There have been 373 recorded events since 1962. Future occurrences are highly likely.

- LIGHTNING. There have been 53 recorded lightning events since 1993, causing twelve injuries, and $2.9 million in reported property damages. Future occurrences are highly likely.

- TORNADOES. There have been 51 recorded tornado events reported in the region since 1956. $124.3 million in property damages. 5 deaths and 77 injuries have been reported. Future occurrences are likely.

- HURRICANES AND TROPICAL STORMS. NOAA data shows that 35 storm tracks have come within 75 miles of the Cleveland Gaston Lincoln Region since 1850. 13 of these events were tropical storms and 22 were tropical depressions. Future occurrences are possible.

- SEVERE THUNDERSTORM WINDS. There have been 522 severe thunderstorm events reported since 1955 with $2.7 million in reported property damages. 2 deaths and 10 injuries have been reported. Future occurrences are highly likely.

- WINTER STORM. There have been 151 recorded winter events in the Cleveland Gaston Lincoln Region since 1993 resulting in $64.1 million in reported property damages. Future occurrences are likely.

- EARTHQUAKES. There have been 28 recorded earthquake events in the Cleveland Gaston Lincoln Region since 1886. The strongest had a recorded magnitude of VII MMI. Future occurrences are possible.

- LANDSLIDE. There have been no recorded landslide events in the Cleveland Gaston Lincoln Region. Mr. Wiedenman asked the Regional Hazard Mitigation Council to provide local information on landslide events, if available. Future occurrences are possible.

- DAM FAILURE. There are 234 dams in the Cleveland Gaston Lincoln Region, 50 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 the previous County level plans but impacts are minimal. Future occurrences are possible.

- FLOOD. There have been 53 flood events recorded in the Cleveland Gaston Lincoln Region since 1993, resulting in $3.7 million in property damage. There have been 46 NFIP losses since 1978 and approximately $511,000 million in claims. Two repetitive loss properties in the region account for 5 of the recorded losses. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS. There have been 21 reported hazardous materials events reported in the region. Only 1 was reported as a serious incident. Future occurrences are possible. A question was raised about why the buffers of 500 and 2500 meters were used for analysis. Meeting participants asked that buffers of ½ mile and a mile be used.

- WILDFIRE. There is an average of 160 fires per year reported in the Cleveland Gaston Lincoln Region. Future occurrences are likely but major events are not common.

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 Winter Storms and Freeze, followed by Severe Thunderstorm, Flood and Tornado. Wildfire was moved from a high risk hazard to a moderate 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 in the moderate range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and grant writers. 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.

Mr. Slaughter also 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, 291 responses had been received. Based on preliminary survey results, respondents felt that severe thunderstorms posed the greatest threat to their neighborhood, followed by tornado, severe winter/ice storms and flood. 80 percent of the respondents were interested in making their homes more resistant to hazards. However, 73 percent don't know who to contact regarding reducing their risks to hazards.

Mr. Slaughter then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Council 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 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 three existing county plans. The Regional Hazard Mitigation Council accepted the proposed goals for the regional plan. Mr. Slaughter then provided an overview and examples of suggested mitigation actions specifically tailored for Cleveland, Gaston and Lincoln 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 December 13, 2013. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by December 13, 2013.

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

Cleveland, Gaston, Lincoln - Kickoff July 9, 2013

Name	Agency	City	Phone Number	E-mail Address
Robert Robinson	Cramerton PD	Cramerton * Mt Holly *	704 824 7964	rrobinson@cramertonpd.org
Felicia Daniels	NCEM	Raleigh, NC	919-825-2324	felicia.daniels@ncdps.gov
Tommy Almond	Gaston County EM	Gastonia	704-862-6240	tommy.almond@co.gaston.nc.us
Ben Blackburn	City of Cherryville	Cherryville	704-435-1710	bblackburn@cityofcherryville.com
Quentin Cash	Cherryville Fire	Cherryville	(980) 522-7474	cashqac@yahoo.com
Jeff Cash	Cherryville Fire	Cherryville	(704) 435-1730	jcash@cityofcherryville.com
Eric Hendrix	Gaston Co. FMO	Gastonia	704-713-5660	EHENDRIX@GCPS.ORG
Terry Revis	Mount Holly Fire	Mount Holly	704 964 1660	tRevis@carolina.rr.com
Jim Benfield	Mount Holly Police	Mount Holly	704-827-4343	Jim.benfield@mtholly.us
Kevin Krouse	Bessemer City		704-629-5542	kkrouse@bessemercity.com

Name	Agency	City	Phone Number	E-mail Address
Chris Henderson	Lincoln County Public Works		704-736-8497	Chenderson@lincolncounty.org
Margaret Royster	Amer. Red Cross		704-691-8756	Margaret.Royster@Redcross.org
MARK CARPENTER	CITY OF LINCOLNTON		704-736-8930	MarkCarpenter@ci.lincolnton.nc
Steve Jertsch	Gaston Cnty Police		704-866-3306	SJertsch@GCPS.org
Craig Austin	Belmont Fire Dept		704-825-0502	Caustin@cityofbelmont.org
Keith Watts	GASTONIA FIRE		980-522-0263	WATTS-GARY@cityofgastonia.com
Willie King Jr.	Gaston County		704.862.5510	willie.King@gastongov.net
David L. William	Gaston County		704 866-3473	david.williams@cu.gaston.nc.us
Rob Boff	City of Lincolnton		704 736-8940	robboff@ci.lincolnton.nc.u
David Wahler	Town of Dallas		704 922-3176	dallasplanning@dallasNC.net
Craig Morehead	Cleveland County Amer. Red Cross			craig.morehead@Redcross.org

Name	Agency	City	Phone Number	E-mail Address
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Teresa Vassey	Cleveland Co. EM	Shelby	704-484-4841	Teresa.Vassey@ clevelandcounty.com
Capt. D. Bates	Lowell P.D.	Lowell	704-506-3143	bates@lowellpd.org
Rick McSwain	Lincoln SWCD	Lincolnton	704-736-8501	rmcswain@lincolncounty.org
Bobby Horton	Cleveland Co EM (Town of Patterson Springs)	Shelby	704-484-4841	Bobby.Horton@ClevelandCounty.com
Randy Williams	LIN. Co. PLNG		704 736 8472	rwilliams@ lincolncounty.org
Josh Grant	LIN. Co. PLNG		704 736 8420	jgrant@ lincolncounty.org
Andrew C. Bryant	Lincoln County Planning	Lincolnton	(704) 736-8726	abryant@lincolncounty.org
Martha Lide	Lincoln County Manager's Office (County)		704-736-8469	mlide@lincolncounty.org
STEVE PEELER	~~City of Lincolnton~~ PUBLIC WORKS AND UTILITIES	LINCOLNTON	704-736-8940	STEVEPEELER@C.L. LINCOLNTON.NC.US

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan
Hazard Mitigation Council Mitigation Strategy Meeting

November 19, 2013
10:00 AM - 12:00 PM

Name	Agency	City	Phone Number	E-mail Address
Rick H. McSwain	Lincoln soil & water cons.	Lincolnton	704-736-8501	rmcswain@lincolncounty.org
Perry Davis	Cleve Co. EM	Shelby	704-484-4841	Perry.Davis@clevelandcounty.com
Rodney Robinson	Town of Cramerton Cramerton P.D	Cramerton	704 824 7964	rrobinson@cramertonpd.org
Jeff Cash	Cherryville FD	Cherryville	704 435-1730	jcash@cityofcherryville.com
Quentin A. Cash	Cherryville FD	Cherryville	(704) 435-1730	qcash@cityofcherryville.com
Randy Williams	Lincoln Co. Planning	Lincoln	704 736 8472	rwilliams@lincolncounty.org
Andrew C. Bryant	Lincoln County Planning	Lincoln	704-736-8726	abryant@lincolncounty.org
Josh Grant	Lincoln County Planning	Lincoln	704 736 8420	jgrant@lincolncounty.org

Name	Agency	City	Phone Number	E-mail Address
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MARK CARPENTER	CITY OF LINCOLNTON	LINCOLNTON	704-736-8930	markcarpenter@ci.lincolnton.nc.us
Erma Deen Hoyle	Lincoln County Parks & Recreation	Lincolnton	704-748-1520	edhoyle@lincolncounty.o
Steve Jarboe	Gaston County Police	Gastonia	704-866-3320	SJarboe@GCPS.org
Don Chamblee	Lincoln County	Lincolnton	7047368495	DChamblee@LincolnCounty.gov
David L. William	Gaston	Gastonia	704 866-3473	david.williams@co.gaston.nc.us
Willie King Jr.	Gaston	Gastonia	704.862.5510	willie.King@co.gaston.nc.us
Felicia Daniels	NCEM	Raleigh	919-825-2324	Felicia.Daniels@ncdps.gov



Photo Source: FEMA

Cleveland Gaston Lincoln 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
- 291 completed surveys received

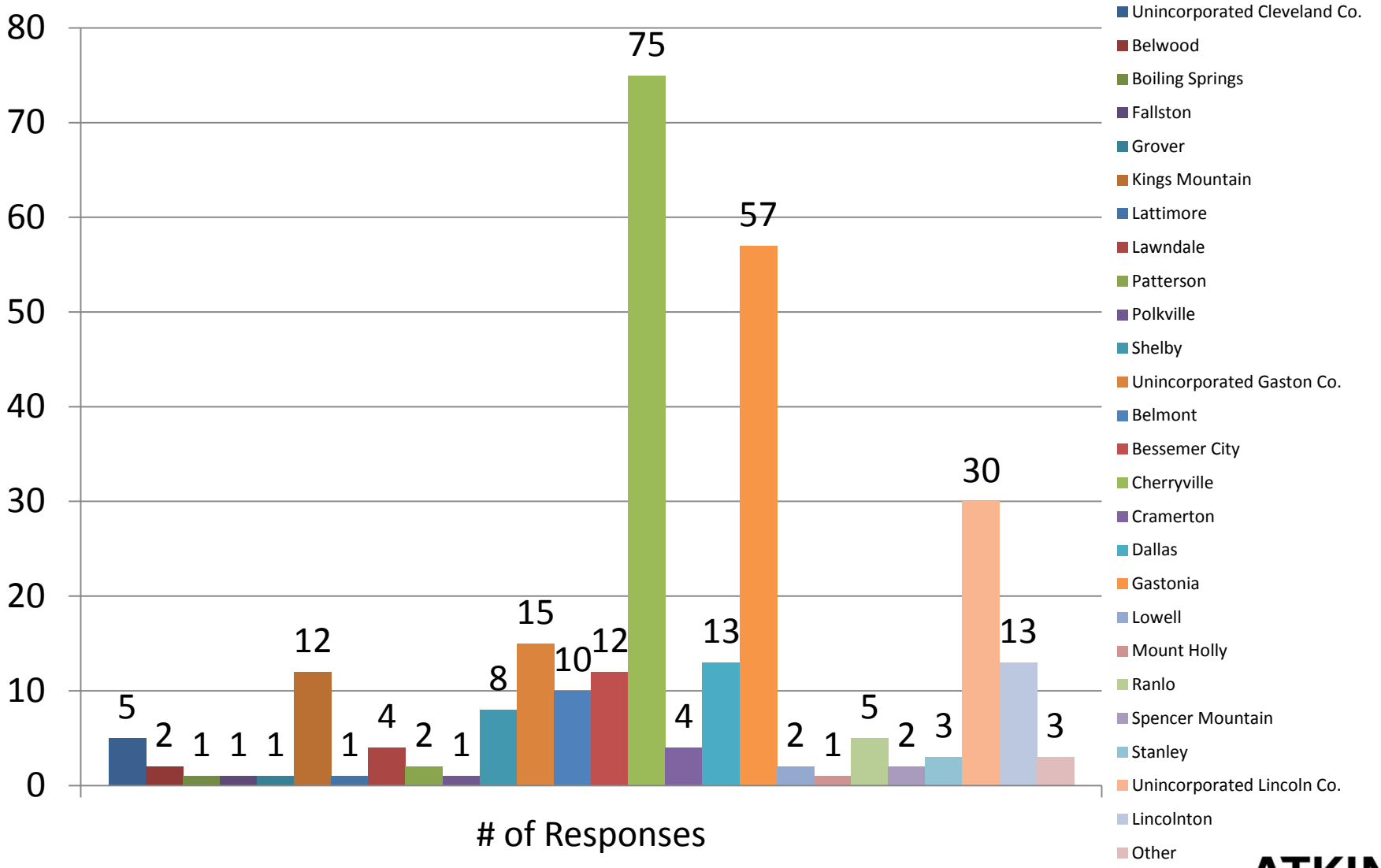
ATKINS

Public Participation Survey Highlights

- 80% of respondents are interested in making their homes more resistant to hazards
- 24% have already taken action to make their homes more hazard resistant
- 73% do not who to contact regarding risk reduction

