Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

2020 Update

FINAL - APRIL 2020











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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 Cleveland, Gaston, and Lincoln counties and the municipal governments within those counties. This area is vulnerable to a wide range of natural hazards, most notably severe winter weather, tornadoes/thunderstorms and flooding. It is also vulnerable to human-caused hazards, including nuclear accidents and hazardous substances. 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.

The three counties participating in the development of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan first joined together in 2014 to develop the initial version of this regional plan. Prior to that, each County was operating under individual County-level hazard mitigation plans. The plan development process for the 2020 update of the plan is detailed 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 Acts

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.

Major federal flood insurance legislation was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act (HFIAA) in 2014 which revised Biggert-Waters. HFIAA established the requirement that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for any of the FEMA mitigation programs. These acts 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. These acts further emphasize 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 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:

- Completely update the existing Cleveland Gaston Lincoln Regional Hazard Mitigation Plan to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions;
- Update the plan in accordance with Community Rating System (CRS) requirements; 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	Kings Mountain
Bessemer City	Lowell
Cherryville	McAdenville
Cramerton	Mount Holly
Dallas	Ranlo
Gastonia	Stanley
High Shoals	Unincorporated Gaston County
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) and the Homeowner Flood Insurance Affordability Act of 2014.

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, NCEM's Risk Management section's 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.

SECTION 2
PLANNING PROCESS

This section describes the planning process undertaken to develop the 2020 update of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan. Information about the development of the 2014 (and first) version of this plan can be found in that plan. Copies of the 2014 plan can be obtained by contacting each County's Emergency Management office or NCEM's Hazard Mitigation Planning Section.

This section consists of the following nine subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the Cleveland Gaston Lincoln Region
- 2.3 Updating the Plan in 2020
- 2.4 The Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress
- 2.9 Gaston County CRS Planning Process Documentation

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 9: *Mitigation Action Plans*). 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 (see Section 10: *Plan Maintenance*).

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, mitigation planning is 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

Prior to the development of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan in 2014, each of the three counties and jurisdictions participating in this Plan had previously adopted separate county-level hazard mitigation plans. 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 Multijurisdictional 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 the development of the 2014 plan, all of the aforementioned jurisdictions joined to develop a regional plan. No new jurisdictions joined the process and all of the jurisdictions that participated in previous planning efforts participated in the development of the 2014 regional plan. The regional plan was developed in order to simplify planning efforts for the jurisdictions in the Cleveland Gaston Lincoln Region and allowed resources to be shared amongst the participating jurisdiction to ease the administrative duties of all of the participants by combining the three existing County-level plans into one multi-jurisdictional plan. The 2014 plan was important and successful first start for regional hazard mitigation planning efforts and that success has carried over into the 2020 update of the plan.

2.3 UPDATING THE PLAN IN 2020

FEMA requires that hazard mitigation plans be updated every five years to remain eligible for federal mitigation and public assistance funding. To prepare the 2020 *Cleveland Gaston Lincoln Regional Hazard Mitigation Plan*, ESP Associates, Inc. was hired by North Carolina Emergency Management to provide professional mitigation planning services. 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 Emergency Management (NCEM) mitigation planning staff[1]. Additionally, for the 2020 update, FEMA Community Rating System (CRS) and Community Wildfire Protection Plan (CWPP) requirements were integrated into the plan update.

[1] A copy of the negotiated contractual scope of work between NCEM and ESP is available through NCEM upon request.

Tables 2.1 and 2.2 below provide an overview of how the Community Rating System and Community Wildfire Protection Plan requirements were integrated into this plan update.

TABLE 2.1 FEMA HAZARD MITIGATION PLANNING REQUIREMENTS AND THE CRS 10-STEP PLANNING PROCESS REFERENCE TABLE

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
Phase I – Planning Process	
§201.6(c)(1)	Step 1: Organize to Prepare the Plan
§201.6(b)(1)	Step 2: Involve the Public
§201.6(b)(2) & (3)	Step 3: Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4: Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5: Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6: Set Goals
§201.6(c)(3)(ii)	Step 7: Review Possible Activities
§201.6(c)(3)(iii)	Step 8: Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9: Adopt the Plan
§201.6(c)(4)	Step 10: Implement, Evaluate and Revise the Plan

TABLE 2.2 COMMUNITY WILDFIRE PROTECTION PLAN PROCESS INTEGRATION REFERENCE TABLE

CWPP Process	Hazard Mitigation Plan Integration Reference
Step 1: Convene Decisionmakers	Section 2: Planning Process
Step 2: Involve Federal Agencies	Section 2: Planning Process
Step 3: Engage Interested Parties	Section 2: Planning Process
Step 4: Establish a Community Base Map	Section 3: Community Profile
Step 5: Develop a Community Risk Assessment	Sections 4, 5 and 6: Hazard Identification, Hazard Profiles and Vulnerability Assessment Section 7: Capability Assessment
Step 6: Establish Community Hazard Reduction Priorities and Recommendations to Reduce Structural Ignitability	Section 8: Mitigation Strategy
Step 7: Develop an Action Plan and Assessment Strategy	Section 9: Mitigation Action Plans Section 10: Plan Maintenance
Step 8: Finalize the CWPP	Appendix A: Plan Adoption

Source: Preparing a Community Wildfire Protection Plan – A Handbook for Wildland-Urban Interface Communities

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.

For the development of the 2020 plan, all of the aforementioned jurisdictions that participated in the development of the 2014 plan participated in this plan's development, except for Spencer Mountain in Gaston County. Spencer Mountain is no longer recognized as a municipality.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately nine months beginning in October 2018. 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*.

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



2.4 THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

In order to guide the initial development of this Plan and this subsequent update, the participating jurisdictions created the Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee. The Regional Hazard Mitigation Committee 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 October 2018, the Regional Hazard Mitigation Planning Committee members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

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

- participate in Regional Hazard Mitigation Planning Committee meetings and workshops
- provide best available data as required for the risk assessment portion of the Plan
- help update 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 update of the Mitigation Strategy, including the review, update and adoption of regional goal statements
- help update existing mitigation actions and design and propose any appropriate new 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 2020 *Cleveland Gaston Lincoln Regional Hazard Mitigation Plan*

Table 2.3 lists the members of the Regional Hazard Mitigation Planning Committee who were responsible for participating in the development of the Plan.

TABLE 2.3: MEMBERS OF THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT / AGENCY / TITLE
Davis, Perry	Cleveland County EM
Earp, Jimmy	Gaston County Fire Marshal
Bryant, Andrew C.	Lincoln County Planning, Director
Ferguson, Chris	NCEM Risk Management
Nightingale, Bob	Mount Holly Fire Department
Horton, Bobby	Cleveland County EM, Deputy Fire Marshall
Williams, David L.	Gaston County Planning, Planning Director
Carlton, Eric	Lincoln County Planning, Planner II
Wofford, Jason	Cherryville Fire Department, Assistant Chief

NAME	DEPARTMENT / AGENCY / TITLE
Derby, Jean	City of Lincolnton, City Manager's / Planning Administrative Assistant
Goodman, Jena L.	Gaston County Planning, Planning GIS Manager
Queen, Josh	Cleveland County EM, Fire Inspector
Baker-Granata, Julia	City of Gastonia Planning, GIS Specialist I
Elam, Laura	City of Lincolnton Planning, Planning Director
Bates, Scott	Lowell Police, Chief
Faro, Tiffany	Town of Dallas, Development Services Director
King Jr., Willie	Gaston County Planning, Development Services Manager
Robinson, Alex	Belmont Planning and Zoning
Wilson, Jonathan	Mount Holly Planning Projects
Baker, Ryan	Mount Holly Fire Department
Friday, Phyliss*	Town of High Shoals, Mayor Pro Tem
Williams, Lucy*	Town of High Shoals, Town Clerk

*Indicates that participants attended meeting during planning process but did not sign the meeting sign-in sheet. The Town of High Shoals hosted the Kickoff Meeting as documented on pages 2.9 through 2.11.

Table 2.4 lists points of contact for several of the jurisdictions who elected to designate their respective county officials to represent their jurisdiction on the planning team, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the Plan, updates to mitigation actions and the Capability Assessment via email and phone conversations. These members are listed below by municipality.

TABLE 2.4: MEMBERS DESIGNATING REPRESENTATIVES TO THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLANNING TEAM

NAME	DEPARTMENT / AGENCY / TITLE
Cleveland County	
Hoyle, Debbie	Mayor of Belwood
Shires, Lucas	Manager of Boiling Springs
Walker, Eddie	Mayor of Casar
Anderson, Noah	Mayor of Earl
Weaver, Doris	Mayor of Fallston
Willis, Bill	Mayor of Grover
Jennings-Reid, Clarissa	Mayor of Kingstown
Sellers, Marilyn	Manager of Kings Mountain
Beal, Alton	Mayor of Lattimore
Sain, John F.	Mayor of Lawndale
Eargle, John O	Mayor of Mooresboro
Canipe, Van	Mayor of Patterson Springs

NAME	DEPARTMENT / AGENCY / TITLE
Shytle, Jack B.	Mayor of Polkville
Howell, Rick	Manager of Shelby
Barrett, Jr. John E. (Butch)	Mayor of Waco
Gaston County	
Inman, James	Bessemer City
Pugh, David	Cramerton
Dellinger, Lesley	McAdenville
Anderson, Tim	Ranlo
Jenkins, Heath	Stanley

Additional participation and input from other identified stakeholders and the general public was sought by the participating counties during the planning process through phone calls and the distribution of emails, advertisements and public notices aimed at informing people on the status of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed later in this section).

2.4.1 Multi-Jurisdictional Participation

The Cleveland Gaston Lincoln Regional Hazard Mitigation Plan includes three counties and twenty-eight 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. 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.

2.5.1 Meeting Minutes

Meeting Minutes from Internal Kickoff Conference Call/Skype Meeting with County Leads and NCEM Representatives
October 10, 2018
Phone Call/Skype Meeting

Following issuance of a notice to proceed from NCEM, on October 2, 2018 ESP Associates reached out by email to County Emergency Management and Planning Department leads from Cleveland, Gaston and Lincoln Counties, NCEM Area 13 and 15 Coordinators and the Western Branch Manager to introduce themselves, explain the plan update process in general and schedule a time to hold an informal internal kickoff conference call/Skype meeting.

On October 10, 2018, Nathan Slaughter, Hazard Mitigation Department Manager from ESP Associates, Inc. and Project Manager for the update of the CGL Regional Hazard Mitigation Plan conducted a conference call/Skype meeting with the internal lead stakeholders previously mentioned above. He presented important project information about the plan update, gave a brief refresher on hazard mitigation and a reminder about the importance of the plan, provided a project overview to include key objectives, project tasks, schedule and staff, and then defined roles and responsibilities of the project consultant and the participating jurisdictions.

Following the presentation, he discussed with these stakeholders the need to set up a date, time and location for the official project kickoff meeting with the regional hazard mitigation planning committee. The lead internal stakeholders discussed potential meeting dates and locations and decided that November 15, 2018 would be the date of the meeting at a location to be determined later. The details of the official kickoff meeting were then determined through later conversations with Gaston County Planning staff.

Meeting Minutes from Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee Kickoff Meeting
November 15, 2018
High Shoals Town Hall

Ms Phyliss Friday, Mayor Pro Tem for the Town of High Shoals welcomed everyone to the High Shoals Town Hall.

Nathan Slaughter, began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting.

Mr. Slaughter led the meeting of the Regional Hazard Mitigation Planning Team and began by having attendees introduce themselves. The 17 attendees included representatives from various departments and local jurisdictions within each of the three counties participating in the plan update. All three counties were represented. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed the agenda and presentation slide handouts. He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

To continue, Mr. Slaughter provided detailed information about the project. He mentioned that the project is funded by a FEMA HMGP grant, and that NCEM was managing the planning effort and had assigned ESP Associates, Inc. to manage the update, thus ensuring that Mr. Slaughter would remain the Project Manager, as he was for the first plan. For this update, there was no local funding required.

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained how we should think about mitigation: we want to mitigate hazard impacts of existing development in the community (houses, businesses, critical facilities, etc.), and ensure that future development is conducted in a way that doesn't increase vulnerability. This can be achieved by having good plans, policies, and procedures in place.

Following the overview, Mr. Slaughter led the group in an "icebreaker" exercise to refamiliarize meeting participants with various mitigation techniques. He briefly recapped 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, Jamie DeRose, Lead Planner from ESP, tabulated and shared the results with the group. The most mock money was spent on emergency services. These results were compared against those from the previous plan development's ice breaker exercise. This helped demonstrate how priorities in mitigation actions have changed since the previous update.

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

- Coordinate between the three participating counties to update the regional plan
- Update the plan to demonstrate progress and reflect current conditions
- Complete the update before the existing plan expires on May 4, 2020
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update the plan in accordance with Community Rating System (CRS) requirements, and
- Maintain compliance with State and Federal requirements

Next, he explained new elements to this update, which include integrating with NCEM's RMT, Activity 510 compliance for CRS communities, Risk MAP, Community Wildfire Protection Plans, the NC Resilience Assessment, and EMAP compliance.

Mr. Slaughter reviewed the list of participating jurisdictions with the group, which all agreed to participate again. He also explained the planning process and specific tasks to be accomplished for the project, which include the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan, and plain maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point of contact to coordinate the gathering of GIS data required for the analysis. He also reviewed the list of identified hazards and the committee agreed to maintain the previous list of hazards for the three counties.

The project schedule was presented and Mr. Slaughter noted that the twelve-month schedule provided ample time to produce a quality plan and meet state and federal deadlines.

Mr. Slaughter discussed what data would need to be collected to complete the project. This includes GIS Data, Capability Assessment Revisions, a Public Participation Survey, and updates to existing Mitigation Actions.

Mr. Slaughter then reviewed the roles and responsibilities of ESP Associates, Inc, the County leads, and the participating jurisdictions. 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. The next HMPT meeting was scheduled for some time in February 2019 to discuss the findings of the risk and capability assessments and to begin updating existing mitigation actions and identify new goals.

FIGURE 2.2: CLEVELAND GASTON LINCOLN KICKOFF MEETING



Meeting Minutes from Meeting with Gaston County Emergency Management
January 24, 2019
615 North Highland St.
Gastonia, NC 28053
3:00 PM - 5:30 PM

Attendees:

- Nathan Slaughter, ESP Associates
- Keith Rapp, Gaston County Emergency Management
- Eric Hendrix, Gaston County Fire Marshal

At the request of new Gaston County Emergency Management Director, Keith Rapp, Mr. Slaughter met with Mr. Rapp and Mr. Hendrix at the Gaston County Emergency Operations Center in Gastonia to review and discuss the hazard mitigation plan update. Mr. Rapp was unable to attend the kickoff meeting for the regional plan update and is new to emergency management so Mr. Slaughter provided a general overview of hazard mitigation and the walked through the existing plan with Mr. Rapp and Mr. Hendrix.

The primary focus of conversation was on the mitigation strategy and what is required of Gaston County for updating the mitigation actions in the plan. Mr. Slaughter indicated that all existing actions need to be updated to determine if the actions have been completed, deleted or will be deferred. Mr. Slaughter said that for each action update, more detailed information will need to be provided for each status update to indicate why that status was given.

Mr. Rapp had several questions about specific projects and whether or not they would qualify for hazard mitigation grant funding. Mr. Slaughter addressed all questions and indicated that any actions that appear to potentially reduce vulnerability to hazards in Gaston County should be considered for inclusion in the plan, whether or not they specifically qualify for FEMA hazard mitigation funding.

Specific projects discussed included:

- Gages to be included in the North Carolina's FIMAN system for flood warning.
- Temporary flood wall barrier protection for Cramerton.
- Planning for shelters in Gaston County.
- Hazmat equipment needs.

Mr. Slaughter indicated that updated mitigation actions would be due later in March of 2019. The meeting concluded at 5:30 PM.

Meeting Minutes from Mitigation Strategy Meeting
February 21, 2019
Town of Dallas Community Room
10:00 AM – Noon

Nathan Slaughter, Project Manager from ESP Associates, began the meeting by welcoming the attendees and reviewing the meeting handouts, which included an agenda, existing plan goals for the regional plan, and a hard copy of the meeting presentation. Mr. Slaughter asked meeting attendees to introduce themselves and gave a refresher on mitigation, why we plan, and the key objectives of the project. He reviewed the participating jurisdictions, project tasks and project schedule. He stated that a draft of the updated Regional Hazard Mitigation Plan would be presented in May.

Jamie DeRose, Lead Planner from ESP Associates, then presented the findings of the risk assessment. She shared the list of all hazards that are addressed in the regional plan, and reviewed the list of hazards addressed in the North Carolina State Hazard Mitigation Plan. She discussed a couple of caveats for the risk assessment and indicated that best available data was used. While that information is helpful, events are often under-reported, so it is important to keep the end goal in sight. The purpose of the risk assessment was shared: to compare hazards and determine which should be the focus of the mitigation actions. Finally, she mentioned to the stakeholders that it ultimately is their risk assessment, so their recommendations for adjustment are welcomed and encouraged.

Ms. DeRose stated that since the last plan was updated, there have been two Presidential disaster declarations that have impacted the areas surrounding the region, which helped emphasize the need to continue updating the mitigation plan.

The following Hazard Profiles and summaries of each hazard were then shared:

- DROUGHT: There were 13 regional drought events between 2005 and 2018, and future occurrences are likely.
- EXTREME HEAT: The average maximum temperatures from the past 48 months were shared. Future occurrences are likely.
- HAILSTORM: There have been 423 recorded events since 1962. Future occurrences are likely.
- HURRICANE AND COASTAL STORM: 37 storm tracks have come within 75 miles of the region since 1854. 14 of those were classified as a hurricane or tropical storm. Future occurrences are likely.
- LIGHTNING: Since 1996, there have been 55 reported occurrences, which resulted in 15 injuries and nearly $6 million dollars in property damage. Future occurrences are highly likely.
- SEVERE THUNDERSTORMS: 484 severe thunderstorm events have been recorded since 1950. These events resulted in 4 deaths, 41 injuries and $3.3 million in property damages. Future occurrences are highly likely.
- TORNADOES: There have been 55 recorded events since 1950, causing 5 deaths, 77 injuries, and $125,181,374 in property damage. Future occurrences are likely.
- WINTER STORM AND FREEZE: 231 winter weather events that resulted in over $55 million in property damage have been recorded since 1993. Future occurrences are highly likely.
- DAM AND LEVEE FAILURE: Of the 236 dams in the region, 47 are considered high hazard dams. No serious breaches have been reported, and future occurrences are unlikely.
- EROSION: Although little information could be obtained on erosion occurrences in the region, erosion was addressed in the previous plan. Future occurrences are possible.
- FLOOD: 60 flood events have occurred since 1993, resulting in over $5 million in property damage. There have also been 106 reported NFIP losses since 1978 and approximately $773,246 in claims. There are 2 repetitive loss properties, and future occurrences are highly likely.
- EARTHQUAKE: No significant earthquake events have taken place in the region, but future occurrences are possible.
- LANDSLIDE: No records of severe landslides were reported, and future occurrences are possible.
- HAZARDOUS MATERIALS INCIDENTS: 24 serious HAZMAT events have been reported through the PHMSA. There are 52 TRI Facilities in the region. Future occurrences are possible.
- WILDFIRE: FEMA reports that 182 acres in the region are burned every year on average, although they are mostly small. Future occurrences are likely.
- NUCLEAR EMERGENCY: There are 2 nuclear facilities within 50 miles of the region. No major historical occurrences were found, and future occurrences are unlikely.

In concluding the review of Hazard Profiles, Ms. DeRose stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email her 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 and Flood. The committee reviewed most recent hazard profile data and discussed moving Hurricanes and Tropical Storms down in rankings, and moving HAZMAT and Extreme Heat up in rankings.

Ms. DeRose then displayed maps that presented each county's social vulnerability, as documented by the Center for Disease Control. The maps present how socially vulnerable areas in each county are as compared to the rest of North Carolina. Many indicators were used to determine the social vulnerability, and the factors were grouped into four themes that were based on census-tract levels.

After a brief break, Mr. Slaughter then presented the Capability Assessment Findings. ESP Associates used 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, and Community Rating System (CRS) participation.

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 moderate to high range for Planning and Regulatory Capability and in the low to 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, it was determined that all of the participating jurisdictions have moderate or high capabilities to implement hazard mitigation programs and activities.

Mr. Slaughter then transitioned to the Mitigation Strategy portion of the presentation. He began by reviewing some of the major concepts of mitigation and then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Planning Committee meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Emergency Services $110
- Prevention $64
- Structural Projects $64
- Property Protection $40
- Education and Awareness $35
- Natural Resource Protection $27

Mr. Slaughter gave an overview of the process for updating the Mitigation Strategy and presented the existing mitigation goals for the regional plan. He asked the Regional Hazard Mitigation Planning Committee to review the goals to determine whether or not they still reflect current vulnerabilities and current mitigation priorities. The committee members agreed that the fourth goal should be modified to include specific coordination between the three participating counties in the region.

Mr. Slaughter then indicated that each participating jurisdiction would need to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by March 21, 2019. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by March 21, 2019. Mr. Slaughter then presented sample mitigation actions for the committee members to consider to include in their plan update.

During a working lunch, the attendees split into three groups by county. They were instructed to look at large maps of their counties that included major roads and floodplains and identify vulnerable areas that could be considered for potential new mitigation actions.

Mr. Slaughter and Ms. DeRose then discussed the results of the public participation survey that was posted on several of the participating counties' and jurisdictions' websites. As of the meeting date, 237 responses had been received. Based on the preliminary results, respondents felt that hurricanes, winter storms, and tornadoes posed the greatest threats to their neighborhood. Most did not live in a floodplain or have flood insurance, but 65.4% of all respondents did not know who to contact regarding reducing their risks to hazards.

Finally, Mr. Slaughter discussed the next steps in the planning process. These included returning mitigation action updates and delivery of a draft plan in May 2019. He thanked the group for taking the time to attend and the meeting was adjourned.

FIGURE 2.3: CLEVELAND GASTON LINCOLN MITIGATION STRATEGY WORKSHOP



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 three methods: (1) physical public meetings; (2) public survey instruments were made available in hard copy and online; and (3) 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. Documentation of these efforts is provided in Appendix D.

In addition to the two opportunities for public comments previously discussed, 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.

Meeting Minutes from Public Meeting #1
November 15, 2018
Gaston County Citizens Resource Center

Nathan Slaughter, Department Manager from ESP Associates, Inc. and Project Manager for the update of the CGL Regional Hazard Mitigation Plan, began the meeting by meeting individually with each attendee. He gave a brief overview of the project and the purpose of the meeting.

He explained that the project is funded by a FEMA PDM grant and is conducted to comply with the Disaster Mitigation Act of 2000 and NC Senate Bill 300. He then discussed the region's high, moderate, and low risk hazards that the Regional Hazard Mitigation Planning Team had elected.

Next, Mr. Slaughter identified the six hazard mitigation planning techniques: prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness. He followed by providing the list of all participating counties and their respective jurisdictions.

Mr. Slaughter then showed an example of the previous Mitigation Action Plan and asked the following questions:

- Where are trouble spots in your neighborhood?
- How can mitigation be improved in your community?
- Which mitigation techniques need improvement?

The meeting concluded after the attendees gave their personal opinions and filled out the public survey.

The final opportunity for public input on the plan came at each participating jurisdictions' County or City Council meeting where the plan was presented for formal adoption. Each of those meetings are open to the public and therefore provided the public an opportunity to provide any final input or comments on the plan.

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Committee 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 Committee to be made available for residents to complete at local public offices. Additionally, a link to an electronic version of the survey was also posted on each county's and municipal websites. A total of 402 survey responses were received, which provided valuable input for the Regional Hazard Mitigation Committee to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 43 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 (37.3 percent), followed by Tornado (24.4 percent), and, Severe Winter/Ice Storm (14.4 percent).
- Approximately 62 percent of respondents have taken actions to make their homes more resistant to hazards and 72 percent are interested in making their homes more resistant to hazards.
- 65.4 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.

Full results from the public survey can be found by contacting North Carolina Emergency Management's Hazard Mitigation Planning section.

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.

At the beginning of the planning process for the development of this plan, the project consultant worked with each of the three County Emergency Management leads to initiate outreach to stakeholders to be involved in the planning process. The project consultant distributed a list of

recommended stakeholders provided from FEMA Publication 386-1 titled **Getting Started: Building Support for Mitigation Planning**, which demonstrated the wide range of stakeholders that were considered to participate in the development of this plan. Each of the County Emergency Management leads used that list for reference as they invited stakeholders from their counties to participate in the planning process.

In addition to participation from a wide variety of County-level departments, additional stakeholders that were involved in the process of developing this plan included Gaston Regional Chamber of Commerce, North Carolina Emergency Management (NCEM), and the United Way of Gaston County.

The Regional Hazard Mitigation Committee 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 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 Appendix E.

Further documentation of plan implementation progress can be found in the Capability Assessment. Community capability continues to improve for each participating jurisdiction 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 reconvening the Regional Hazard Mitigation Committee to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

2.9 GASTON COUNTY CRS PLANNING PROCESS DOCUMENTATION

As a participant in the NFIP's CRS program, Gaston County has taken additional steps during the 2020 update of this plan to meet the CRS requirements of Activity 510: Floodplain Management Planning and attempt to maximize the number of points the County receives for this activity for this plan. Specific to the planning process, the County ensured the following activities took place:

- Assigned Gaston County staff to serve on the Regional Hazard Mitigation Planning Committee. The staff members assigned to the committee actively participated in the plan update process and represent a wide range of staff expertise in the areas of mitigation techniques. The Gaston County staff and their associated area of expertise are listed in Table 2.5.

TABLE 2.5: GASTON COUNTY STAFF MEMBERS OF THE CLEVELAND GASTON LINCOLN REGIONAL HAZARD MITIGATION PLANNING TEAM AND THEIR AREA OF EXPERTISE

NAME	DEPARTMENT / AGENCY / TITLE	MITIGATION TECHNIQUE					
		PREVENTION MEASURES	PROPERTY PROTECTION	NATURAL RESOURCE PROTECTION	EMERGENCY SERVICES	STRUCTURAL PROJECTS	PUBLIC INFORMATION
Earp, Jimmy	Gaston County Deputy Fire Marshal	X	X		X		X
Williams, David L.	Gaston County Planning, Planning Director	X	X	X		X	X
Goodman, Jena L.	Gaston County Planning, Planning GIS Manager	X	X	X		X	X
King Jr., Willie	Gaston County Planning, Development Services Manager	X	X	X		X	X
Hendrix, Eric	Gaston County Fire Marshal	X	X		X		X
Rapp, Keith	Gaston County Emergency Management Director	X	X		X		X

- Ensured that the first public meeting held during the plan update process was conducted within the first two months of the planning process. As previously documented, the first meeting in the plan update process (Internal Kickoff Conference Call) was held on October 10. The first public meeting was held in the evening of November 15 following the official Kickoff Meeting with the Regional Hazard Mitigation Planning Committee and just over a month from the beginning of the plan update process.
- Invited multiple outside stakeholders to participate in the plan update process. An email was sent to the following stakeholders to invited them to attend the public meeting. The email invitation is included in Appendix D.

    - **United Way of Gaston County**
    - Gaston Association of Realtors
    - Home Builders Association of Greater Charlotte
    - **Gaston Regional Chamber**
    - Bethlehem Church
    - Gaston YMCA
    - Gaston Together

    Bold font indicates the organizations that attended the meeting and filled out public surveys.

- Gaston County initially wanted to hold one final public meeting at least two weeks before submittal of the final plan to Gaston County's Board of County Commissioners for adoption; however, this effort was cancelled as the County was dealing with the COVID-19 pandemic during this time and public meetings were not possible during this time.

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

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.

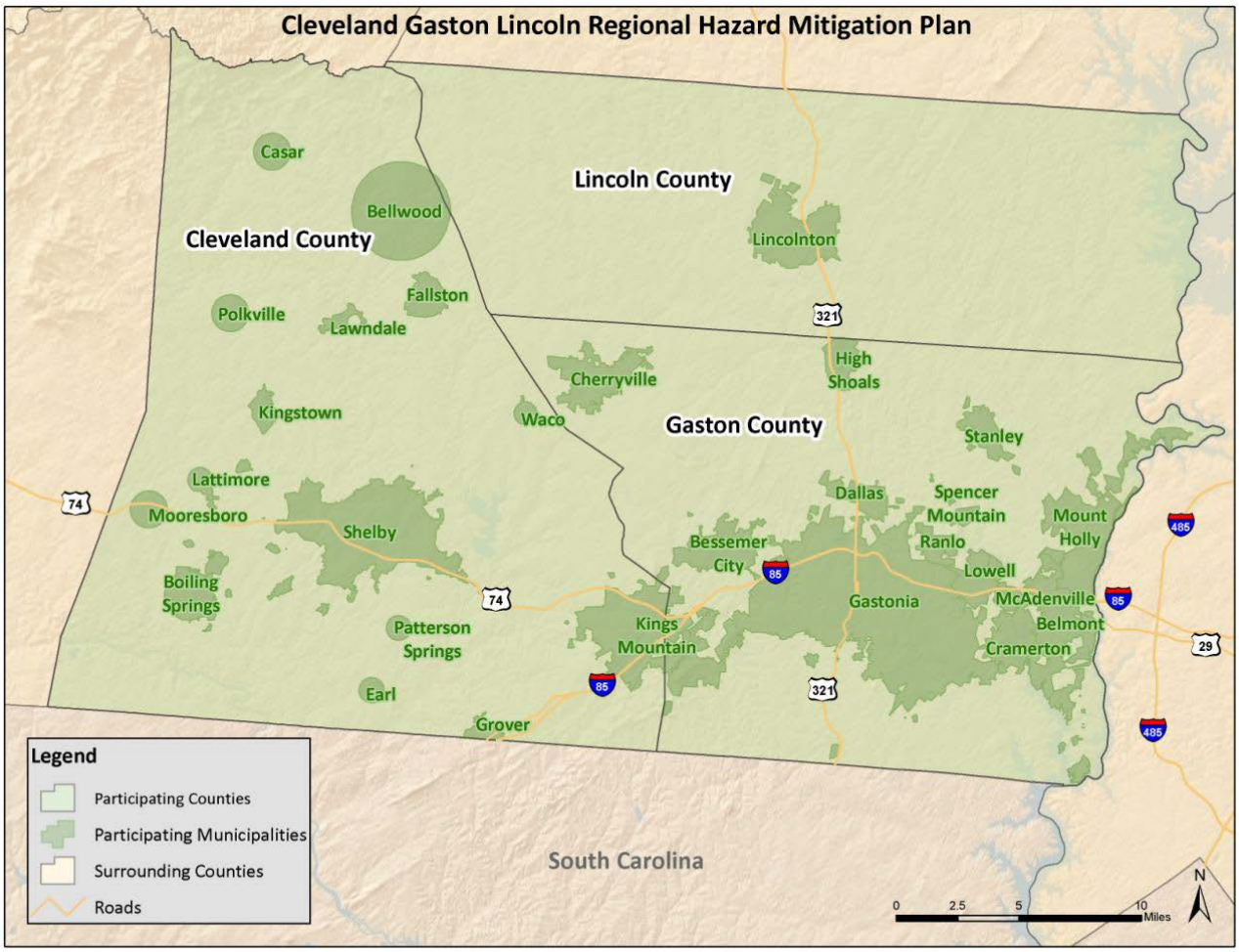
From March through May, temperatures have an average high in the mid-sixties and an average low in the lower forties. Typically, the weather is milder by late April and warm in May. In the summer, afternoon showers and thunderstorms are common and average temperatures increase with afternoon

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 2016, all of the participating counties experienced population growth with Lincoln County having the most significant growth with a 4.8% increase.

Population counts from the US Census Bureau for 2000 and estimations for 2016 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	2016 Population Estimates	% Change 2010-2016
Cleveland County	84,714	96,827	98,078	98,244	.17%
Gaston County	175,093	190,365	206,086	215,489	4.6%
Lincoln County	50,319	63,780	78,265	82,033	4.8%

Source: US Census Bureau, NC Office of State Budget and Management

Based on the 2010 Census and 2017 estimates, 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 (2017)	Black or African American, Percent (2017)	American Indian or Alaska Native, Percent (2017)	Asian, Percent (2017)	Native Hawaiian or Other Pacific Islander, Percent (2010)	Persons of Hispanic Origin, Percent (2017) *	Two or More Races, Percent (2017)
Cleveland County	76.0%	20.8%	0.4%	1.0%	0.0%	3.6%	1.7%
Gaston County	78.7%	17.1%	0.6%	1.6%	0.1%	7.1%	2.0%
Lincoln County	91.5%	5.8%	0.4%	0.7%	0.1%	7.1%	1.5%

*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 US Census Bureau, in 2015 there were an estimated 166,857 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 (2010)	Housing Units (2015)	Seasonal Units, Percent (2015)	Median Home Value (2010-2015)
Cleveland County	43,373	43,291	1.2%	$104,400
Gaston County	88,686	89,702	0.9%	$125,100
Lincoln County	33,641	33,864	1.8%	$153,200

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 ten 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 44 million passengers in 2017, more than three million passengers more than it served in 2010. 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 services are 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 80 fire stations, 22 police stations, and 112 public schools located within the study area.

Twenty-six 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

Land uses in the Cleveland Gaston Lincoln Region vary from county to county. Gaston County, primarily because of its proximity to Charlotte, is much more developed than both Lincoln and Cleveland counties, and continues to experience development pressures from growth in the Charlotte metro area. To a lesser extent, Cleveland and Lincoln Counties experiences similar challenges. Cleveland County is pressured from development in both Charlotte and the Grenville-Spartanburg area and to a lesser extent, Lincoln County faces similar pressure from Hickory to the north.

As shown in **Figure 3.1** above, there are many incorporated municipalities located throughout the study area (mainly in Cleveland and Gaston Counties) which cover a great deal of the region's land area. Most of the region's population comes from these municipalities as well. 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.

While population growth and development in the region remains relatively slow, growth that is occurring is well-managed by the participating jurisdictions. The Capability Assessment found in Section 7 provides an overview of the land use tools that are in place in each jurisdiction. Local land use (and associated regulations) is further discussed in the Capability Assessment as well.

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 Department of Commerce, Labor and Economic Analysis Division, in 2018, Cleveland County had a labor force of 47,932 workers. As of 2018, the top five employers in Cleveland County were the Cleveland County Board of Education, Atrium Health, Wal-Mart Associates, Cleveland County and Gardner-Webb University and the unemployment rate was 3.8 compared to the State rate of 3.7.

Gaston County had a labor force of 110,948 workers. As of 2018, the top five employers in Gaston County were the Caromont Health, Gaston County Schools, Freightliner Corp, Gaston County and Wal-Mart Associates and the unemployment rate was 3.6 compared to the State rate of 3.7.

Lincoln County had an average annual employment of 43,195 workers. As of 2018, the top five employers in Lincoln County were Lincoln County Schools, Lincoln County, Atrium Health, Wal-Mart Associates, and RSI Home Products and the unemployment rate was 3.3 compared to the State rate of 3.7.

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 Disaster Declarations
- 4.3 Summary of Hazard Impacts Since Previous Plan
- 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 (2018). To maintain consistency, the Cleveland Gaston Lincoln Planning Committee voted to assess the same hazards that were identified in the most recent update of the North Carolina State Hazard Mitigation Plan. Therefore, since the development of the previous version of this plan, the hazard identified and included in the plan have changed. A list of all previous hazards covered in the 2014 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan is viewable in **Table 4.1**, along with a summary of the hazards assessed in this 2020 update. Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

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

TABLE 4.1: 2020 CLEVELAND GASTON LINCOLN HAZARDS UPDATE

2014 Cleveland Gaston Lincoln Identified Hazards		2020 Cleveland Gaston Lincoln Identified Hazards		Sub hazards covered in 2020 Plan and Explanations
Atmospheric Hazards	Drought	Drought	**Natural Hazards**	Agricultural Drought, Hydrological Drought
	Hailstorm			Assessed under "Tornadoes/Thunderstorms"
	Heat Wave	Excessive Heat		
	Hurricane and Tropical Storm	Hurricane and Coastal Hazards		Storm Surge associated with Hurricanes and Nor'easters, High Wind associated with Hurricanes and Nor'easters, Torrential Rain, Tornadoes Associates with Hurricanes, Severe Winter Weather associated with Nor'easters
	Lightning			Assessed under "Tornadoes/Thunderstorms"
	Tornado	Tornadoes/Thunderstorms		Hailstorm, Torrential Rain associated with Severe Thunderstorms, Thunderstorm Wind, Lightning, Waterspout, High Wind
	Severe Thunderstorm			Assessed under "Tornadoes/Thunderstorms"
	Winter Storm and Freeze	Severe Winter Weather		Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold
Hydrologic Hazards	Dam and Levee Failure	Dam Failures		
	Erosion			Assessed under "Geological"
	Flood	Flooding		
Geologic Hazards	Earthquake	Earthquakes		
	Landslide	Geological		Landslides, Sinkholes, Erosion
Other Hazards	Wildfire	Wildfires	**Other Hazards**	
		Infectious Disease		
Other Hazards	Hazardous Materials Incident	Hazardous Substances	**Technological Hazards**	Hazardous Materials, Hazardous Chemicals, Oil Spill
	Nuclear Accident	Radiological Emergency – Fixed Nuclear Facilities		
		Terrorism		Chemical, Biological, Radiological, Nuclear, Explosive
		Cyber		
		Electromagnetic Pulse		

4.2 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the Cleveland Gaston Lincoln regional planning area. Since 1974, eight presidential disaster declarations have been reported in the Cleveland Gaston Lincoln Region, which can be seen in **Table 4.2** below. This includes three storms related to winter storm events, two storms related to hurricanes and tropical storms, two storms related to tornadoes, and one severe storm that included major flooding.