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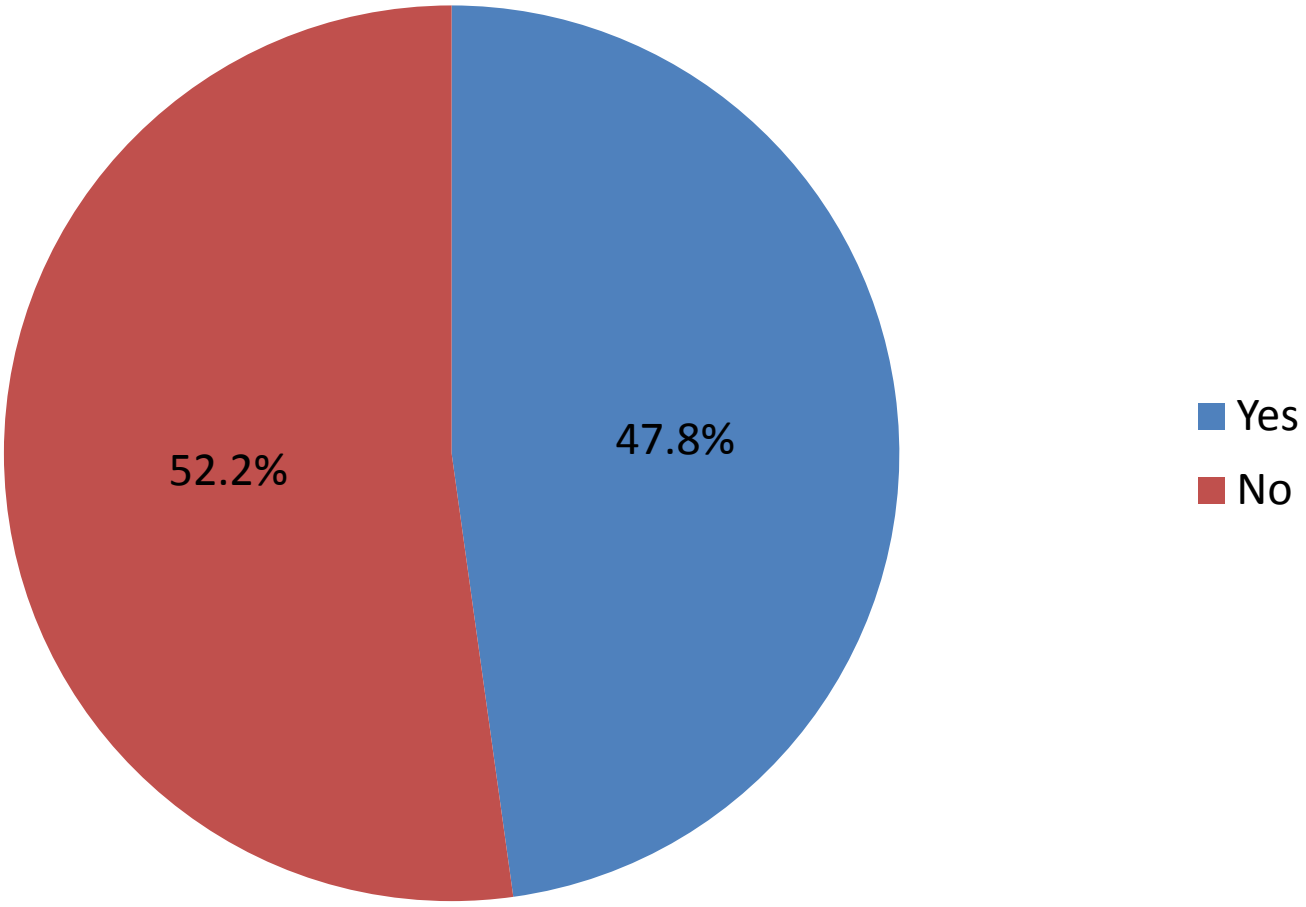
1. Where do you live?



*Note: No responses were received from those jurisdictions not listed

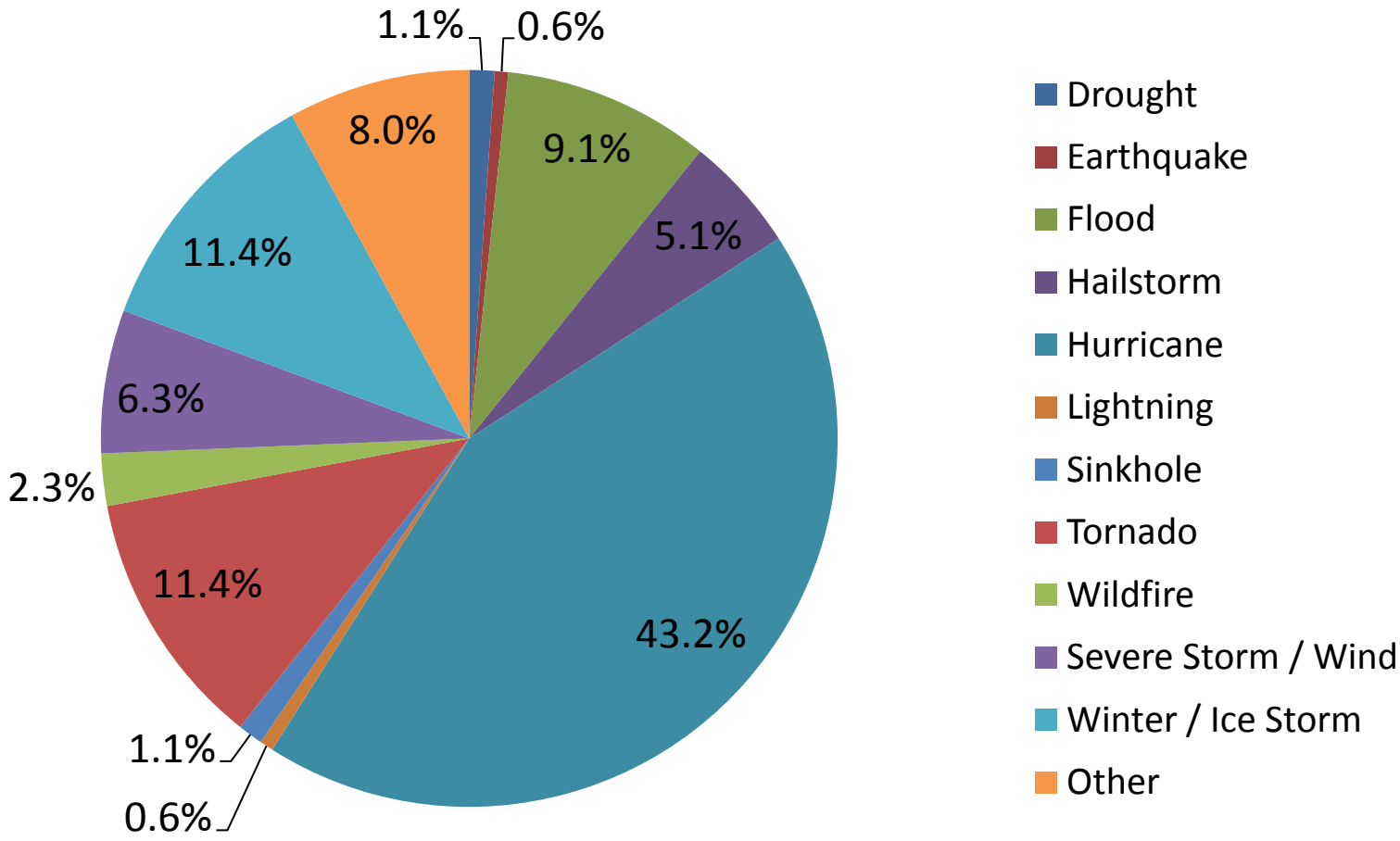
ATKINS

2. Have you experienced a disaster?



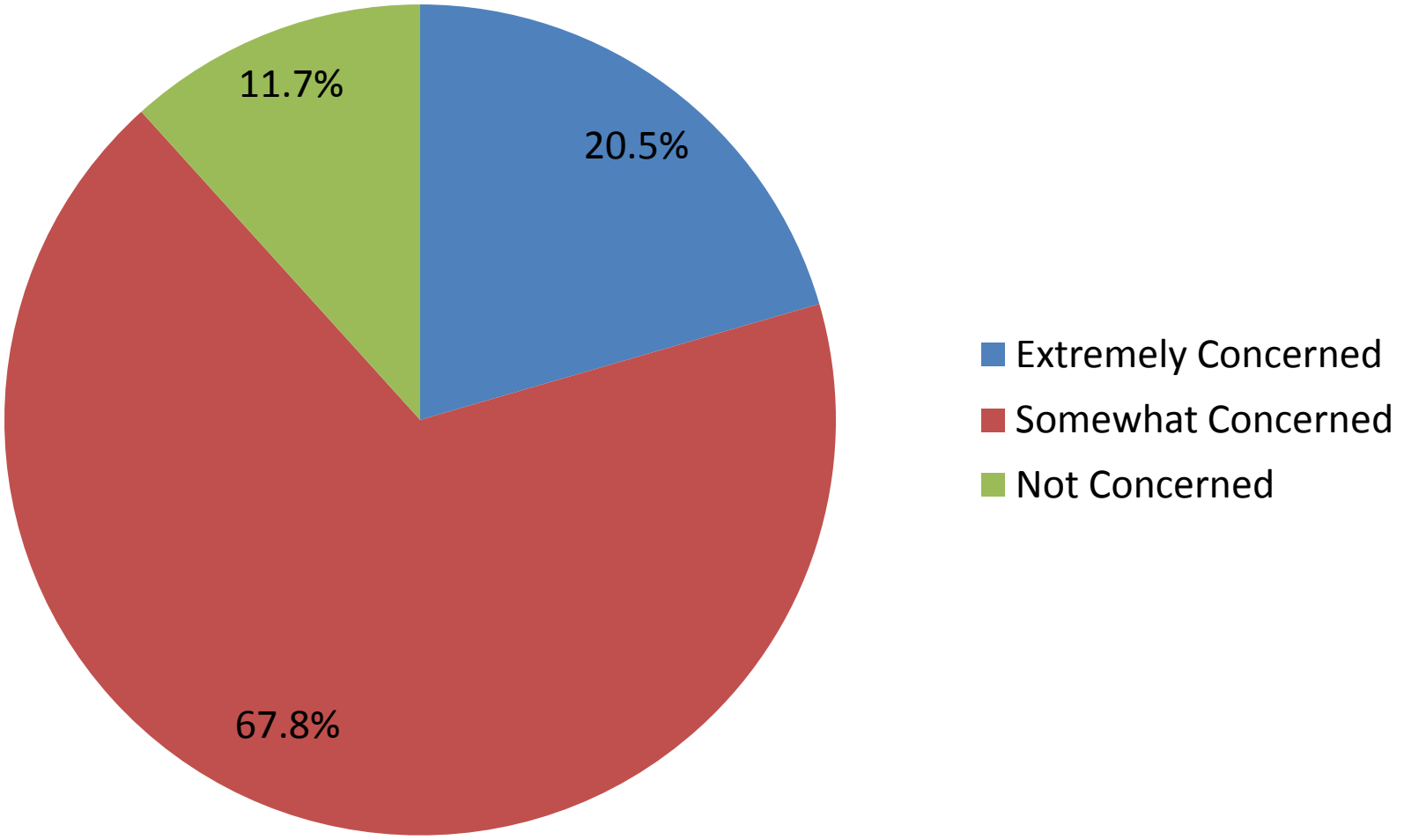
ATKINS

2. Examples of disasters experienced



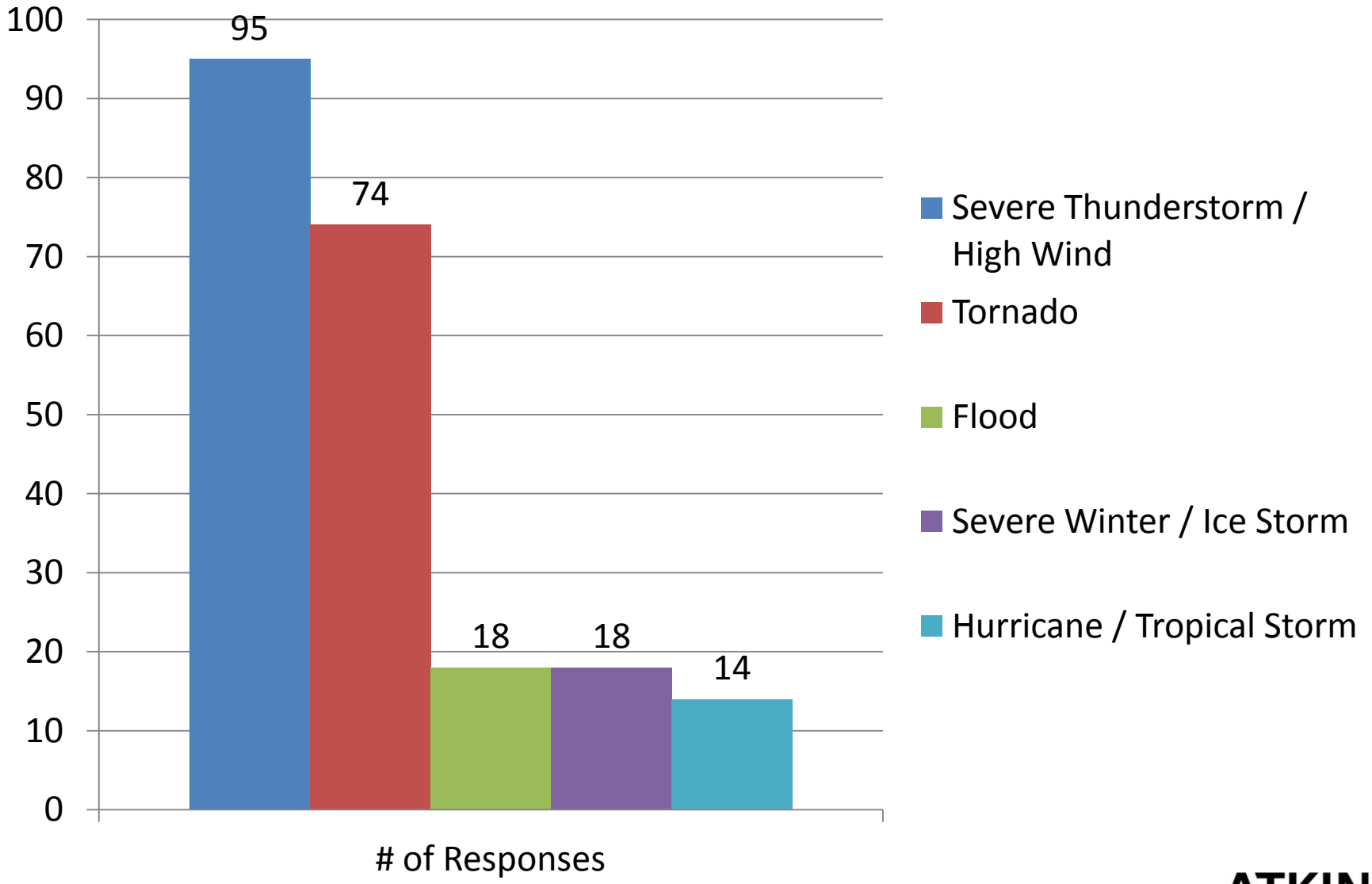
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3. How concerned about possibility of disaster?



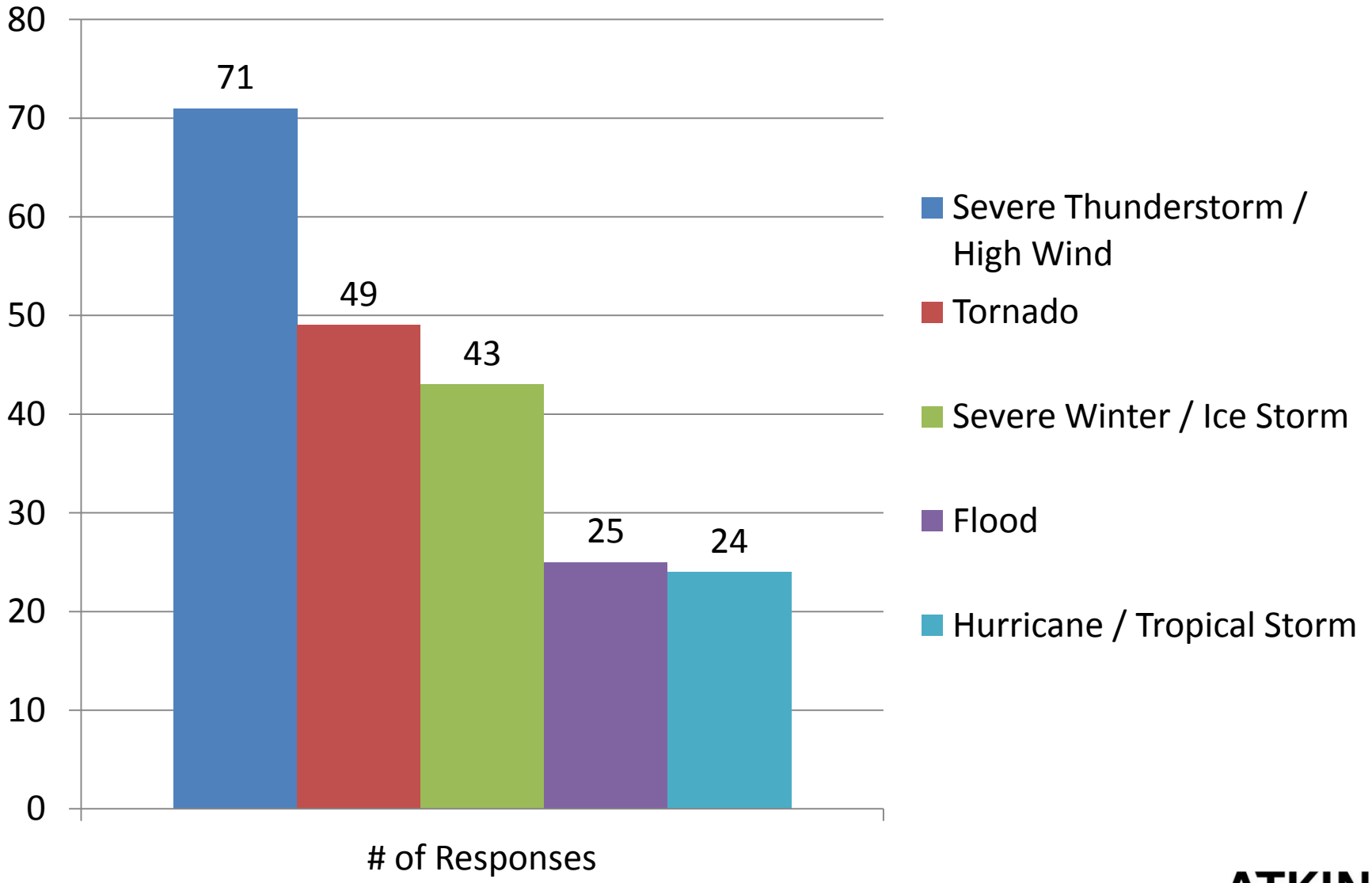
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4. Highest hazard threat?



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5. Second highest hazard threat?



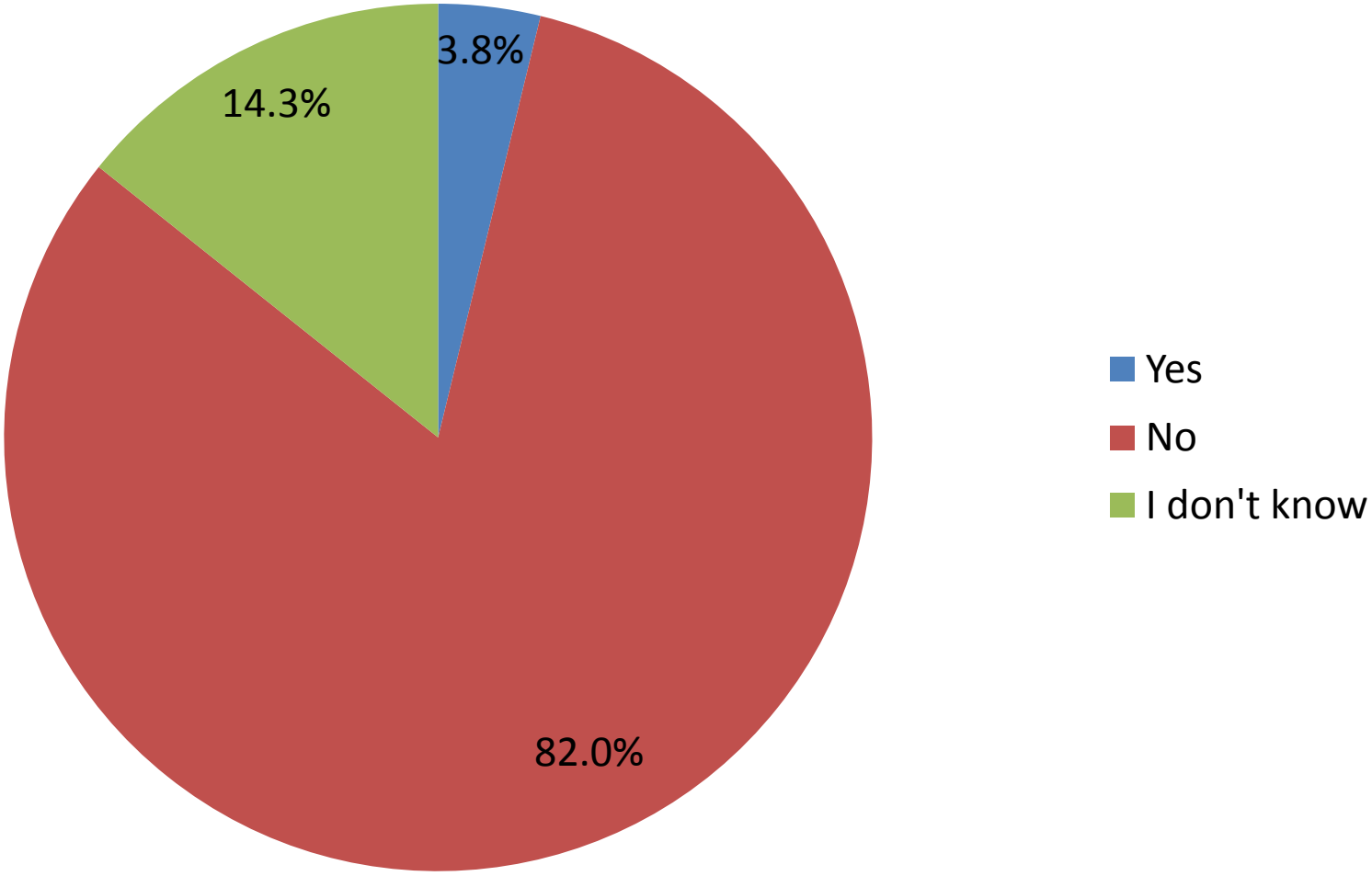
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6. Other hazards not listed?