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
2002	1448	SEVERE ICE STORM	X	X	X
2004	1546	TROPICAL STORM FRANCES	X	X	X
2013	4153	SEVERE STORMS, FLOODING, LANDSLIDES, & MUDSLIDES			X

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan (5/20/2015), there have been 148 hazard events recorded for the region in the National Centers for Environmental Information Storm Events Database. It is important to take note of those hazard events and consider them in the *Hazard Identification* section to help ensure that the appropriate hazards are being considered in the risk assessment sections and in the Mitigation Strategy. **Table 4.3** documents the hazard events recorded. Details for some of these events are discussed in further detail in the *Hazard Profiles* section.

TABLE 4.3: SUMMARY OF HAZARD EVENTS SINCE PREVIOUS PLAN

Hazard Type*	Number of Reported Events in Cleveland County	Number of Reported Events in Gaston County	Number of Reported Events in Lincoln County
Cold/Wind Chill	1	1	1
Flash Flood	1	1	0
Flood	0	1	0
Hail	9	5	5
Heavy Snow	2	1	2
High Wind	1	2	0
Lightning	1	0	0
Strong Wind	1	2	2
Thunderstorm Wind	26	28	20
Tornado	4	1	2
Tropical Storm	1	1	1
Winter Storm	2	3	2

Winter Weather	6	4	8
TOTAL NUMBER OF REPORTED EVENTS	**55**	**50**	**43**

* The hazard type names that NCEI uses are different than the names of hazards used in this plan; however, one can still get an understanding of the types of hazards that impact the region as the hazard types are similar in name.

Appendix G includes detailed information about all previous historical hazard occurrence events that have occurred in the region as reported to the National Centers for Environmental Information. Some more detailed information about previous historical hazards events can be found in Section 5: Hazard Profiles under each separate hazard profile.

4.4 HAZARD EVALUATION

Table 4.4 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.

TABLE 4.4: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

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?
NATURAL 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 the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	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.
Drought	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the North Carolina Drought Monitor website • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• There are reports of drought conditions in 13 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 (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's	• Hailstorm events are discussed in the state plan under the Tornadoes/ Thunderstorm hazard.

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?
		Multi-Hazard Identification and Risk Assessment • Review of NOAA NCEI Storm Events Database • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• NCEI reports 423 hailstorm events (3/4 inch size hail to 4.0 inches) for the Cleveland Gaston Lincoln Region between 1962 and 2018. For these events there was over $7 million (2018 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.
Excessive Heat	**YES**	• Review of NOAA NCEI Storm Events Database • Review of the North Carolina State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	NCEI reports 1 excessive heat event for the Cleveland Gaston Lincoln counties. • The NC State Hazard Mitigation Plan includes Excessive Heat 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.
Hurricane and Coastal Hazards	**YES**	• Review of NC State Hazard Mitigation Plan • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website	Hurricane and coastal hazard 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 37 hurricane or tropical

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?
		• Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	storms/depressions have come within 75 miles of the Cleveland Gaston Lincoln Region since 1850. • Two out of eight 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 coastal hazards were addressed as Hurricanes and Tropical Storms in all three previous Cleveland Gaston Lincoln plans.
Lightning	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCEI Storm Events Database, NOAA lightning statistics • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	Lightning events are discussed in the state plan as part of the Tornadoes/Thunderstorm hazard. • NCEI reports 55 lightning events for the Cleveland Gaston Lincoln Region since 1996. These events have resulted in a recorded 15 injuries and nearly $6 million (2018 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

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 two plans. Given the damage and reported death and injuries, individual analysis is warranted.
Nor'easter	**NO**	• Review of NC State Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	Nor'easters are discussed in the state plan. The Piedmont 5 Region, which includes the Cleveland Gaston Lincoln Region, has a low vulnerability. • NCEI 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.
Tornadoes/Thunderstorm	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCEI Storm Events Database • Review of the previous Cleveland Gaston Lincoln	Tornado events are discussed in the NC State Hazard Mitigation Plan. • NCEI reports 55 tornado events in Cleveland Gaston Lincoln Region counties since 1950. These events have resulted in 4 recorded deaths and have caused 77 injuries and $125.2 million (2018 dollars) in property damage with the most severe being an F4.

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?
		Regional Hazard Mitigation Plan	• Tornado events were addressed in all of the previous Cleveland Gaston Lincoln plans.
Severe Thunderstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NOAA NCEI Storm Events Database • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	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. • NCEI reports 484 thunderstorm wind events in the Cleveland Gaston Lincoln Region counties between since 1950. These events have resulted in 4 deaths and 41 injuries and over $3 million (2018 dollars) in property damage. • Severe thunderstorm events were addressed in all of the previous Cleveland Gaston Lincoln plans.
Severe Winter Weather	**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 NCEI Storm Events Database • Review of the previous Cleveland	Severe winter weather, 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. • NCEI reports that the Cleveland Gaston Lincoln counties have been affected by 231 snow and ice events since 1993. These events resulted in over $55 million (2018 dollars) in damages but did not cause any deaths or injuries.

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?
		Gaston Lincoln Regional Hazard Mitigation Plan	• Three of the region's eight disaster declarations were directly related to severe winter weather events. • Severe winter weather events were addressed in all of the previous Cleveland Gaston Lincoln plans.
Earthquakes	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • 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. • 29 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

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?
			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.
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 the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• 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.
Geological (Landslides, Sinkholes, Erosion)	**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 the previous Cleveland Gaston Lincoln	• Landslide/rock fall 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.

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?
		Regional Hazard Mitigation Plan	• All of the previous Cleveland Gaston Lincoln hazard mitigation plans address landslides.
Land Subsidence	**NO**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• 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 the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks –	• 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

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?
		Identifying Hazards and Estimating Losses).	suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	**NO**	• Review of 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.
Dam Failure	**YES**	• Review of NC State Hazard Mitigation Plan • Review of North Carolina Dam Safety Program's NC Dam Inventory as of 11/20/19 • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Dam failure is discussed in the state plan as a hazard of concern for the Cleveland Gaston Lincoln Region. • Per the NC Dam Inventory, there are 49 high hazard dams in the planning region. (High hazard is defined as "where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.") • The previous Cleveland Gaston Lincoln hazard mitigation plan identified dam failure as a hazard.
Erosion	**YES (Referenced in Geological Hazards)**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln	• Erosion is only referenced in 2 of the previous Cleveland Gaston Lincoln mitigation plans.

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?
		Regional Hazard Mitigation Plan	• 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
Flooding	**YES**	• Review of NC State Hazard Mitigation Plan • Review of historical disaster declarations • Review of NOAA NCEI Storm Events Database • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS) • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• The flood hazard is thoroughly discussed in the state plan. • Three of eight Presidential Disaster Declarations were flood-related and/or caused by hurricane or tropical storm related events. • NCEI reports that Cleveland Gaston Lincoln Region counties have been affected by 60 flood events since 1993. These events in total caused no reported deaths or injuries, but did cause an estimated $5 million (2018 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	• Storm surge is discussed in the state plan under the hurricane hazard and indicates that the Piedmont 5 Region

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?
		• Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	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 NCEI • Given the inland location of the Cleveland Gaston Lincoln Region, storm surge would not affect the area.
OTHER HAZARDS			
Wildfires	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • 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 182 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.
Hazardous Substances	**YES**	• Review of the previous Cleveland Gaston	• All of the previous Cleveland Gaston Lincoln Region hazard mitigation

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?
		Lincoln Regional Hazard Mitigation Plan	plans make mention of hazardous materials to some degree. • This update assesses hazardous materials, hazardous chemicals, and oil spills under this hazard.
Infectious Disease	**YES**	• Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Although none of the previous hazard mitigation plans for the region included infectious diseases as a hazard, it is assessed in this update to maintain consistency with the NC State Hazard Mitigation Plan.
TECHNOLOGICAL HAZARDS			
Terrorism	**YES**	• Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of local Official knowledge	• Although none of the previous hazard mitigation plans for the region included terrorism threat as a hazard, it is assessed in this update to maintain consistency with the NC State Hazard Mitigation Plan. • There is a fixed nuclear facility in the state. •This hazard will assess chemical, biological, radiological, nuclear, and explosive terrorism events.
Radiological Emergency – Fixed Nuclear Facilities	**YES**	• Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of IAEA list of fixed nuclear power stations in the United States • Discussion with local officials	• 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 radiological emergencies are not

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?
		about location of nuclear power stations	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
Cyber	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of a cyber attack with the increase in global technology
Electromagnetic Pulse	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology

4.4 HAZARD IDENTIFICATION RESULTS

Table 4.5 provides a summary of the hazard identification and evaluation process noting which of the 24 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

TABLE 4.5: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

NATURAL HAZARDS		TECHNOLOGICAL HAZARDS	
☐	Avalanche	☑	Radiological Emergency – Fixed Nuclear Facilities
☑	Drought	☑	Terrorism
☑	Hailstorm**	☑	Cyber
☑	Excessive Heat	☑	Electromagnetic Pulse
☑	Hurricane and Coastal Hazards	**OTHER HAZARDS**	
☑	Flooding	☑	Hazardous Substances
☑	Lightning**	☑	Wildfires
☐	Nor'easter	☑	Infectious Disease
☑	Tornadoes/Thunderstorms		
☑	Severe Winter Weather		
☑	Earthquakes		
☑	Dam Failures		
☑	Geological		
☑	Infectious Disease		
☐	Expansive Soils		
☐	Land Subsidence		
☐	Tsunami		
☐	Volcano		
☐	Storm Surge		
☐	Erosion		

☑ = Hazard considered significant enough for further evaluation in the Cleveland Gaston Lincoln Region hazard risk assessment.

* * = Hazard is assessed as a sub hazard under the Tornadoes/Thunderstorms hazard.

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 Excessive Heat
- 5.5 Hurricane and Coastal Hazards
- 5.6 Tornadoes/Thunderstorms
- 5.7 Severe Winter Weather
- 5.8 Earthquakes
- 5.9 Geological
- 5.10 Dam Failure
- 5.11 Flooding
- 5.12 Wildfires
- 5.13 Infectious Disease
- 5.14 Hazardous Substances
- 5.15 Radiological Emergency – Fixed Nuclear Facilities
- 5.16 Terrorism
- 5.17 Cyber
- 5.18 Electromagnetic Pulse
- 5.19 Conclusions on Hazard Risk
- 5.20 Final Determinations

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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 hazards 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.

After reviewing the list of assessed hazards from the previous update, the Cleveland Gaston Lincoln Regional Planning Team moved to amend the hazards in order to be consistent with the State of North Carolina Hazard Mitigation Plan. This required some of the hazard names to change and additional hazards were included in the assessment.

The following hazards were identified:

- **Natural**
  - Drought
  - Excessive Heat
  - Hurricane and Coastal Hazards
  - Tornadoes/Thunderstorms (including hailstorms and lightning)
  - Severe Winter Weather
  - Earthquakes
  - Geological (including landslides, sinkholes, and erosion)
  - Dam Failure
  - Flooding
- **Other**
  - Wildfires
  - Infectious Disease
- **Technological**
  - Hazardous Substances
  - Radiological Emergency – Fixed Nuclear Facilities
  - Terrorism
  - Cyber
  - Electromagnetic Pulse

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	Kings Mountain
Bessemer City	Lowell
Cherryville	McAdenville
Cramerton	Mount Holly
Dallas	Ranlo
Gastonia	Stanley
High Shoals	Unincorporated Gaston County
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 can be found under Cleveland County.

FIGURE 5.1: CLEVELAND GASTON LINCOLN REGION BASE MAP

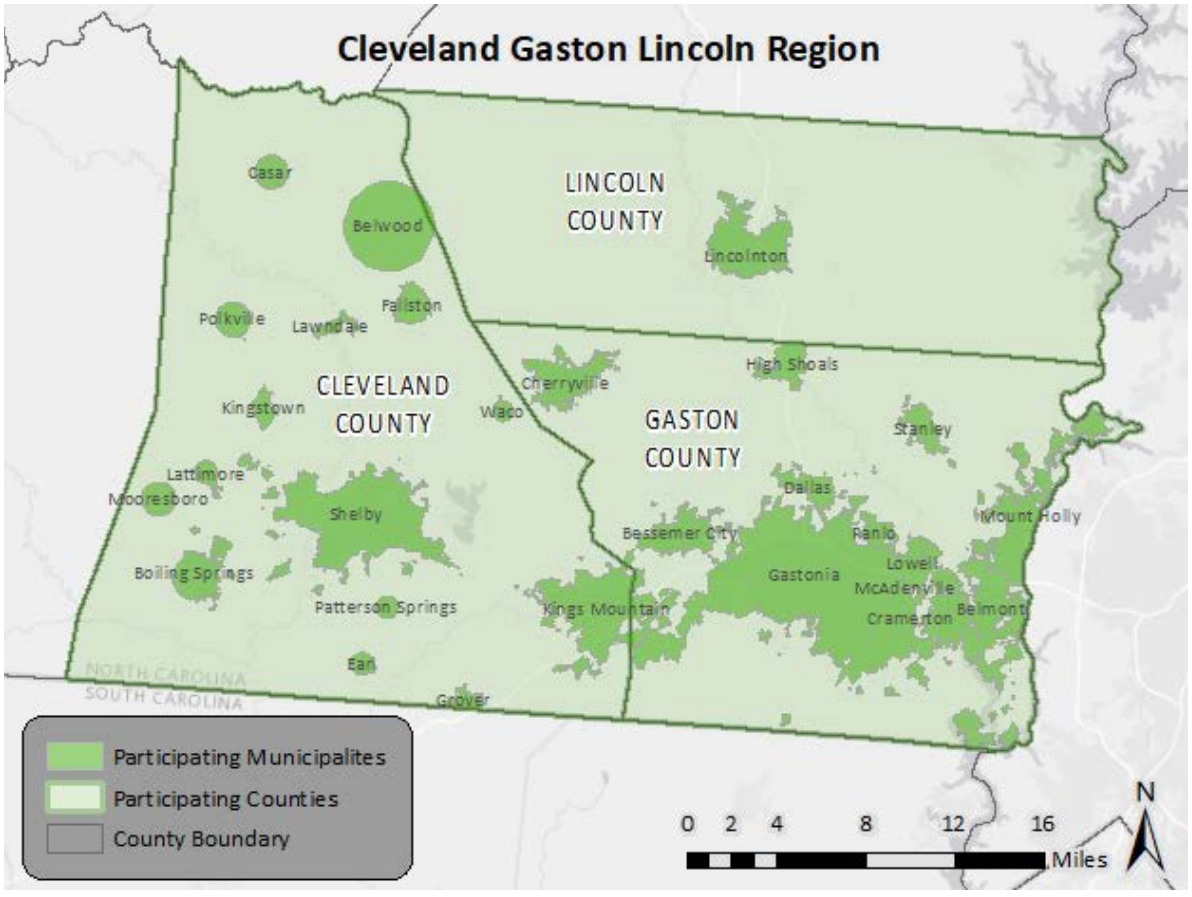


Table 5.2 lists each significant hazard for the Cleveland Gaston Lincoln Region and identifies whether or not it has been determined to be a specific hazard of concern for the twenty-nine municipal jurisdictions and each of the three county's unincorporated areas. This is the based on the best available 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	NATURAL										OTHER	TECHNOLOGICAL				
	Drought	Excessive Heat	Hurricane and Coastal Hazards	Tornadoes/ Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cyber	Electromagnetic Pulse
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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Stanley	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lincoln County																
Lincolnton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Natural Hazards

5.3 DROUGHT

5.3.1 Background and Description

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, which usually lasts a season or longer. 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. Prolonged drought events 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

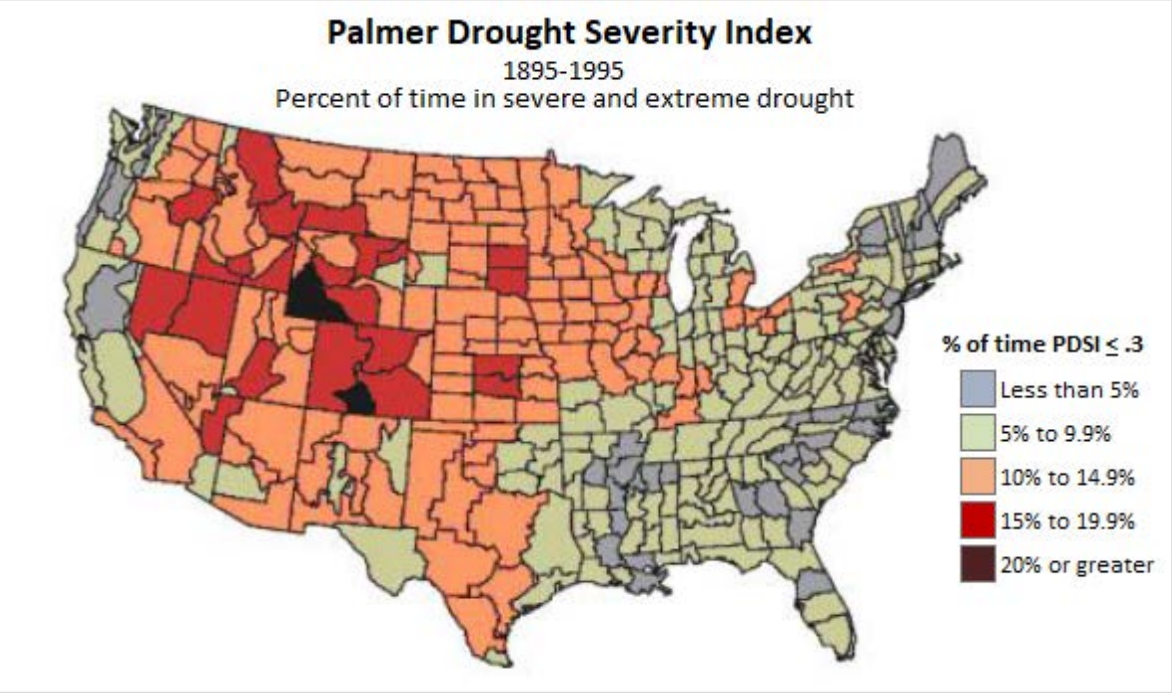
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural 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.

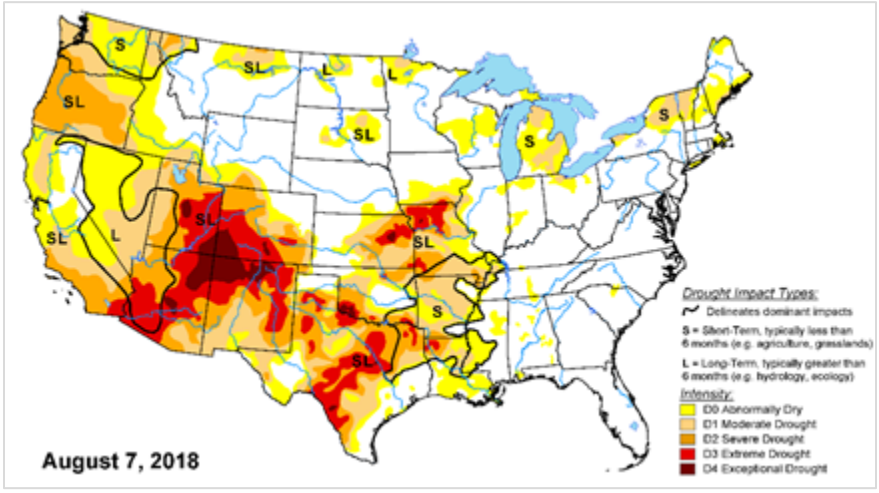
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

The figure above is the most updated version of the Palmer Drought Severity Index; however, the US Drought Monitor is updated on a weekly basis. An archived map from the summer of 2018 can be seen below in **Figure 5.3** to reflect more current drought conditions in the US.

FIGURE 5.3: US DROUGHT MONITOR



Source: US Drought Monitor

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

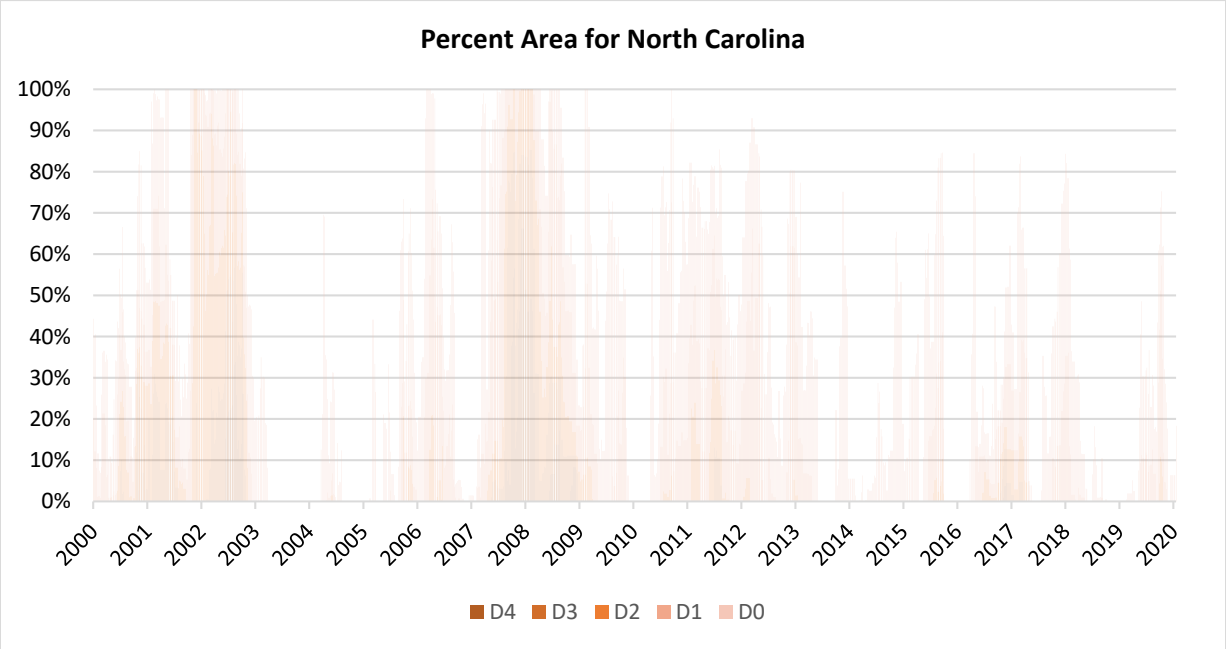
The North Carolina Drought Management Advisory Council also reports data on North Carolina drought conditions from 2000 to 2018 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor, which classifies conditions on a scale of D0 to D4. Each class is further explained in **Table 5.4.**

TABLE 5.4: USDM DROUGHT CLASSIFICATIONS

Scale	Description	Impacts
D0	Abnormally Dry	- Short-term dryness slowing planting, growth of crops - Some lingering water deficits - Pastures or crops not fully recovered
D1	Moderate Drought	- Some damage to crops, pastures - Some water shortages developing - Voluntary water-use restrictions requested
D2	Severe Drought	- Crop or pasture loss likely - Water shortages common - Water restrictions imposed
D3	Extreme Drought	- Major crop/pasture losses - Widespread water shortages or restrictions
D4	Exceptional Drought	- Exceptional and widespread crop/pasture losses - Shortages of water creating water emergencies

Data from the North Carolina Drought Management Advisory Council and National Centers for Environmental Information (NCEI) were used to ascertain historical drought events in the Cleveland Gaston Lincoln Region. Since 2000, the longest duration of drought (D1-D4) in North Carolina lasted 155 weeks beginning on January 4, 2000 and ending on December 17, 2002. The most intense period of drought occurred the week of December 11, 2007 where D4 affected 66.2% of North Carolina land. **Figure 5.4** shows the percent area of North Carolina that has experiencing drought conditions from 2000 to 2018.

FIGURE 5.4: NORTH CAROLINA DROUGHT CONDITIONS (2000-2018)



Source: NIDIS, Drought.gov, US Drought Portal

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 (2005-2018) (**Table 5.5**). 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 5.5: SUMMARY OF DROUGHT OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION

Year	Cleveland County	Gaston County	Lincoln County
2005	Moderate Drought	Moderate Drought	Moderate Drought
2006	Severe Drought	Moderate Drought	Moderate Drought
2007	Exceptional Drought	Exceptional Drought	Exceptional Drought
2008	Exceptional Drought	Exceptional Drought	Exceptional Drought
2009	Severe Drought	Severe Drought	Severe Drought
2010	Moderate Drought	Moderate Drought	Moderate Drought
2011	Severe Drought	Moderate Drought	Moderate Drought
2012	Severe Drought	Severe Drought	Severe Drought
2013	Moderate Drought	Moderate Drought	Moderate Drought
2014	Abnormally Dry	Abnormally Dry	Abnormally Dry
2015	Severe Drought	Severe Drought	Severe Drought
2016	Severe Drought	Severe Drought	Severe Drought
2017	Severe Drought	Moderate Drought	Severe Drought
2018	Abnormally Dry	Moderate Drought	Moderate Drought

Source: North Carolina Drought Monitor (through August 2018)

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. While reports indicate that there is a much lower probability for extreme, long-lasting drought conditions, NOAA also predicts that central North Carolina to have areas of persistent drought and further drought development[1].

[1] *U.S. Seasonal Drought Outlook. National Weather Service Climate Prediction Center. http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php*

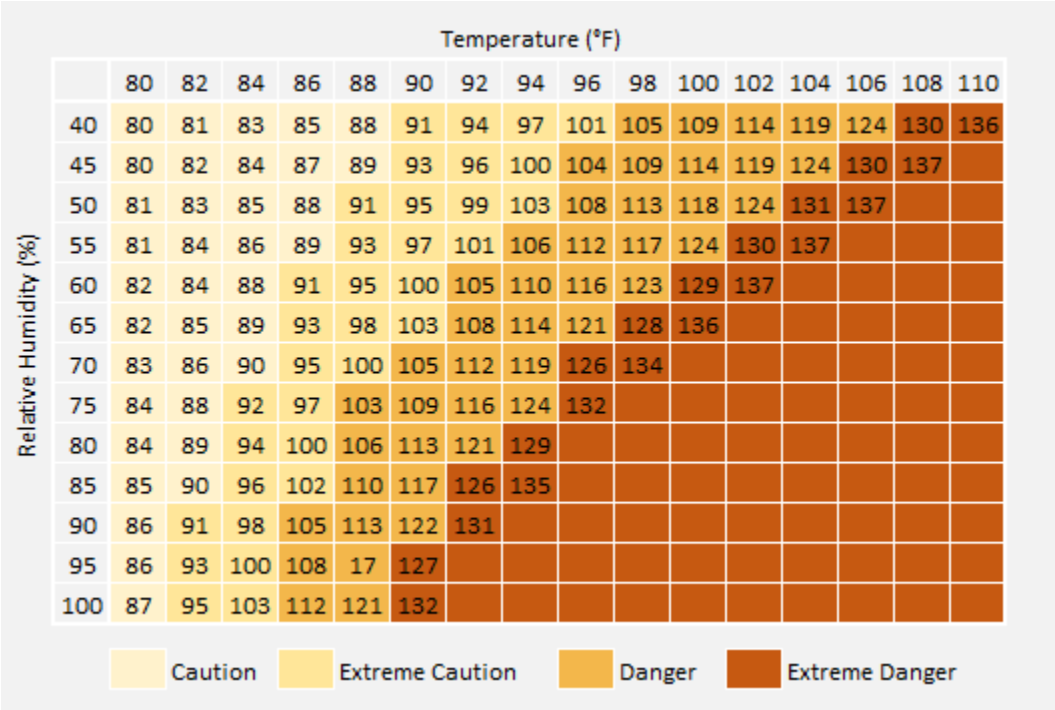
5.4 EXCESSIVE HEAT

5.4.1 Background and Description

Excessive heat, like drought, poses little risk to property. However, excessive heat can have devastating effects on health. Excessive heat can often be referred to as "extreme heat" or 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[2].

According to the National Oceanic and Atmospheric Administration, heat is the number one weather related killer among natural hazards, followed by frigid winter temperatures[3]. 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 5.4**, uses air temperature and humidity to determine the heat index or apparent temperature. **Table 5.6** 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 5.4: NWS HEAT INDEX CHART



Source: NOAA, National Weather Service

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

[3] *https://www.NCEI.noaa.gov/sotc/drought/201802#det-pdi*

TABLE 5.6: 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 Health Watch/Warning System in order to better inform and warn the public of heat dangers. A Heat Health Watch 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

Extreme 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 Centers for Environmental Information was used to determine historical excessive heat and heat wave events in the Cleveland Gaston Lincoln Region. The results are reported in **Table 5.7** below:

TABLE 5.7: EXCESSIVE HEAT OCCURRENCES IN THE CLEVELAND GASTON LINCOLN REGION (1996-2018)

County	Number of Events	Deaths/ Injuries	Property Damage (2018 dollars)
Cleveland	2	0/0	$0
Gaston	2	0/0	$0
Lincoln	3	0/1	$0
Cleveland Gaston Lincoln Regional Total	**7**	**0/1**	**$0**

Source: NCEI

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 5.8**:

TABLE 5.8: 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 5.9** shows the average maximum temperatures from 2015 to 2018 at the Lincolnton observation station, which can be used as a general comparison for the region.

TABLE 5.9: AVERAGE MAXIMUM TEMPERATURE IN LINCOLNTON, LINCOLN COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	51.4	57.3	64.7	72.8	81.0	89.2	91.8	90.0	88.0	75.3	63.6	57.6

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 excessive heat events to impact the region.

5.5 HURRICANE AND COASTAL HAZARDS

5.5.1 Background and Description

Hurricanes and coastal hazards 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 (2018)

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

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

5.5.2 Location and Spatial Extent

Hurricanes, coastal hazards, 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 coastal hazards.

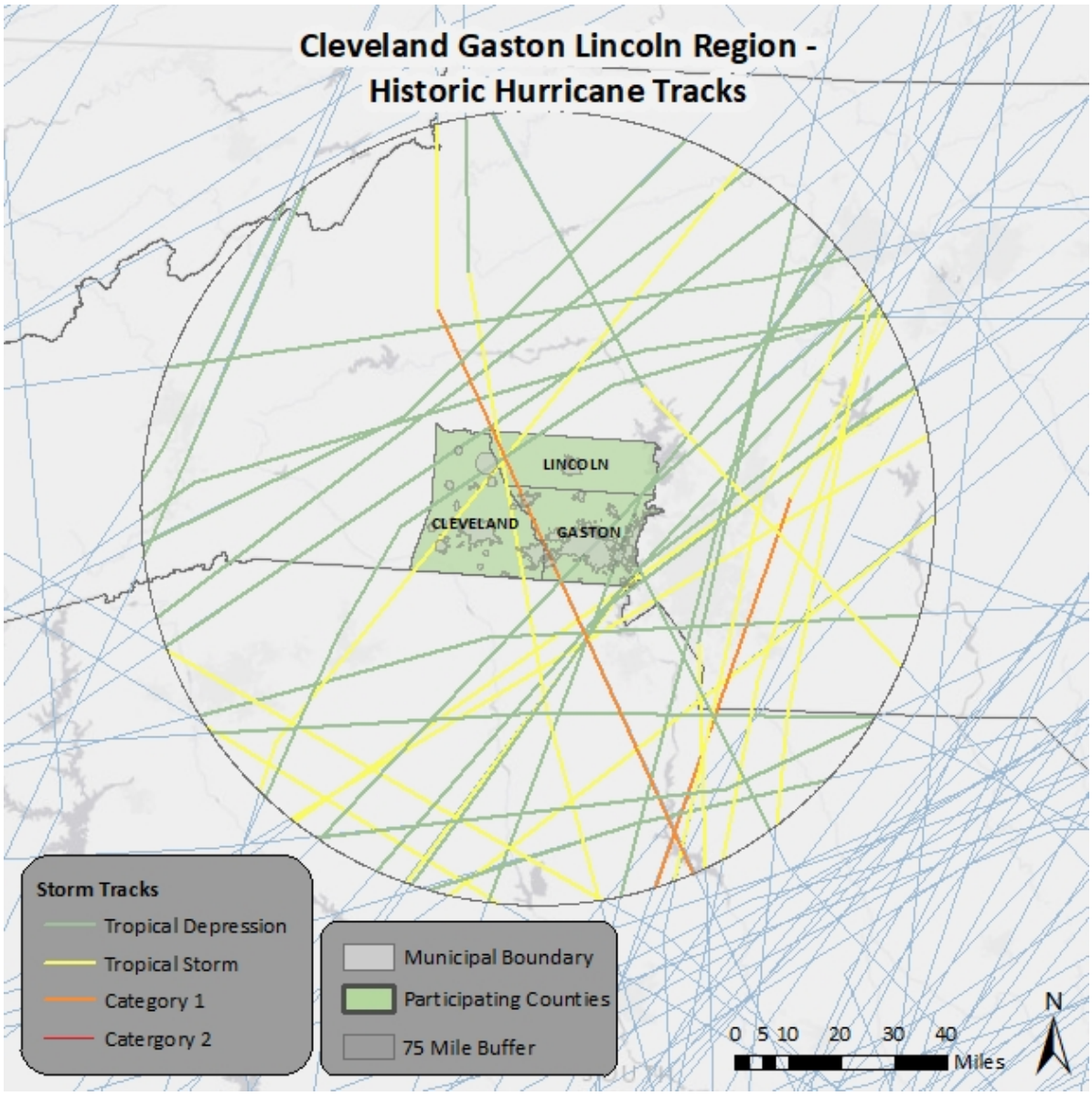
5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 37 hurricane or tropical storm tracks have passed within 75 miles of the Cleveland Gaston Lincoln Region since 1850[4]. This includes fourteen tropical storms and twenty-three tropical depressions.

Of the recorded storm events, eleven have traversed directly through the Cleveland Gaston Lincoln Region as shown in **Figure 5.5**. Furthermore, **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.

[4] 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 5.5: 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 (1850–2018)

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

Date of Occurrence	Storm Name	Maximum Wind Speed (knots)	Storm Category
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
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 Centers for Environmental Information did not report any events associated with a hurricane or tropical storm in the Cleveland Gaston Lincoln Region between 1950 and 2018. However, federal records indicate that two disaster declarations were made in 1989 (Hurricane Hugo) and 2004 (Tropical Storm Frances) for the region[5].

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

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

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.

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.

5.5.4 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.

5.6 TORNADOES/THUNDERSTORMS

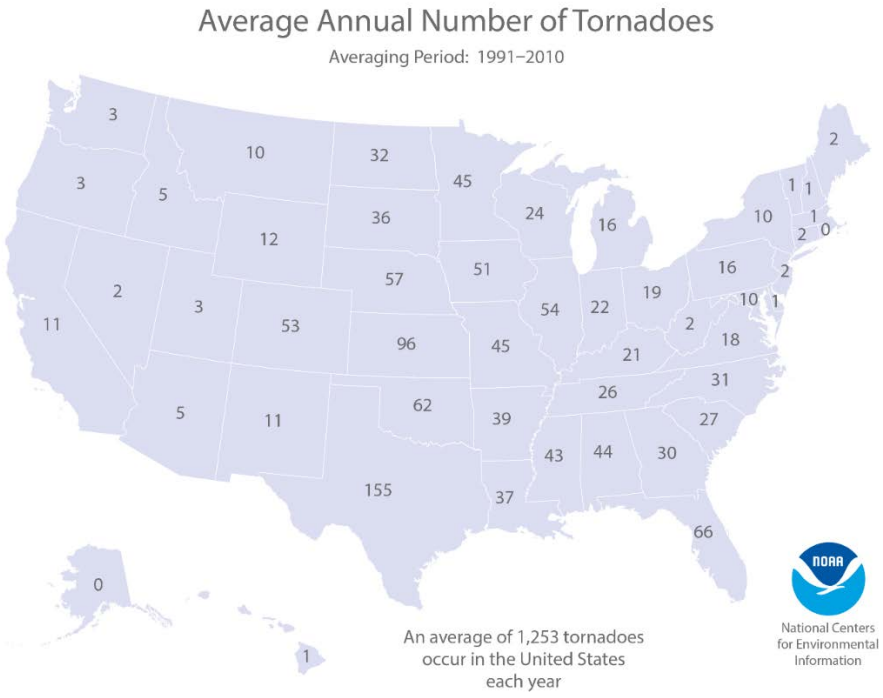
For the purposes of maintaining consistency with the State of State of North Carolina Hazard Mitigation Plan, this section will assess tornadoes and thunderstorms, which also include high winds, hailstorms and lightning.

5.6.1 Background and Description

Tornadoes

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 1,200 tornadoes is reported nationwide, resulting in an average of 56 deaths and 1,500 injuries[6]. 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



[6] NOAA, 2013.

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 5.13**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.14**).