- Nuclear
- Terrorism
- Civil unrest
- Crime
- Communicable disease
- Pollution
- Bad urban planning / development in floodplains
- Power failures
- Aircraft crash

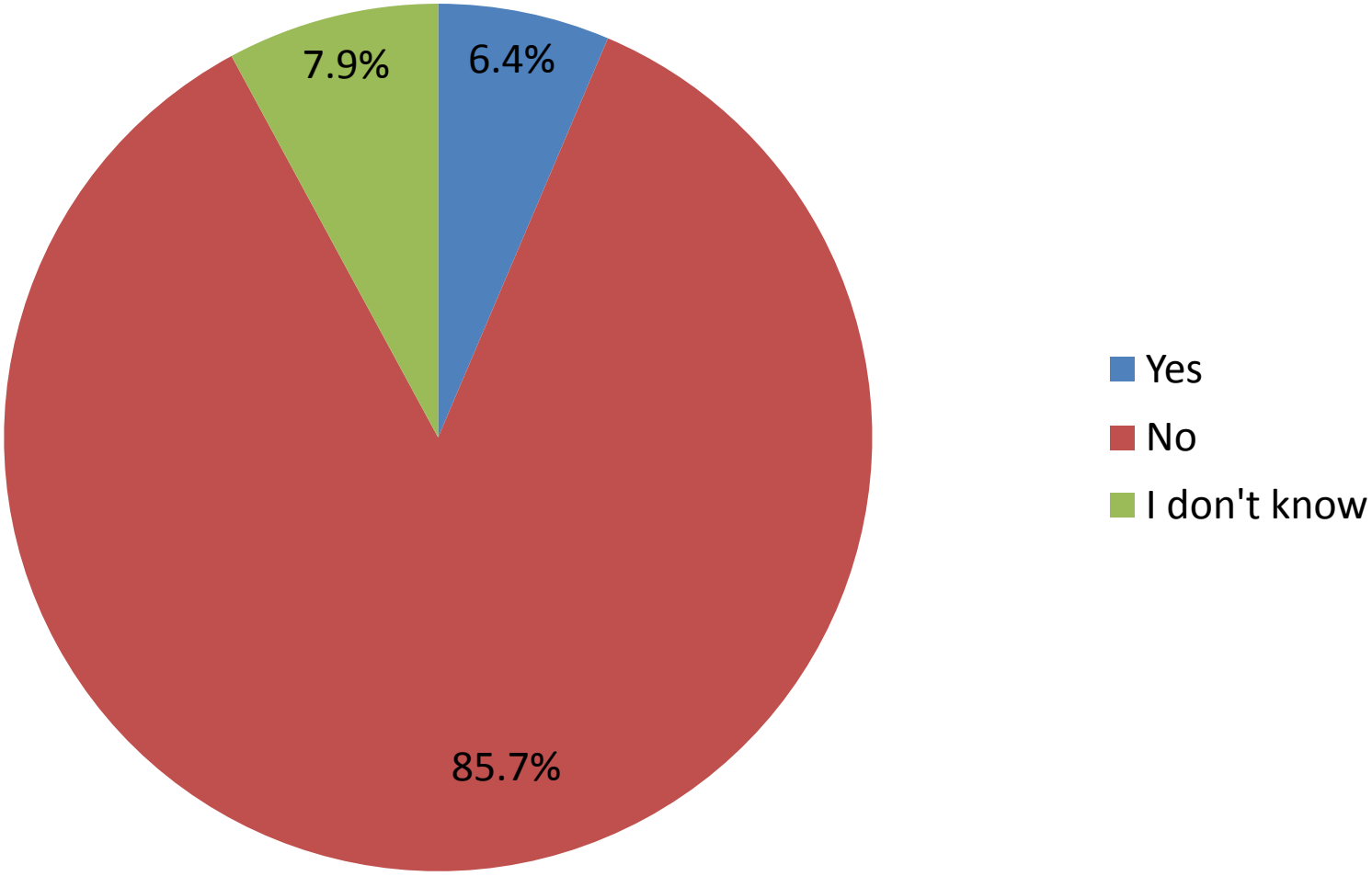
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7. Is your home in a floodplain?



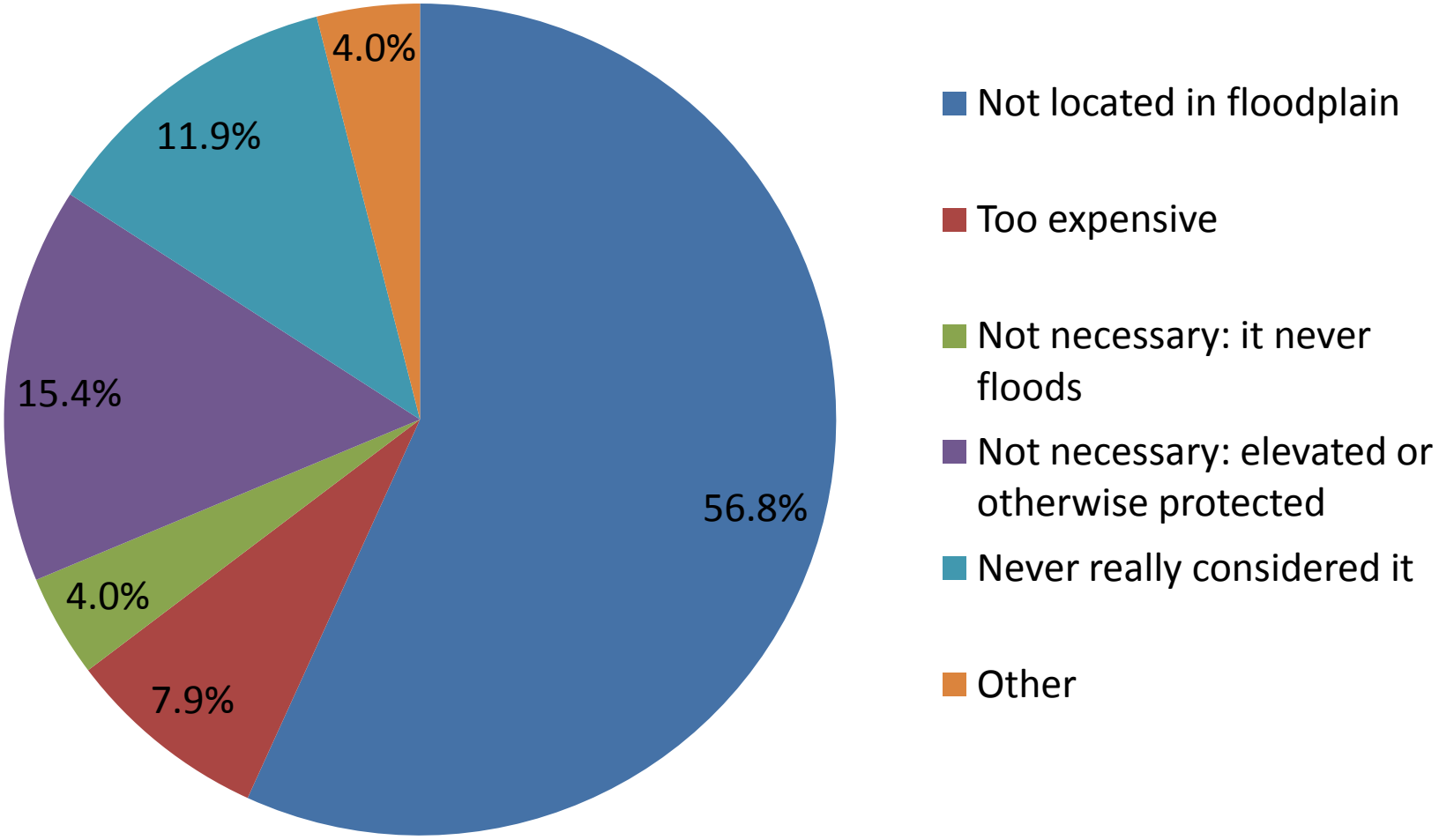
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8. Do you have flood insurance?