TABLE 5.13: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-Scale Number	Intensity Phrase	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 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 5.14 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
0	Gale	65-85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
1	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.
2	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.
3	Severe	136-165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
4	Devastating	166-200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5	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

Thunderstorms

Thunderstorms can produce a variety of accompanying hazards including wind, hailstorms, and lightning[7], which are all discussed here. 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.

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

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 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."

Hailstorms

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. 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 5.15** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.15: 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 crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	1.0 – 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	1.2 – 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries

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

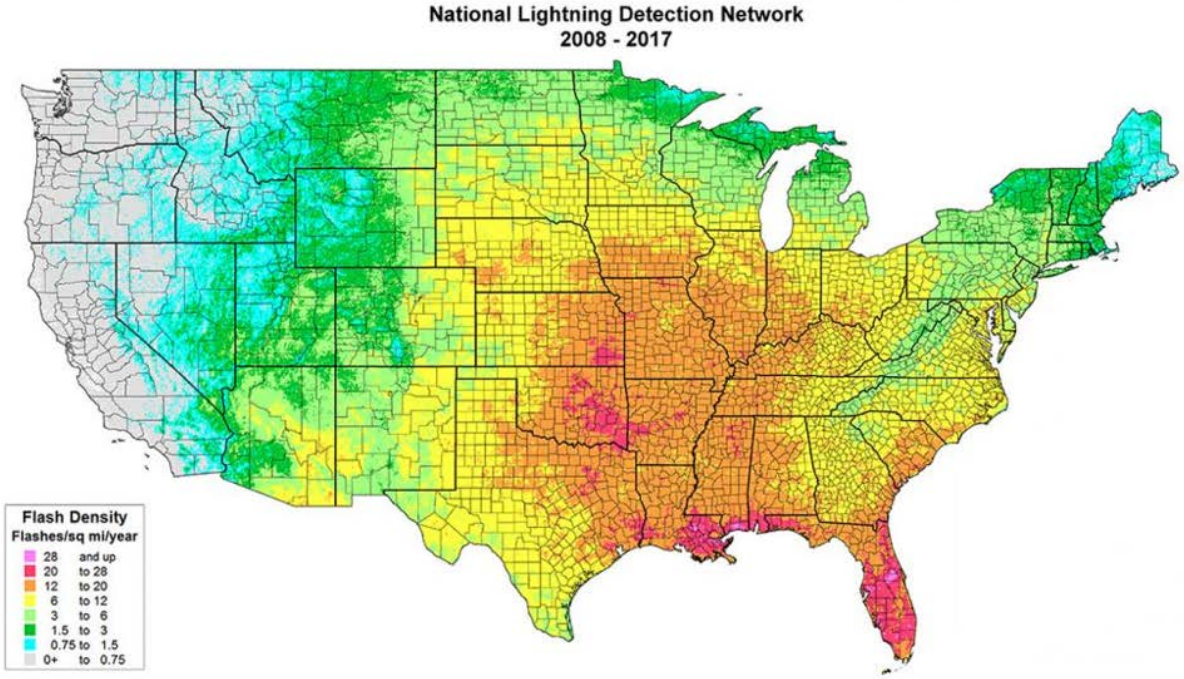
Source: http://www.torro.org.uk/site/hscale.php

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 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.

Figure 5.7 shows a lightning flash density map for the years 2008-2017 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.7: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala U.S. National Lightning Detection Network

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.

5.6.2 Location and Spatial Extent

Tornadoes

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.

Thunderstorms

A thunderstorm/ 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.

Hailstorms

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.

Lightning

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.

5.6.3 Historical Occurrences

Tornadoes

Tornadoes have resulted in two disaster declarations in the Cleveland Gaston Lincoln Region in 1974 and 1989[8]. According to the National Centers for Environmental Information, there have been a total of 56 recorded tornado events in the Cleveland Gaston Lincoln Region since 1950 (**Table 5.16**), resulting in over $125 million (2018 dollars) in property damages[9]. Four of the recorded tornado occurrences happened within the last five years. 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

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

[9] These tornado events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). 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.

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.

TABLE 5.16: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Cleveland County	**23**	**0/36**	**$54,333,028**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$0
Casar	0	0/0	$0
Earl	1	0/0	$850,695
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	1	0/0	$23,422
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	1	0/0	$102,866
Mooresboro	1	0/0	$102,866
Patterson Springs	1	0/0	$85,069
Polkville	2	0/0	$34,276
Shelby	1	0/0	$1,607
Waco	2	0/0	$66,740
Unincorporated Area	12	0/36	$53,065,487
Gaston County	**13**	**1/11**	**$16,848,757**
Belmont	1	0/0	$1,271,969
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$2,746,970
Cramerton	1	0/0	$62,536
Dallas	0	0/0	$0
Gastonia	4	0/0	$8,661,216
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	5	1/11	$4,106,066
Lincoln County	**20**	**4/30**	**$54,529,426**
Lincolnton	3	0/0	$68,517
Unincorporated Area	17	4/30	$54,460,909
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**56**	**5/77**	**$125,711,211**

Source: National Centers for Environmental Information

Further details of recent tornado events can be seen in **Table 5.17**. These include descriptions of each event from

Thunderstorms

Severe storms have not resulted in any disaster declarations in the Cleveland Gaston Lincoln Region[10]. According to NCEI, there have been 598 reported thunderstorm wind and high wind events since 1955 in the Cleveland Gaston Lincoln Region[11]. These events caused over $4.8 million (2018 dollars) in damages. There were reports of 14 injuries and 3 fatalities. **Table 5.16** summarizes this information.

TABLE 5.17: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Cleveland County	**232**	**0/6**	**$1,829,011**
Belwood	4	0/0	$29,278
Boiling Springs	15	0/0	$232,726
Casar	13	0/0	$0
Earl	6	0/0	$0
Fallston	6	0/0	$27,407
Grover	7	0/0	$6,851
Kings Mountain	15	0/0	$6,689
Kingstown	0	0/0	$0
Lattimore	4	0/0	$12,160
Lawndale	5	0/0	$113,712
Mooresboro	9	0/0	$167,732
Patterson Springs	8	0/0	$67,729
Polkville	8	0/0	$14,953
Shelby	44	0/6	$173,077
Waco	7	0/0	$72,965
Unincorporated Area	81	0/0	$903,732
Gaston County	**216**	**2/7**	**$1,635,117**
Belmont	13	0/0	$46,409
Bessemer City	12	0/0	$15,000
Cherryville	19	0/1	$208,794
Cramerton	5	0/0	$3,873
Dallas	14	0/0	$121,953
Gastonia	49	2/1	$215,778
High Shoals	2	0/0	$0
Lowell	2	0/0	$25,014
McAdenville	3	0/1	$0
Mount Holly	8	0/0	$73,213
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	7	0/0	$26,064
Unincorporated Area	81	0/4	$899,019
Lincoln County	**150**	**1/1**	**$1,419,693**
Lincolnton	49	0/1	$249,186

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

[11] These thunderstorm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). 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.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Unincorporated Area	101	1/0	$1,170,507
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**598**	**3/14**	**$4,833,821**

Source: National Centers for Environmental Information

Hailstorms

According to the National Centers for Environmental Information, 423 recorded hailstorm events have affected the Cleveland Gaston Lincoln Region since 1962[12]. **Table 5.18** is a summary of the hail events in the Cleveland Gaston Lincoln Region. In all, hail occurrences resulted in over $2 million (2018 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 Centers for Environmental Information. 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 5.18: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Cleveland County	**149**	**0/0**	**$0**
Belwood	1	0/0	$0
Boiling Springs	7	0/0	$0
Casar	14	0/0	$0
Earl	4	0/0	$0
Fallston	5	0/0	$0
Grover	4	0/0	$0
Kings Mountain	19	0/0	$0
Kingstown	0	0/0	$0
Lattimore	2	0/0	$0
Lawndale	6	0/0	$0
Mooresboro	2	0/0	$0
Patterson Springs	4	0/0	$0
Polkville	10	0/0	$0
Shelby	23	0/0	$0
Waco	2	0/0	$0
Unincorporated Area	46	0/0	$0
Gaston County	**153**	**0/0**	**$411,107**
Belmont	10	0/0	$411,107
Bessemer City	10	0/0	$0
Cherryville	14	0/0	$0

[12] These hail events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional hail events have affected the Cleveland Gaston Lincoln Region. In addition to NCEI, 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 (2018)
Cramerton	3	0/0	$0
Dallas	10	0/0	$0
Gastonia	32	0/0	$0
High Shoals	1	0/0	$0
Lowell	3	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	5	0/0	$0
Unincorporated Area	55	0/0	$0
Lincoln County	**121**	**0/0**	**$1,639,070**
Lincolnton	39	0/0	$7,007
Unincorporated Area	82	0/0	$1,632,063
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**423**	0/0	**$2,050,177**

Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been a total of 55 recorded lightning events in the Cleveland Gaston Lincoln Region since 1996[13]. These events resulted in nearly $6 million (2018 dollars) in damages, as listed in summary **Table 5.19**. Furthermore, lightning caused 15 injuries throughout the Cleveland Gaston Lincoln Region.

It is certain that more than 55 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.19: SUMMARY OF LIGHTNING OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Cleveland County	**25**	**0/5**	**$4,029,853**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$11,163
Casar	1	0/0	$30,144
Earl	1	0/0	$38,572
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	4	0/1	$69,600
Kingstown	0	0/0	$0
Lattimore	1	0/0	$13,958
Lawndale	2	0/1	$0
Mooresboro	0	0/0	$0

[13] These lightning events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). 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.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Patterson Springs	0	0/0	$0
Polkville	1	0/0	$125,557
Shelby	12	0/3	$3,426,709
Waco	1	0/0	$175,569
Unincorporated Area	1	0/0	$139,581
Gaston County	**19**	**0/7**	**$650,791**
Belmont	2	0/0	$13,293
Bessemer City	0	0/0	$0
Cherryville	2	0/1	$34,861
Cramerton	0	0/0	$0
Dallas	1	0/0	$1,329
Gastonia	10	0/6	$479,139
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	1	0/0	$58,047
Unincorporated Area	3	0/0	$64,122
Lincoln County	**11**	**0/3**	**$1,350,921**
Lincolnton	4	0/0	$405,376
Unincorporated Area	7	0/3	$945,545
Cleveland Gaston Lincoln Regional Total	**55**	**0/15**	**$6,031,565**

Source: National Centers for Environmental Information

5.6.4 Probability of Future Occurrences

Tornadoes

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).

Thunderstorms

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.

Hailstorms

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.

Lightning

Although there was not a high number of historical lightning events reported throughout the Cleveland Gaston Lincoln Region via NCEI 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 2010 and 2018. 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.

5.7 SEVERE WINTER WEATHER

5.7.1 Background and Description

Severe winter weather 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 severe winter weather 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 severe winter weather 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.

5.7.2 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.

5.7.3 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[14]. According to the National Centers for Environmental Information, there have been a total of 236 recorded winter storm events in the Cleveland Gaston Lincoln Region since 1993 (**Table 5.20**)[15]. These events resulted in more than $55.7 million (2018 dollars) in damages[16]. Five of the historical occurrences happened recently in 2018.

TABLE 5.20: SUMMARY OF SEVERE WINTER WEATHER EVENTS IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Cleveland County	83	0/0	$15,179,627
Gaston County	72	0/0	$26,640,549
Lincoln County	81	0/0	$13,897,616
CLEVELAND GASTON LINCOLN REGION TOTAL	**236**	**0/0**	**$55,717,792**

Source: National Centers for Environmental Information

There have been several severe winter weather events in the Cleveland Gaston Lincoln Region. **Appendix G** includes descriptions of recent winter storm events.

5.7.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the Cleveland Gaston Lincoln Region. According to historical information, the Cleveland Gaston Lincoln Region generally experiences several winter storm events each year. Therefore, the annual probability is highly likely.

[14] 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 Identification*.

[15] These ice and winter storm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional winter storm conditions have affected the Cleveland Gaston Lincoln Region. In addition, the 236 are reported by county, so many of these storms likely affected all of the counties.

[16] The dollar amount of damages provided by NCEI is divided by the number of affected counties to reflect a damage estimate for the county.

5.8 EARTHQUAKES

5.8.1 Background and Description

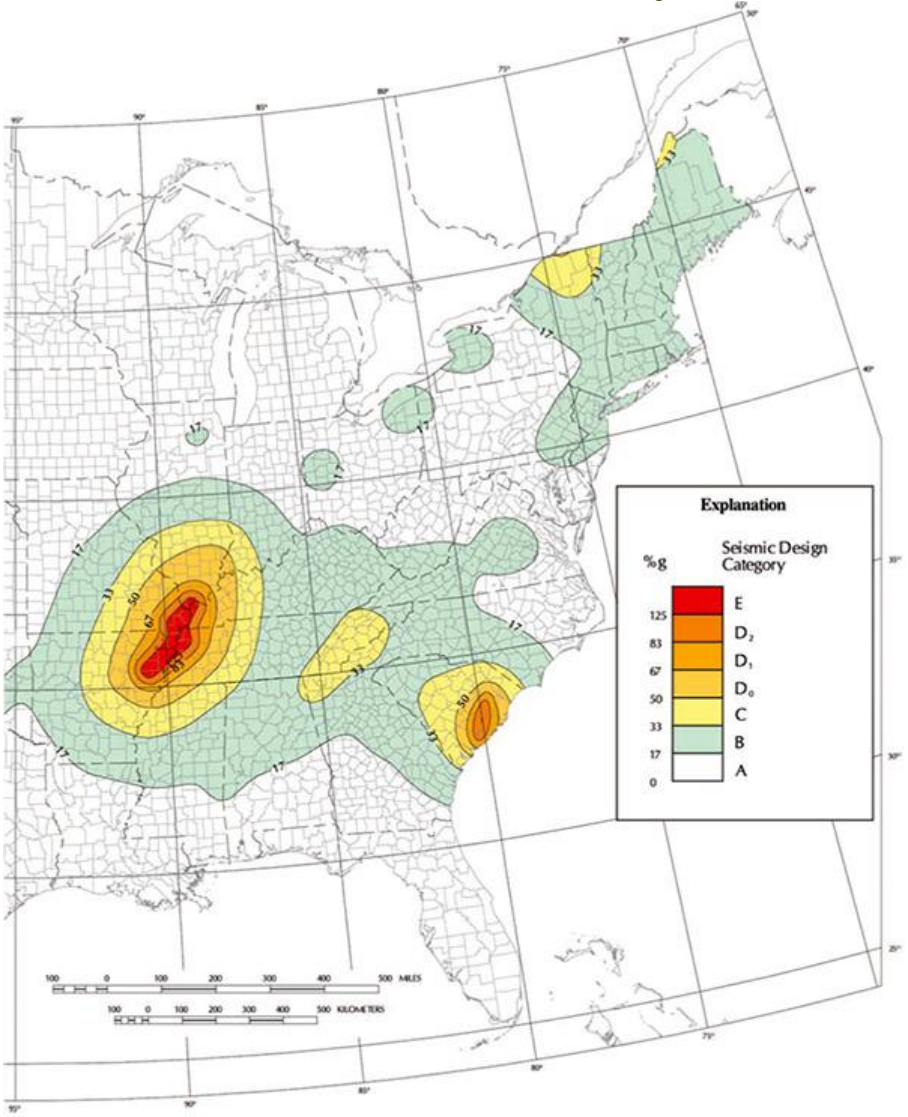
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured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

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

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

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.8** shows relative seismic risk for the United States.

FIGURE 5.8: EASTERN UNITED STATES EARTHQUAKE HAZARD MAP



Source: Federal Emergency Management Agency

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

TABLE 5.21: RICHTER SCALE

Richter Magnitudes	Earthquake Effects
< 3.5	Generally not felt, but recorded.
3.5 – 5.3	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 5.22: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

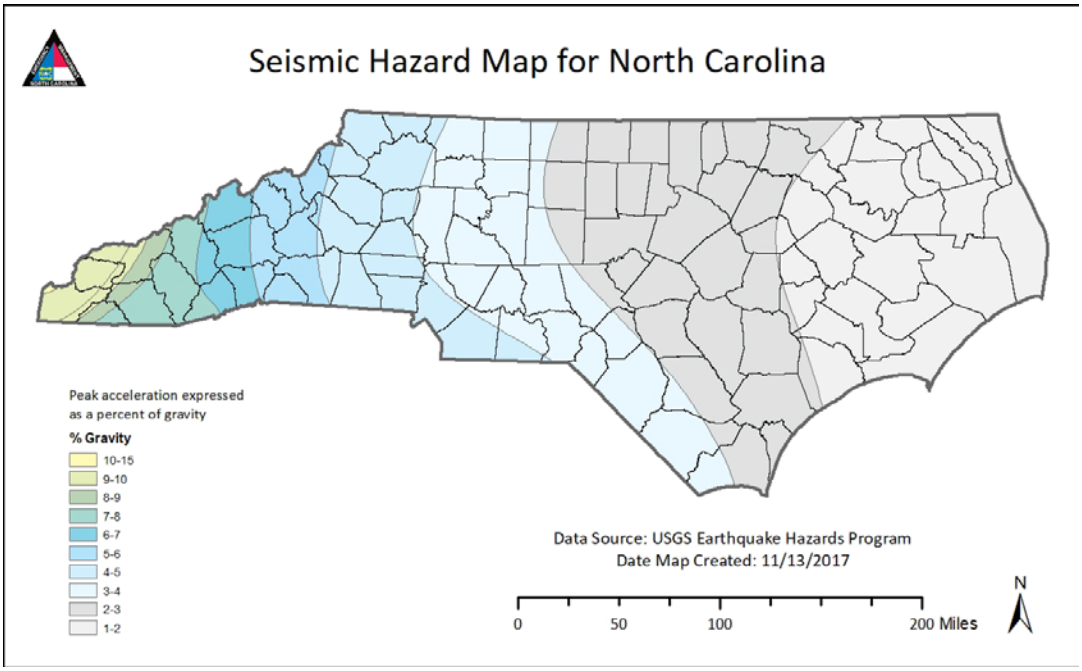
Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Not felt	Not felt except by a very few under especially favorable conditions.	
II	Weak	Felt only by a few persons at rest,especially on upper floors of buildings.	< 4.2
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.	
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.	< 4.8
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.	< 5.4
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.	< 6.1
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.	
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.	< 6.9
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.	< 7.3

Source: Federal Emergency Management Agency

5.8.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.9** is a map showing geological and seismic information for North Carolina.

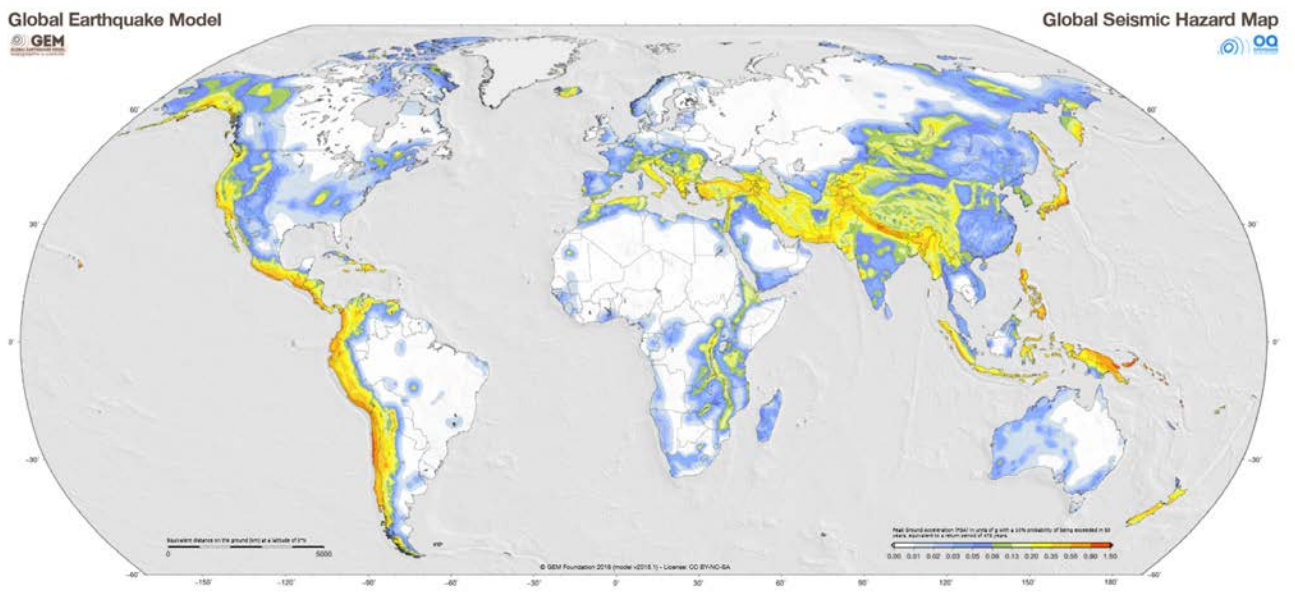
FIGURE 5.9: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.10 shows the intensity level associated with the world and the Cleveland Gaston Lincoln Region, based on the national USGS and Global Earthquake Model (GEM). The Global Earthquake Model Global Seismic Hazard Map depicts the geographic distribution of the Peak Ground Acceleration (PGA) with a 10% probability of being exceeded in 50 years. The data represents the probability that the ground motion will reach a certain level during an earthquake. The map was created by collating maps computed using national and regional probabilistic seismic hazard models developed by various institutions and projects, and by GEM Foundation scientists. This indicates that the region as a whole exists within an area of low to moderate seismic risk.

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



Source: Global Earthquake Model, 2018

5.8.3 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 5.23** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985.

TABLE 5.23: 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
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	--	--

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
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

Note: No further details about these events could be located. Future updates of the plan will attempt to provide more context to previously reported earthquake events.

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 5.24.**

TABLE 5.24: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

Date	Origin Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/07/1812	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

Date	Origin Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
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

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).

5.8.4 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). The USGS also uses historical data to predict the probability of a major earthquake within the next 50 years by county. Those results follow: Cleveland County – 1.43%; Gaston County – 1.08%; Lincoln County – 1.01%

5.9 GEOLOGICAL

5.9.1 Background and Description

For the purposes of maintaining consistency with the State of North Carolina Hazard Mitigation Plan, this section will assess geological hazards which include landslides, sinkholes, and erosion.

Landslides

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.

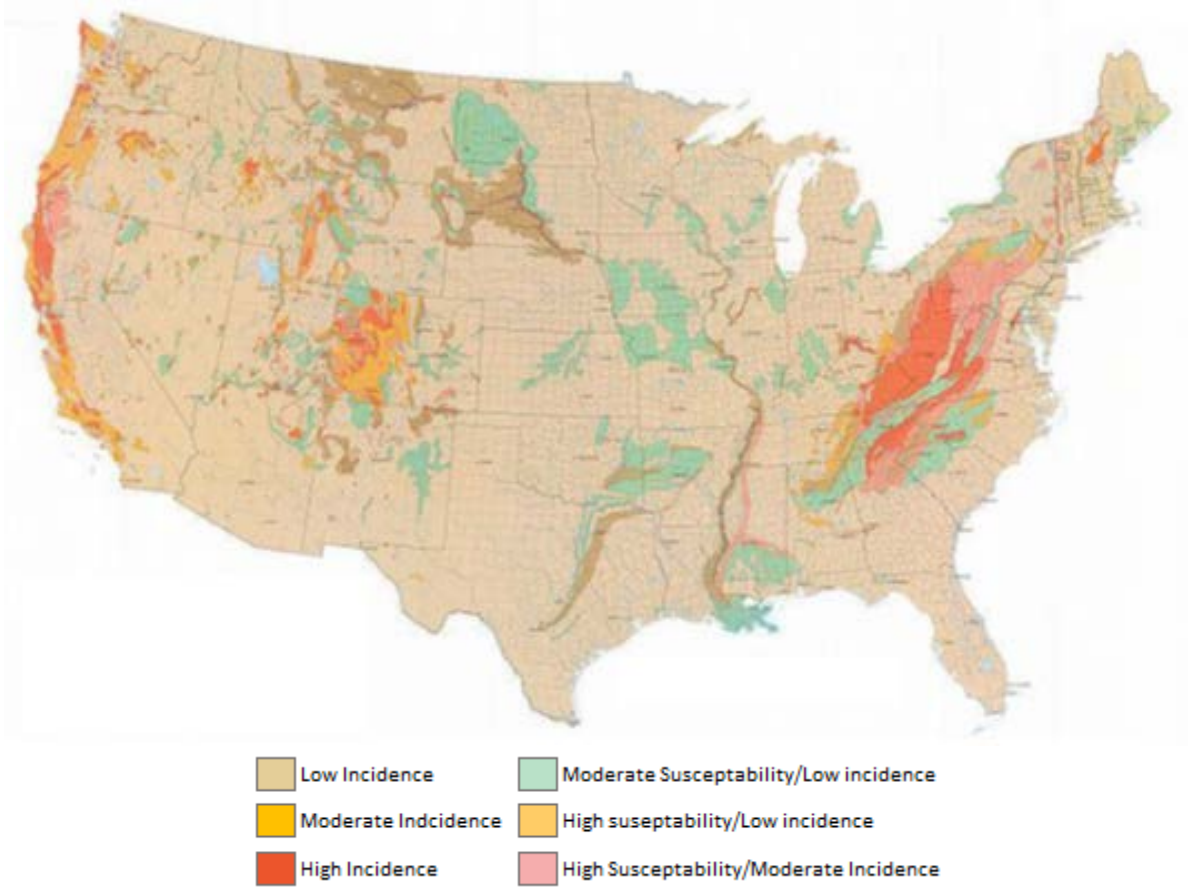
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved 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 (2018 dollars) in damage and between 25 and 50 deaths in the United States[17]. **Figure 5.11** delineates areas where large numbers of landslides have occurred and areas that are susceptible to landsliding in the

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

conterminous United States[18].

FIGURE 5.11: LANDSLIDE OVERVIEW MAP OF THE UNITED STATES[19]



Source: USGS

Sinkholes

According to the United States Geological Survey, a sinkhole is an area of ground that has no natural external surface drainage--when it rains, all of the water stays inside the sinkhole and typically drains into the subsurface. Sinkholes can vary from a few feet to hundreds of acres and from less than 1 to more than 100 feet deep. Some are shaped like shallow bowls or saucers whereas others have vertical walls.

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact

[18] 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.

[19] 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.

for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small, or, as **Figure 5.12** below shows, they can be huge and can occur where a house or road is on top[20].

FIGURE 5.12: SINKHOLE IN NORTH CAROLINA



Source: NCEM

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.

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,

[20] *Sinkholes. United States Geological Survey. Retrieved on December 14, 2017 from: https://water.usgs.gov/edu/sinkholes.html*

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.

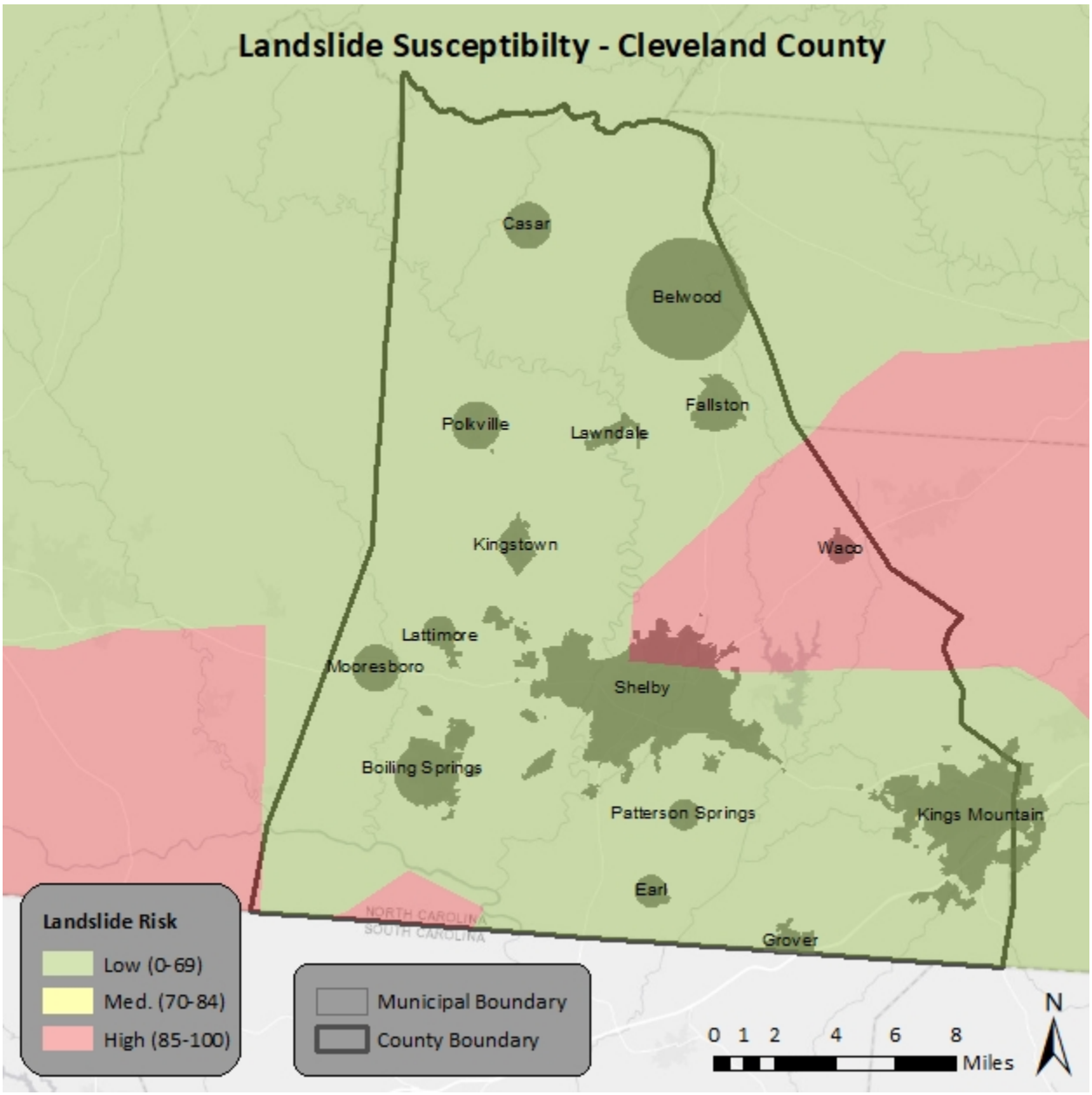
5.9.2 Location and Spatial Extent

Landslides

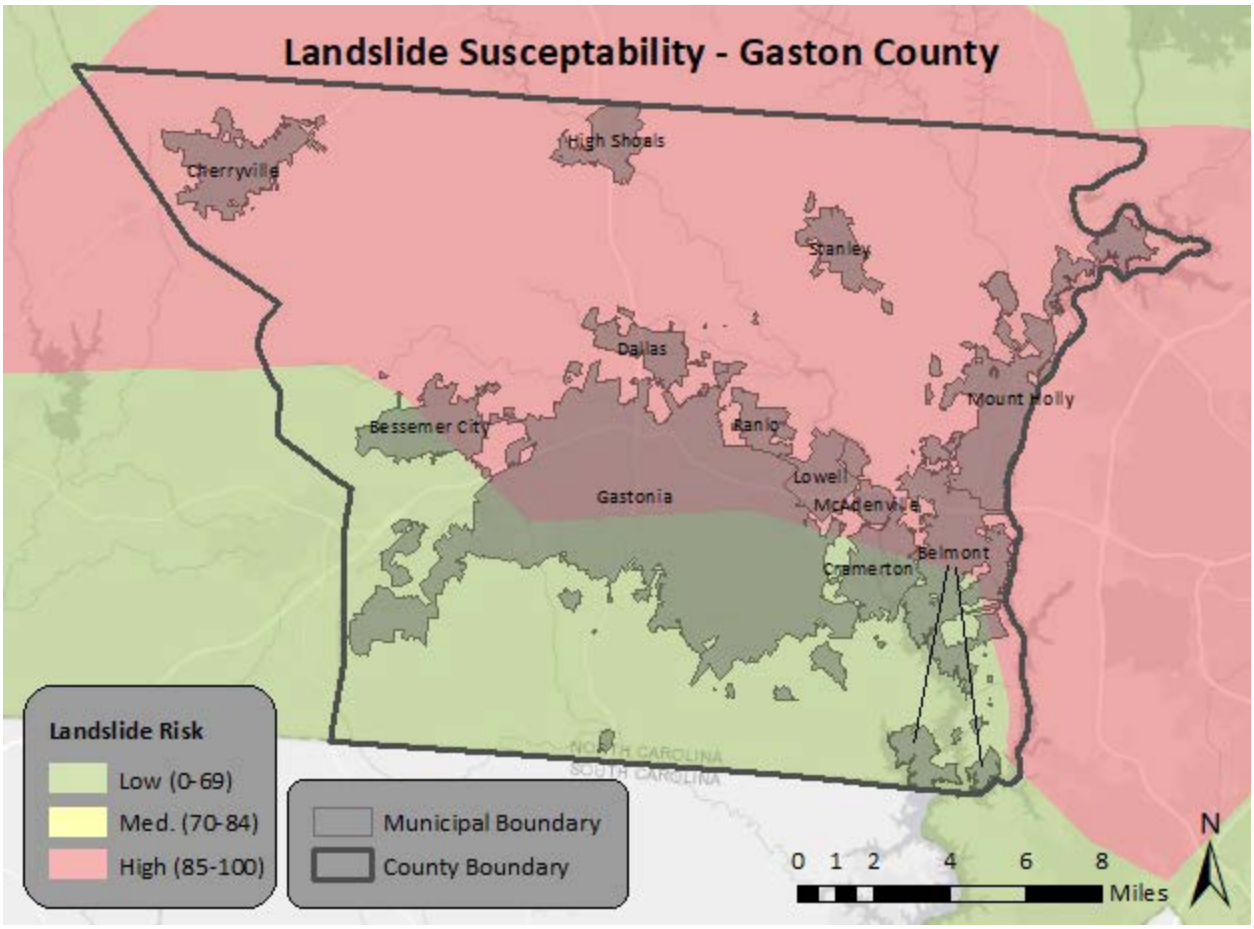
Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout the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

According to **Figure 5.13** 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.

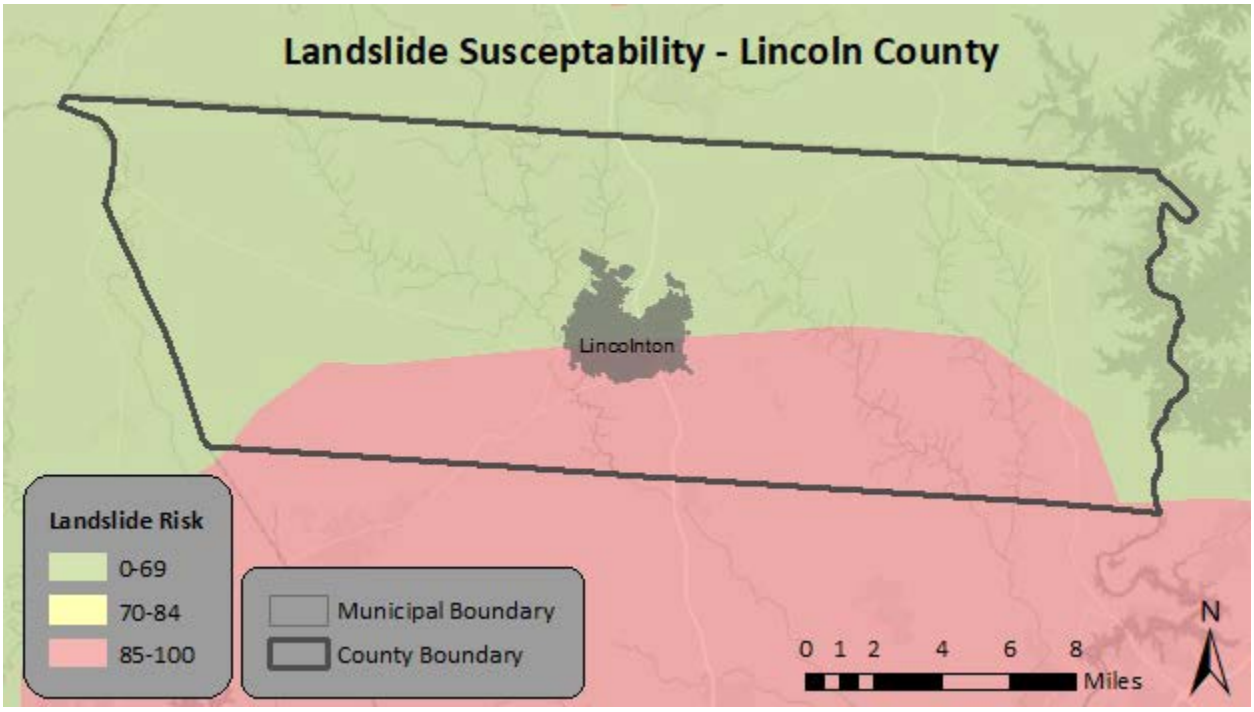
FIGURE 5.13: LANDSLIDE SUSCEPTIBILITY IN THE CLEVELAND GASTON LINCOLN REGION



Source: USGS



Source: USGS

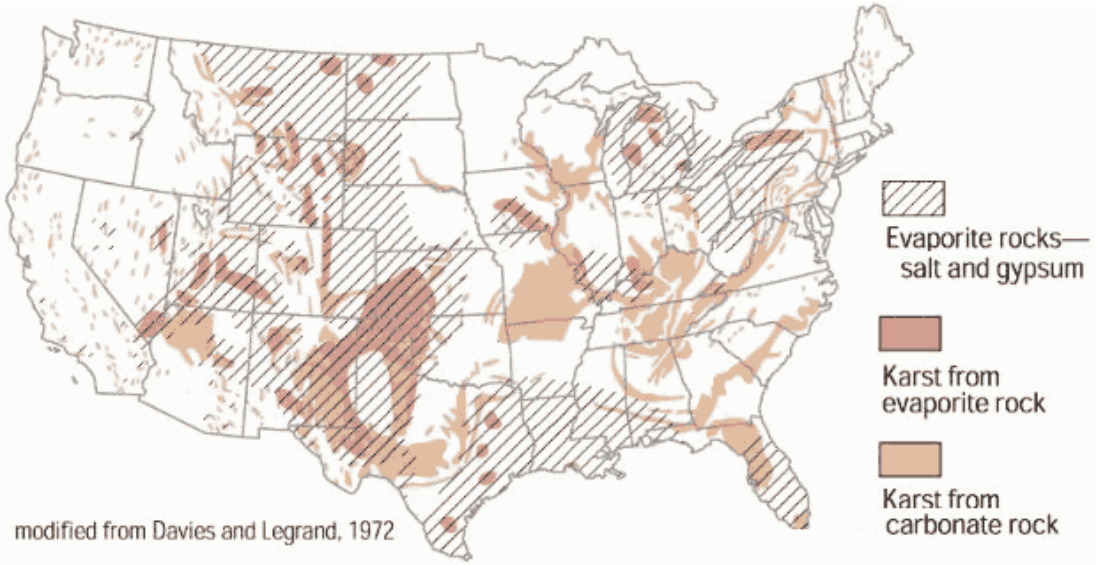


Source: USGS

Sinkholes

Figure 5.14 below shows areas of the United States where certain rock types that are susceptible to dissolution in water occur. In these areas, the formation of underground cavities can form and catastrophic sinkholes can happen. These rock types are evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). Evaporite rocks underlie about 35 to 40 percent of the United States, though in many areas they are buried at great depths. In some cases, sinkholes in North Carolina have been measured at up to 20 to 25 feet in depth, with similar widths.