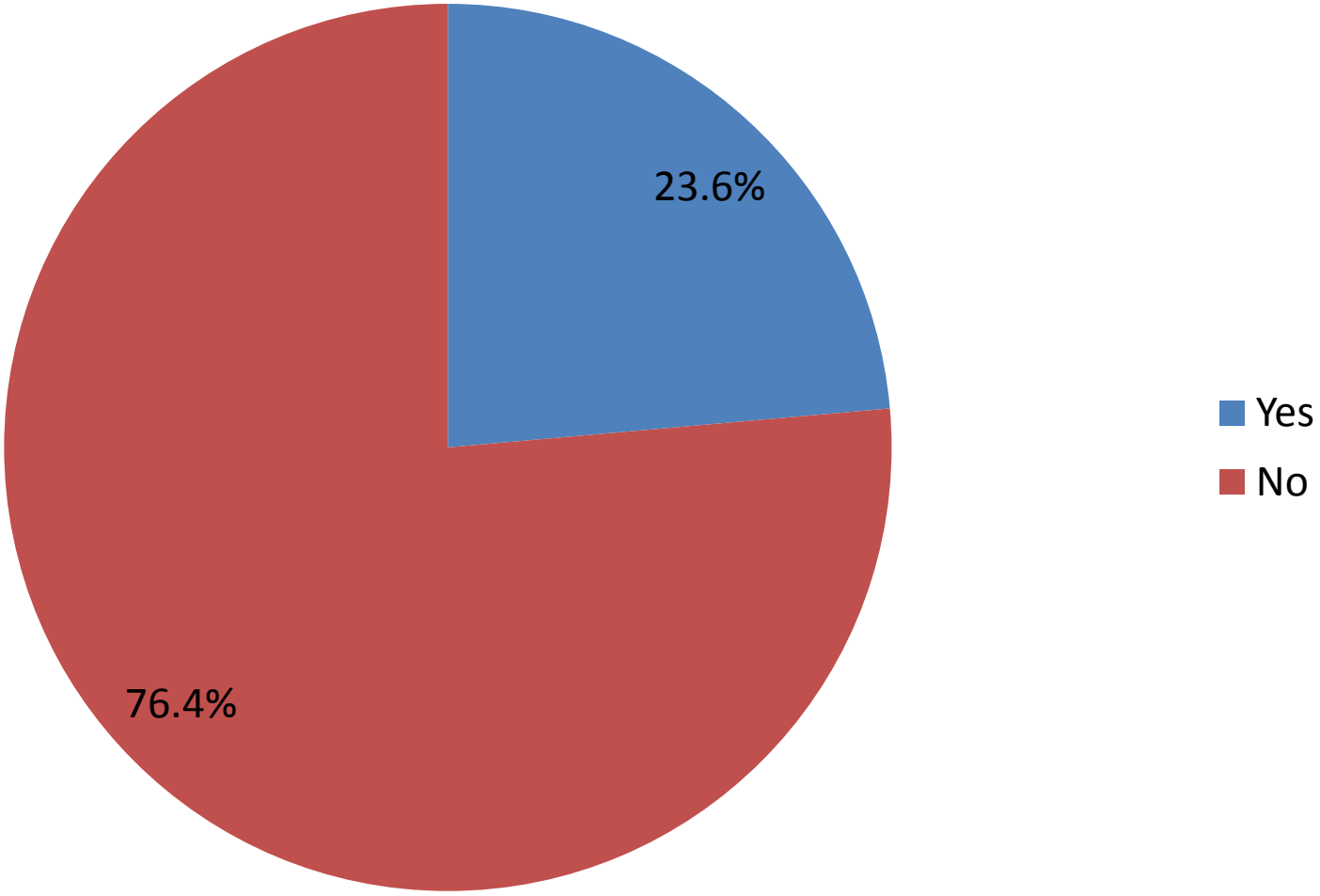
ATKINS

8. Why no flood insurance?



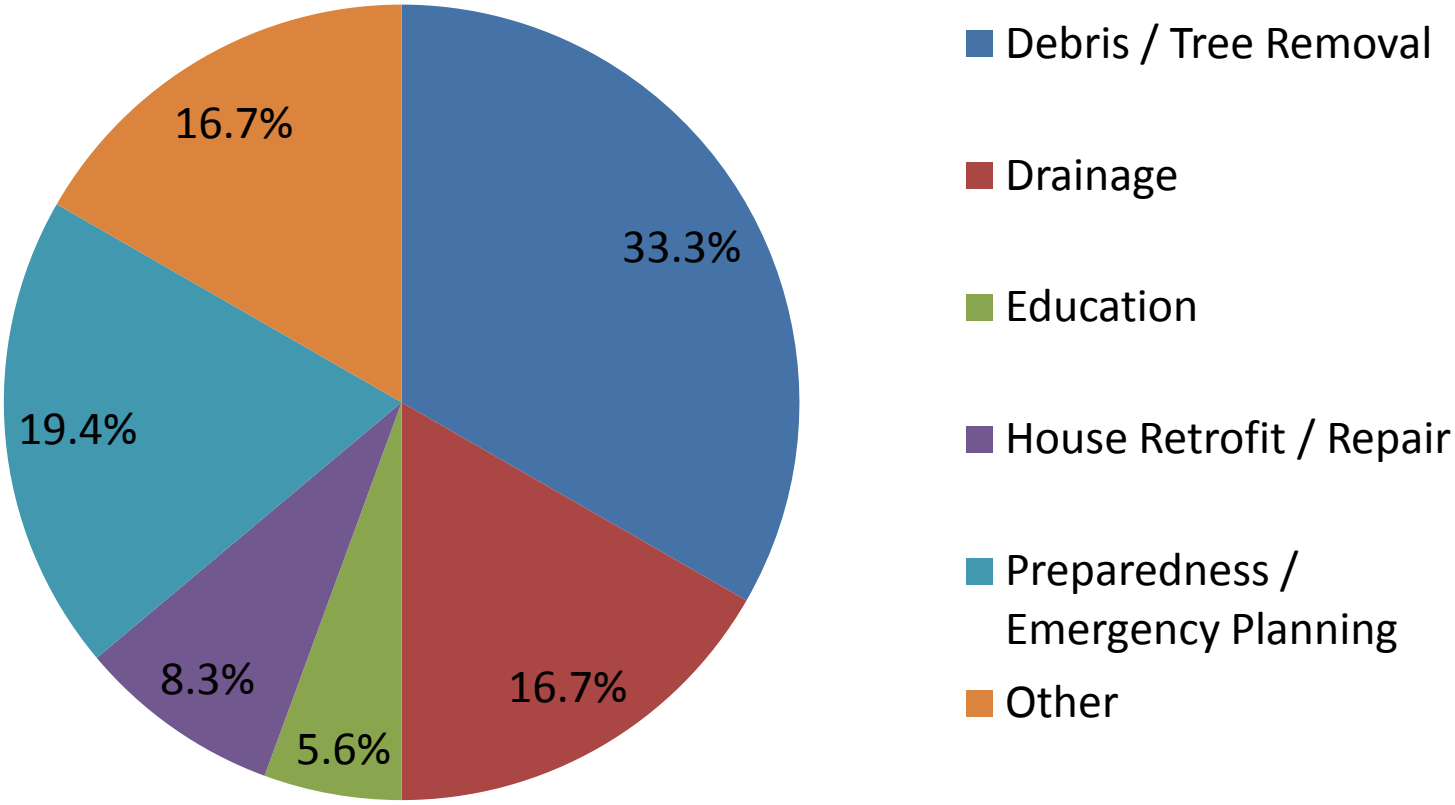
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9. Taken action to be more hazard resistant?



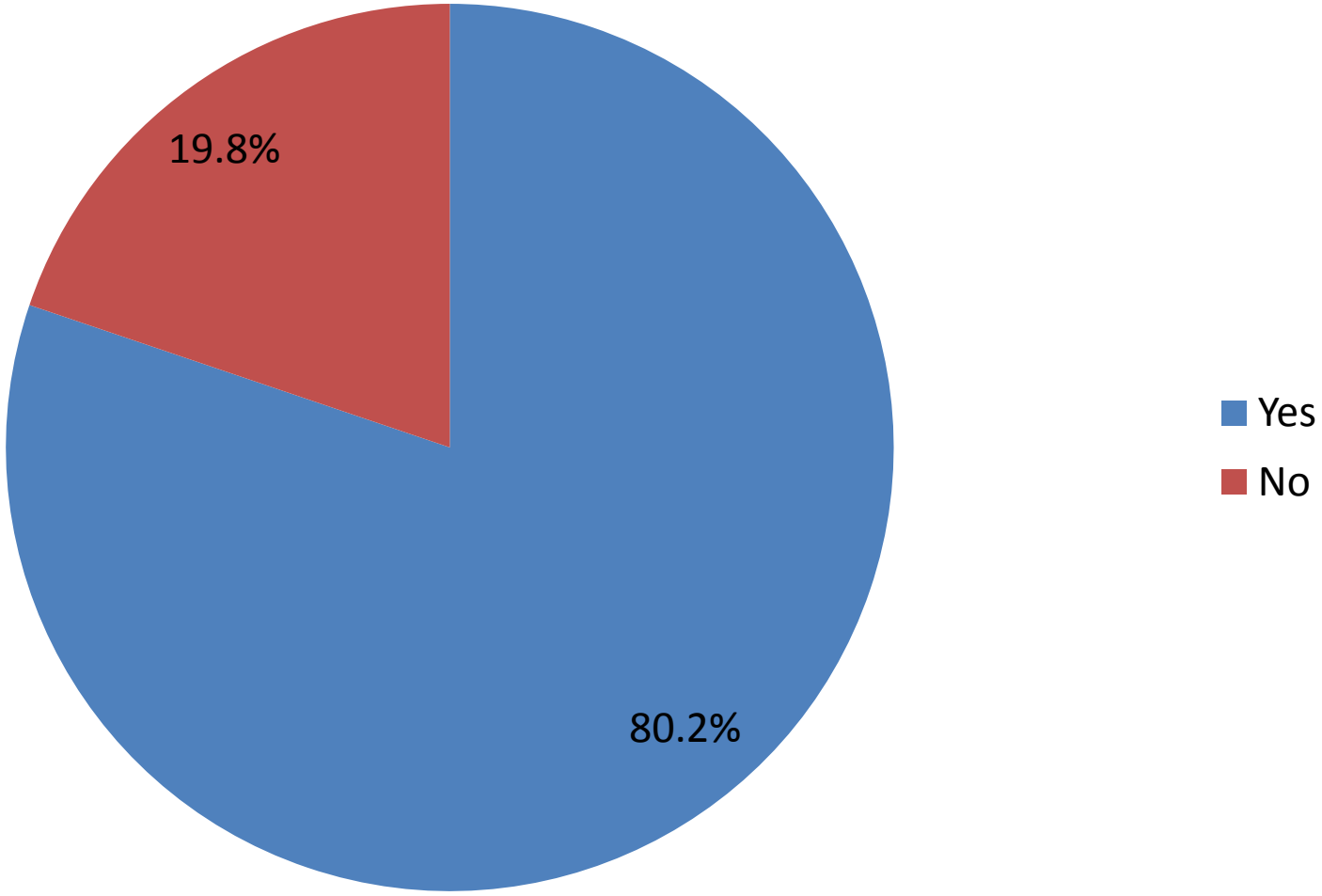
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9. Examples of actions taken



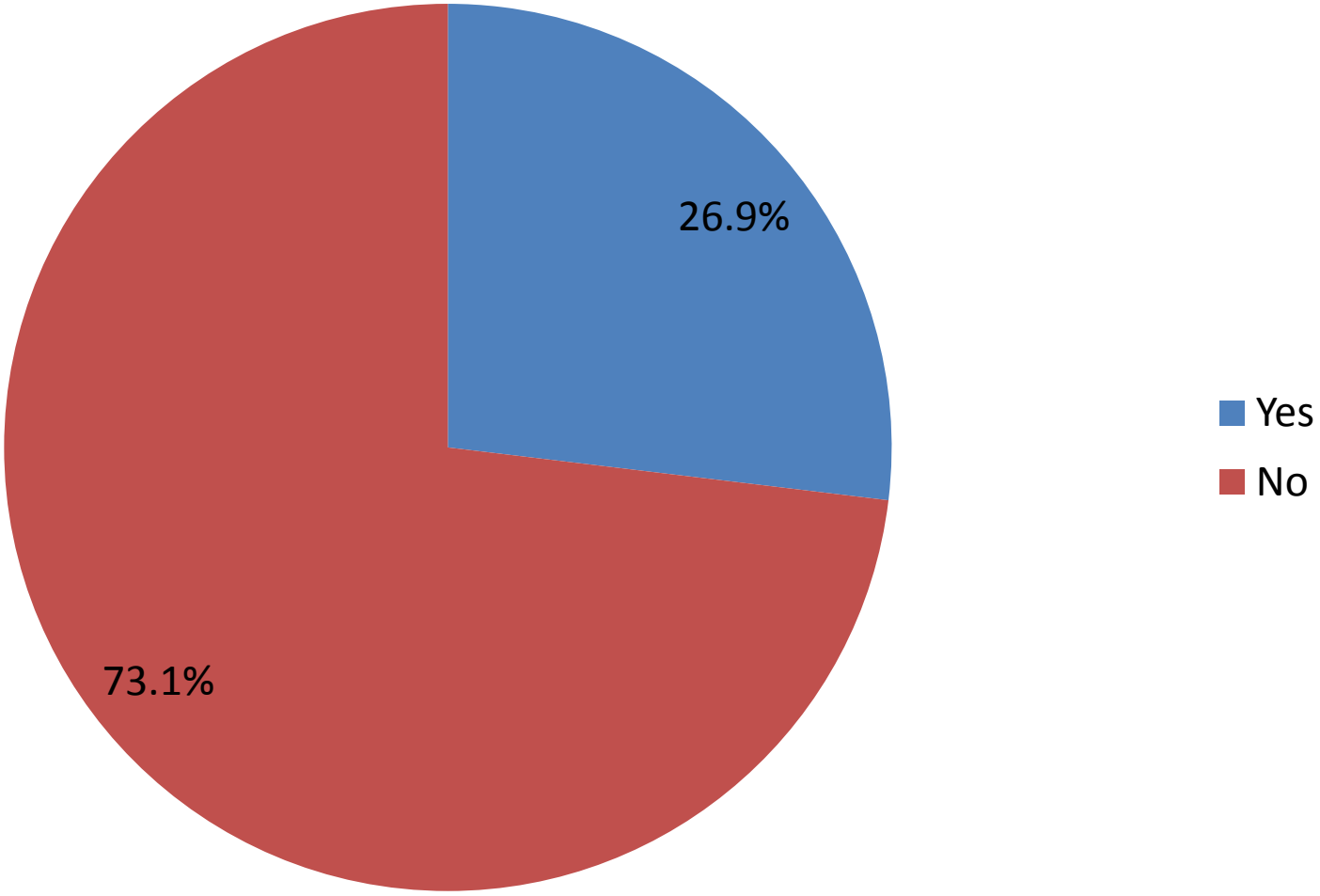
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10. Interested in being more hazard resistant?