FIGURE 5.14: UNITED STATES GEOLOGICAL SURVEY OF KARST MODIFIED FROM DAVIES AND LEGRAND, 1972



Erosion

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 planning committee.

5.9.3 Historical Occurrences

Landslides

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, provided by the North Carolina Geological Survey, showed that there have been no reported incidents in the Cleveland Gaston Lincoln region[21]. Some incidence mapping has also been completed throughout

[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

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.

Sinkholes

In North Carolina, most sinkholes occur in the southern coastal plain due to the high concentration of limestone; however, they are also common in the western part of the state and in the Cleveland Gaston Lincoln region. According to a search of local media outlets across the state, the western area has experienced more than 40 sinkholes over the past 20 years. There are no historical occurrences of sinkholes in the region.

Erosion

Most historical occurrences of erosion are seen near the coast of North Carolina, but the Cleveland Gaston Lincoln region is still susceptible to the hazard. 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 referenced in the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, but there was no recorded history of significant erosion events and it was found to be hazard with a negligible potential impact.

5.9.4 Probability of Future Occurrences

Landslides

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.

Sinkholes

Sinkholes have also affected parts of North Carolina in recent history, but most of those impacts have been in the southeastern region of the state, not the Cleveland Gaston Lincoln region. While many sinkholes have been relatively small, it is still unlikely (between 1 and 33.3 percent annual probability) that this region will continue to be affected in the future.

Erosion

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*.

earliest date reported was 1940. No damage information was provided by NCGS.

5.10 DAM FAILURE

5.10.1 Background and Description

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.

5.10.2 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 5.25** explains these classifications.

TABLE 5.25: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads Less than 25 vehicles per day	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 240 dams in

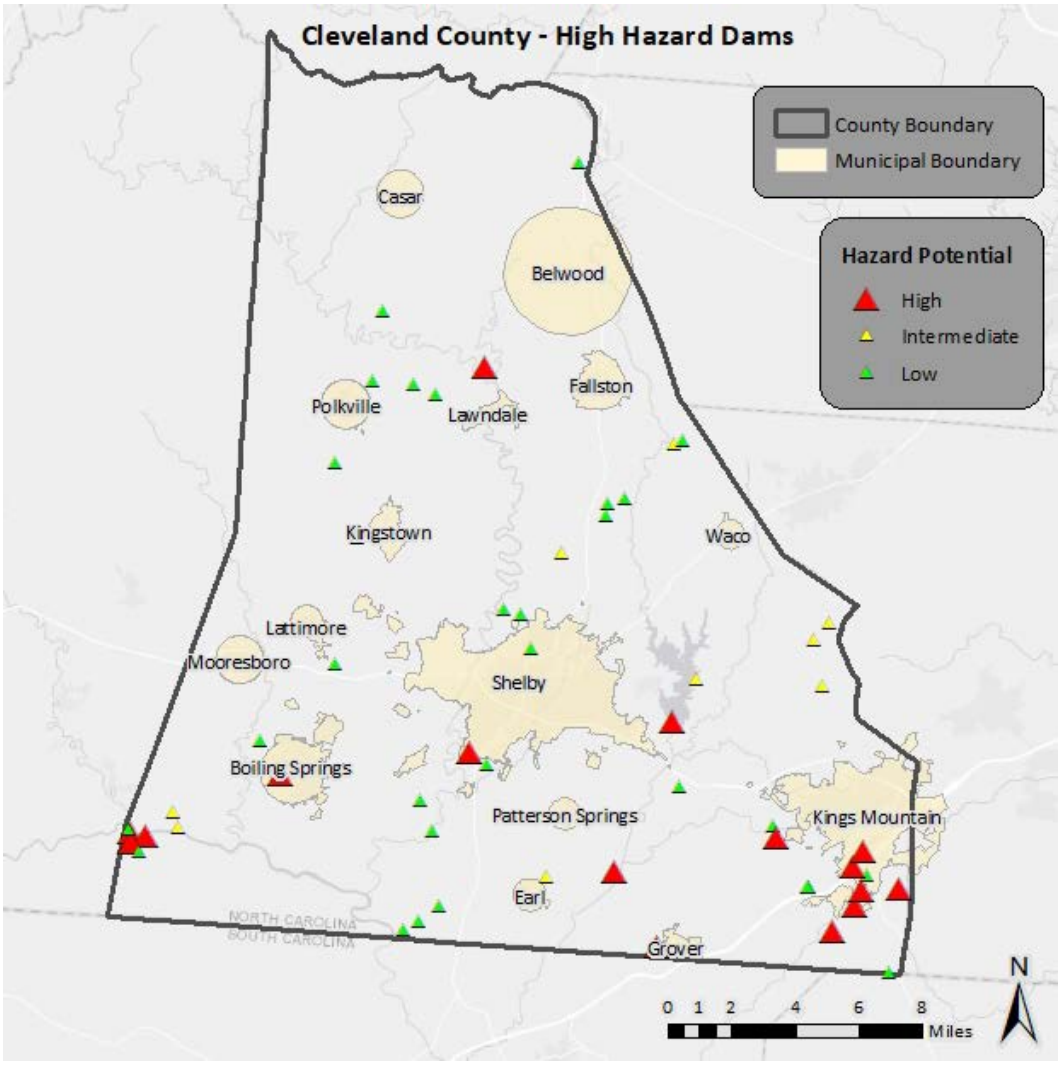
the Cleveland Gaston Lincoln Region[22]. **Figures 5.15-17** show the dam location and the corresponding hazard ranking for each. Of these dams, 47 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.26.**

TABLE 5.26: SUMMARY OF HIGH HAZARD DAM LOCATION

Location	Number of High Hazard Dams
Cleveland County	16
Gaston County	23
Lincoln County	8
CLEVELAND GASTON LINCOLN REGION TOTAL	**47**

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

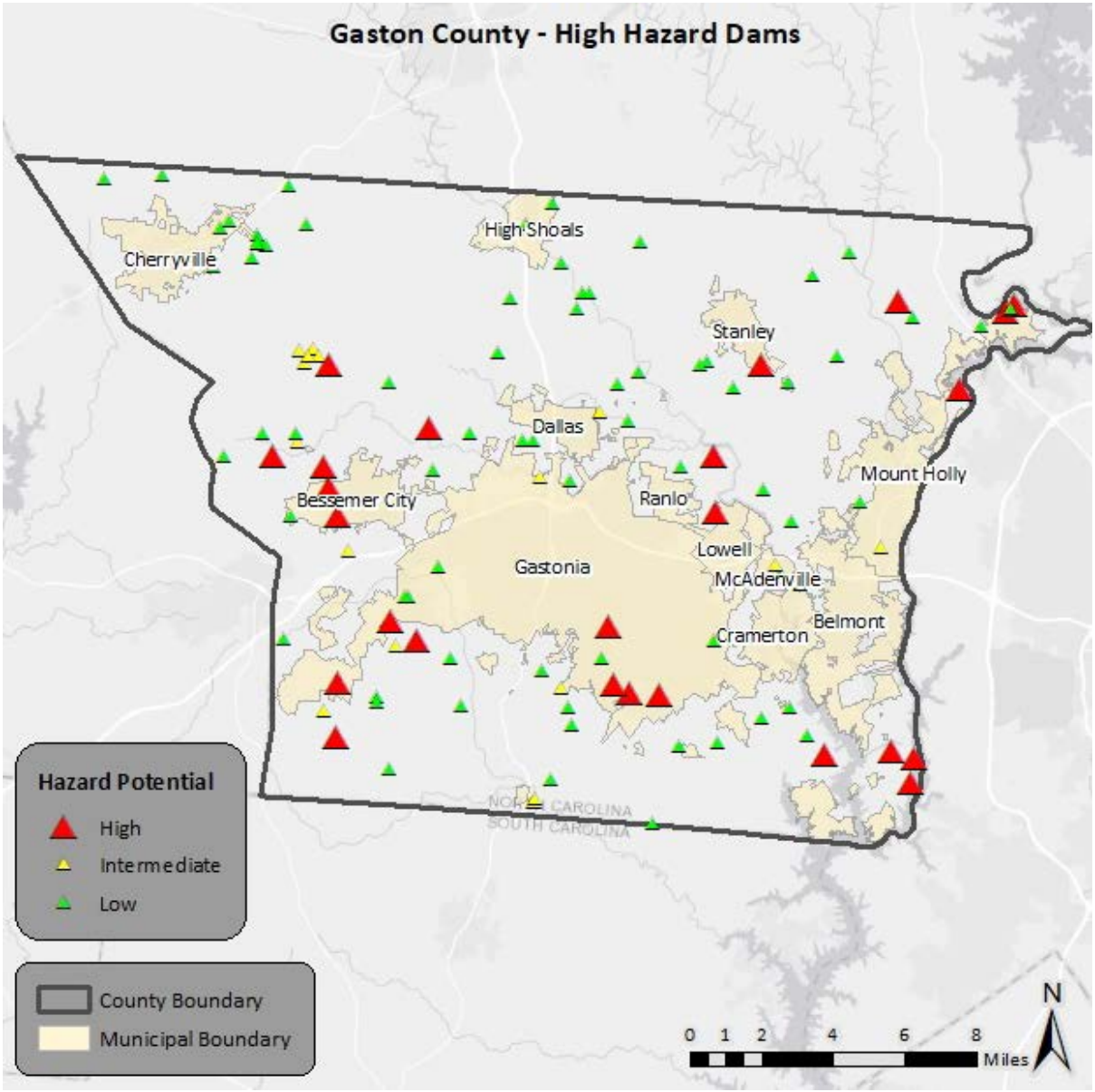
FIGURE 5.15: CLEVELAND COUNTY DAM LOCATIONS



Source: North Carolina Division of Land Resources, 2018

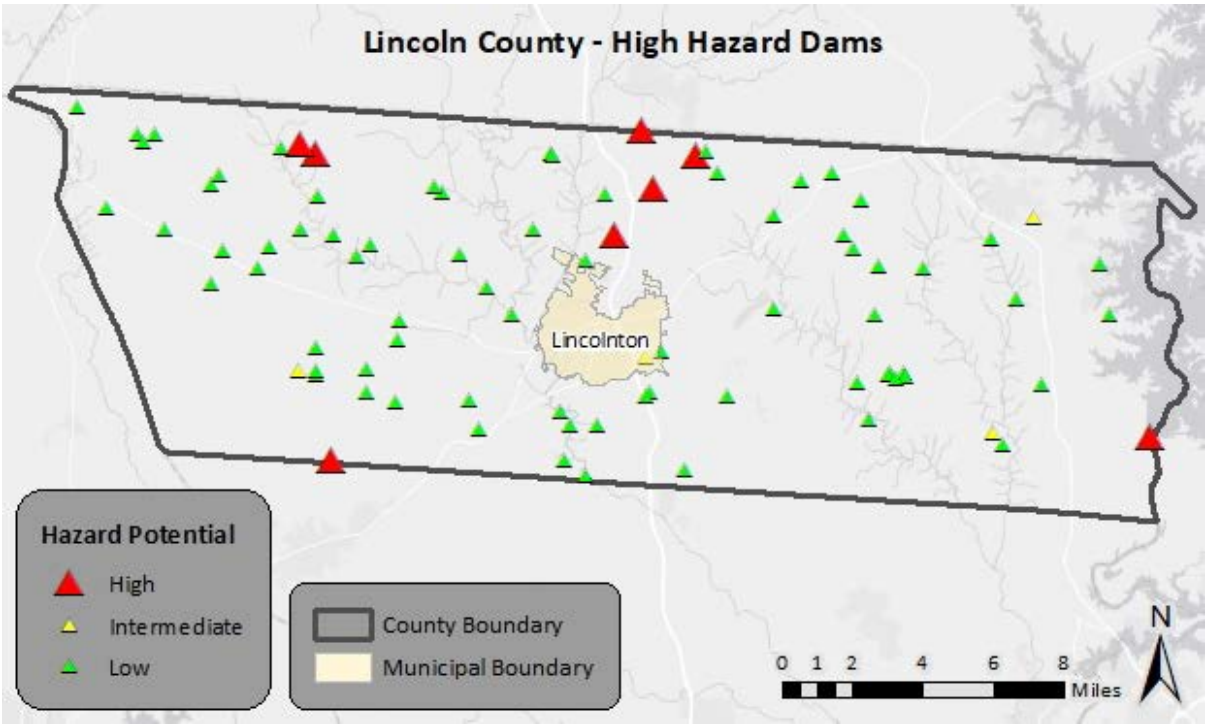
[22] The October 1, 2018 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land Resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.

FIGURE 5.16: GASTON COUNTY DAM LOCATIONS



Source: North Carolina Division of Land Resources, 2018

FIGURE 5.17: LINCOLN COUNTY DAM LOCATIONS



Source: North Carolina Division of Land Resources, 2018

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

5.10.3 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 Centers for Environmental Information 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 $3,167 (2018 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.

Future plan updates will attempt to provide more context for the previously reported events.

5.10.4 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.

Inventories of statewide dam inundation data is an area that NCEM-RM is currently working hard to improve. At this time, there is geospatial data in final quality control review for 19 dams in North Carolina and that number is expected to increase significantly over the next several years. Additionally, NCEM is currently working with the USACE to acquire inundation data for 9 dams under the Corps' management. As this data becomes available, detailed assessments can be run to better determine vulnerability to dam failures. The 2025 update of this plan may include a much more robust analysis of dam failure vulnerability at the County level.

5.11 FLOODING

5.11.1 Background and Description

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.

Floodplain boundaries are designated and routinely updated through Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) reports and these revisions are then shown on Flood Insurance Rate Maps (FIRMs), according to various flood hazard zones. Flood hazard zone designations will depend upon local conditions and the date when the map was issued, but all will show the 100-year or base floodplain (1-percent annual chance), as well as areas of the 500-year floodplain (0.2-percent annual chance).

5.11.2 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 the Cleveland Gaston Lincoln Region (including the area of Cleveland County, Gaston County, and Lincoln County), there are 80.93 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 3.30 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.27**.

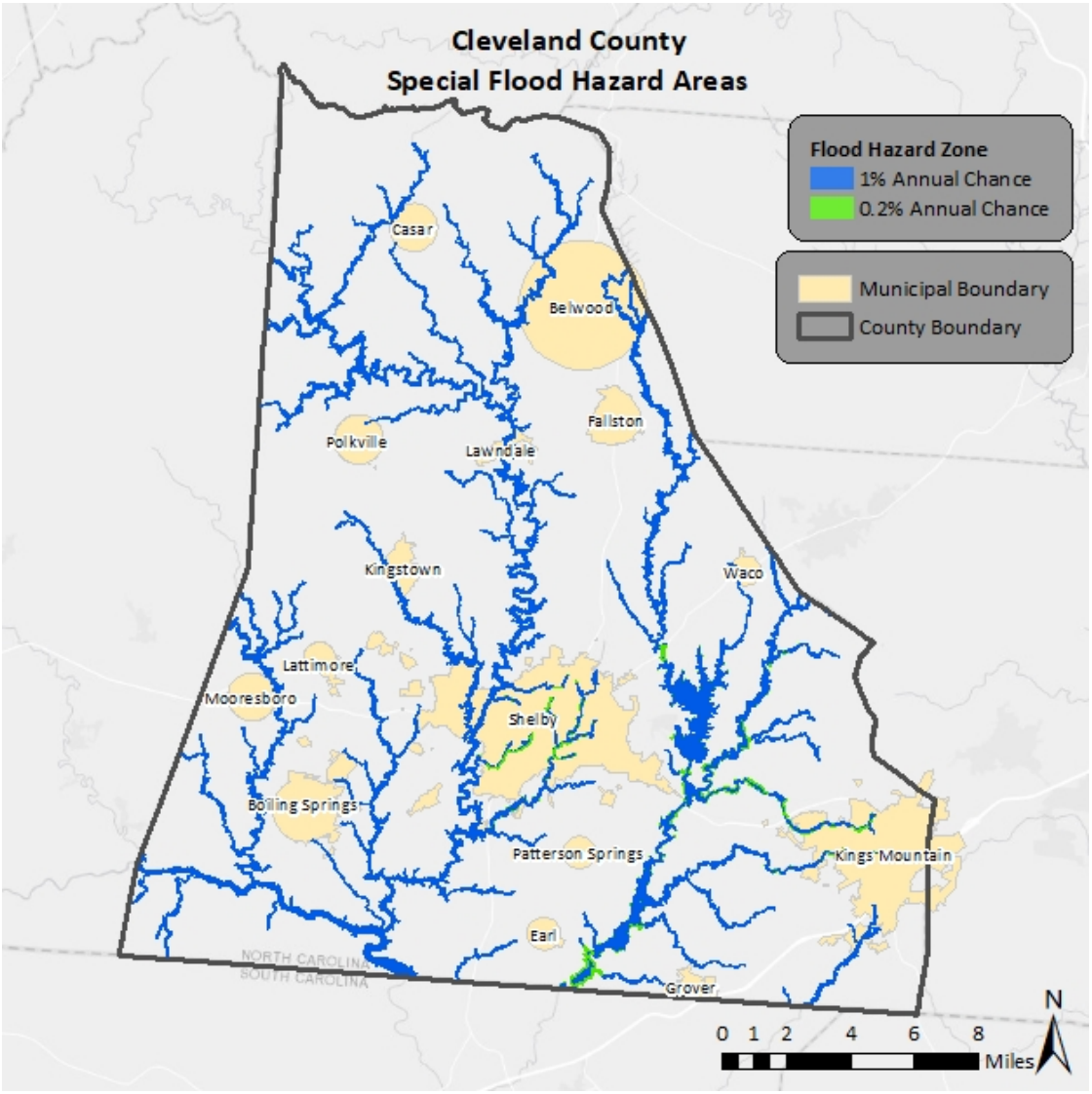
TABLE 5.27: SUMMARY OF FLOODPLAIN AREAS IN THE CLEVELAND GASTON LINCOLN REGION

Location	100-year area (square miles)	500-year area (square miles)
Cleveland County	24.23	0.67
Gaston County	29.00	2.01
Lincoln County	27.70	0.62
CLEVELAND GASTON LINCOLN REGION TOTAL	**80.93**	**3.30**

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. **Figures 5.18-5.20** illustrate the location and extent of currently mapped special flood hazard areas for each county in the Cleveland Gaston Lincoln Region based on best available FEMA DFIRM data from October of 2018.

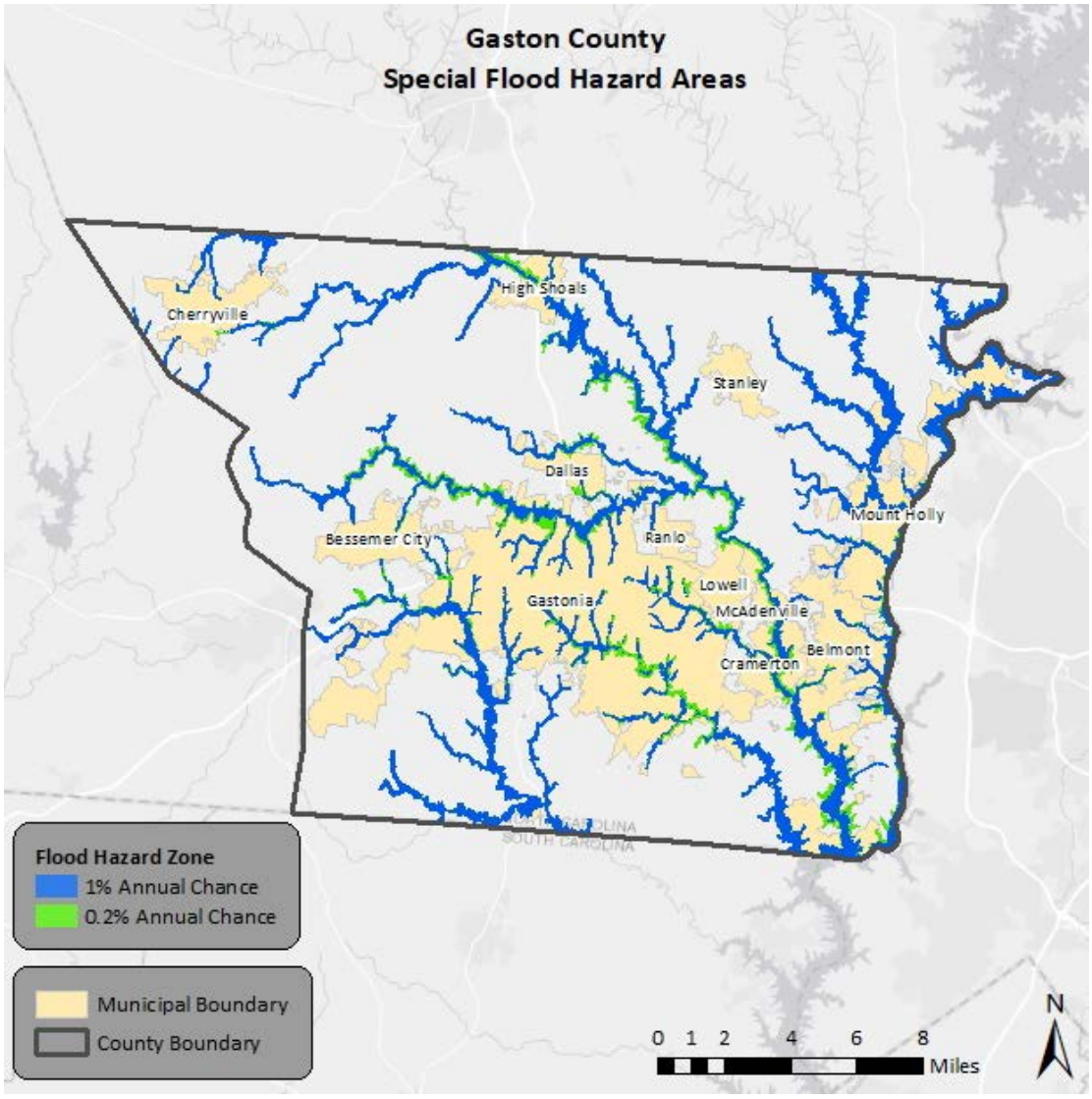
[23] The county-level DFIRM data used for Cleveland County was updated in 2008. Lincoln's County's data was updated in 2009 and the Gaston County data was updated in 2015.

FIGURE 5.18: SPECIAL FLOOD HAZARD AREAS IN CLEVELAND COUNTY



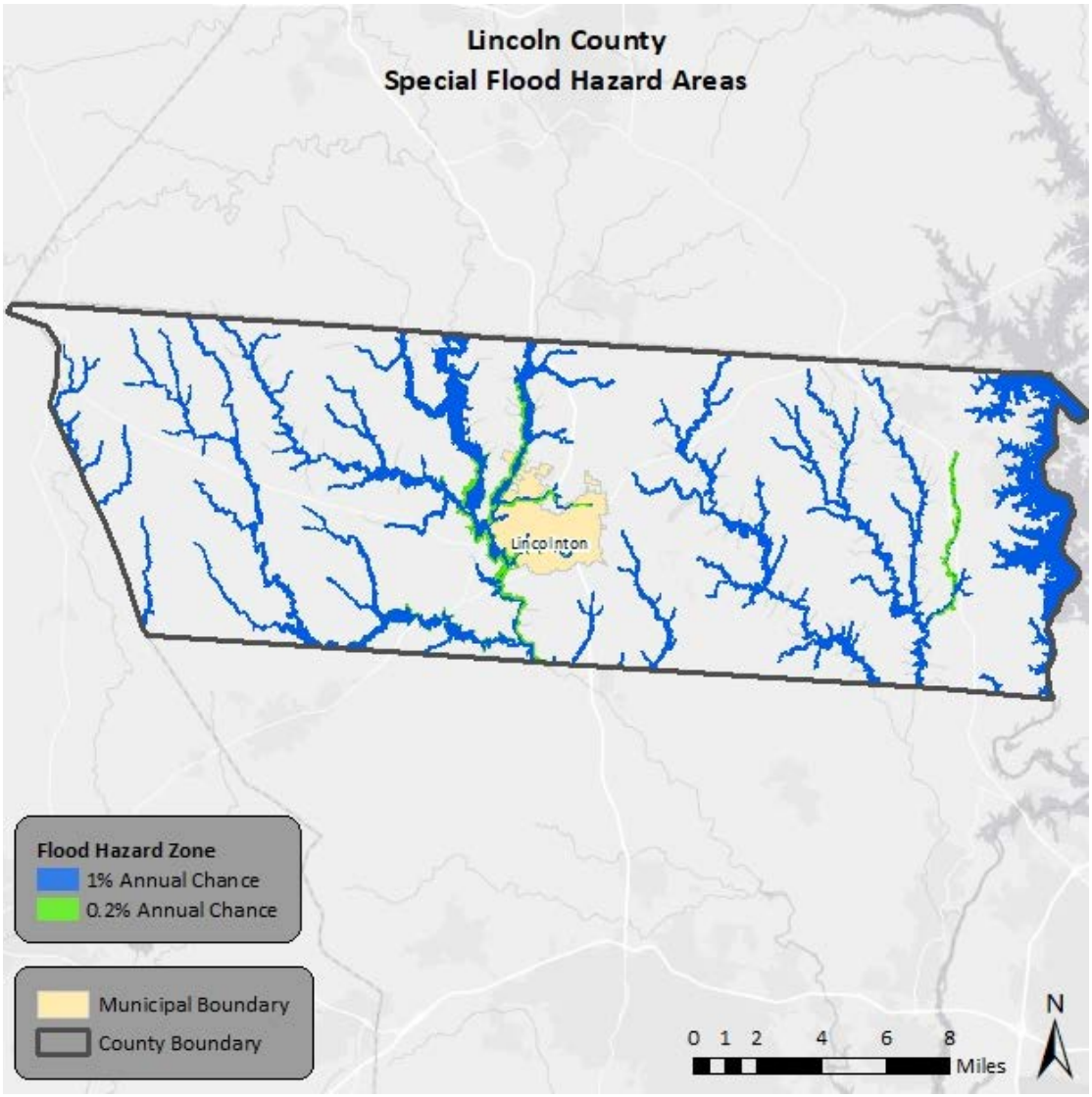
Source: Federal Emergency Management Agency

FIGURE 5.19: SPECIAL FLOOD HAZARD AREAS IN GASTON COUNTY



Source: Federal Emergency Management Agency

FIGURE 5.20: SPECIAL FLOOD HAZARD AREAS IN LINCOLN COUNTY



Source: Federal Emergency Management Agency

5.11.3 Historical Occurrences

Information from the National Centers for Environmental Information was used to ascertain historical flood events. The National Centers for Environmental Information reported a total of 60 events throughout the Cleveland Gaston Lincoln Region since 1993[24]. A summary of these events is presented in **Table 5.28**. These events accounted for over $5.2 million (2018 dollars) in property damage throughout the region[25].

[24] These events are only inclusive of those reported by NCEI. 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 5.28: SUMMARY OF FLOOD OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
CLEVELAND COUNTY	**13**	**0/0**	**$86,754**
Belwood	0	0/0	$0
Boiling Springs	0	0/0	$0
Casar	0	0/0	$0
Earl	0	0/0	$0
Falston	1	0/0	$0
Grover	1	0/0	$0
Kings Mountain	2	0/0	$10,638
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	0/0	$11,563
Waco	0	0/0	$0
Unincorporated Area	6	0/0	$64,553
GASTON COUNTY	**22**	**0/0**	**$2,871,325**
Belmont	0	0/0	$0
Bessemer City	3	0/0	$14,312
Cherryville	2	0/0	$0
Cramerton	0	0/0	$0
Dallas	1	0/0	$0
Gastonia	5	0/0	$4,004
High Shoals	1	0/0	$56,047
Lowell	1	0/0	$0
McAdenville	1	0/0	$2,127
Mount Holly	1	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	6	0/0	$2,794,835
LINCOLN COUNTY	**25**	**0/0**	**$2,326,702**
Lincolnton	9	0/0	$58,890
Unincorporated Area	16	0/0	$2,267,812
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**60**	**0/0**	**$5,284,781**

Source: National Centers for Environmental Information

5.11.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of October 2018, there have been 106 flood losses reported in the Cleveland Gaston Lincoln Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $773,000 in claims payments (2018 dollars). A summary of these figures for Cleveland Gaston Lincoln counties is provided in **Table 5.29**. 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 5.29: SUMMARY OF INSURED FLOOD LOSSES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Flood Losses	Claims Payments
CLEVELAND COUNTY	**38**	**$444,414**
Belwood	0	$0
Boiling Springs	0	$0
Casar	-	-
Earl*	-	-
Falston*	-	-
Grover*	-	-
Kings Mountain	3	$11,804
Kingstown	0	$0
Lattimore*	-	-
Lawndale	-	-
Mooresboro*	-	-
Patterson Springs*	-	-
Polkville	0	$0
Shelby	28	$403,317
Waco	-	-
Unincorporated Area	7	$29,293
GASTON COUNTY	**60**	**$194,519**
Belmont	5	$8,066
Bessemer City	0	$0
Cherryville	0	$0
Cramerton	5	$38,047
Dallas	2	$12,878
Gastonia	33	$85,911
High Shoals	0	$0
Lowell	0	$0
McAdenville	0	$0
Mount Holly	5	$12,745
Ranlo	0	$0
Spencer Mountain	0	$0
Stanley	0	$0
Unincorporated Area	10	$36,872
LINCOLN COUNTY	**8**	**$134,313**
Lincolnton	1	$3,933
Unincorporated Area	7	$130,380
CLEVELAND GASTON LINCOLN REGION TOTAL	**105**	**$773,246**

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

5.11.5 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 2018), 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 5.30** presents a summary these figures for the Cleveland Gaston Lincoln Region.

TABLE 5.30: 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
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

Location	Number of Properties	Number of Losses	Total Payments
Lincoln County	**0**	**0**	**$0**
Lincolnton	0	0	$0
Unincorporated Area	0	0	$0
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**2**	**5**	**$34,147**

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

5.11.6 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).

Other Hazards

5.12 WILDFIRES

5.12.1 Background and Description

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed[26]. 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.

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.

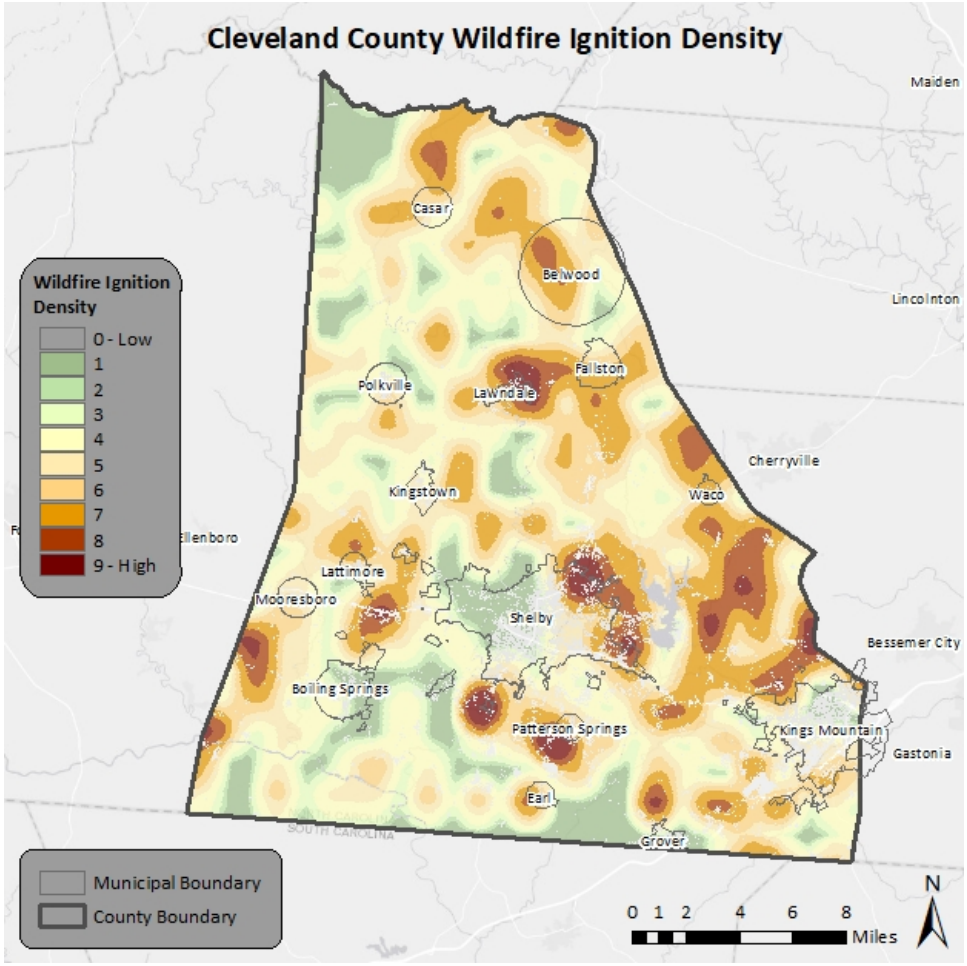
[26] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

5.12.2 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 border formerly undeveloped areas.

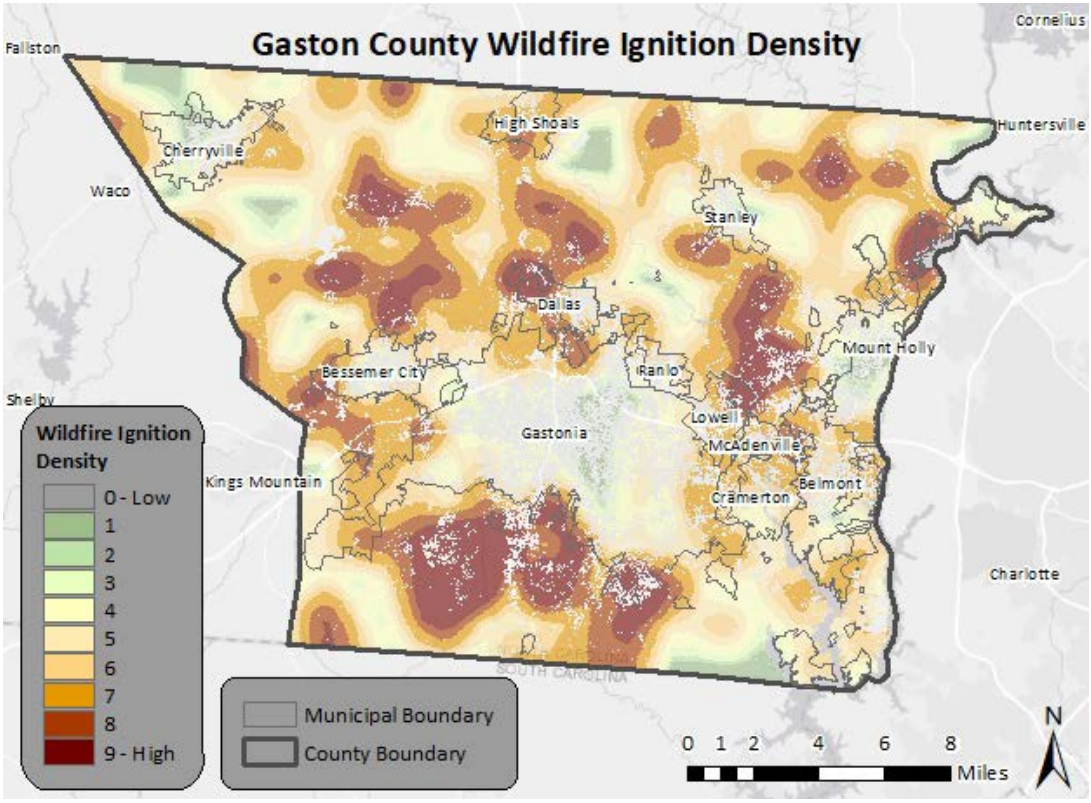
Figures 5.21-5:23 shows the Wildfire Ignition Density for each county in the Cleveland Gaston Lincoln Region based on data from the Southern Wildfire Risk Assessment. This data represents the likelihood of wildfire igniting in the area, which is derived from historical wildfire occurrences to create an average ignition rate map.