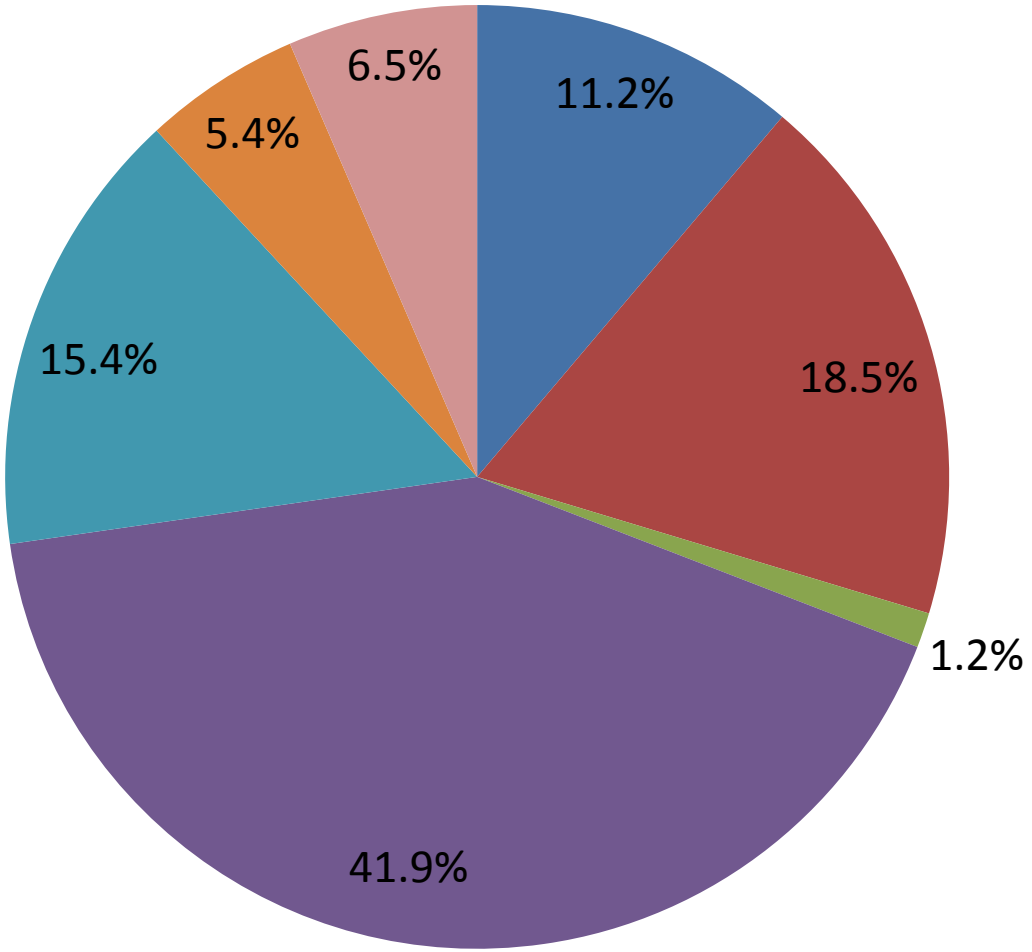
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11. Know who to contact for reducing risks?



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12. Most effective way to receive information?



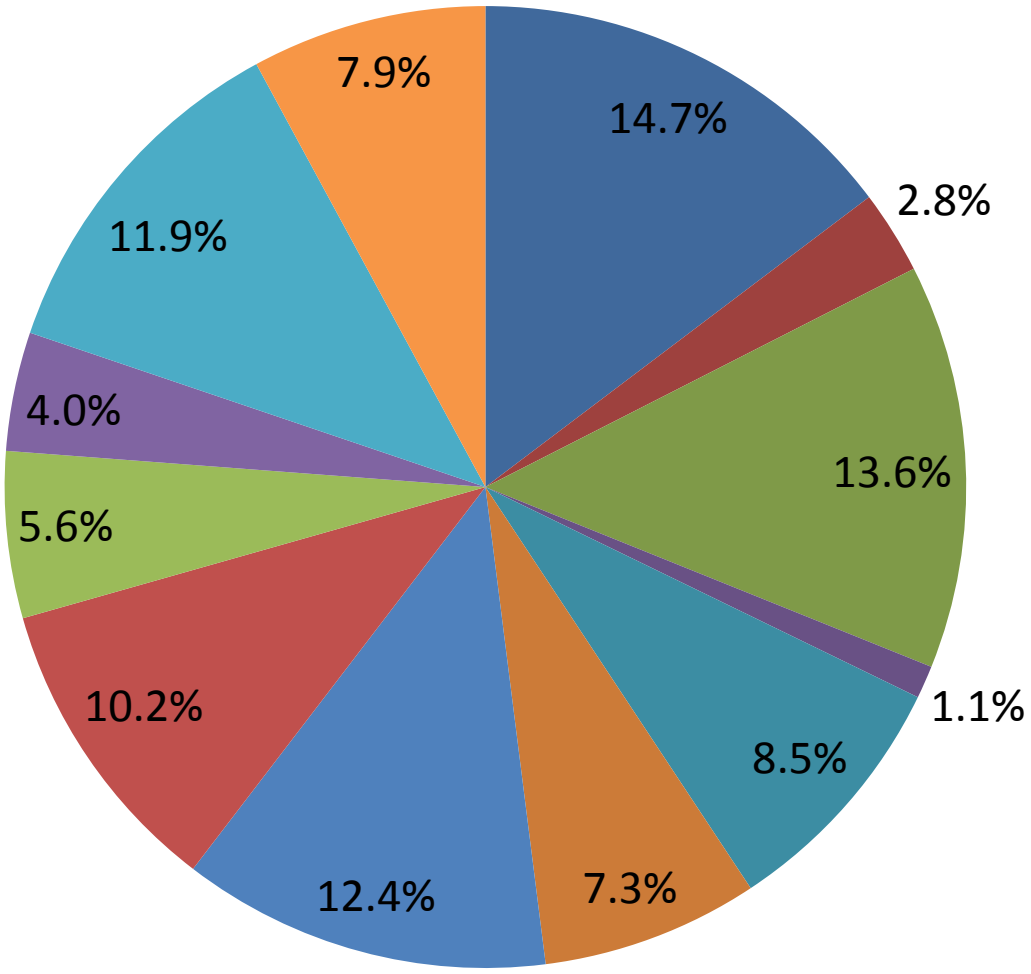
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12. Other ways to receive information

- Email
- Combination of internet, mail, workshops, meetings
- Emergency Management / Government agencies
- Phone / Cell phone weather alert

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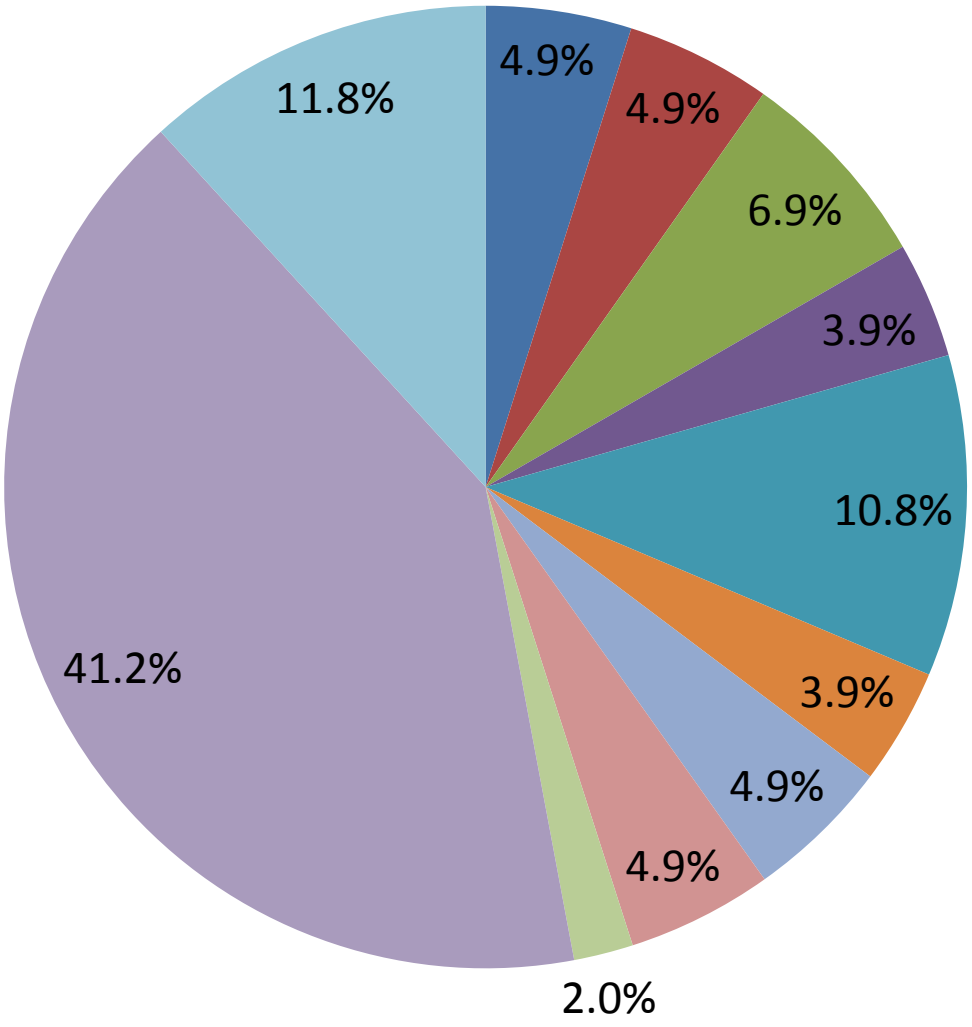
13. Steps local gov't could take to reduce risk



- Alert / Warning System
- Community Shelter
- Debris / Tree Limb Removal
- Flyers
- Improve Communication
- Improve / Retrofit Infrastructure
- Preparedness / Emergency Planning
- Public Education

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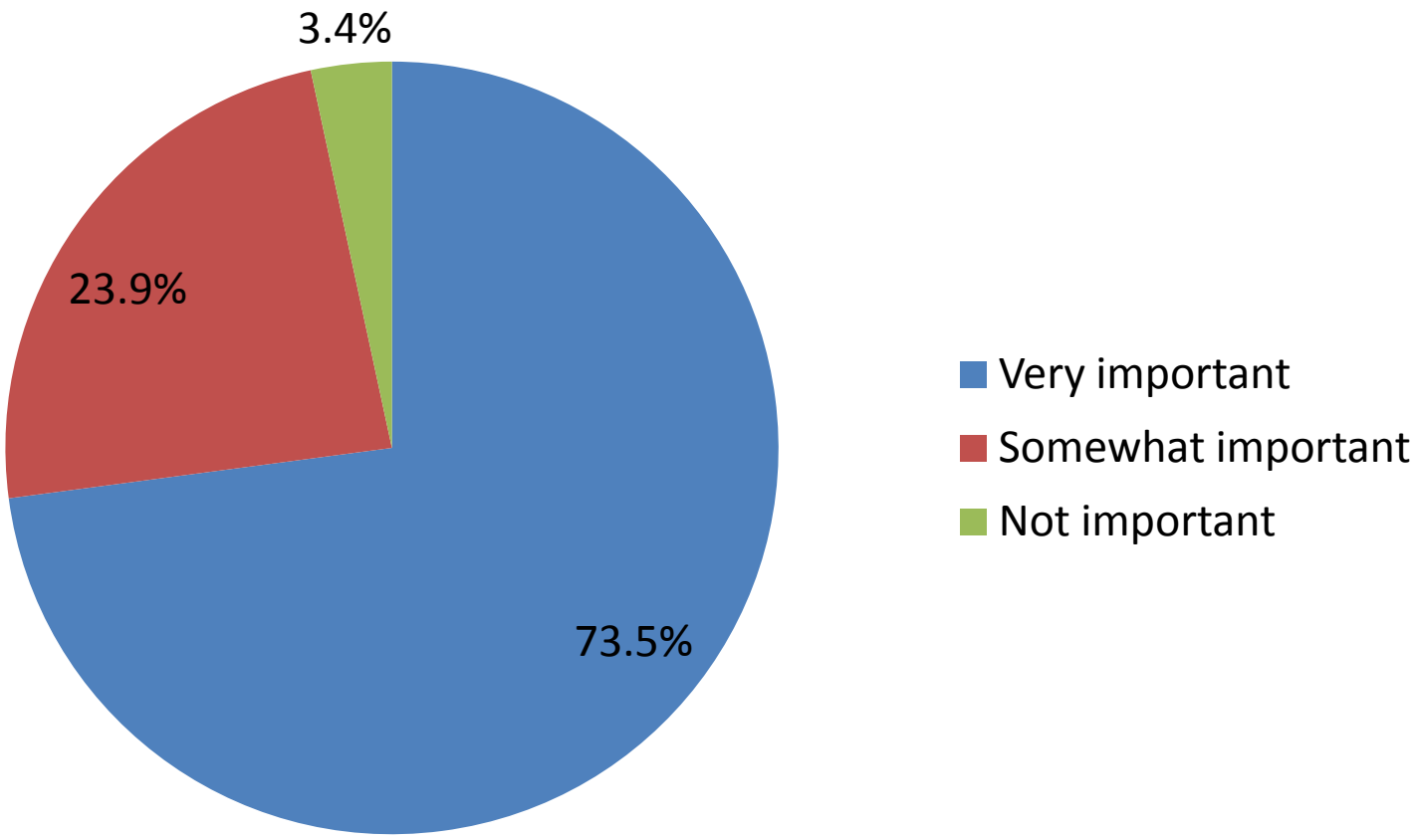
14. Other issues regarding risk and loss



- Community Shelters
- Debris / Tree Limb Removal
- Education
- Improve Communication
- Improve Preparedness / Planning
- Lack of Funding
- Retrofit Infrastructure / Protect Facilities
- Training

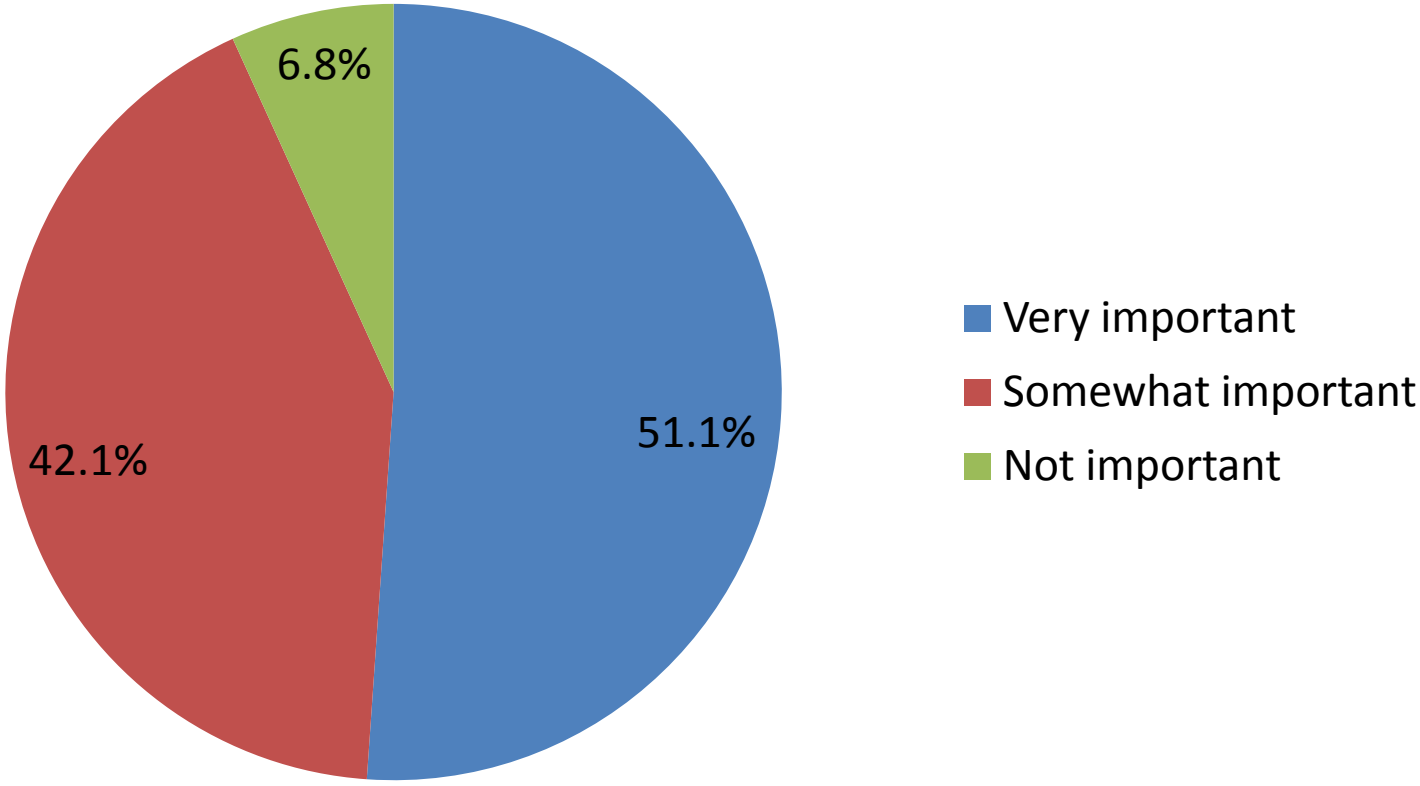
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15. Mitigation Actions: Prevention



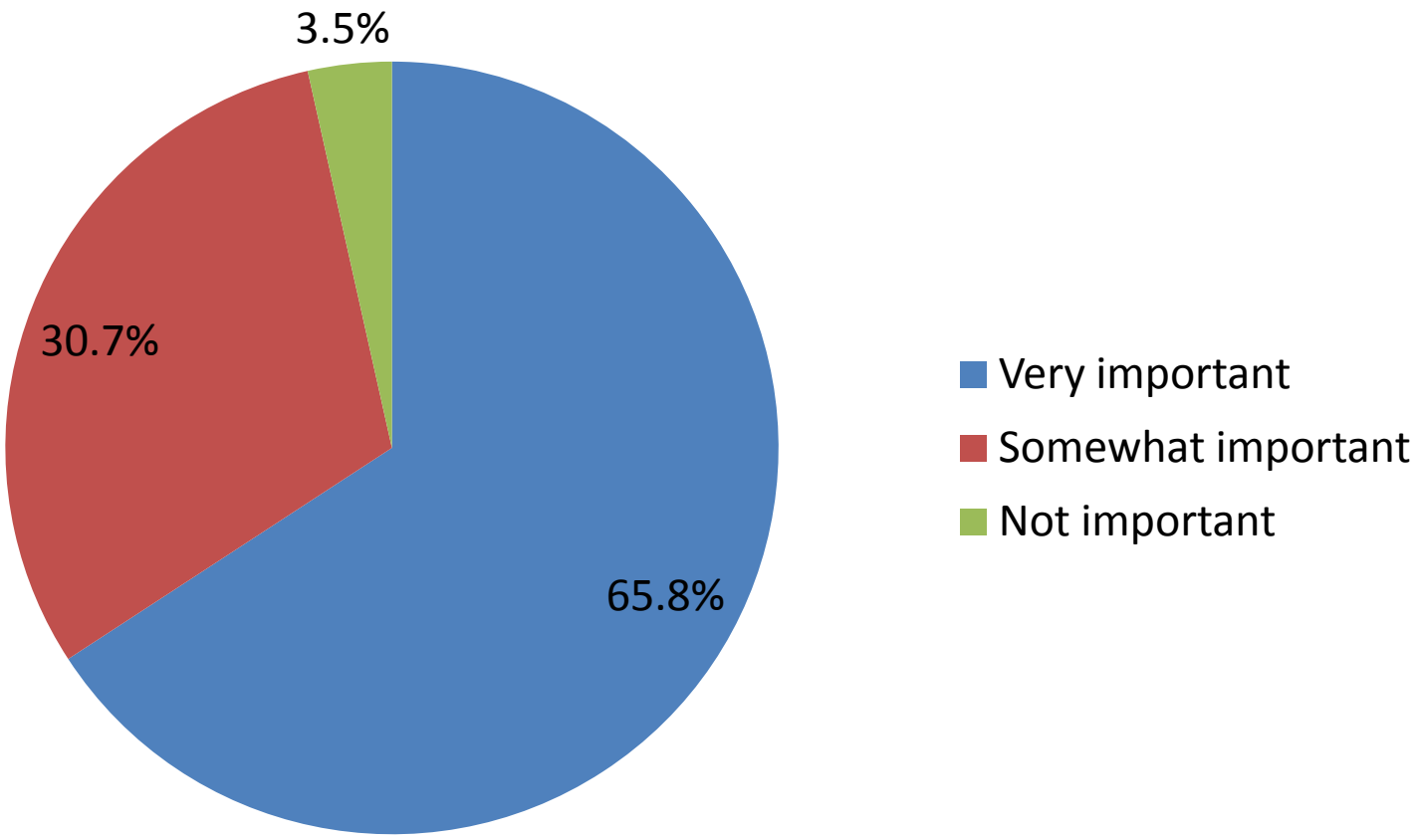
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15. Mitigation Actions: Property Protection