FIGURE 5.21: WILDFIRE IGNITION DENSITY IN CLEVELAND COUNTY



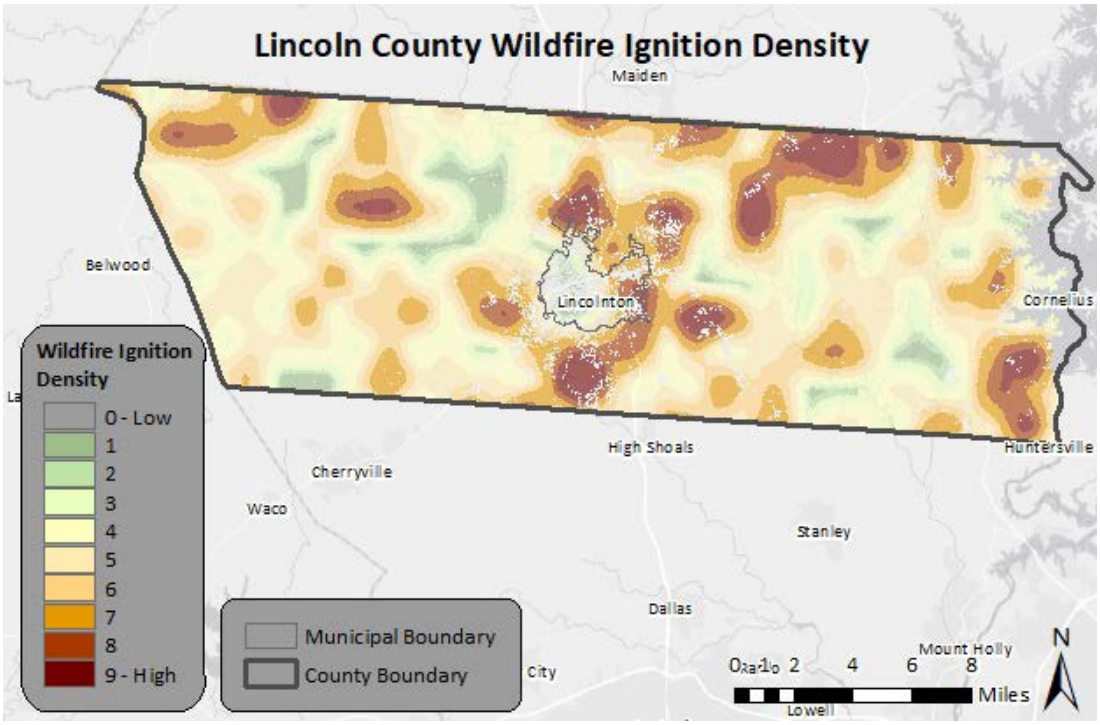
Source: Southern Wildfire Risk Assessment

FIGURE 5.22: WILDFIRE IGNITION DENSITY IN GASTON COUNTY



Source: Southern Wildfire Risk Assessment

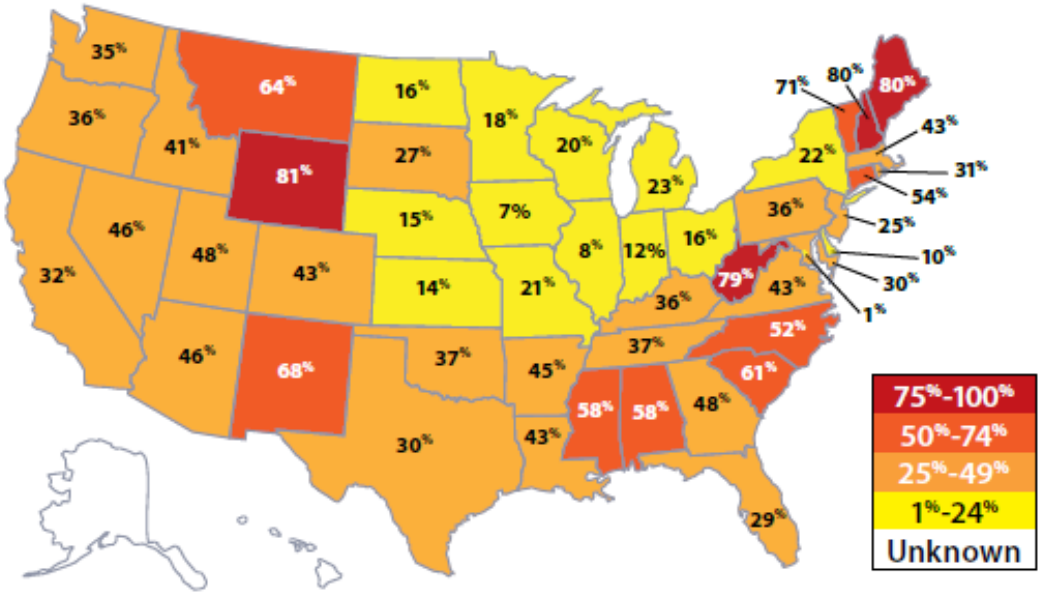
FIGURE 5.23: WILDFIRE IGNITION DENSITY IN LINCOLN COUNTY



Source: Southern Wildfire Risk Assessment

Every state also has a Wildland Urban Interface (WUI), which is the rating of potential impact of wildfires on people and their homes. The WUI is not a fixed geographical location, but rather a combination of human development and vegetation where wildfires have the greatest potential to result in negative impacts. Nationally, one-third of all homes lie in the WUI, which is a growing danger. Below, **Figure 5.24** shows a map of each state's WUI. Based on the data from the US Department of Agriculture, 52% of homes in North Carolina lie within the WUI.

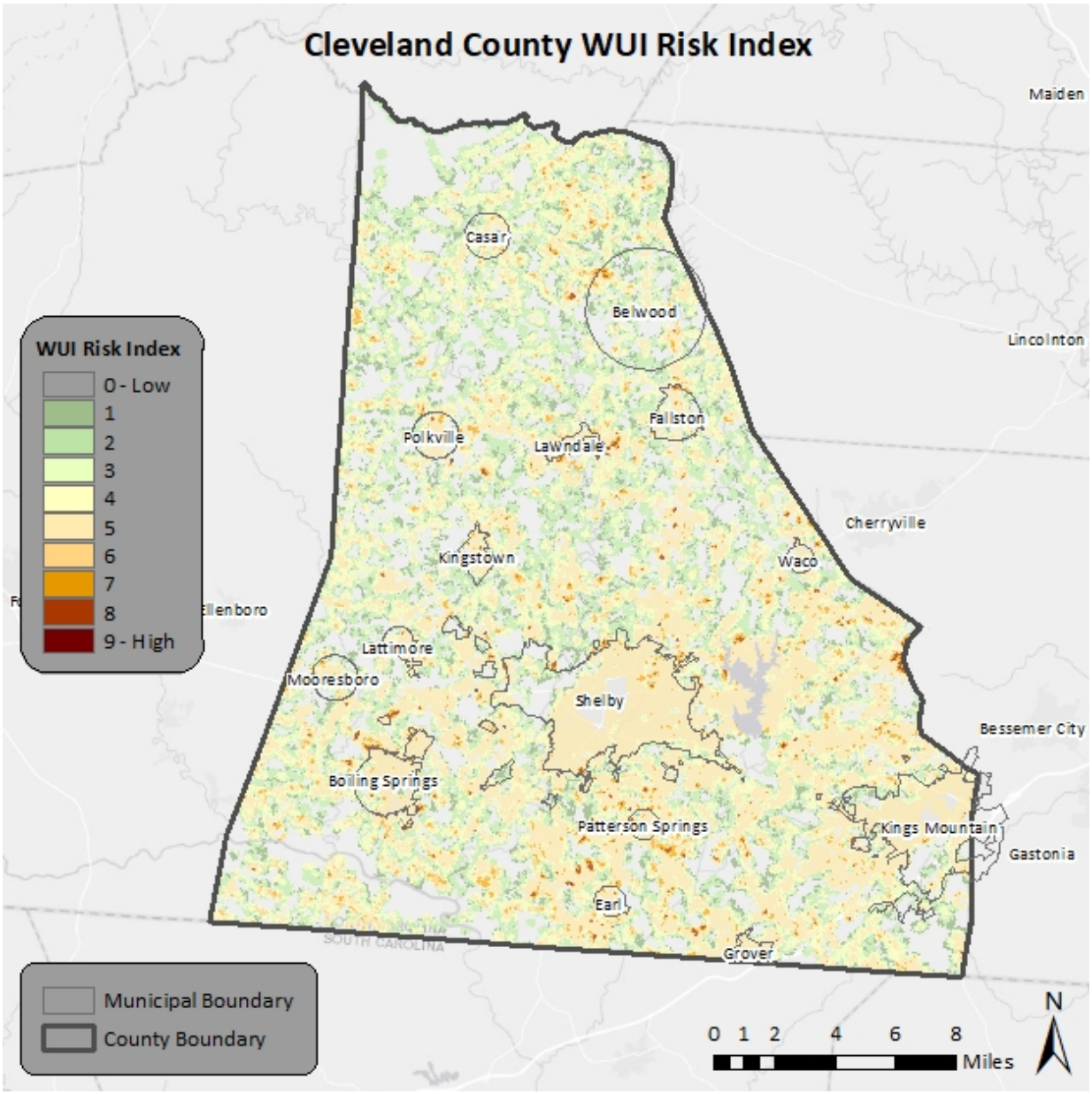
FIGURE 5.24: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: US Department of Agriculture

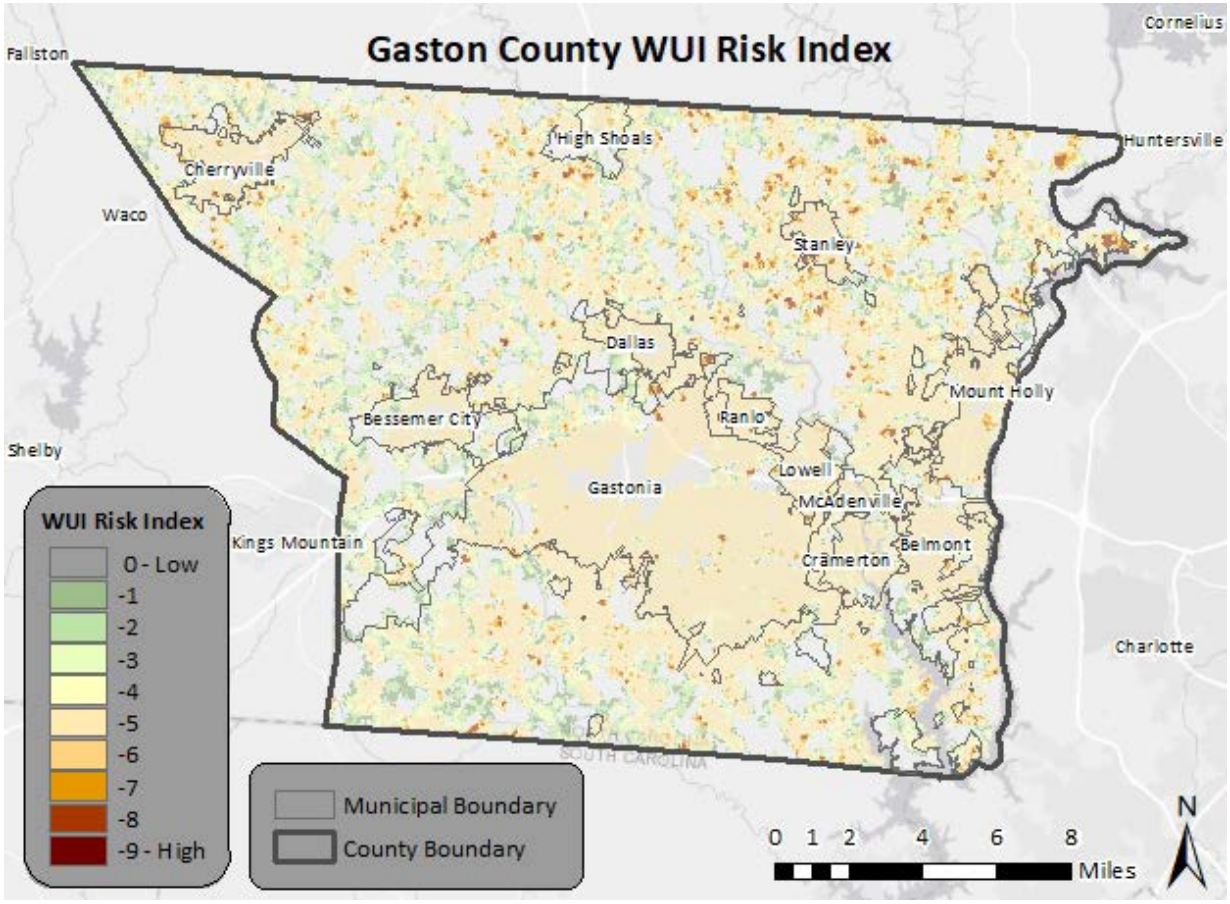
Below, **Figures 5.25-27** display the WUI Risk Index for the counties in the Cleveland Gaston Lincoln Region.

FIGURE 5.25: CLEVELAND COUNTY WILDLAND URBAN INTERFACE RISK INDEX



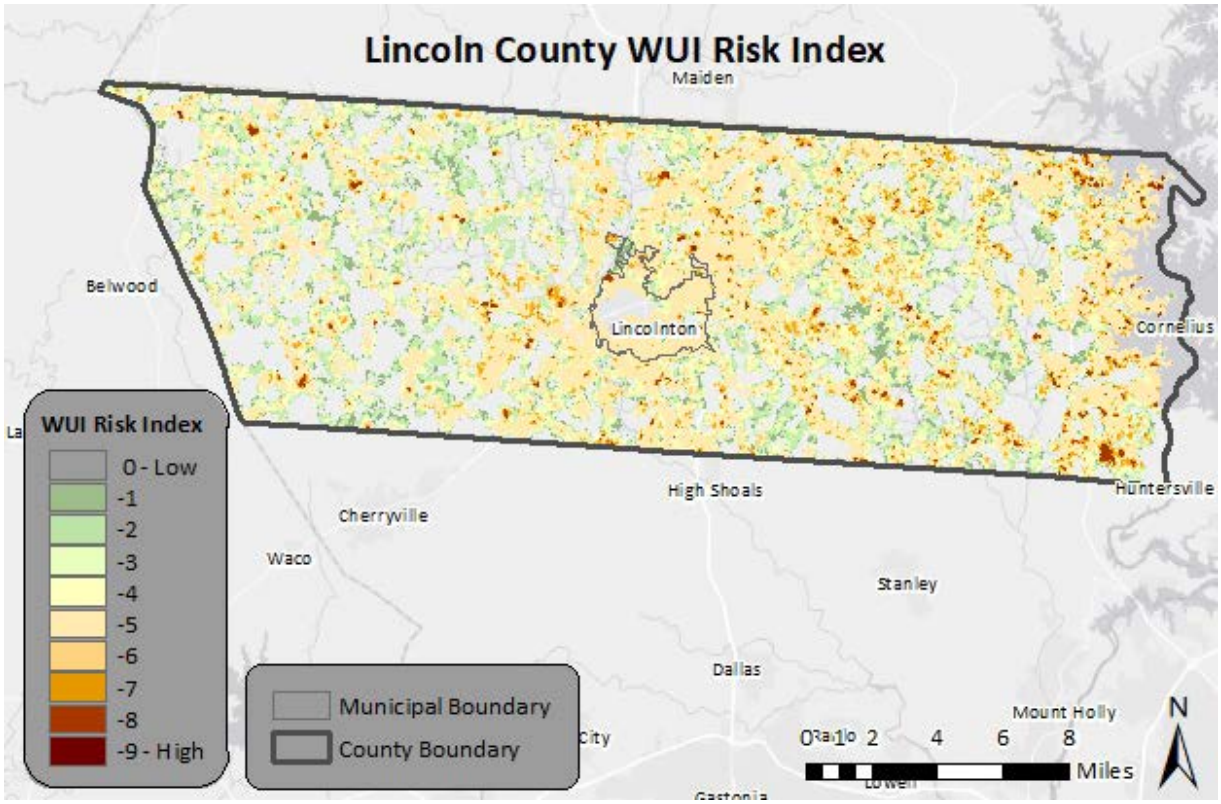
Source: Southern Wildfire Risk Assessment

FIGURE 5.26: GASTON COUNTY WILDLAND URBAN INTERFACE RISK INDEX



Source: Southern Wildfire Risk Assessment

FIGURE 5.27: LINCOLN COUNTY WILDLAND URBAN INTERFACE RISK INDEX



Source: Southern Wildfire Risk Assessment

5.12.3 Historical Occurrences

Information from the National Association of State Foresters was used to ascertain historical wildfire events. The National Association of State Foresters reported that a total of 640 events that impacted an area greater than 1 acre have occurred throughout the Cleveland Gaston Lincoln Region since 2001[27]. A summary of these events is presented in **Table 5.31**. The largest of these events was the Pinnacle Road Fire which occurred in Gastonia in 2005 and impacted 116 acres.

TABLE 5.31: SUMMARY OF WILDFIRE INCIDENTS (2001-2018)

Location	Number of Wildfires	Total Acres Burned
CLEVELAND COUNTY	233	821.02
Belwood	3	6.9
Boiling Springs	0	0
Casar	1	5.2
Earl	0	0
Falston	1	1
Grover	0	0

[27] These events are only inclusive of those reported by NASFI. It is likely that additional occurrences have occurred and have gone unreported.

Location	Number of Wildfires	Total Acres Burned
Kings Mountain	3	4.8
Kingstown	2	18.06
Lattimore	0	0
Lawndale	1	1
Mooresboro	1	1
Patterson Springs	0	0
Polkville	0	0
Shelby	1	1.2
Waco	0	0
Unincorporated Area	220	781.86
GASTON COUNTY	261	1073.55
Belmont	5	15
Bessemer City	1	3
Cherryville	2	9.5
Cramerton	3	9.4
Dallas	1	1
Gastonia	16	170.2
High Shoals	2	13
Lowell	2	8.6
McAdenville	1	1.5
Mount Holly	5	10
Ranlo	1	6
Spencer Mountain	0	0
Stanley	0	0
Unincorporated Area	218	816.85
LINCOLN COUNTY	146	427.27
Lincolnton	3	6.5
Unincorporated Area	143	420.77
CLEVELAND GASTON LINCOLN REGION TOTAL	**640**	**2321.84**

There is no narrative information on historical wildfires to impact the Cleveland Gaston Lincoln Region found in the NCEI database, the NC State Hazard Mitigation Plan, the North Carolina Forest Service or provided by local emergency managers. The main causes of previous wildfires in the Cleveland Gaston Lincoln Region are from debris burning (38%) and incendiary causes (20%) but they are generally smaller fires that are controlled before causing major damages.

5.12.4 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the Cleveland Gaston Lincoln Region. The likelihood of a wildfire 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 wildland urban index boundary. The risk will also vary due to assets. Areas in the wildland urban 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).

5.13 INFECTIOUS DISEASE

5.13.1 Background and Description

For the purposes of this plan, this section will assess infectious diseases and vector-borne diseases within the Cleveland Gaston Lincoln region.

Infectious Disease

Communicable, or infectious, diseases are conditions that result in clinically evident illness which are transmissible directly from one person to another or indirectly through vectors such as insects, air, water, blood, or other objects. The impact of communicable disease can range from the mild effects of the common cold to the extreme lethality of pneumonic plague or anthrax. The public health system in the United States was developed in large part as a response to the often urgent need to respond to or prevent outbreaks of communicable diseases. Through public health methods of disease reporting, vaccinations, vector control, and effective treatments, most communicable diseases are well controlled in the United States and across the Cleveland Gaston Lincoln region. However, control systems can fail and when people come together from locations outside of the state, outbreaks can occur, even in the most modern of communities. In this section, some of the more significant potential communicable disease concerns are described.

The threats discussed in this section usually do not occur on a regular basis, though some are more frequent. The diseases described herein do not originate from intentional exposure (such as through terrorist actions) but do present significant issues and concerns for the public health community. There are numerous infectious diseases that rarely, if ever, occur in the State of North Carolina, such as botulism or bubonic plague. Some highly dangerous diseases which could potentially be used as biological weapons, such as anthrax, pneumonic plague, and smallpox, are safely housed and controlled in laboratory settings such as at the Center for Disease Control and Prevention (CDC). Other diseases have not (yet) mutated into a form that can infect humans, or otherwise lie dormant in nature.

There have been several significant viral outbreaks from emerging diseases in recent years of both national and international importance. The Zika virus and West Nile virus are viruses that are typically passed to humans or animals by mosquitoes and made major news as emergent disease threats. Meanwhile, diseases that are spread directly between human beings such as Severe Acute Respiratory Syndrome (SARS) and Ebola have also been identified as serious threats. While each of these conditions caused a great deal of public health concern when they were first identified, SARS has virtually disappeared, West Nile virus occurs with low frequency and causes serious disease in only a very small percentage of cases, Ebola has been more or less contained and a vaccine is in development, and many people infected with Zika will not experience symptoms from the disease.

Other communicable diseases pose a much more frequent threat to the citizens of in the region. Some of the infectious diseases of greatest concern include influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the

emergence of influenza in one of the pandemic H1N1 forms, such as in the “Spanish Flu” outbreak of 1918-19, which killed over 50 million people worldwide. Every year, North Carolina sees hundreds of cases of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees. Of note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

Norovirus is recognized as the leading cause of foodborne-disease outbreaks in the United States. The virus can cause diarrhea, vomiting, and stomach pain, and is easily spread from person to person through contaminated food or water and by surface to surface contact. Especially vulnerable populations to this virus include those living or staying in nursing homes and assisted living facilities and other healthcare facilities such as hospitals. Norovirus could also be a threat in the event of large public gatherings such as sporting events, concerts, festivals, and so forth. North Carolina often experiences norovirus outbreaks on an annual basis. No vaccine or treatment exists for the Norovirus, making it especially dangerous for the public in the event of an outbreak.

Public health threats can occur at any time and can have varying impacts. Discussions between public health professionals, planning officials, and first response agencies are essential in order to facilitate safe, effective, and collaborative efforts toward outbreaks.

Vector-Borne Diseases

Bacterial, viral and parasitic diseases that are transmitted by mosquitoes, ticks and fleas are collectively called "vector-borne diseases" (the insects and arthropods are the "vectors" that carry the diseases). Although the term "vector" can also apply to other carriers of disease — such as mammals that can transmit rabies or rodents that can transmit hantavirus — those diseases are generally called zoonotic (animal-borne) diseases.

The most common vector-borne diseases found in North Carolina and the Cleveland Gaston Lincoln region are carried by ticks and mosquitoes. The tick-borne illnesses most often seen in the state are Rocky Mountain Spotted Fever, ehrlichiosis, Lyme disease and Southern Tick-Associated Rash Illness (STARI). The most frequent mosquito-borne illnesses, or "arboviruses," in North Carolina include La Crosse encephalitis, West Nile virus and Eastern equine encephalitis. An outbreak of the West Nile Virus began showing up in the United States in 1999, with North Carolina reporting 63 cases from that time through the end of 2016.

5.13.2 Location and Spatial Extent

Extent is difficult to measure for an infectious disease event as the extent is largely dependent on the type of disease and on the effect that it has on the population (discussed above). Extent can be somewhat defined by the number of people impacted, which depending on the type of disease could number in the tens of thousands within the state.

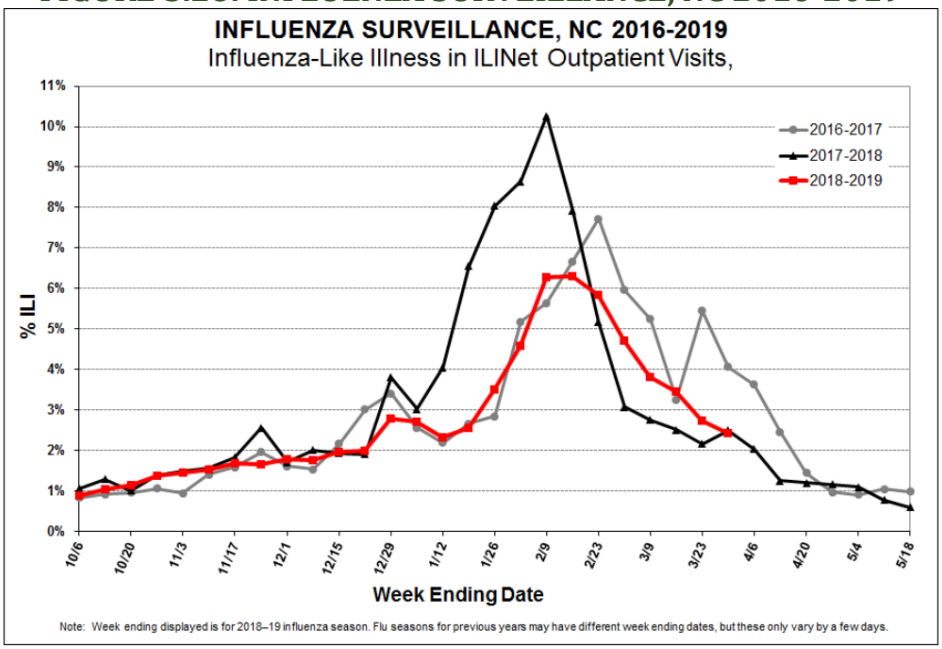
5.13.3 Historical Occurrences

Infectious Disease

The influenza is historically the most common infectious disease that has occurred in the Cleveland Gaston Lincoln region. Cases of the flu tend to occur in the late fall and early winter months. In recent

years, cases of the influenza and influenza-like illnesses have been reported in hospitals. As seen in **Figure 5.28** below, 172 people throughout North Carolina died from the flu between 2018 and 2019.

FIGURE 5.28: INFLUENZA SURVEILLANCE, NC 2016-2019



N.C. Flu-Associated Deaths*

2	172
New Flu Deaths 3/24/19-3/30/19	Total Flu Deaths This Season (9/30/2018-5/18/2019)

Source: NC Department of Health and Human Services

Vector-Borne Diseases

In 2016, North Carolina state health officials encouraged citizens to take preventative measures against mosquito bites to avoid contracting the Zika virus. $477,500 dollars was allocated from the Governor's yearly budget to develop an infrastructure to detect, prevent, control, and respond to the Zika virus and other vector-borne illnesses[28].

5.13.4 Probability of Future Occurrence

It is difficult to predict the future probability of infectious diseases due to the difficulty with obtaining information on this type of hazard. The most common and probable disease in the state has shown to be influenza; however, based on historical data, it is relatively unlikely (between 1 and 33.3 percent annual probability) that the Cleveland Gaston Lincoln region will experience an outbreak of infectious diseases in the future.

[28] https://www.ncdhhs.gov/news/press-releases/nc-prepared-zika-virus-risk-local-virus-carrying-mosquitoes-low

Technological Hazards

5.14 HAZARDOUS SUBSTANCES

5.14.1 Background and Description

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[29]. 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.

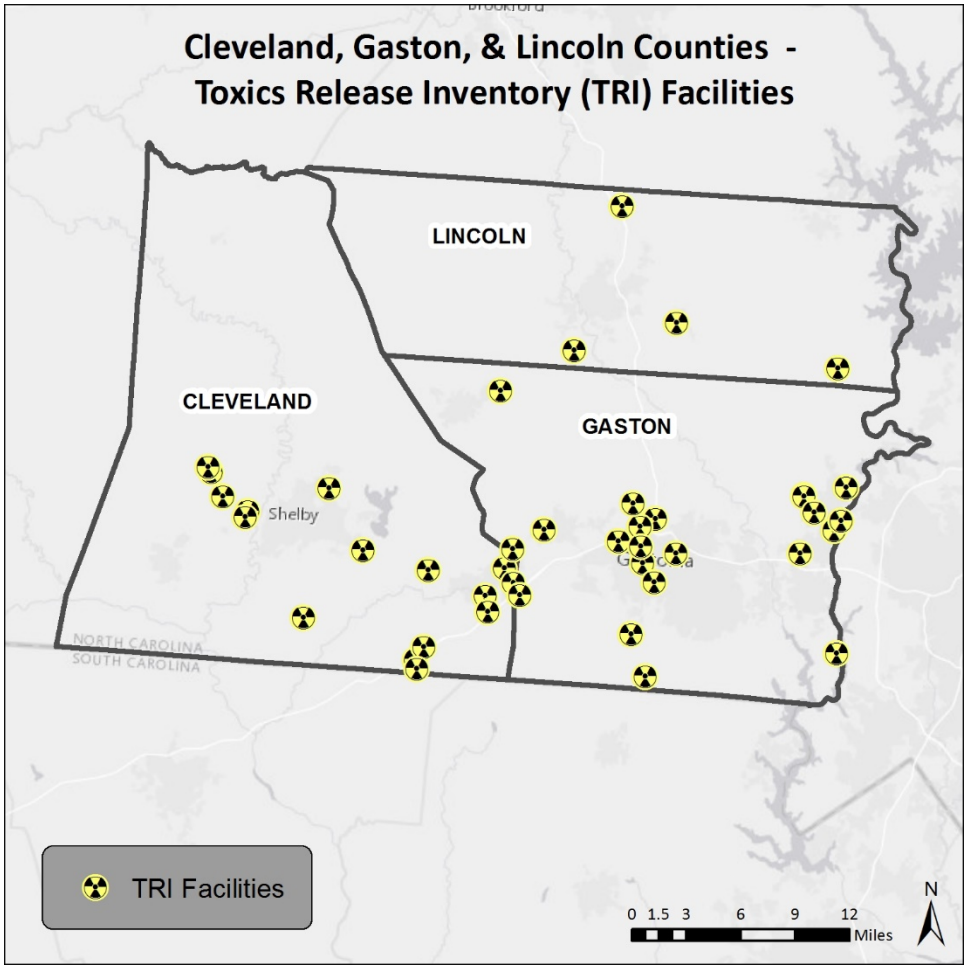
5.14.2 Location and Spatial Extent

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

[29] FEMA, 1997.

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. As of 2017, the Cleveland Gaston Lincoln Region has 52 TRI sites. These sites are shown in **Figure 5.29.**

FIGURE 5.29: 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.

5.14.3 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 5.32 summarizes the HAZMAT incidents reported in the Cleveland Gaston Lincoln Region.

TABLE 5.32: SUMMARY OF HAZMAT INCIDENTS IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
CLEVELAND COUNTY	**5**	**0/0**	**$5,414**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$5,414
Casar	0	0/0	$0
Earl	0	0/0	$0
Falston	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	0	0/0	$0
Waco	0	0/0	$0
Unincorporated Area	0	0/0	$0
GASTON COUNTY	**17**	**0/0**	**$320,380**
Belmont	6	0/0	$420
Bessemer City	3	0/0	$3,066
Cherryville	1	0/0	$0
Cramerton	1	0/0	$0
Dallas	1	0/0	$23,007
Gastonia	4	0/0	$275,887
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	0	0/0	$0

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2018)
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	1	0/0	$0
LINCOLN COUNTY	**4**	**0/0**	**$1,609,132**
Lincolnton	2	0/0	$658,943
Unincorporated Area	2	0/0	$950,189
CLEVELAND GASTON LINCOLN REGION TOTAL	**26**	**0/0**	**1,934,926**

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

5.14.4 Probability of Future Occurrence

Given the location of 52 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.

5.15 RADIOLOGICAL EMERGENCY – FIXED NUCLEAR FACILITIES

5.15.1 Background and Description

Although not referenced in the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, radiological emergencies will be assessed in this update.

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. While radiological emergencies generally are a rare occurrence, many incidents are extremely well known due to their large-scale impact and serious effects on people and the environment.

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.

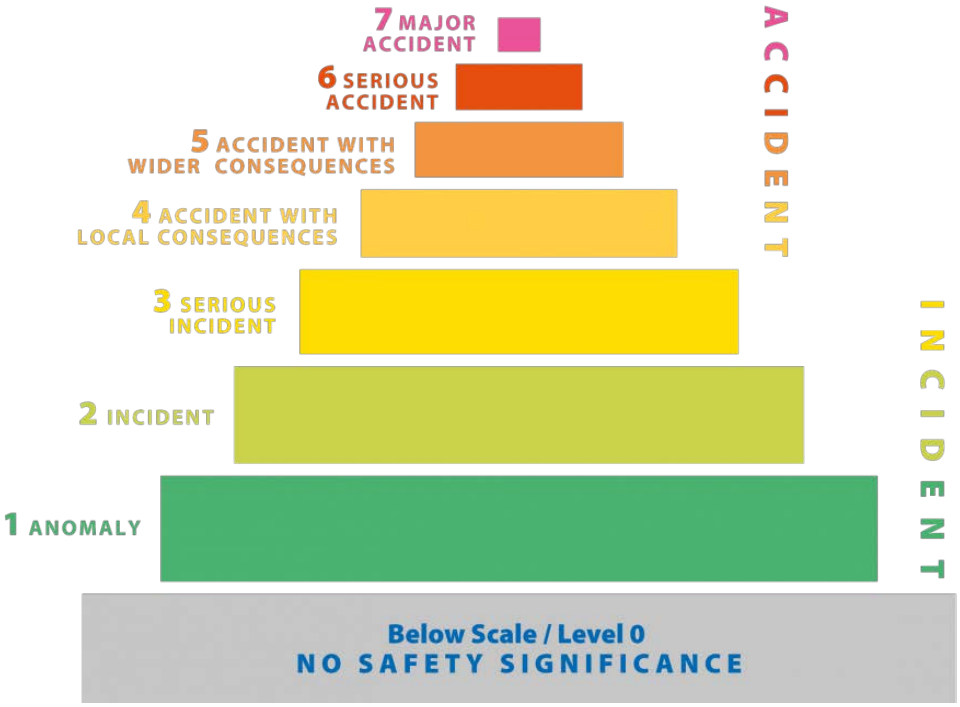
The region is also located within a close proximity to the Catawba Nuclear Station in South Carolina which houses two 1,129-megawatt pressurized water reactors. The plant was commissioned in 1985 and the second unit was added in 1986. It also operates with a very high level of security. It first unit began operating in 1985, followed by the next unit in 1986, and is only 11 miles southwest of Charlotte, NC[30].

5.15.2 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 5.30**).

[30] *https://www.duke-energy.com/our-company/about-us/power-plants*

FIGURE 5.30: INTERNATIONAL NUCLEAR EVENT SCALE

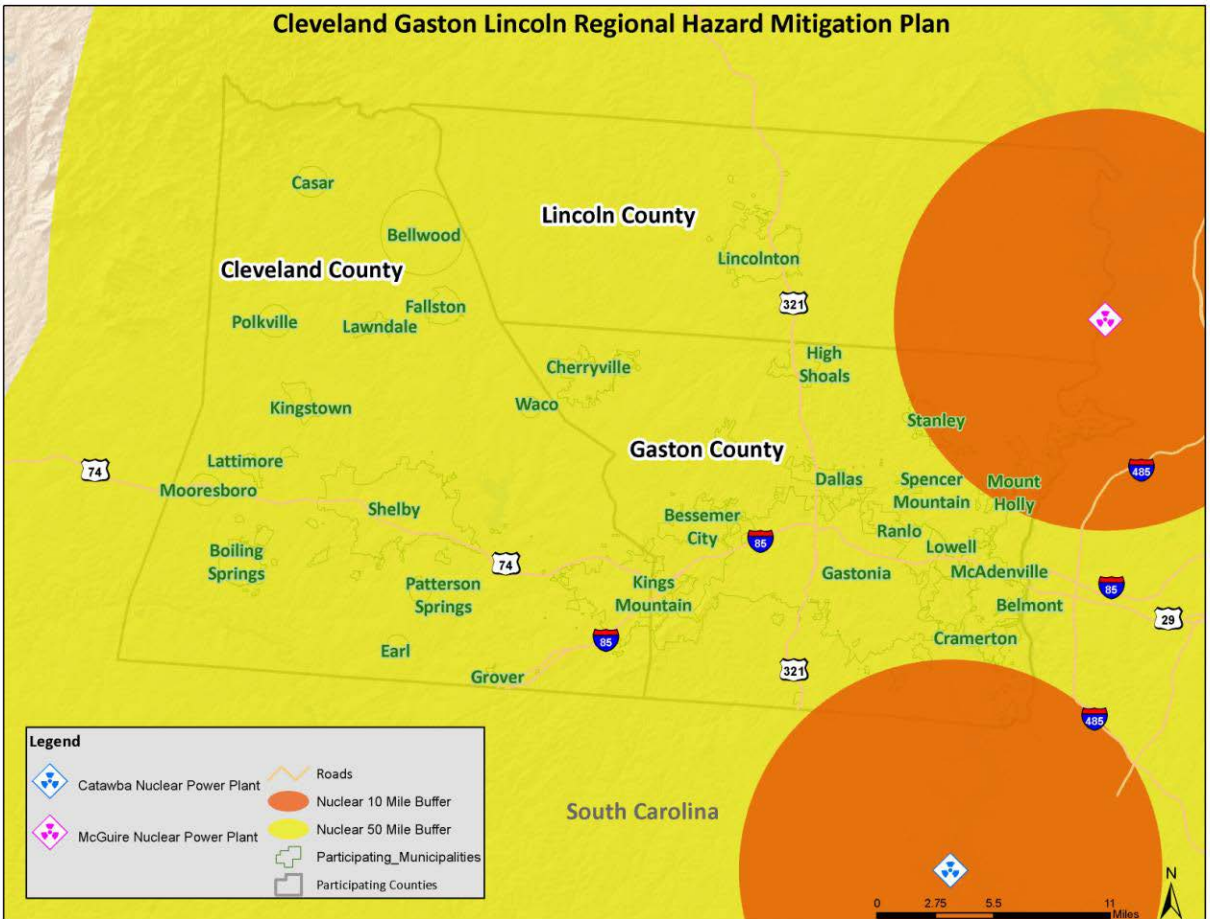


Source: International Atomic Energy Agency

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. 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.

Both the McGuire Nuclear Station and the Catawba Nuclear Station are within ten miles of the Cleveland Gaston Lincoln. Furthermore, both of the plant's 50-mile buffer zones completely cover the three participating counties, as seen in the **Figure 5.31** below.

FIGURE 5.31: MCGUIRE AND CATAWBA NUCLEAR POWER STATIONS INCIDENT HAZARD ZONES



Source: International Atomic Energy Agency

5.15.3 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.

5.15.4 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).

5.16 TERRORISM

5.16.1 Background and Description

Terrorism was not referenced in the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, but is addressed in this update. For the purpose of this report, terrorism encompasses explosive, chemical, radiological, biological, nuclear, and other threats.

Terrorism is defined in the United States by the Code of Federal Regulations is "the unlawful use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof, in furtherance of political or social objectives." Terrorist acts may include assassinations, kidnappings, hijackings, bombings, small arms attacks, vehicle ramming attacks, edged weapon attacks, incendiary attacks, cyber-attacks (computer based), and the use of chemical, biological, nuclear and radiological weapons. For the purposes of this plan, cyber-attacks are included as a separate hazard.

Historically the main categories of weapons of mass destruction (WMDs) used in terror attacks are Chemical, Biological, Radiological, Nuclear, and Explosive (collectively referred to as CBRNE). As we rank these categories, considering immediate danger posed, impact, probability, technical feasibility, frequency, and historical success, they are typically ranked in the following way.

Explosive

Explosive attacks lead all others due to their immediate danger to life and health, immediate and measurable impact, high probability, low cost/easy degree of technical feasibility, and a long history of successful attacks.

Chemical

Chemical attacks can pose immediate danger to life and health depending upon the materials used. Chemicals are easy to access, low cost, and easy to deploy. Chemical terrorism can have high and persistent impacts to people and places. These types of attacks are probable and have enjoyed historical success.

Radiological

Radiological attacks can pose significant threats to life and health depending upon the specific materials used. Radiological materials while restricted and regulated are accessible to people with some knowledge in this discipline. While radiological incidents have occurred, they occur less frequently than explosive and chemical attacks.

Biological

Biological attacks can pose significant threats to life and health. They are typically deployed as diseases and bio-toxins. They require some degree of technical expertise in order to be deployed successfully. While biological incidents have occurred, they occur less frequently than explosive and chemical attacks.

Nuclear

While yielding a very high impact, the Nuclear attack is extremely rare due to the fact that it is cost prohibitive and very technically difficult to achieve. This type of attack, however, could be state sponsored which makes it viable.

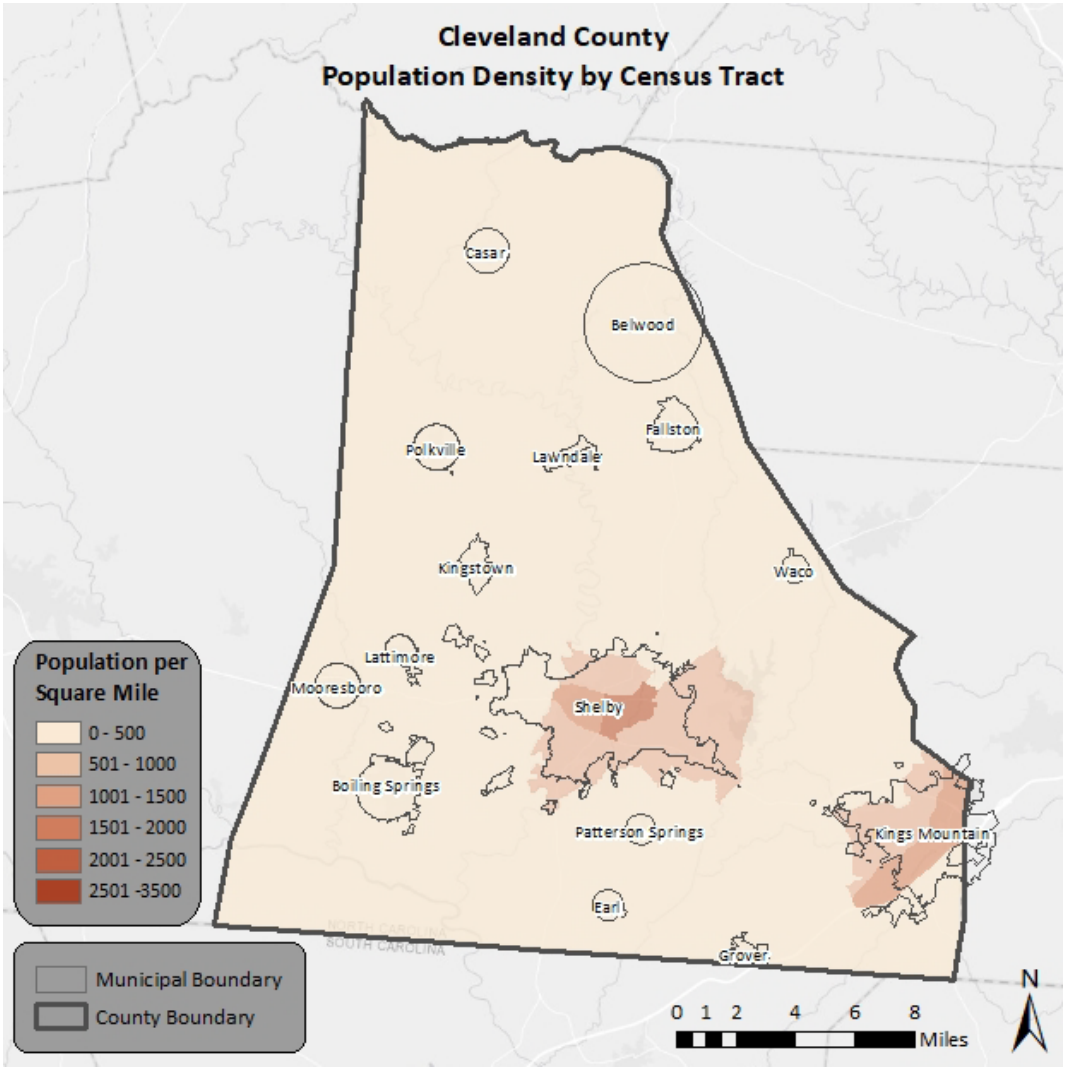
OTHER

Terrorism Hazard Assessment must also account for modern trends and changes. An additional "OTHER" category should be considered that includes small arms attacks, vehicle ramming attacks, edged weapon attacks, and incendiary attacks.

5.16.2 Location and Spatial Extent

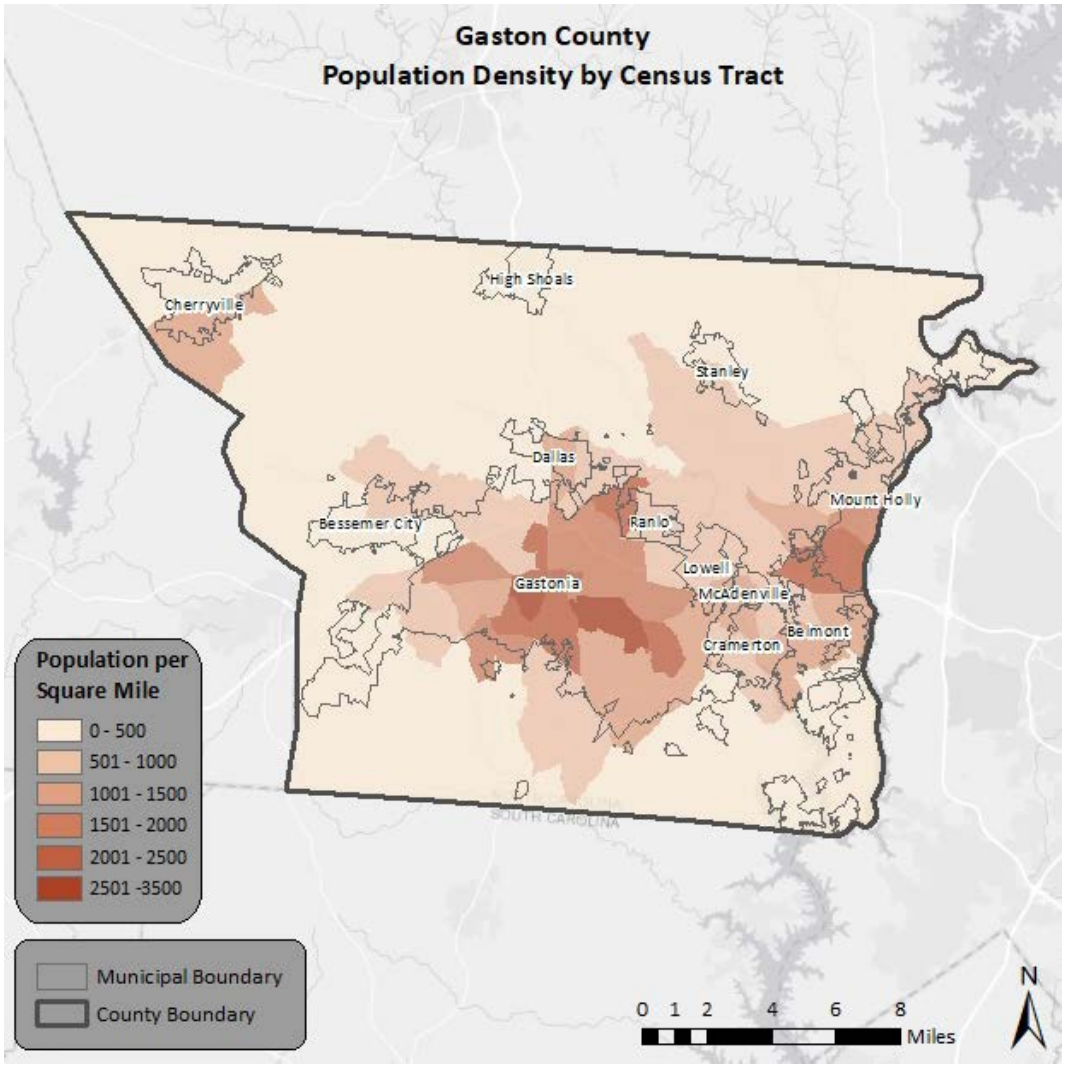
All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The map in **Figure 5.32, Figure 5.33,** and **Figure 5.34** display the population density in each county in the Cleveland Gaston Lincoln region using census tract levels.

FIGURE 5.32: POPULATION DENSITY IN CLEVELAND COUNTY



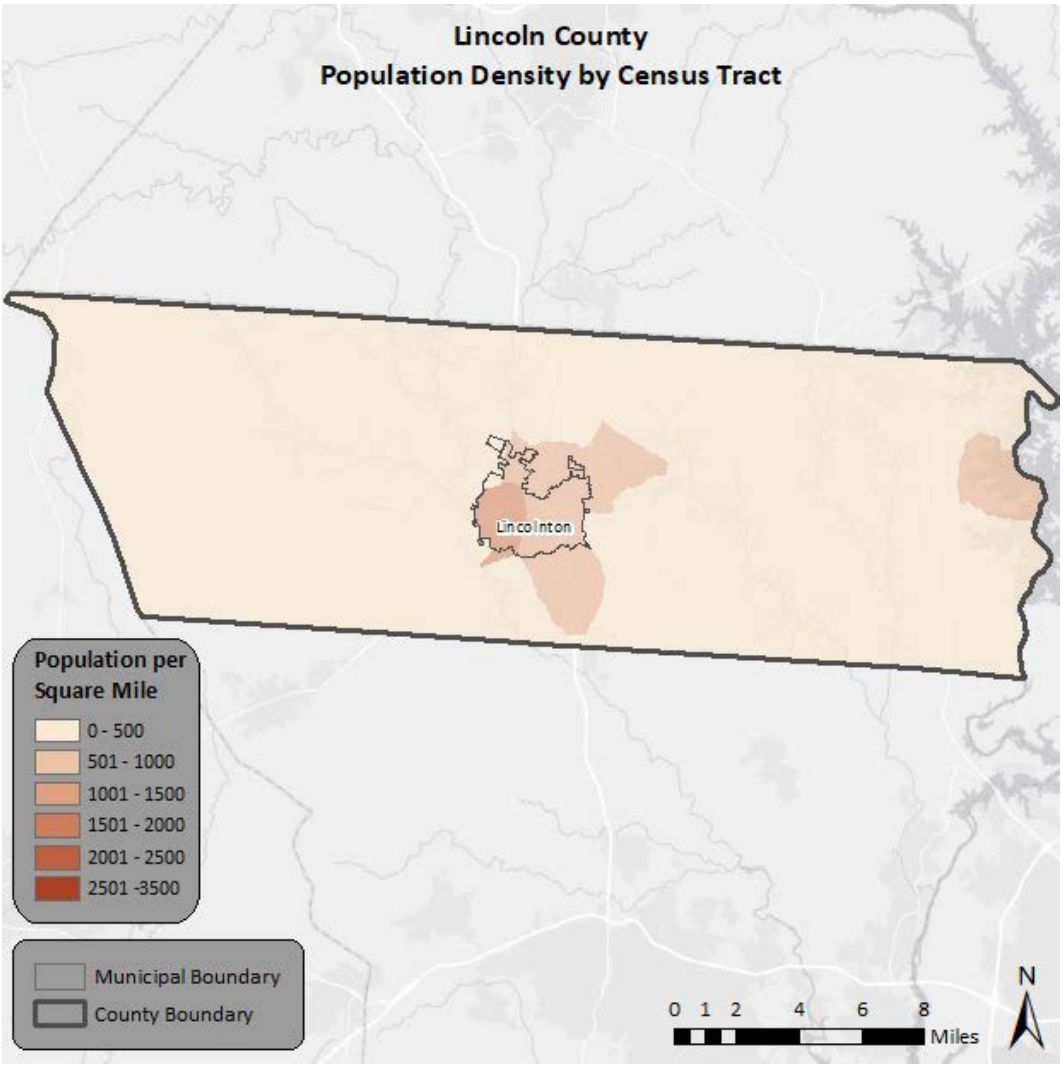
Source: US Census Bureau

FIGURE 5.33: POPULATION DENSITY IN GASTON COUNTY



Source: US Census Bureau

FIGURE 5.34: POPULATION DENSITY IN LINCOLN COUNTY



Source: US Census Bureau

Furthermore, the most recent population counts of each participating county and jurisdictions can be seen in **Table 5.33** below.

TABLE 5.33: 2017 POPULATION ESTIMATES FOR THE CLEVELAND GASTON LINCOLN REGION

Location	2017 Population Estimate
Cleveland County	**97,038**
Belwood	934
Boiling Springs	4,645
Casar	261
Earl	230
Fallston	574
Grover	977
Kingstown	612

Location	2017 Population Estimate
Kings Mountain	10,929
Lattimore	468
Lawndale	758
Mooresboro	447
Patterson Springs	759
Polkville	555
Shelby	20,058
Waco	254
Unincorporated Area	54,577
Gaston County	**214,049**
Belmont	11,373
Bessemer City	5,411
Cherryville	5,854
Cramerton	4,274
Dallas	4,592
Gastonia	74,381
High Shoals	678
Lowell	3,591
McAdenville	662
Mount Holly	14,948
Ranlo	3,523
Spencer Mountain	0
Stanley	3,614
Unincorporated Area	81,148
Lincoln County	**80,504**
Lincolnton	10,574
Unincorporated Area	69,930
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**391,591**

Source: US Census Bureau, NC Office of State Budget and Management

5.16.3 Historical Occurrences

No extreme cases of terror attacks have previously affected the Cleveland Gaston Lincoln region. However, as the population in the area continues to increase, so does the chance of an attack.

5.16.4 Probability of Future Occurrences

The Cleveland Gaston Lincoln region has experienced no major terrorist attacks, but the area's population is continuing to rise. The probability of future occurrences of a terrorist attack, while unlikely (between 1 and 10 percent annual probability) is a real possibility that the area must be prepared for.

5.17 CYBER

5.17.1 Background and Description

Cyberattacks are deliberate attacks on information technology systems in an attempt to gain illegal access to a computer, or purposely cause damage. As the world and the Cleveland Gaston Lincoln region become more technologically advanced and dependent upon computer systems, the threat of cyberattacks is becoming increasingly prevalent. Also known as computer network attacks, cyberattacks are difficult to recognize and typically use malicious code to alter computer data or steal information.

Mitigating and preparing for cyberattacks is challenging because of how diverse and complex attacks can be. The FBI is the lead federal agency for investigating cyberattacks by criminals, overseas adversaries, and terrorists. In North Carolina, the Department of Information Technology is the lead agency that maintains Cybersecurity and Risk Management resources.

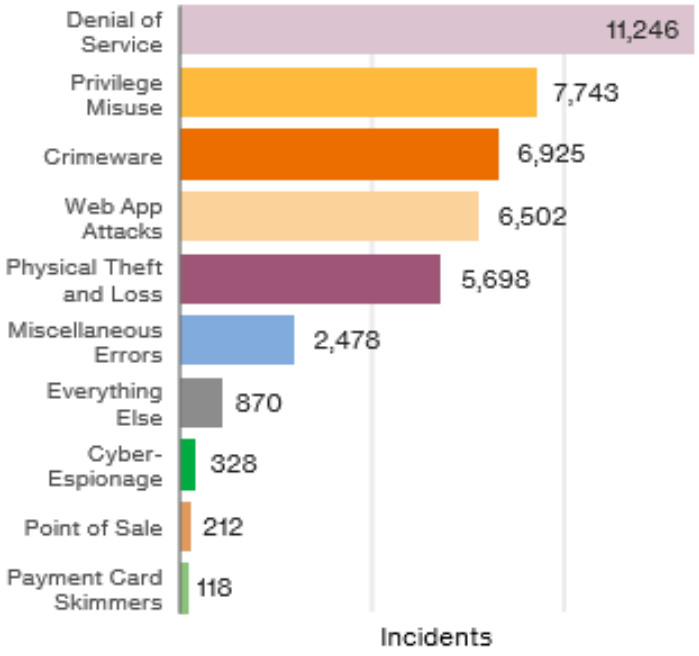
Cyberattacks can happen in both the public and private sector. They may be carried out by a specific individual, or by groups from afar. Many attacks attempt to steal money or to disturb normal operations. According to the 2017 Verizon Report of Data Breaching, 93% of all data breaches had a financial or espionage motive, and espionage cases are rising.

There are many types of cyberattack incident patterns, which include:

- Web App Attacks: Incidents in which web applications were attacked, which can include exploiting code-level vulnerabilities in the application.
- Point-of-Sale Intrusions: Remote attacks against environments where card-present retail transactions are conducted.
- Insider and Privilege Misuse: Unapproved or malicious use of organizational resources.
- Miscellaneous Errors: Incidents in which unintentional actions directly compromise an attribute of a security asset.
- Physical Theft and Loss: Incidents where an information asset went missing.
- Crimeware: Instances involving malware that do not fit into a more specific pattern.
- Payment Card Skimmers: Incidents involving skimming devices physically implanted on an asset that reads magnetic stripe data from payment cards.
- Cyber-espionage: Unauthorized network or system access linked to state-affiliated actors.
- Denial-of-Service Attacks: Any attack intended to compromise the availability of networks and systems that are designed to overwhelm systems, resulting in performance degradation or interruption of service.

Figure 5.35 below displays nationwide cyberattack incident patterns from the 2017 Verizon Data Breach Investigations Report.

FIGURE 5.35: PERCENTAGE AND COUNTS OF INCIDENTS PER PATTERN



Source: 2017 Verizon Data Breach Investigations Report

5.17.2 Location and Spatial Extent

Cyberattacks happen all over the world and are not restricted to a certain locational boundary. They tend to affect the public industry rather than private industries.

5.17.3 Historical Occurrences

In North Carolina and the Cleveland Gaston Lincoln region, the Department of Information Technology specializes in cybersecurity and risk management. Within the department, the NC Information Sharing and Analysis Center gathers information on cyber threats within the State raise cybersecurity.

In 2016, North Carolina reported the highest number of cybercrimes in the "non-payment/non-delivery" sector, which can be seen in **Table 5.34** below.

TABLE 5.34: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2016

Crime Type by Victim Count			
Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
419/Overpayment	614	Health Care Related	10
Advanced Fee	384	IPR/Copyright and Counterfeit	58
Auction	442	Identity Theft	345
BEC/EAC	254	Investment	28
Charity	10	Lottery/Sweepstakes	119
Civil Matter	28	Malware/Scareware	62
Confidence Fraud/Romance	326	Misrepresentation	102
Corporate Data Breach	74	No Lead Value	121
Credit Card Fraud	274	Non-payment/Non-Delivery	1,844
Crimes Against Children	19	Other	218
Criminal Forums	0	Personal Data Breach	569
Denial of Service	28	Phishing/Vishing/Smishing/Pharming	399
Employment	467	Ransomware	67
Extortion	468	Re-shipping	25
Gambling	1	Real Estate/Rental	280
Government Impersonation	319	Tech Support	298
Hacktivist	2	Terrorism	6
Harassment/Threats of Violence	364	Virus	29
Descriptors*			
Social Media	455	Virtual Currency	38

Source: FBI Internet Crime Complaint Center, 2016

Although the Cleveland Gaston Lincoln region has not reported any major catastrophic cyberattacks, the potential to experience one is unpredictable and can happen at any time.

5.17.4 Probability of Future Occurrences

As the world's dependency on technology grows, the possibility of experiencing cyberattacks rises as well. There have not been severe past occurrences in the region, and it is considered unlikely (less than 1 percent annual probability) to experience one in the near future.

5.18 ELECTROMAGNETIC PULSE

5.18.1 Background and Description

The United States Department of Energy defines electromagnetic pulses (EMPs) as "intense pulses of electromagnetic energy resulting from solar-caused effects or man-made nuclear and pulse power devices." EMPs can be naturally occurring or human-caused hazards. Examples of natural EMP events include:

- Lightning electromagnetic pulse
- Electrostatic discharge
- Meteoric electromagnetic pulse, and
- Coronal mass ejection, also known as a solar electromagnetic pulse.

A human-caused EMP (such as a nuclear EMP) is a technological hazard that can cause severe damage to electrical components attached to power lines or communication systems. One of the most complex aspects of EMPs is the fact they are invisible, unpredictable, and rapid. They can also overload electronic devices that people heavily rely on every day. EMPs are harmless to people biologically; however, an EMP attack could damage electronic systems such as planes or cars. This could cause destruction of property and life and potentially generate disease or societal collapse.

In 2015, Congress amended the Homeland Security Act of 2002 by passing the Critical Infrastructure Protection Act (CIPA), which protects Americans from an EMP. It also required reporting of EMP threats, research and development, and a campaign to educate planners and emergency responders about EMP events.

5.18.2 Location and Spatial Extent

An EMP can happen in any location, and they are relatively unpredictable. Due to advancing technologies, densely populated may be more prone to damages from an EMP. Therefore, bigger cities in the Cleveland Gaston Lincoln region may be more susceptible.

5.18.3 Historical Occurrences

There have been no reports of EMP occurrences in the Cleveland Gaston Lincoln region.

5.18.4 Probability of Future Occurrences

The probability of an EMP is unlikely (less than 1 percent annual probability), but an occurrence could have catastrophic impacts.

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 5.35 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 5.35 EXTENT OF CLEVELAND GASTON LINCOLN REGION HAZARDS

Natural 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 5:5). 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.
Excessive Heat	The extent of excessive 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
Hurricane and Coastal Hazards	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.9). 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 more intense storms can and have impacted the region directly.
Tornadoes/ Thunderstorms	Tornadoes: 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 5.12 and 5.13). 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 Thunderstorms: Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 63-year history from the National Centers for Environmental Information, 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

	Lightning: According to the Vaisala flash density map (Figure 5.15), 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. Hailstorms: 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
Severe Winter Weather	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
Earthquakes	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from the 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
Geological	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. Sinkhole: The western part of North Carolina and the Cleveland Gaston Lincoln region is susceptible to sinkholes; however, there are no historical records of sinkholes in the region. 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.
Dam Failure	Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.24). Of the 240 dams in Cleveland Gaston Lincoln Region, 47 are classified as high-hazard. • Cleveland County: 16 high hazard dams • Gaston County: 23 high hazard dams • Lincoln County: 8 high hazard dams
Flooding	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	-

Depth of flooding inside structures across the region during a maximum flood event ranges from 1-3 feet and varies based on the structure's location in the floodplain and the elevation of the structure.

Other Hazards

Wildfires

Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county. 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.

Infectious Disease

There is no available method for determining dollar losses due to infectious diseases at this time; however, $477,500 dollars was allocated from the Governor's yearly budget in 2016 for preventative measures regarding the Zika Virus. The entire Cleveland Gaston Lincoln region is susceptible to infectious diseases such as the flu, which kills hundreds of people annually.

Technological 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

Radiological Emergency – Fixed Nuclear Facilities	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.
Terrorism	Although no severe terrorism attacks have been reported in the Cleveland Gaston Lincoln region, the entire area is still at risk to a future event. Densely populated areas, such as cities, are considered more susceptible. Terror events have the potential to affect the human population, buildings and infrastructure, and the economy in the region.
Cyber	No cyber attacks have been historically reported in the Cleveland Gaston Lincoln region. Technology usage, however, is increasing. A cyber attack could potentially devastate the region's economy and could have lasting negative impacts.
Electromagnetic Pulse	Electromagnetic Pulse (EMP) occurrences have not taken place in the Cleveland Gaston Lincoln region, but the risk still exists. If an EMP were to occur, the effects would negatively impact first responders and communication efforts and may cause panic within the area.

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[31], as summarized in **Table 5.36**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

[31] 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.

(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 who made recommendations to make changes to the final hazard rankings.

TABLE 5.36: 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	

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

5.19.3 Priority Risk Index Results

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

TABLE 5.37: SUMMARY OF PRI RESULTS FOR THE CLEVELAND GASTON LINCOLN REGION

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought		Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Excessive Heat		Possible	Minor	Large	More than 24 hours	Less than 1 week	2.1
Hurricane and Coastal Hazards		Possible	Critical	Large	More than 24 hours	Less than 24 hours	2.6
Tornadoes/ Thunderstorms	Hailstorm, Lightning	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Severe Winter Weather		Likely	Critical	Large	More than 24 hours	Less than 1 week	3.0
Earthquakes		Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.0
Geological	Landslide, Sinkholes, Erosion	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	2.1
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 24 hours	2.2
Flooding		Likely	Limited	Moderate	6 to 12 hours	Less than 1 week	2.7
Other Hazards							
Wildfires		Likely	Minor	Small	Less than 6 hours	More than 1 week	2.4
Infectious Disease		Unlikely	Limited	Moderate	More than 24 hours	More than 1 week	2.0
Technological Hazards							
Hazardous Substances		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	2.2
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	2.4

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Terrorism		Unlikely	Critical	Moderate	Less than 6 hours	More than 1 week	2.6
Cyber		Unlikely	Minor	Moderate	Less than 6 hours	Less than 1 week	1.9
Electromagnetic Pulse		Unlikely	Limited	Large	Less than 6 hours	More than 1 week	2.5

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. 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. 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.

A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment*.

Table 5.38 ranks the hazards that were assessed in the update that were renamed to be consistent with the State of State of North Carolina Hazard Mitigation Plan. These conclusions were based on the PRI calculations and input from the Cleveland Gaston Lincoln Regional Planning Committee.

TABLE 5.38: 2020 CONCLUSIONS ON HAZARD RISK FOR THE CLEVELAND GASTON LINCOLN REGION

HIGH RISK	Severe Winter Weather Tornadoes/Thunderstorms Flooding Hazardous Substances
MODERATE RISK	Hurricanes and Coastal Storms Terrorism Electromagnetic Pulse Drought Radiological Emergency Wildfires Excessive Heat
LOW RISK	Dam Failure Geological Infectious Disease Earthquakes Cyber

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

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. Additionally, an assessment is conducted for each identified hazard, including the potential impact and expected amount of damages it may cause. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, each county 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:

- Geological
- Tornadoes/Thunderstorms
- Severe Winter Weather
- Hazardous Substances

With the exception of Hazardous Substances, the hazards listed above are considered natural 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 Centers for Environmental Information 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, excessive heat, infectious disease, radiological emergency, terrorism, cyber, EMP, and geological hazards, 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 6.26**.

6.2.2 GIS-Based Analysis

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

[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.

- Flooding
- Hazardous Substances
- Geological (Landslide)
- Wildfires

The objective of the GIS-based analysis was to determine the estimated vulnerability of buildings, 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 georeferenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS™ 10.6.1 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 and was supplemented with current population estimates from the US Census Bureau. 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 Management Tool

The Risk Management Tool (RMT) was developed by NCEM-RM as a tool to simplify hazard mitigation plan development into a single, automated, tool-based format to include geospatially based risk assessment data, also developed by the NCEM-RM. The RMT is a twofold system used to create and/or update a local and state hazard mitigation plan. The two parts of the RMT are a step-by-step system that will prompt a user to input information and narrative as well as upload pictures, documents and other information as needed. The second part of the system is the Risk Tool. The Risk Tool will run a risk assessment at the building level for each hazard selected based on predetermined calculations for each hazard. Some hazards will have a single return period and others have multi-return periods. The availability of multi-returns periods are based on the availability of datasets for each hazard and the degree of detail in each dataset.

The Risk Assessment produced by the Risk Tool will also identify high-risk structures in the planning area and estimate cost by types of mitigation projects (wind retrofits, elevation, acquisition, mitigation reconstruction) and benefit-cost estimates by type of mitigation. The mitigation tool is only meant to begin the process of thinking about problem areas where mitigation may be of interest to the jurisdiction and property owners. It is also designed to drive mitigation actions that are specific, measurable, attainable, realistic and timely.

Finally, the Risk Assessment Tool also assesses vulnerable populations, such as children and elderly persons. Data used to assess these populations is from the US 2010 Census. According to the US Census Bureau, those defined as “elderly,” are 65 years old or older, while those defined as “children” are 5 years old or younger. It is important to note that the numbers assessed are from the most recent Census in 2010.

Once all of the information was input into the system, a hazard mitigation plan can then be exported into multiple document formats. The system will also store the plan so that when it is time to update the plan, the information is already in the system.

The RMT was originally developed as part of the Integrated Hazard Risk Management (IHRM) pilot project which included Durham, Edgecombe, Macon and New Hanover counties. The pilot was successful and it was determined that there is a need and interest in a system designed to be used statewide and potentially nationwide in the future. The RMT used in this update was the second version created by NCEM.

A list of the hazards assessed by the RMT follows:

- Hurricane and Coastal Hazards
- Tornadoes/Thunderstorms
- Earthquakes
- Flooding
- Wildfires

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

Hurricane and Coastal Hazards

NCEM's Risk Management Tool assessed vulnerable areas to Hurricane and Coastal Hazards. For this assessment, vulnerable buildings and populations were analyzed against damages caused by hurricane winds.

Tornadoes/Thunderstorms

NCEM's Risk Management Tool analyzed the vulnerable buildings and populations of the Tornadoes/Thunderstorms hazard. Sub hazards assessed under the thunderstorms hazard include hail and lightning; however, for the purposes of this assessment, thunderstorm winds were the only risk analyzed.

Earthquakes

NCEM's Risk Management Tool assessed vulnerable areas to the earthquake hazard. This assessment included susceptible buildings by the type of structure, and the potential dollar losses associated with the buildings. It also analyzed susceptible populations, such as children and elderly.

Geological (Landslide)

Data from the U.S. Geological Survey was used to first determine what areas are considered high, moderate, or low susceptibility areas to the landslide hazard. Data was downloaded in an ArcGIS compatible format. This allowed the parcel data received by local governments to be layered on top of the landslide regions to assess vulnerability to landslide occurrences.

Flooding

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. This data was also supplemented with the NCEM RMT data, which assessed structure type and vulnerable populations within the floodplain areas. It should be noted that NCEM's RMT analysis does account for building elevation.

Wildfires

The data used to determine vulnerability to wildfires 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 the "Wildland Urban Interface" (WUI) was used to determine vulnerability of people and property. This layer uses the key input of housing density to define potential wildfire impacts to people and homes. The WUI Risk Index is then derived from a scale of -1 to -9, with the least negative impact being a -1, and uses flame length to measure fire intensity. The primary purpose of this data is to highlight areas of concern that may be conducive to mitigation actions. Many assumptions are made, making it not a true probability; however, it does provide a comparison of risk throughout the region. Data was also supplemented with the data from NCEM's RMT, which assessed vulnerable buildings, potential dollar losses of those buildings, and susceptible populations.

Hazardous Substances

Hazardous materials incidents can occur in both fixed facilities and through mobile transportation. For the fixed incident analysis, Toxic Release Inventory (TRI) data was used. The Toxic Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemicals, 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 was further expanded by the Pollution Prevention Act of 1990. Facilities that meet certain activity thresholds must annually report their releases and other waste management activities for listed toxic chemicals to the EPA and to their state or tribal entity. A facility must report if it meets the following 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.

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 vulnerability was 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:

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. Each county provided data from their respective critical facilities that were used in this section. Identified critical facilities are fire stations, police stations, medical care facilities, schools, government facilities, emergency operation centers, or other important buildings. 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

[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.

Region (study area of vulnerability assessment)[3]

TABLE 6.1: IMPROVED PROPERTY IN THE CLEVELAND GASTON LINCOLN REGION

Location[4]	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Cleveland County	**56,611**	**6,370,677,262**	**56,201**	**4,352,649,027**
Belwood	708	52,675,010	693	26,507,416
Boiling Springs	2,492	358,056,439	2,238	277,215,527
Casar	223	15,974,441	147	11,595,842
Earl	161	8,245,091	96	5,868,719
Fallston	439	34,900,432	300	26,412,388
Grover	420	27,303,310	316	22,252,285
Kings Mountain	7,731	99,8725,686	6,817	767,530,972
Kingstown	375	15,097,056	261	11,503,078
Lattimore	205	17,439,242	149	13,742,526
Lawndale	409	16,775,202	287	12,774,439
Mooresboro	203	11,310,481	146	7,632,165
Patterson Springs	288	20,167,392	217	14,540,719
Polkville	368	23,003,929	232	17,084,728
Shelby	12,687	1,656,420,928	11,999	1,213,175,592
Waco	192	12,773,600	138	9,647,762
Unincorporated Area	27,777	2,552,200,217	17,746	1,554,603,160
Gaston County	**105,087**	**14,015,844,354**	**83,871**	**10,687,961,953**
Belmont	10,490	2,281,603,850	9,041	1,689,775,491
Bessemer City	6,337	585,390,519	5,174	453,108,007
Cherryville	4,603	472,479,051	3,960	383,422,281
Cramerton	1,769	275,296,512	1,455	218,863,216
Dallas	7,642	952,651,443	6,765	745,097,865
Gastonia	43,474	6,349,810,454	38,428	4,952,482,657
High Shoals	48	1,093,586	6	46,574
Lowell	1,961	184,411,584	1,653	246,488,489
McAdenville	353	61,682,377	271	48,600,925
Mount Holly	9,764	1,550,570,612	8,761	1,232,632,677
Ranlo	84	850,404	13	31,650
Spencer Mountain	2	457,485	0	0
Stanley	4,333	556,035,264	3,861	444,443,709
Unincorporated Area	14,227	$743,511,213	4,483	$272,968,412
Lincoln County	**52,525**	**8,361,721,566**	**37,757**	**5,592,325,251**
Lincolnton	18,416	2,247,118,880	13788	1,639,621,683
Unincorporated Area	34,109	5,678,231,209	23,969	3,952,703,568
CLEVELAND GASTON LINCOLN REGION TOTAL	**214,223**	**$28,748,243,182**	**177,829**	**$20,632,936,231**

Source: Local governments

[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.