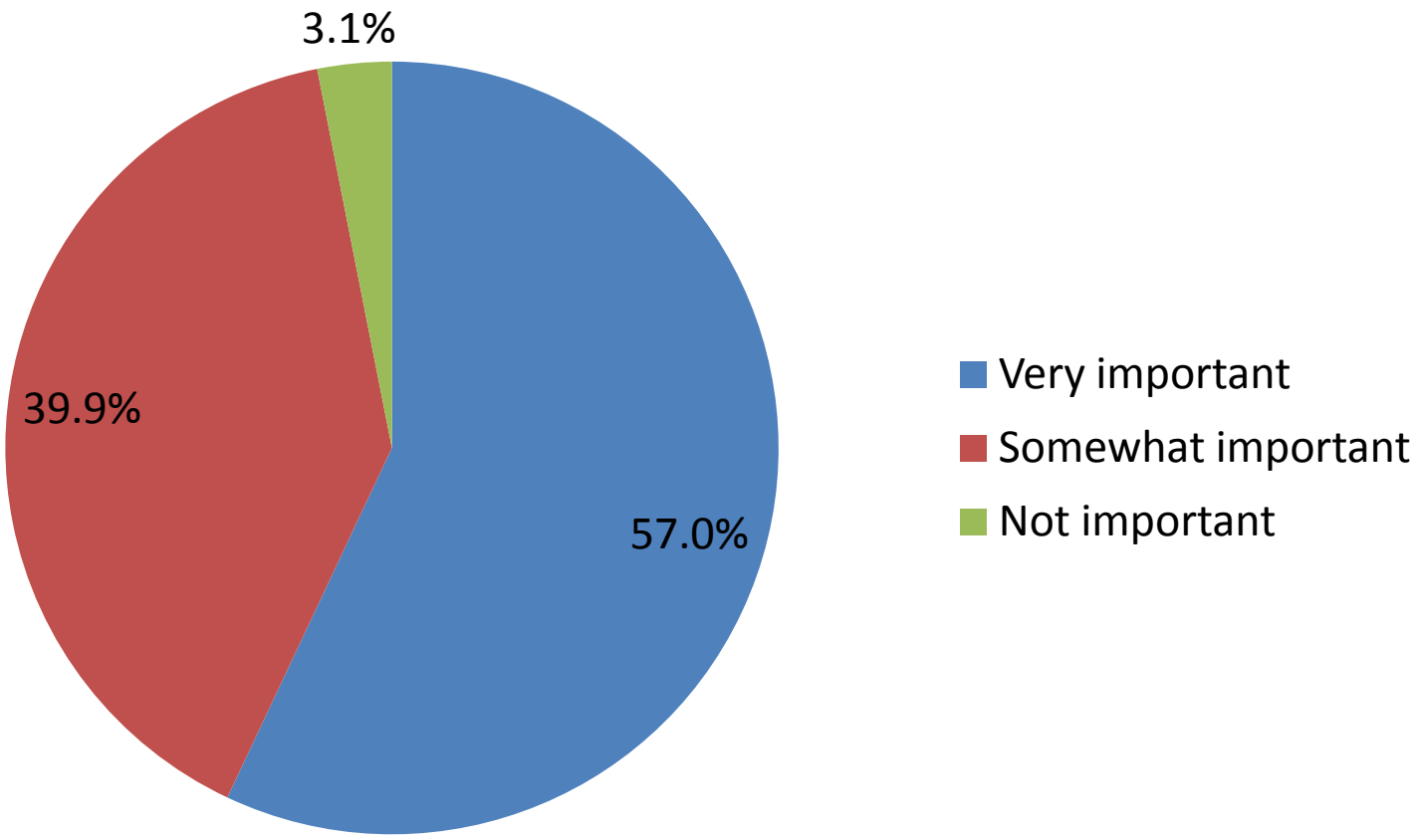
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15. Mitigation Actions: Natural Resource Protection



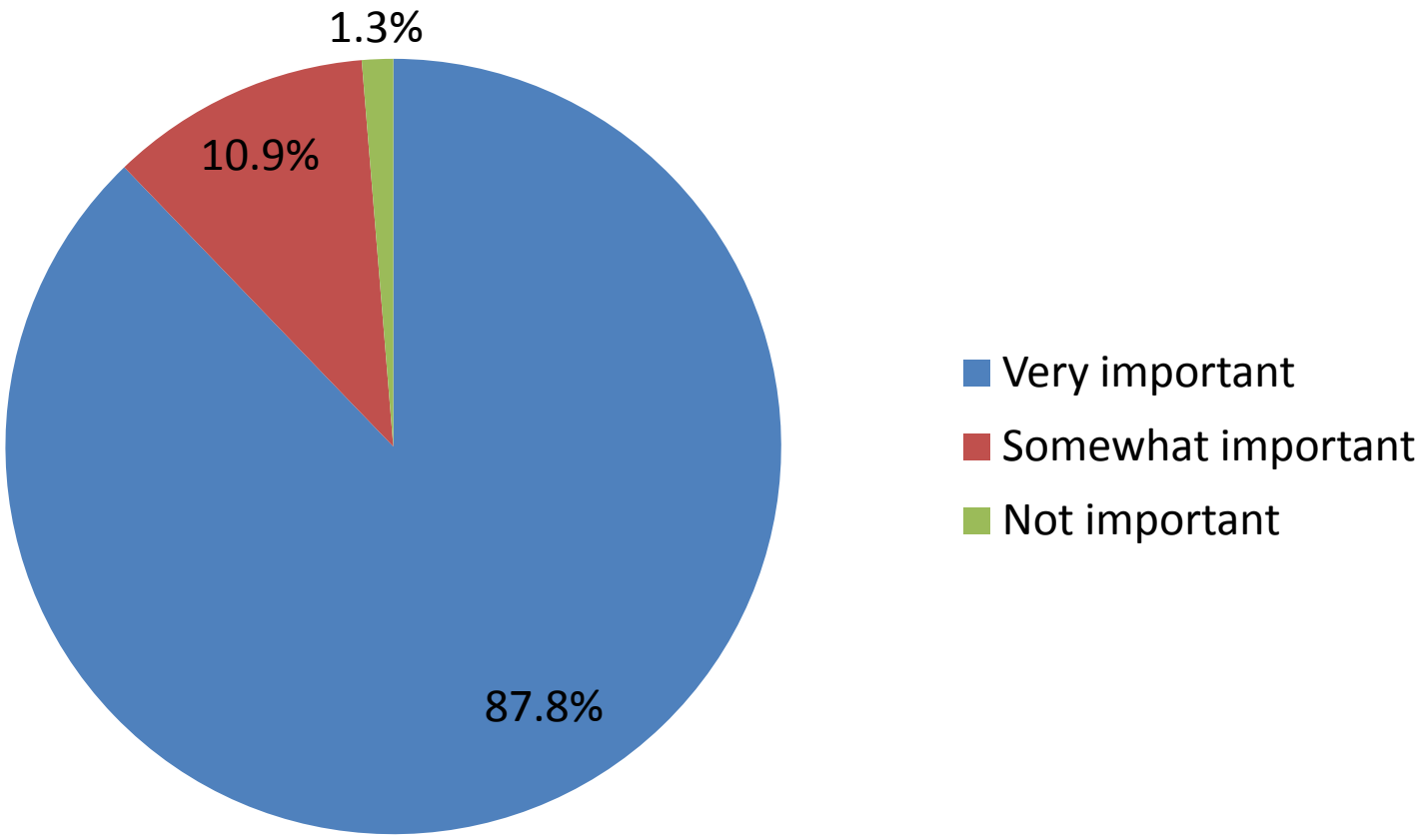
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15. Mitigation Actions: Structural Projects



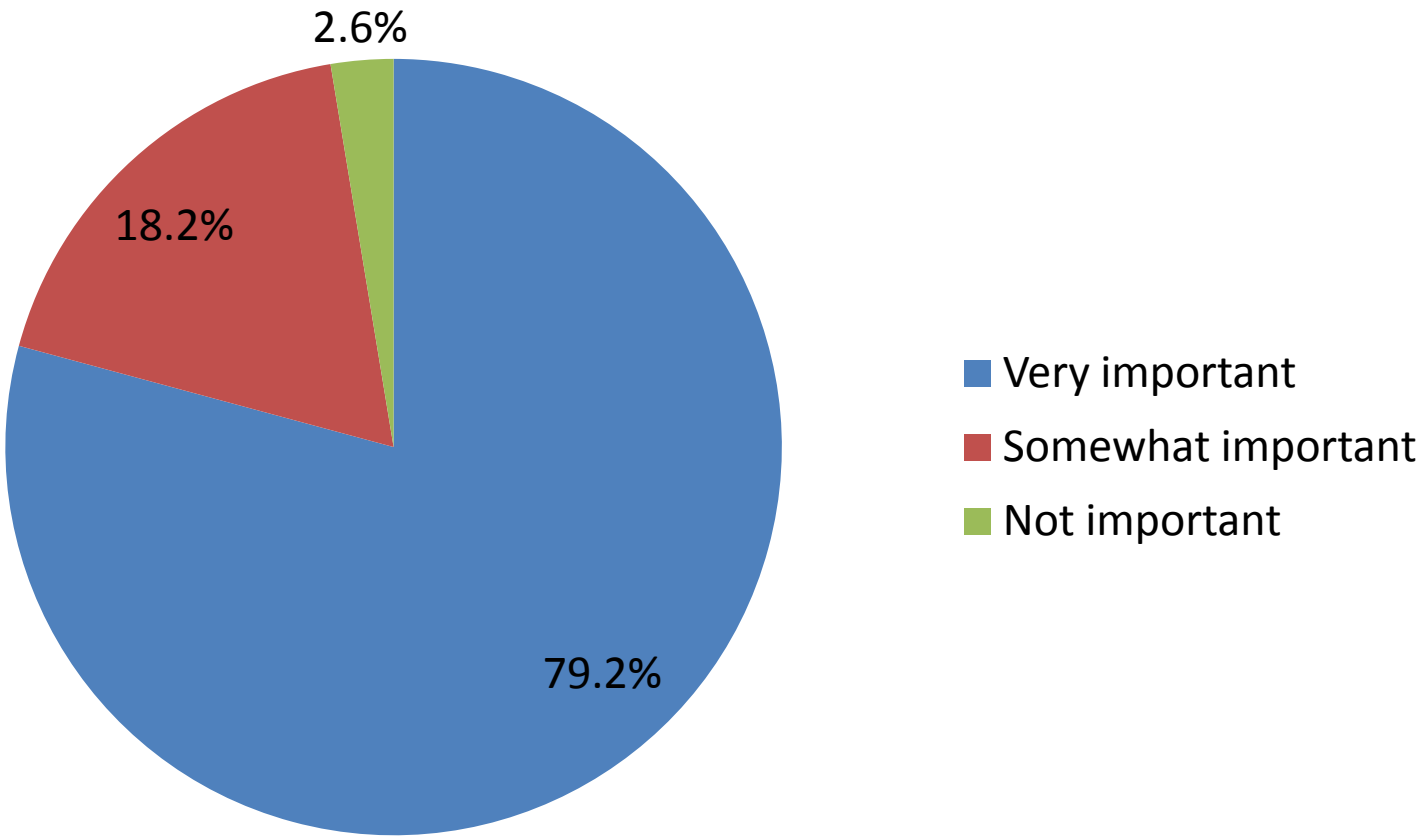
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15. Mitigation Actions: Emergency Services



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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: FEMA

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

Public Participation Survey Results

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