The following table 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. In addition, **Figure 6.1** shows the locations of essential facilities in the Cleveland Gaston Lincoln Region. **Table 6.26**, at 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.

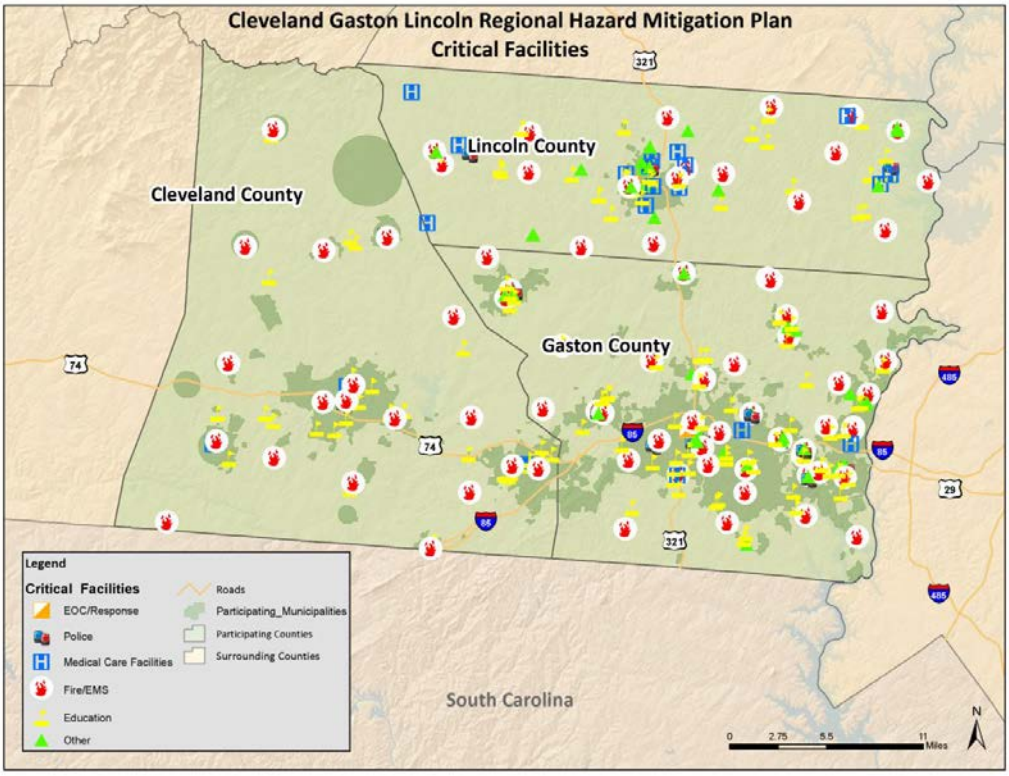
TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE CLEVELAND GASTON LINCOLN REGION

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Cleveland County	**18**	**5**	**9**	**0**	**26**	**0**
Belwood	0	0	1	0	0	0
Boiling Springs	2	1	1	0	1	0
Casar	1	0	0	0	1	0
Earl	0	0	0	0	0	0
Fallston	1	0	0	0	1	0
Grover	1	1	0	0	1	0
Kings Mountain	3	1	2	0	8	0
Kingstown	0	0	0	0	0	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
Polkville	1	0	1	0	0	0
Shelby	4	2	2	0	6	0
Waco	0	0	1	0	0	0
Unincorporated Area	3	0	1	0	8	0
Gaston County	**35**	**11**	**15**	**1**	**74**	**75**
Belmont	4	1	3	0	8	4
Bessemer City	4	1	0	0	6	5
Cherryville	2	1	1	0	4	7
Cramerton	1	1	0	0	3	3
Dallas	2	1	1	0	7	9
Gastonia	11	2	7	1	33	26
High Shoals	1	0	0	0	0	1
Lowell	1	1	0	0	1	3
McAdenville	1	0	1	0	2	2
Mount Holly	5	1	1	0	5	6
Ranlo	1	1	0	0	0	1
Spencer Mountain	0	0	0	0	0	0
Stanley	1	1	1	0	5	4
Unincorporated Area	1	0	0	0	0	4
Lincoln County	**21**	**5**	**2**	**5**	**13**	**4**
Lincolnton	3	2	2	5	6	4
Unincorporated Area	18	3	0	0	7	0

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
CLEVELAND GASTON LINCOLN REGION TOTAL	74	21	26	6	113	79

Source: Local governments

FIGURE 6.1: CRITICAL FACILITY LOCATIONS IN THE CLEVELAND GASTON LINCOLN REGION



Source: Local Governments

6.4.2 Social Vulnerability

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

Table 6.3 lists the population by county according to U.S. Census 2010 population estimates. The population estimates are updated using the most recent vintage tables dated July 1, 2017. The total population in the Cleveland Gaston Lincoln Region according to Census data is 399,919.

TABLE 6.3: TOTAL POPULATION IN THE CLEVELAND GASTON LINCOLN REGION

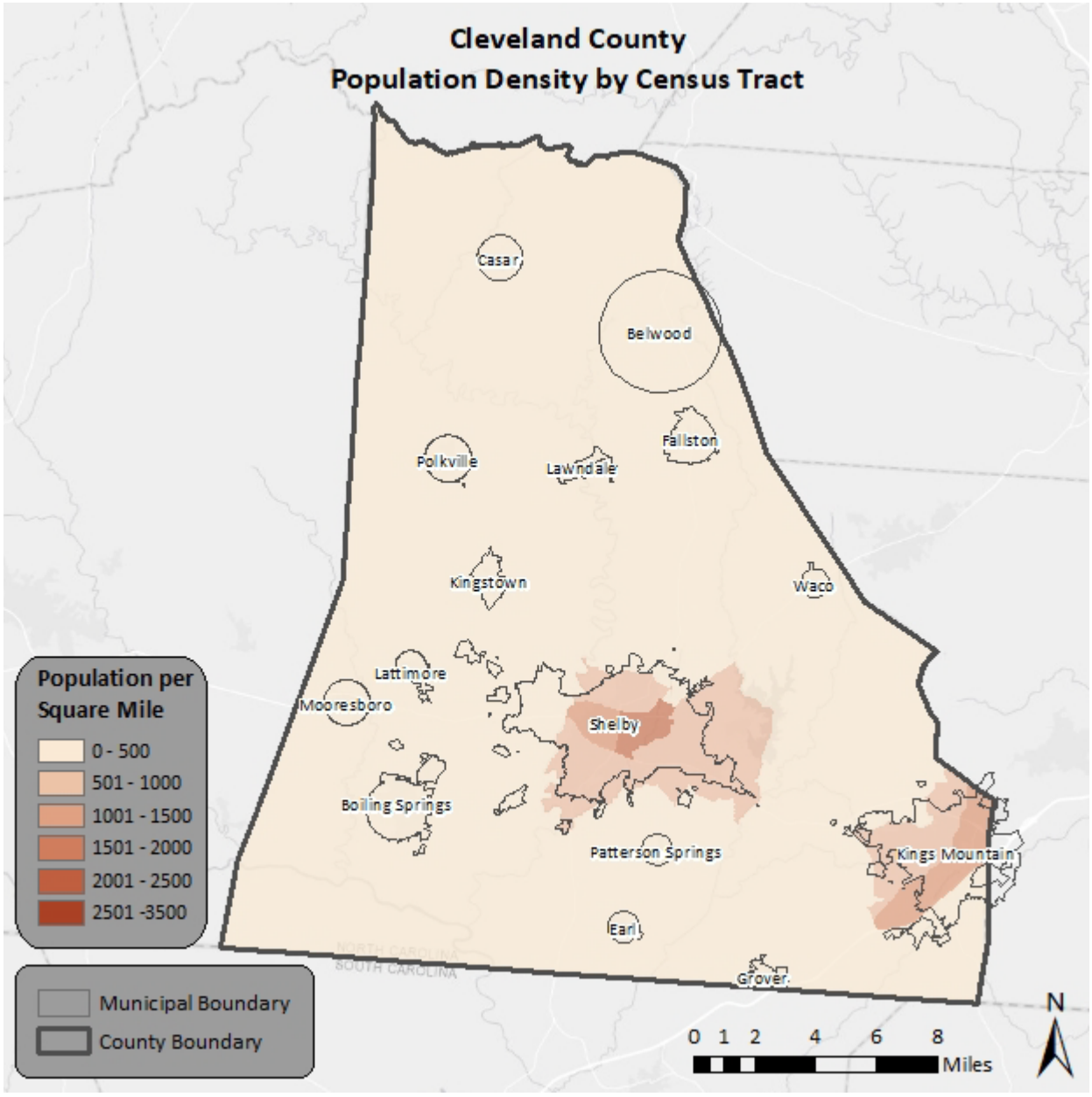
Location	2018 Population Estimates
Cleveland County	97,334
Gaston County	220,182
Lincoln County	82,403

Source: US Census Bureau

Additional population estimates are presented in Section 3: *Community Profile*.

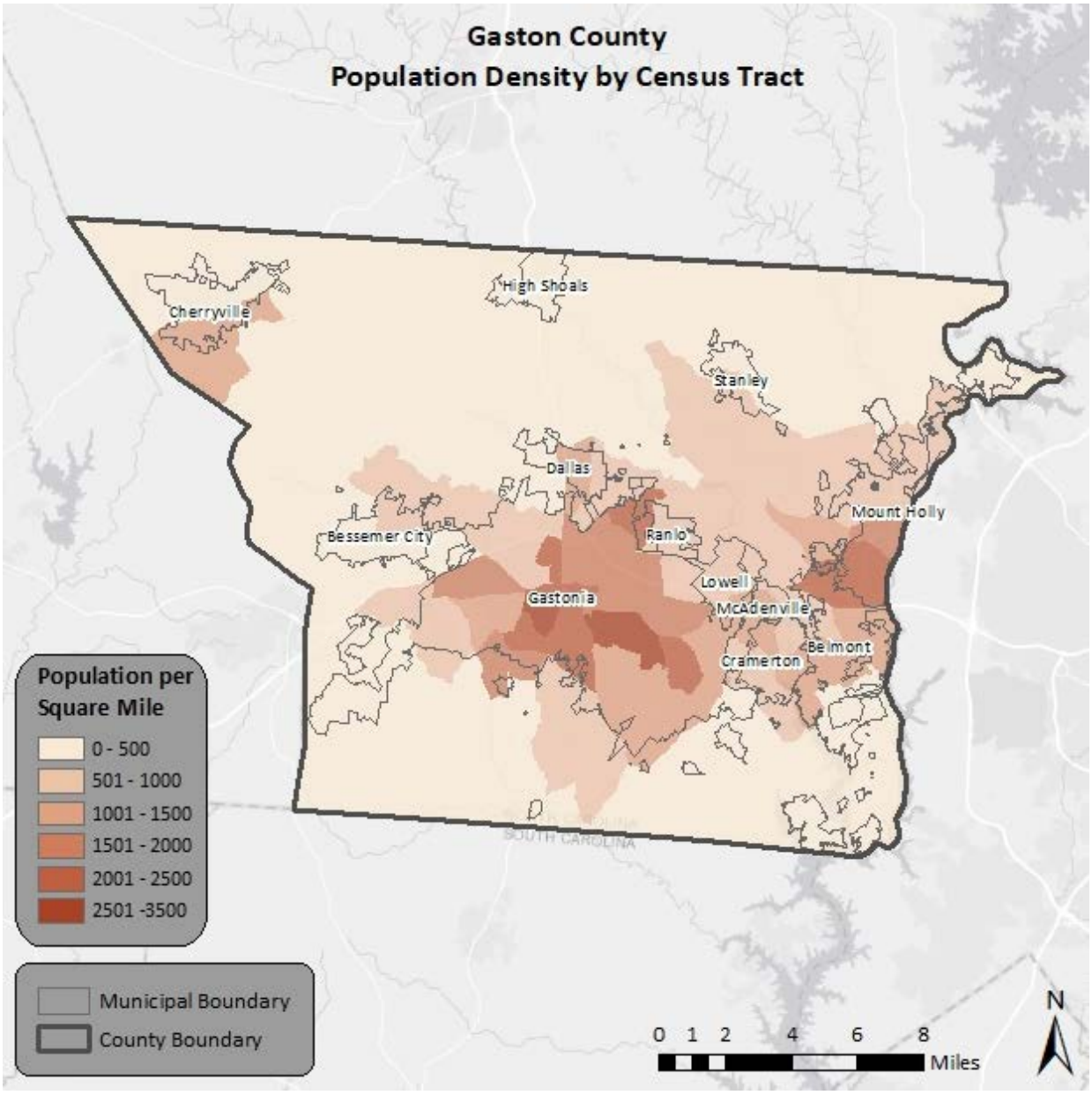
In addition, **Figures 6.2, 6.3, and 6.4** illustrate the population density by census tract for each county as it was reported by the US Census Bureau in 2010 and updated with 2018 population estimates.

FIGURE 6.2: POPULATION DENSITY IN CLEVELAND COUNTY



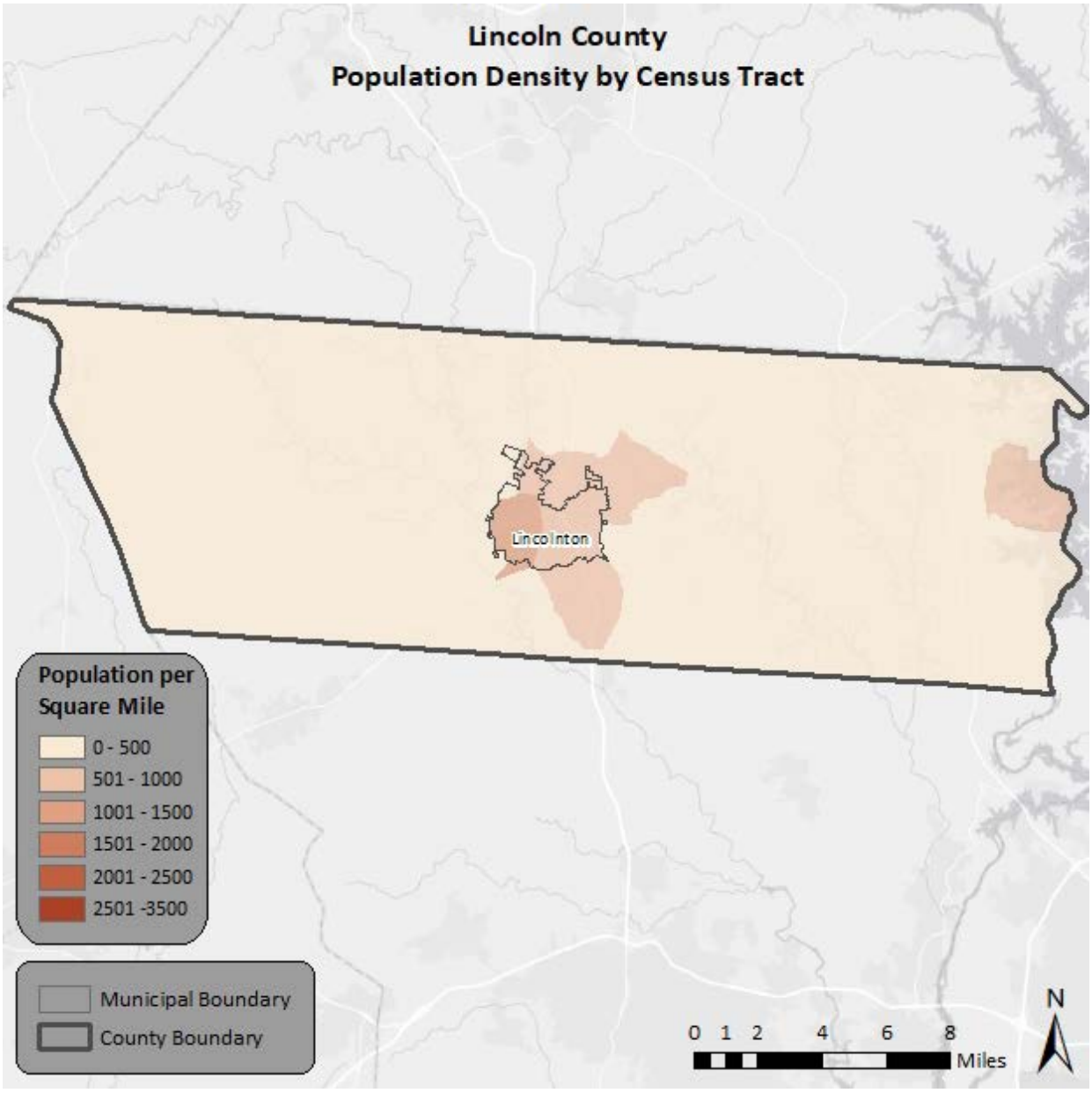
Source: US Census Bureau

FIGURE 6.3: POPULATION DENSITY IN GASTON COUNTY



Source: US Census Bureau

FIGURE 6.4: POPULATION DENSITY IN LINCOLN COUNTY



Source: US Census Bureau

6.4.3. Development Trends and Changes in Vulnerability

Since the previous regional hazard mitigation plan was approved (in 2015), 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 (2017)	Units Built 2010 Or Later	% Building Stock Built Post-2010
Cleveland County	**43,498**	**920**	**2.1%**
Belwood	437	0	0.0%
Boiling Springs	1,434	16	1.1%
Casar	121	29	24.0%
Earl	126	8	6.3%
Fallston	264	14	5.3%
Grover	353	42	11.9%
Kingstown	291	0	0.0%
Kings Mountain	4,583	225	4.9%
Lattimore	172	5	2.9%
Lawndale	350	61	17.4%
Mooresboro	235	36	15.3%
Patterson Springs	293	0	0.0%
Polkville	273	3	1.1%
Shelby	9,444	365	3.9%
Waco	126	3	2.4%
Unincorporated Area	24,996	115	0.5%
Gaston County	**91,011**	**5,312**	**5.8%**
Belmont	4,839	920	19.0%
Bessemer City	2,221	27	1.2%
Cherryville	2,521	26	1.0%
Cramerton	1,598	134	8.4%
Dallas	2,123	217	10.2%
Gastonia	31,942	1,836	5.7%
High Shoals	276	28	10.1%
Lowell	1,513	55	3.6%
McAdenville	279	83	29.7%
Mount Holly	6,180	955	15.5%
Ranlo	1,468	207	14.1%
Spencer Mountain	8	0	0.0%
Stanley	1,489	163	10.9%
Unincorporated Area	34,554	614	1.8%
Lincoln County	**34,639**	**87**	**2.5%**
Lincolnton	4,882	3	0.6%
Unincorporated Area	29,757	84	2.8%
Cleveland Gaston Lincoln Region Total	**169,148**	**6,319**	**3.7%**

Source: US Census Bureau

Table 6.5 shows population growth estimates for the region from 2010 to 2017 based on the US Census Annual Estimates of Resident Population and 2017 population estimates.

TABLE 6.5: POPULATION GROWTH IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Population Estimates (as of July 1)*				% Change 2010-2017
	2017	2016	2015	2010	
Cleveland County	**97,038**	**97,113**	**97,178**	**98,030**	**-1.02%**
Belwood	934	972	994	949	-1.61%
Boiling Springs	4,645	4,650	4,636	4,641	0.86%
Casar	261	275	269	297	-13.79%
Earl	230	224	303	260	-13.04%
Fallston	574	593	667	606	-5.57
Grover	977	976	1,037	707	-6.14%
Kingstown	612	730	742	823	-34.47%
Kings Mountain	10,929	11,053	10,792	10,631	2.7%
Lattimore	468	474	469	426	8.9%
Lawndale	758	760	709	696	8.18%
Mooresboro	447	503	486	354	20.8%
Patterson Springs	759	721	662	554	27.0%
Polkville	555	515	496	672	-21.08%
Shelby	20,058	20,259	20,245	20,417	-1.79%
Waco	254	281	322	257	-1.18
Gaston County	**214,049**	**211,753**	**209,807**	**206,150**	**3.69%**
Belmont	11,373	10,494	10,387	10,252	8.67%
Bessemer City	5,411	5,462	5,455	5,342	1.28%
Cherryville	5,854	5,901	5,868	5,761	1.59
Cramerton	4,274	4,292	4,245	4,168	2.48%
Dallas	4,592	4,602	4,540	4,492	2.18%
Gastonia	74,381	73,877	73,211	71,757	3.53%
High Shoals	714	711	710	695	2.66%
Lowell	3,591	3,616	3,594	3,527	1.78%
McAdenville	662	653	660	650	1.81%
Mount Holly	14,948	14,058	13,924	13,662	8.60%
Ranlo	3,523	3,535	3,496	3,436	2.47%
Spencer Mountain	29	22	21	37	-27.59%
Stanley	3,614	3,633	3,615	3,558	1.55%
Lincoln County	**80,504**	**79,783**	**79,578**	**78,400**	**2.61%**
Lincolnton	10,574	10,593	10,696	10,503	0.67%
Cleveland Gaston Lincoln Region Total	**391,591**	**388,649**	**386,563**	**382,580**	**-0.25%**

Source: US Census Bureau

Based on the above data, the rate of residential development and population growth in the region since 2010 has declined very slightly. Changes in development have not impacted the region's vulnerability from the previous update because the overall change is so slight. However, it should be noted that if future development occurs in vulnerable areas, populations and infrastructure will be exposed to potential hazards.

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, excessive heat, hailstorm, lightning, and severe winter weather) or, due to lack of data, analysis would not lead to credible results (sinkholes, erosion, dam failure, infectious disease, terrorism, cyber, EMP). The total region exposure, and thus risk, was presented in **Table 6.26**.

The annualized loss estimate for all hazards, where available, is presented at the end of this section in **Table 6.24.**

The hazards presented in this subsection include: hurricane and coastal hazards, tornadoes/thunderstorms, earthquakes, landslides, flooding, wildfires, and hazardous substances.

6.5.1. Hurricane and Coastal Hazards

Historical evidence indicates that the Cleveland Gaston Lincoln Region has a significant risk to the hurricane and tropical storm hazard, mostly due to the location of the state of North Carolina. In recent years, there have been three disaster declarations from hurricanes in the region (Hurricane Hugo, Tropical Storm Frances, Hurricane Katrina Evacuation). Many more storm tracks have come near or traversed through the region, as shown and discussed in Section 5: Hazard Profiles.

Numerous secondary hazards, such as erosion, flooding, tornadoes, and high winds, tend to be a result of hurricanes or tropical storms. These cumulative effects often make potential loss estimates difficult to calculate and track.

NCEM's Risk Management Tool analyzes hurricane winds and no other hazards often associated with hurricanes; therefore, only hurricane winds are analyzed in this section. Building and population vulnerabilities to hurricane winds in a 100-year frequency event (return period) are reported in the following **Table 6.6** and **Table 6.7**.

It is assumed that all existing and future buildings and populations are at risk to the hurricane and coastal hazards.

TABLE 6.6: BUILDING VULNERABILITIES TO HURRICANE WINDS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**41,550**	**48,874**	**$17,580,582**	**3,313**	**$10,060,876**	**745**	**$1,559,534**	**52,932**	**$29,200,991**
Belwood	697	648	$249,418	47	$107,628	4	$3,188	699	$360,234
Boiling Springs	1,239	1,961	$775,121	108	$211,121	62	$130,952	2,131	$1,117,194
Casar	282	269	$114,862	11	$10,929	7	$32,337	287	$158,128
Earl	164	148	$49,076	18	$21,677	1	$60	167	$70,813
Fallston	389	360	$153,375	25	$26,094	6	$8,503	391	$187,972
Grover	323	314	$114,070	54	$18,898	16	$6,037	384	$139,005
Kingstown	268	284	$79,861	13	$15,504	2	$238	299	$95,602
Kings Mountain	6,038	7,300	$2,678,176	570	$4,466,223	136	$362,739	8,006	$7,507,139
Lattimore	209	177	$64,369	18	$5,275	15	$4,803	210	$74,448
Lawndale	355	327	$78,937	20	$10,949	10	$7,532	357	$97,417

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Mooresboro	195	195	$48,115	16	$2,876	9	$4,967	220	$55,958
Patterson Springs	289	262	$43,539	26	$8,266	2	$1,027	290	$52,831
Polkville	286	317	$89,996	19	$27,469	4	$21,918	340	$139,383
Shelby	8,915	10,146	$3,999,716	1,198	$2,774,157	240	$283,554	11,584	$7,057,427
Waco	181	160	$83,438	18	$4,440	8	$2,484	186	$90,362
Unincorporated Area	21,720	26,006	$8,958,513	1,152	$2,349,370	223	$689,195	27,381	$11,997,078
Gaston County	**73,992**	**106,820**	**$20,876,217**	**9,204**	**$4,158,234**	**2,032**	**$1,972,389**	**118,056**	**$27,006,841**
Belmont	3,932	5,794	$1,436,636	404	$265,342	162	$110,542	6,360	$1,812,521
Bessemer City	3,685	3,303	$633,752	396	$120,150	94	$100,072	3,793	$853,975
Cherryville	4,241	4,627	$806,382	530	$215,896	103	$50,914	5,260	$1,073,192
Cramerton	1,436	2,834	$695,206	181	$71,158	51	$50,164	3,066	$816,528
Dallas	1,854	2,169	$410,672	190	$39,456	106	$32,292	2,465	$482,420
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	693	1,155	$149,327	83	$18,964	31	$5,667	1,269	$173,958
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	435	488	$120,628	64	$91,974	18	$5,733	570	$218,335
Mount Holly	3,413	5,771	$1,378,600	542	$367,574	106	$58,187	6,419	$1,804,361
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	39	1	$124	36	$13,275	2	$324	39	$13,723
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,108	42,088	$6,045,441	2,713	$865,440	497	$414,612	45,298	$7,325,493
Lincoln County	**18,973**	**43,917**	**$13,703,398**	**3,795**	**$6,354,148**	**510**	**$2,832,093**	**48,222**	**$22,889,639**
Lincolnton	6,031	6,774	$2,086,112	787	$1,064,631	156	$222,782	7,717	$3,373,525
Unincorporated Area	12,942	37,143	$11,617,286	3,008	$5,289,517	354	$2,609,311	40,505	$19,516,114
Cleveland Gaston Lincoln Region Total	**134,515**	**199,611**	**$52,160,197**	**16,312**	**$20,573,258**	**3,287**	**$6,364,016**	**219,210**	**$79,097,471**

Source: NCEM Risk Management Tool

TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**7,082**	**2,808**	**47,325**
Belwood	145	58	965
Boiling Springs	883	350	5,902
Casar	43	17	289
Earl	38	15	256
Fallston	90	36	601
Grover	104	41	698
Kingstown	78	31	523
Kings Mountain	2,449	986	16,517
Lattimore	73	29	488

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Lawndale	89	35	595
Mooresboro	47	18	311
Patterson Springs	82	32	547
Polkville	79	31	528
Shelby	3,512	1,392	23,467
Waco	48	19	321
Unincorporated Area	0	0	0
Gaston County	**7,638**	**3,690**	**57,652**
Belmont	1,595	771	12,040
Bessemer City	842	407	6,358
Cherryville	1,010	488	7,626
Cramerton	787	380	5,944
Dallas	635	307	4,795
Gastonia	10,301	4,977	77,756
High Shoals	259	125	1,956
Lowell	519	251	3,920
McAdenville	103	50	774
Mount Holly	1,893	914	14,288
Ranlo	481	232	3,629
Spencer Mountain	5	2	38
Stanley	1,040	502	7,848
Unincorporated Area	0	0	0
Lincoln County	**8,432**	**3,758**	**63,289**
Lincolnton	1,926	858	14,454
Unincorporated Area	6,506	2,900	48,835
Cleveland Gaston Lincoln Region Total	**23,152**	**10,256**	**168,266**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

Given the equal susceptibility across the entire Cleveland Gaston Lincoln Region, it can be assumed that the entire 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. Although some buildings may perform better than others in the face of such an event due to construction, age, and 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 6.26** 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. Tornadoes/Thunderstorms

Tornadoes

A probabilistic scenario was created to estimate building and population vulnerabilities in the Cleveland Gaston Lincoln region for the tornado hazard. For this scenario, a tornado ranked F2 on the Fujita scale was analyzed. The Risk Management Tool analyzed this information which has been reported in **Table 6.8** and **Table 6.9**.

TABLE 6.8: BUILDING VULNERABILITY TO THE TORNADOES HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**41,573**	**48,903**	**$5,843,309,469**	**3,314**	**$4,208,473,301**	**745**	**$764,184,548**	**52,962**	**$10,815,967,321**
Belwood	697	648	$71,222,264	47	$40,381,066	4	$2,991,684	699	$114,595,015
Boiling Springs	1,239	1,961	$265,492,452	108	$112,266,505	62	$67,730,267	2,131	$445,489,224
Casar	282	269	$30,061,144	11	$4,649,664	7	$16,701,530	287	$51,412,338
Earl	164	148	$15,683,539	18	$7,943,995	1	$152,340	167	$23,779,875
Fallston	389	360	$46,963,358	25	$17,070,685	6	$10,975,535	391	$75,009,578
Grover	323	314	$33,643,327	54	$43,963,502	16	$6,512,871	384	$84,119,701
Kingstown	268	284	$28,532,545	13	$5,142,943	2	$713,975	299	$34,389,462
Kings Mountain	6,038	7,300	$893,510,474	570	$1,214,034,754	136	$140,668,031	8,006	$2,248,213,259
Lattimore	209	177	$21,762,438	18	$7,405,091	15	$8,543,470	210	$37,710,999
Lawndale	355	327	$33,016,291	20	$27,897,827	10	$9,120,622	357	$70,034,740
Mooresboro	195	195	$20,113,156	16	$4,179,556	9	$3,826,282	220	$28,118,994
Patterson Springs	289	262	$18,076,976	26	$9,207,519	2	$1,155,863	290	$28,440,358
Polkville	286	317	$27,367,876	19	$9,214,855	4	$4,823,844	340	$41,406,576
Shelby	8,915	10,146	$1,392,547,264	1,198	$1,457,936,432	240	$244,353,741	11,584	$3,094,837,436
Waco	181	160	$21,701,624	18	$6,447,537	8	$2,821,459	186	$30,970,620
Uninc. Area	21,743	26,035	$2,923,614,741	1,153	$1,240,731,370	223	$243,093,034	27,411	$4,407,439,146
Gaston County	**74,037**	**106,894**	**$8,715,618,297**	**9,220**	**$4,490,125,792**	**2,033**	**$1,188,593,568**	**118,147**	**$14,394,337,661**
Belmont	3,932	5,794	$596,383,888	404	$345,469,640	162	$99,405,677	6,360	$1,041,259,205
Bessemer City	3,685	3,303	$248,802,693	396	$173,768,863	94	$41,794,477	3,793	$464,366,033
Cherryville	4,241	4,627	$351,953,589	530	$244,388,396	103	$49,528,849	5,260	$645,870,835
Cramerton	1,436	2,834	$317,091,076	181	$91,064,049	51	$28,319,034	3,066	$436,474,159
Dallas	1,854	2,169	$175,926,810	190	$62,542,655	106	$50,117,719	2,465	$288,587,185
Gastonia	23,256	30,019	$2,964,175,674	3,466	$2,003,172,411	710	$497,017,100	34,195	$5,464,365,186
High Shoals	692	1,155	$79,155,821	83	$22,062,052	31	$7,512,226	1,269	$108,730,099
Lowell	1,667	1,987	$154,086,322	235	$111,503,549	57	$33,244,719	2,279	$298,834,590
McAdenville	435	488	$48,777,906	64	$103,502,342	18	$8,647,104	570	$160,927,352
Mount Holly	3,413	5,771	$626,275,222	542	$303,819,754	106	$58,815,279	6,419	$988,910,255
Ranlo	1,370	1,709	$143,743,108	92	$111,723,083	26	$16,027,705	1,827	$271,493,897
Spencer Mountain	39	1	$53,819	36	$11,001,918	2	$805,478	39	$11,861,215

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Stanley	4,863	4,875	$374,941,792	272	$169,826,968	69	$51,676,715	5,216	$596,445,475
Uninc. Area	23,154	42,162	$2,634,250,577	2,729	$736,280,112	498	$245,681,486	45,389	$3,616,212,175
Lincoln County	**18,973**	**43,917**	**$4,627,690,517**	**3,795**	**$3,596,213,149**	**510**	**$668,104,774**	**48,222**	**$8,892,008,439**
Lincolnton	6,031	6,774	$763,182,432	787	$932,262,345	156	$135,845,813	7,717	$1,831,290,589
Uninc. Area	12,942	37,143	$3,864,508,085	3,008	$2,663,950,804	354	$532,258,961	40,505	$7,060,717,850
Cleveland Gaston Lincoln Region Total	**134,583**	**199,714**	**$19,186,618,283**	**16,329**	**$12,294,812,242**	**3,288**	**$2,620,882,890**	**219,331**	**$34,102,313,421**

Source: NCEM Risk Management Tool

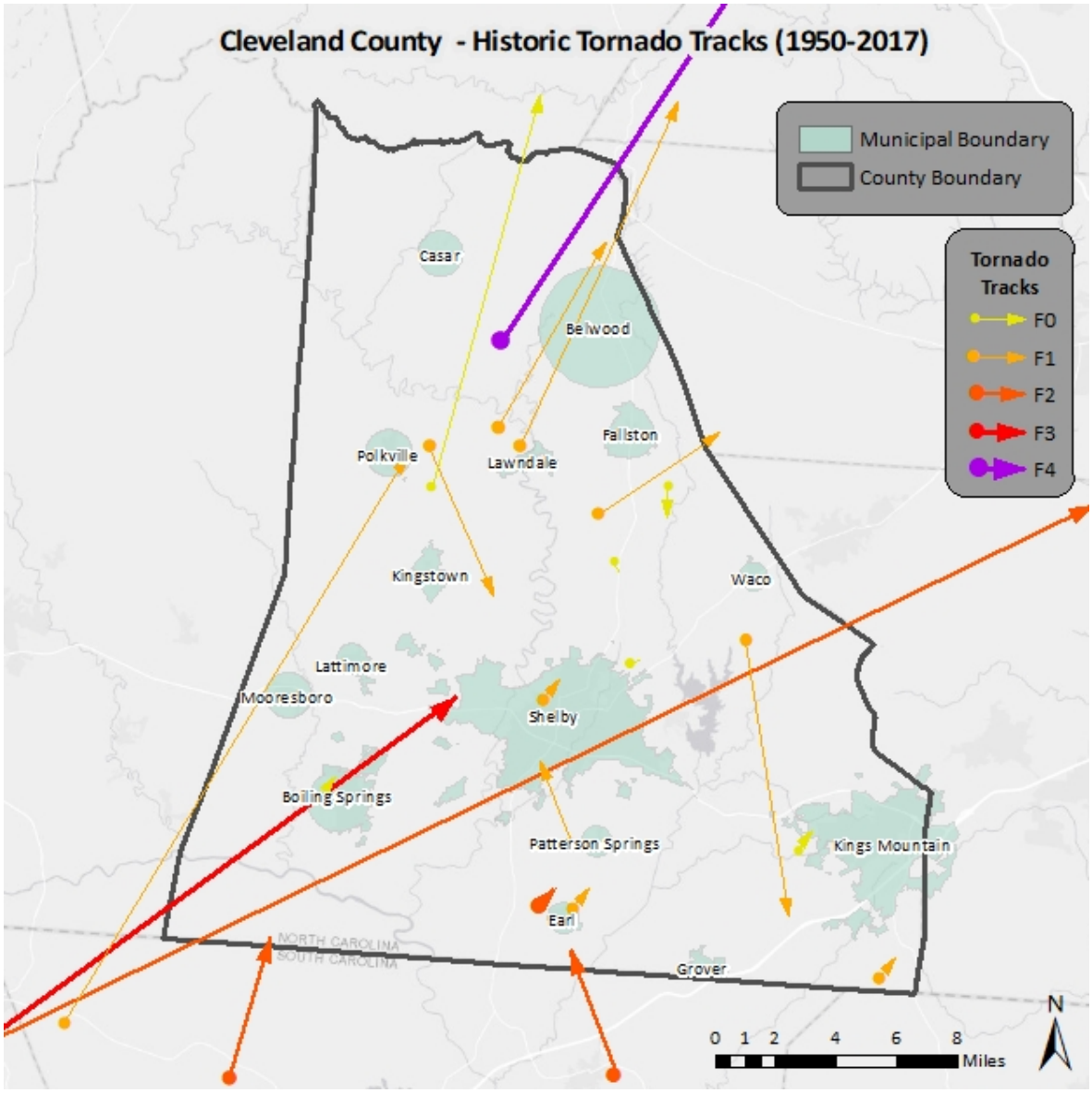
TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**14,850**	**5,901**	**99,386**
Belwood	145	58	965
Boiling Springs	883	350	5,902
Casar	43	17	289
Earl	38	15	256
Fallston	90	36	601
Grover	104	41	698
Kingstown	78	31	523
Kings Mountain	2,449	986	16,517
Lattimore	73	29	488
Lawndale	89	35	595
Mooresboro	47	18	311
Patterson Springs	82	32	547
Polkville	79	31	528
Shelby	3,512	1,392	23,467
Waco	48	19	321
Unincorporated Area	7,090	2,811	47,378
Gaston County	**27,121**	**13,102**	**204,725**
Belmont	1,595	771	12,040
Bessemer City	842	407	6,358
Cherryville	1,010	488	7,626
Cramerton	787	380	5,944
Dallas	635	307	4,795
Gastonia	10,301	4,977	77,756
High Shoals	259	125	1,956
Lowell	519	251	3,920
McAdenville	103	50	774
Mount Holly	1,893	914	14,288
Ranlo	481	232	3,629
Spencer Mountain	5	2	38
Stanley	1,040	502	7,848
Unincorporated Area	7,651	3,696	57,753
Lincoln County	**10,358**	**4,616**	**77,743**
Lincolnton	1,926	858	14,454
Unincorporated Area	8,432	3,758	63,289
Cleveland Gaston Lincoln Region Total	**52,329**	**23,619**	**381,854**

Source: NCEM Risk Management Tool

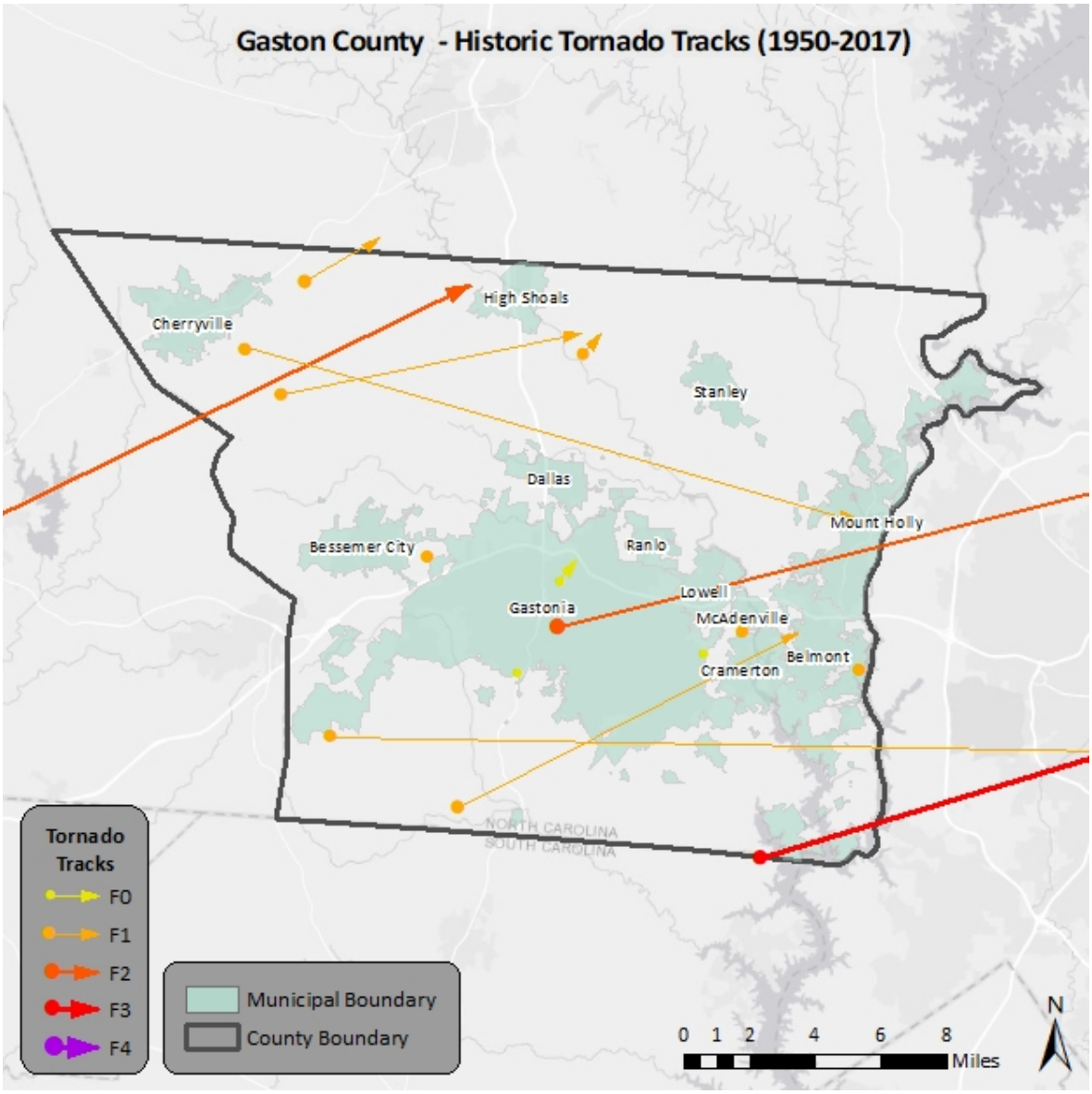
A map of historical tornado points of origin and paths can be seen below in **Figures 6.5. 6.6. and 6.7**.

FIGURE 6.5: HISTORIC TORNADO TRACKS IN CLEVELAND COUNTY



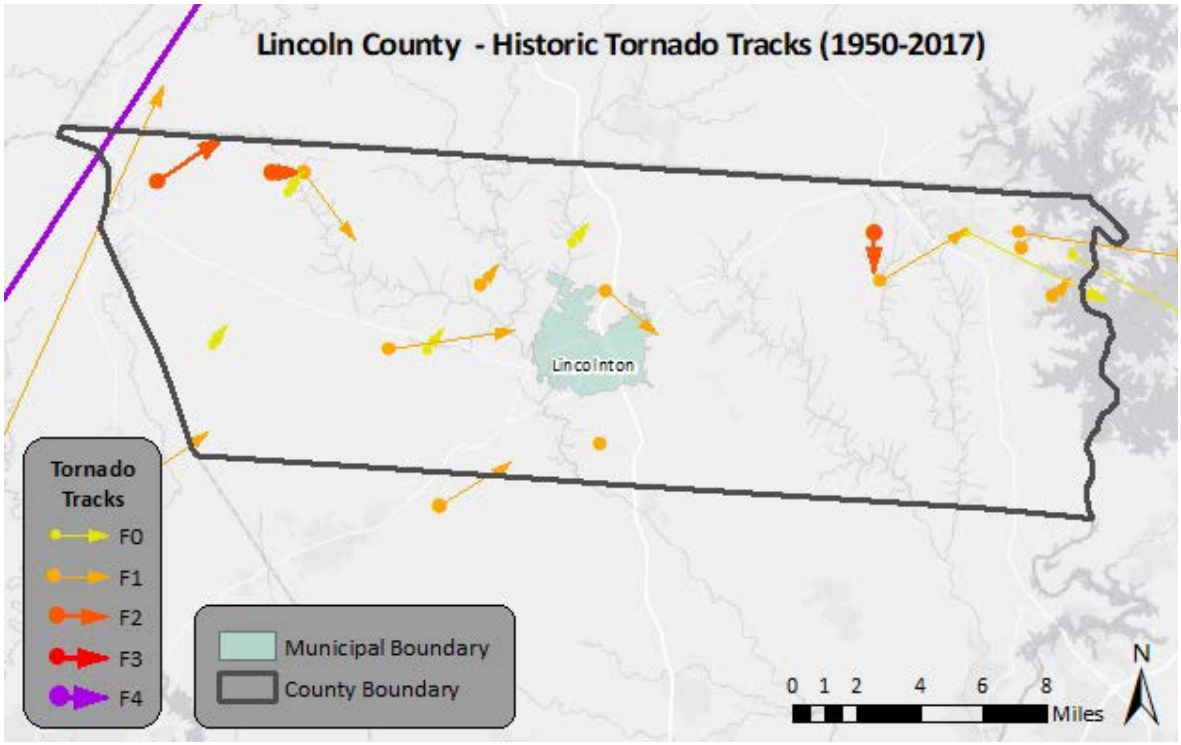
Source: NOAA

FIGURE 6.6: HISTORIC TORNADO TRACKS IN GASTON COUNTY



Source: NOAA

FIGURE 6.7: HISTORIC TORNADO TRACKS IN LINCOLN COUNTY



Source: NOAA

Thunderstorms

A probabilistic scenario was created to estimate building and population vulnerabilities in the Cleveland Gaston Lincoln region for the thunderstorm hazard. For this scenario, damages due to thunderstorm winds on a 50-year frequency event (return period) were analyzed. It is important to note that this data does not include damages caused by other remnants of thunderstorms, such as lightning or hail. The Risk Management Tool analyzed this information which has been reported below in **Table 6.10** and **Table 6.11**.

TABLE 6.10: BUILDING VULNERABILITY TO THUNDERSTORM WINDS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**41,550**	**48,874**	**$17,580,582**	**3,313**	**$10,060,876**	**745**	**$1,559,534**	**52,932**	**$29,200,991**
Belwood	697	648	$249,418	47	$107,628	4	$3,188	699	$360,234
Boiling Springs	1,239	1,961	$775,121	108	$211,121	62	$130,952	2,131	$1,117,194
Casar	282	269	$114,862	11	$10,929	7	$32,337	287	$158,128
Earl	164	148	$49,076	18	$21,677	1	$60	167	$70,813
Fallston	389	360	$153,375	25	$26,094	6	$8,503	391	$187,972
Grover	323	314	$114,070	54	$18,898	16	$6,037	384	$139,005
Kingstown	268	284	$79,861	13	$15,504	2	$238	299	$95,602
Kings Mountain	6,038	7,300	$2,678,176	570	$4,466,223	136	$362,739	8,006	$7,507,139
Lattimore	209	177	$64,369	18	$5,275	15	$4,803	210	$74,448

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Lawndale	355	327	$78,937	20	$10,949	10	$7,532	357	$97,417
Mooresboro	195	195	$48,115	16	$2,876	9	$4,967	220	$55,958
Patterson Springs	289	262	$43,539	26	$8,266	2	$1,027	290	$52,831
Polkville	286	317	$89,996	19	$27,469	4	$21,918	340	$139,383
Shelby	8,915	10,146	$3,999,716	1,198	$2,774,157	240	$283,554	11,584	$7,057,427
Waco	181	160	$83,438	18	$4,440	8	$2,484	186	$90,362
Unincorporated Area	21,720	26,006	$8,958,513	1,152	$2,349,370	223	$689,195	27,381	$11,997,078
Gaston County	**73,992**	**106,820**	**$20,876,217**	**9,204**	**$4,158,234**	**2,032**	**$1,972,389**	**118,056**	**$27,006,841**
Belmont	3,932	5,794	$1,436,636	404	$265,342	162	$110,542	6,360	$1,812,521
Bessemer City	3,685	3,303	$633,752	396	$120,150	94	$100,072	3,793	$853,975
Cherryville	4,241	4,627	$806,382	530	$215,896	103	$50,914	5,260	$1,073,192
Cramerton	1,436	2,834	$695,206	181	$71,158	51	$50,164	3,066	$816,528
Dallas	1,854	2,169	$410,672	190	$39,456	106	$32,292	2,465	$482,420
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	693	1,155	$149,327	83	$18,964	31	$5,667	1,269	$173,958
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	435	488	$120,628	64	$91,974	18	$5,733	570	$218,335
Mount Holly	3,413	5,771	$1,378,600	542	$367,574	106	$58,187	6,419	$1,804,361
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	39	1	$124	36	$13,275	2	$324	39	$13,723
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,108	42,088	$6,045,441	2,713	$865,440	497	$414,612	45,298	$7,325,493
Lincoln County	**18,973**	**43,917**	**$13,703,398**	**3,795**	**$6,354,148**	**510**	**$2,832,093**	**48,222**	**$22,889,639**
Lincolnton	6,031	6,774	$2,086,112	787	$1,064,631	156	$222,782	7,717	$3,373,525
Unincorporated Area	12,942	37,143	$11,617,286	3,008	$5,289,517	354	$2,609,311	40,505	$19,516,114
Cleveland Gaston Lincoln Region Total	**134,515**	**199,611**	**$52,160,197**	**16,312**	**$20,573,258**	**3,287**	**$6,364,016**	**219,210**	**$79,097,471**

Source: NCEM RMT

TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**14,842**	**5,898**	**99,333**
Belwood	145	58	965
Boiling Springs	883	350	5,902
Casar	43	17	289
Earl	38	15	256
Fallston	90	36	601

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Grover	104	41	698
Kingstown	78	31	523
Kings Mountain	2,449	986	16,517
Lattimore	73	29	488
Lawndale	89	35	595
Mooresboro	47	18	311
Patterson Springs	82	32	547
Polkville	79	31	528
Shelby	3,512	1,392	23,467
Waco	48	19	321
Unincorporated Area	7,082	2,808	47,325
Gaston County	**27,108**	**13,096**	**204,624**
Belmont	1,595	771	12,040
Bessemer City	842	407	6,358
Cherryville	1,010	488	7,626
Cramerton	787	380	5,944
Dallas	635	307	4,795
Gastonia	10,301	4,977	77,756
High Shoals	259	125	1,956
Lowell	519	251	3,920
McAdenville	103	50	774
Mount Holly	1,893	914	14,288
Ranlo	481	232	3,629
Spencer Mountain	5	2	38
Stanley	1,040	502	7,848
Unincorporated Area	7,638	3,690	57,652
Lincoln County	**10,358**	**4,616**	**77,743**
Lincolnton	1,926	858	14,454
Unincorporated Area	8,432	3,758	63,289
Cleveland Gaston Lincoln Region Total	**52,308**	**23,610**	**381,700**

Source: NCEM RMT

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk to the tornadoes/thunderstorms hazard.

CRITICAL FACILITIES

All critical facilities should still be considered at-risk to damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.26**.

6.5.3. Earthquakes

A probabilistic scenario was created to estimate building and population vulnerabilities in the Cleveland Gaston Lincoln region for the earthquake hazard with a 500-year frequency (return period). The Risk

Management Tool analyzed this information which has been reported below in **Table 6.12** and **Table 6.13**.

TABLE 6.12: BUILDING VULNERABILITIES TO THE EARTHQUAKE HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**41,573**	**48,903**	**$12,150,618**	**3,314**	**$17,749,095**	**745**	**$3,610,256**	**52,962**	**$33,509,972**
Belwood	697	648	$120,760	47	$148,758	4	$13,609	699	$283,128
Boiling Springs	1,239	1,961	$587,947	108	$460,647	62	$268,964	2,131	$1,317,559
Casar	282	269	$46,934	11	$13,089	7	$58,872	287	$118,895
Earl	164	148	$36,520	18	$39,963	1	$919	167	$77,402
Fallston	389	360	$86,341	25	$65,594	6	$50,985	391	$202,920
Grover	323	314	$84,781	54	$206,436	16	$33,098	384	$324,316
Kingstown	268	284	$47,714	13	$18,325	2	$4,673	299	$70,713
Kings Mountain	6,038	7,300	$1,938,346	570	$5,133,722	136	$650,612	8,006	$7,722,680
Lattimore	209	177	$50,048	18	$34,554	15	$46,815	210	$131,417
Lawndale	355	327	$68,400	20	$138,592	10	$46,078	357	$253,070
Mooresboro	195	195	$34,473	16	$15,984	9	$17,780	220	$68,237
Patterson Springs	289	262	$36,391	26	$45,076	2	$5,939	290	$87,406
Polkville	286	317	$63,801	19	$33,532	4	$27,809	340	$125,141
Shelby	8,915	10,146	$3,093,028	1,198	$6,506,935	240	$1,208,486	11,584	$10,808,450
Waco	181	160	$56,424	18	$28,861	8	$14,102	186	$99,387
Unincorporated Area	21,743	26,035	$5,798,710	1,153	$4,859,027	223	$1,161,515	27,411	$11,819,251
Gaston County	**74,037**	**106,894**	**$14,088,623**	**9,220**	**$19,248,190**	**2,033**	**$5,285,663**	**118,147**	**$38,622,475**
Belmont	3,932	5,794	$958,637	404	$1,532,529	162	$459,268	6,360	$2,950,434
Bessemer City	3,685	3,303	$393,177	396	$746,105	94	$166,829	3,793	$1,306,111
Cherryville	4,241	4,627	$555,695	530	$1,043,028	103	$212,154	5,260	$1,810,877
Cramerton	1,436	2,834	$494,953	181	$396,376	51	$114,981	3,066	$1,006,310
Dallas	1,854	2,169	$299,283	190	$282,217	106	$200,727	2,465	$782,227
Gastonia	23,256	30,019	$4,800,727	3,466	$8,886,589	710	$2,291,328	34,195	$15,978,644
High Shoals	692	1,155	$118,645	83	$83,670	31	$31,007	1,269	$233,322
Lowell	1,667	1,987	$238,032	235	$492,669	57	$146,561	2,279	$877,262
McAdenville	435	488	$75,540	64	$435,501	18	$34,828	570	$545,869
Mount Holly	3,413	5,771	$902,697	542	$1,208,034	106	$262,843	6,419	$2,373,574
Ranlo	1,370	1,709	$214,887	92	$433,239	26	$76,675	1,827	$724,801
Spencer Mountain	39	1	$69	36	$40,674	2	$2,220	39	$42,963
Stanley	4,863	4,875	$555,629	272	$630,105	69	$216,069	5,216	$1,401,803
Unincorporated Area	23,154	42,162	$4,480,652	2,729	$3,037,454	498	$1,070,173	45,389	$8,588,278

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Lincoln County	**18,973**	**43,917**	**$7,328,978**	**3,795**	**$12,510,386**	**510**	**$2,256,306**	**48,222**	**$22,095,671**
Lincolnton	6,031	6,774	$1,488,527	787	$3,703,703	156	$558,863	7,717	$5,751,094
Unincorporated Area	12,942	37,143	$5,840,451	3,008	$8,806,683	354	$1,697,443	40,505	$16,344,577
Cleveland Gaston Lincoln Region Total	**134,583**	**199,714**	**$33,568,219**	**16,329**	**$49,507,671**	**3,288**	**$11,152,225**	**219,331**	**$94,228,118**

Source: NCEM Risk Management Tool

TABLE 6.13: POPULATION VULNERABILITIES TO THE EARTHQUAKE HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**7,082**	**2,808**	**47,325**
Belwood	145	58	965
Boiling Springs	883	350	5,902
Casar	43	17	289
Earl	38	15	256
Fallston	90	36	601
Grover	104	41	698
Kingstown	78	31	523
Kings Mountain	2,449	986	16,517
Lattimore	73	29	488
Lawndale	89	35	595
Mooresboro	47	18	311
Patterson Springs	82	32	547
Polkville	79	31	528
Shelby	3,512	1,392	23,467
Waco	48	19	321
Unincorporated Area	0	0	0
Gaston County	**7,638**	**3,690**	**57,652**
Belmont	1,595	771	12,040
Bessemer City	842	407	6,358
Cherryville	1,010	488	7,626
Cramerton	787	380	5,944
Dallas	635	307	4,795
Gastonia	10,301	4,977	77,756
High Shoals	259	125	1,956
Lowell	519	251	3,920
McAdenville	103	50	774
Mount Holly	1,893	914	14,288
Ranlo	481	232	3,629
Spencer Mountain	5	2	38
Stanley	1,040	502	7,848
Unincorporated Area	0	0	0
Lincoln County	**8,432**	**3,758**	**63,289**
Lincolnton	1,926	858	14,454

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Area	6,506	2,900	48,835
Cleveland Gaston Lincoln Region Total	**23,152**	**10,256**	**168,266**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk to the earthquake hazard.

CRITICAL FACILITIES

All critical facilities should still be considered at-risk to minor damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.26**.

In conclusion, an earthquake could potentially impact all existing and future buildings, facilities, and populations in the Cleveland Gaston Lincoln region. Though minor earthquakes are often recorded but not felt, they may rattle breakables and cause minimal damage. Furthermore, major earthquakes have potential to damage structures. Severe impacts of earthquakes may result in debris clean-up, service disruption, building collapse, and fatalities. 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.

6.5.4. Geological (Landslide)

GIS analysis was used to complete the vulnerability assessment for landslides in the Cleveland Gaston Lincoln Region. 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 6.14** 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 6.14: TOTAL POTENTIAL AT-RISK PARCELS FOR THE LANDSLIDE HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

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	**49,546**	**7,065**	**34,194**	**4,714**	**$3,852,570,271**	**$500,078,756**
Belwood	708	0	386	0	$26,507,416	$0
Boiling Springs	2,492	0	1,851	0	$277,215,527	$0
Casar	223	0	147	0	$11,595,842	$0
Earl	161	0	96	0	$5,868,719	$0
Fallston	439	0	300	0	$26,412,388	$0
Grover	420	0	316	0	$22,252,285	$0
Kingstown	375	0	261	0	$11,503,078	$0
Kings Mountain	7,731	0	5,895	0	$767,530,972	$0
Lattimore	205	0	149	0	$13,742,526	$0

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
Lawndale	409	0	287	0	$12,774,439	$0
Mooresboro	203	0	146	0	$7,632,165	$0
Patterson Springs	288	0	217	0	$14,540,719	$0
Polkville	368	0	232	0	$17,084,728	$0
Shelby	10,896	478	8,471	281	$1,082,660,934	$130,514,658
Waco	0	192	0	138	$0	$9,647,762
Unincorporated Area	24,628	6,395	15,440	4,295	$1,555,248,533	$359,916,336
Gaston County	**38,381**	**66,008**	**31,207**	**51,404**	**$4,292,656,704**	**$6,284,614,265**
Belmont	2,510	3,539	1,749	2,992	$360,738,951	$618,082,671
Bessemer City	1,305	1,657	874	1,324	$65,487,516	$117,517,389
Cherryville	0	3,247	0	2,674	$0	$267,860,106
Cramerton	1,636	648	1,310	583	$264,972,148	$78,638,801
Dallas	0	2,364	0	1,910	$0	$187,569,332
Gastonia	16,803	14,195	14,968	11,467	$2,269,356,991	$1,509,088,215
High Shoals	0	399	0	289	$0	$16,743,676
Lowell	0	1,810	0	1,508	$0	$170,373,482
McAdenville	0	461	0	325	$0	$60,901,203
Mount Holly	0	6,748	0	5,842	$0	$896,540,304
Ranlo	0	1,828	0	1,573	$0	$143,120,762
Spencer Mountain	0	5	0	2	$0	$4,875
Stanley	0	1,882	0	1,588	$0	$210,854,804
Unincorporated Area	16,127	27,225	12,306	19,327	$1,332,101,098	$2,007,318,645
Lincoln County	**36,424**	**15,895**	**27,137**	**11,489**	**$5,256,284,912**	**$1,545,600,231**
Lincolnton	7,091	4,525	5,466	3,475	$1,012,557,155	$395,885,149
Unincorporated Area	29,333	11,370	21,671	8,014	4,243,727,757	1,149,715,082
Cleveland Gaston Lincoln Region Total	**124,351**	**88,968**	**92,538**	**67,607**	**$13,401,511,887**	**$8,330,293,252**

Source: USGS; County Tax Assessor Data

SOCIAL VULNERABILITY

Landslides are often geographically confined to a small area and do not have wide-ranging impacts on large segments of the population. Additionally, social vulnerability does not come into play as much with landslides as it does with other, more wide-ranging hazards.

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 (139) 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 17 and 15 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 6.26** at the end of this section.

In conclusion, a landslide has the potential to impact some existing and future buildings, facilities, and populations in the Cleveland Gaston Lincoln Region and some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for 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.

6.5.5. Flooding

Historical evidence indicates that the Cleveland Gaston Lincoln Region is susceptible to flood events. A total of 60 flood events have been reported by the National Centers for Environmental Information since 1993, resulting in over $5 million dollars in damages (2018 dollars), 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 6.15** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

Location	1.0 Percent ACF			2.0 Percent ACF		
	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Cleveland County	**4,056**	**2,164**	**$374,501,126**	**1,547**	**973**	**$196,204,466**
Belwood	85	39	$2,122,453	0	0	$0
Boiling Springs	79	39	$5,741,533	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	2	0	$0	0	0	$0
Kingstown	6	4	$183,923	0	0	$0
Kings Mountain	219	129	$3,4500,513	186	107	$31,212,823
Lattimore	0	0	$0	0	0	$0
Lawndale	19	10	$949,583	0	0	$0
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	8	2	$178,055	0	0	$0
Shelby	729	457	$96,933,808	624	414	$78,892,863
Waco	12	7	$617,210	0	0	$0
Unincorporated Area	2,897	1,477	$233,274,048	737	452	$86,098,780

Location	1.0 Percent ACF			2.0 Percent ACF		
	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Gaston County	**7,738**	**4,879**	**$1,224,994,868**	**5,511**	**3,649**	**$983,597,675**
Belmont	410	216	$128,281,609	392	214	$125,091,468
Bessemer City	34	20	$1,699,233	37	23	$1,888,060
Cherryville	68	48	$9,583,396	10	9	$2,267,421
Cramerton	258	170	$52,875,734	252	186	$52,690,952
Dallas	150	107	$10,760,423	200	152	$12,270,010
Gastonia	2,352	1,576	$450,097,320	2,396	1,648	$458,084,791
High Shoals	52	33	$2,630,194	36	21	$1,467,470
Lowell	23	14	$2,082,077	49	37	$5,194,335
McAdenville	51	25	$5,721,270	65	33	$6,971,866
Mount Holly	634	446	$126,606,721	187	140	$36,692,134
Ranlo	55	36	$3,814,907	1	1	$187,532
Spencer Mountain	4	2	$4,875	4	2	$4,875
Stanley	8	4	$578,781	0	0	$0
Unincorporated Area	3,639	2,182	$430,258,328	1,882	1,183	$280,786,761
Lincoln County	**5,618**	**3,846**	**$965,042,917**	**966**	**615**	**$179,512,916**
Lincolnton	776	492	$165,699,700	546	357	$84,167,520
Unincorporated Area	4,842	3,354	$799,343,217	420	258	$95,345,396
Cleveland Gaston Lincoln Region Total	**17,412**	**10,889**	**$2,564,538,911**	**8,024**	**5,237**	**$1,359,315,057**

Source: FEMA DFIRM, Local tax accessor data

To assess flood risk, the NCEM Risk Management Tool (RMT) analyzed buildings located in the 1 percent chance of annual floodplains. The buildings are assessed by the type of building (commercial, residential, or public) and also assesses Pre-Firm buildings, or structures built before flood ordinance regulations were implemented. This data is presented by jurisdiction in **Table 6.16**.

TABLE 6.16: BUILDING VULNERABILITY FOR 100-YEAR FLOODPLAINS IN CLEVELAND GASTON LINCOLN REGION

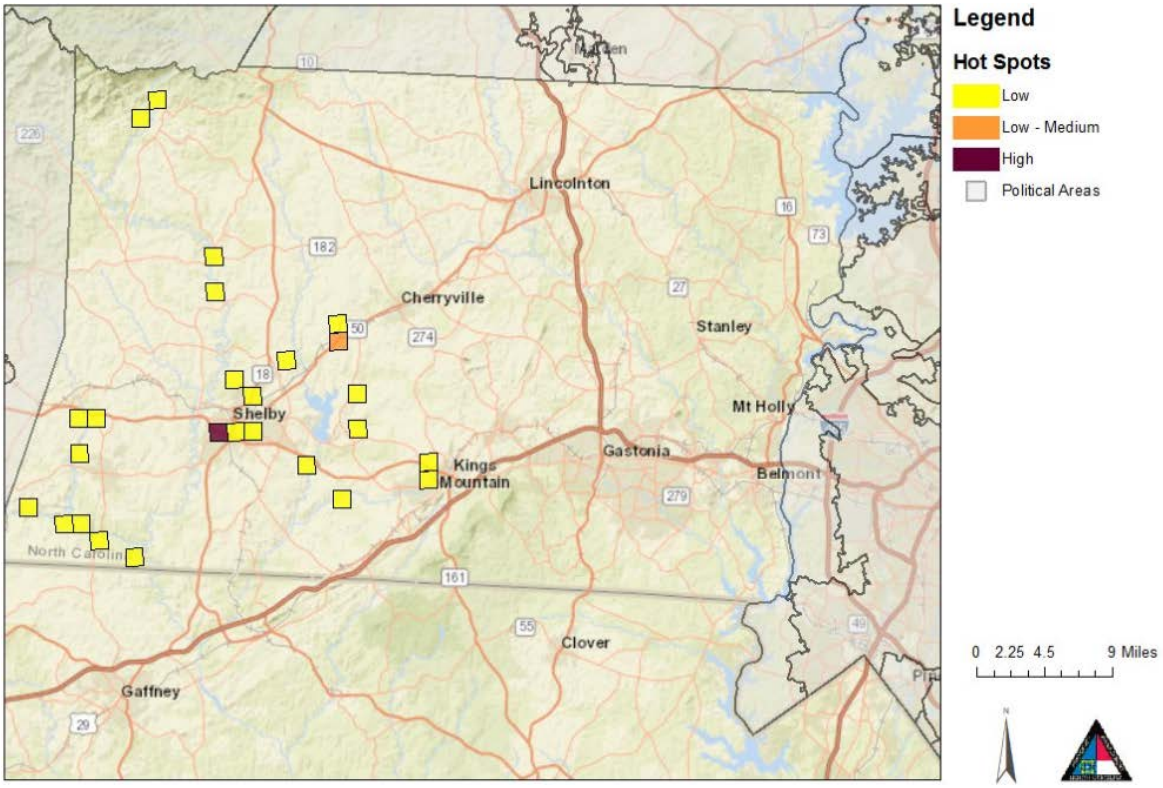
Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**81**	**106**	**$1,084,557**	**4**	**$1,091,131**	**0**	**0**	**110**	**$2,175,688**
Belwood	0	0	$0	0	$0	0	$0	0	$0
Boiling Springs	1	1	$14,505	0	$0	0	$0	1	$14,505
Casar	0	0	$0	0	$0	0	$0	0	$0
Earl	0	0	$0	0	$0	0	$0	0	$0
Fallston	0	0	$0	0	$0	0	$0	0	$0
Grover	0	0	$0	0	$0	0	$0	0	$0
Kingstown	0	0	$0	0	$0	0	$0	0	$0
Kings Mountain	6	6	$22,678	0	$0	0	$0	6	$22,678
Lattimore	0	0	$0	0	$0	0	$0	0	$0
Lawndale	1	1	$9,667	0	$0	0	$0	1	$9,667
Mooresboro	0	0	$0	0	$0	0	$0	0	$0
Patterson Springs	0	0	$0	0	$0	0	$0	0	$0

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Polkville	0	0	$0	0	$0	0	$0	0	$0
Shelby	28	32	$326,585	2	$1,022,286	0	$0	34	$1,348,871
Waco	7	7	$330,303	0	$0	0	$0	7	$330,303
Unincorporated Area	38	59	$380,819	2	$68,845	0	$0	61	$449,664
Gaston County	**409**	**618**	**$4,426,296**	**82**	**$4,448,910**	**2**	**$32,409**	**702**	**$8,907,616**
Belmont	20	25	$192,612	3	$68,224	1	$31,115	29	$291,951
Bessemer City	4	4	$71,754	0	$0	0	$0	4	$71,754
Cherryville	4	4	$11,912	0	$0	0	$0	4	$11,912
Cramerton	0	0	$0	0	$0	0	$0	0	$0
Dallas	0	0	$0	0	$0	0	$0	0	$0
Gastonia	205	223	$1,668,976	22	$1,749,172	1	$1,294	246	$3,419,443
High Shoals	9	4	$6,937	4	$42,635	0	$0	8	$49,572
Lowell	0	0	$0	0	$0	0	$0	0	$0
McAdenville	0	0	$0	0	$0	0	$0	0	$0
Mount Holly	24	49	$597,618	6	$88,380	0	$0	55	$685,998
Ranlo	2	3	$5,303	0	$0	0	$0	3	$5,303
Spencer Mountain	3	1	$40,005	2	$96,961	0	$0	3	$136,966
Stanley	1	1	$573	0	$0	0	$0	1	$573
Unincorporated Area	137	304	$1,830,606	45	$2,403,538	0	$0	349	$4,234,144
Lincoln County	**86**	**137**	**$571,155**	**16**	**$161,790**	**1**	**$18,570**	**154**	**$751,515**
Lincolnton	44	39	$340,924	9	$114,168	0	$0	48	$455,092
Unincorporated Area	42	98	$230,231	7	$47,622	1	$18,570	106	$296,423
Cleveland Gaston Lincoln Region Total	**576**	**861**	**$6,082,008**	**102**	**$5,701,831**	**3**	**$50,979**	**966**	**$11,834,819**

Source: NCEM Risk Management Tool

Figure 6.8 below displays visual hotspots of potential dollar losses for the flood hazard in the region. Based on the photo, most hot spots are in an area with low vulnerability.

FIGURE 6.8: POTENTIAL DOLLAR LOSSES FOR FLOODING IN THE CLEVELAND GASTON LINCOLN REGION



Source: NCEM Risk Management Tool

Table 6.17 assesses the vulnerability of the region's population. This data is also from the RMT and analyzes the populations of elderly and children living at risk to the 1 percent annual flooding.

TABLE 6.17: POPULATION VULNERABILITY FOR 100-YEAR FLOODPLAINS IN CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**29**	**11**	**227**
Belwood	0	0	0
Boiling Springs	0	0	3
Casar	0	0	0
Earl	0	0	0
Fallston	0	0	0
Grover	0	0	0
Kingstown	0	0	0
Kings Mountain	2	1	41
Lattimore	0	0	0
Lawndale	0	0	2
Mooresboro	0	0	0
Patterson Springs	0	0	0
Polkville	0	0	0
Shelby	11	4	74
Waco	0	0	0

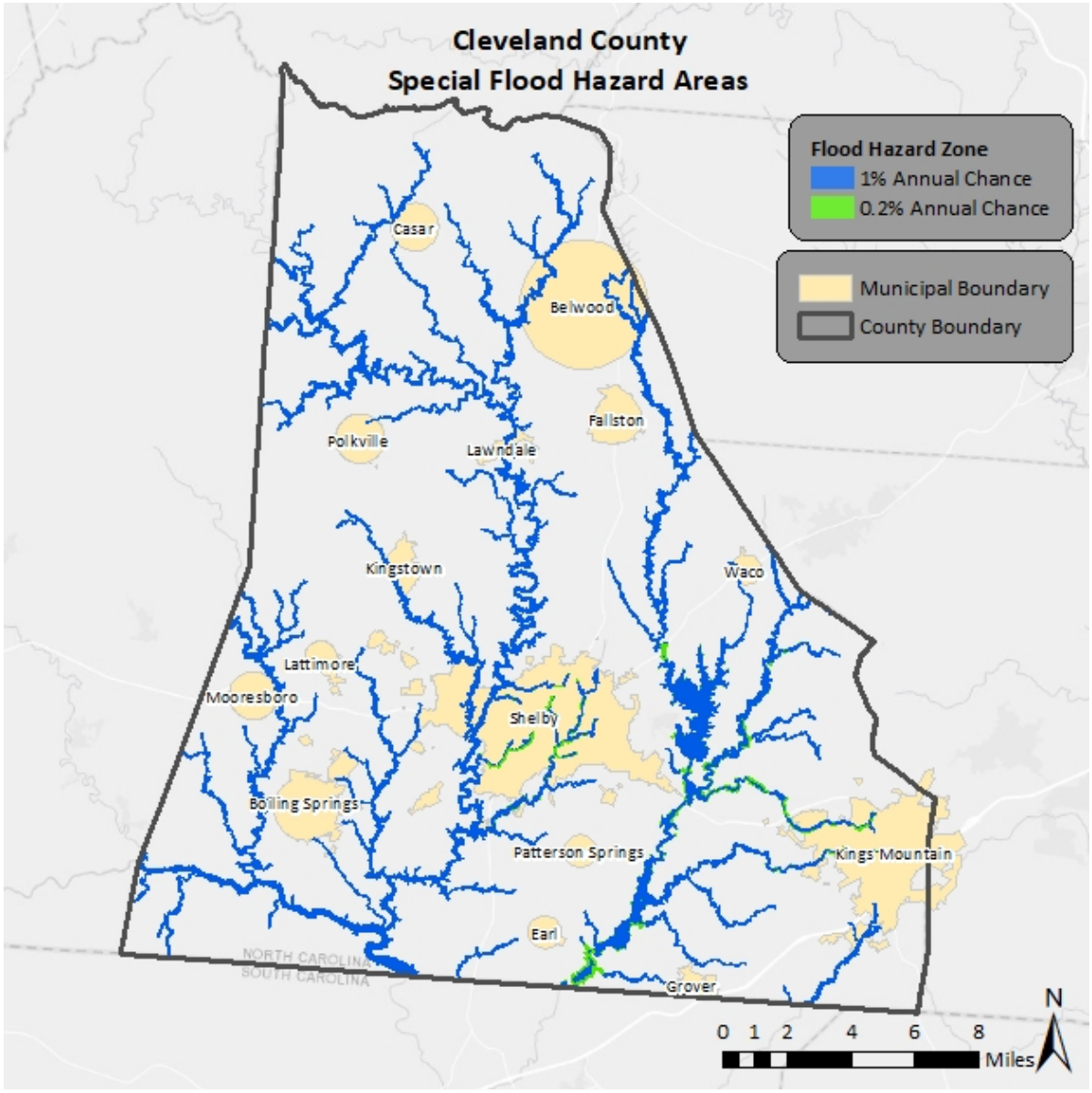
Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Unincorporated Area	16	6	107
Gaston County	**178**	**84**	**1,346**
Belmont	7	3	52
Bessemer City	1	0	8
Cherryville	1	0	7
Cramerton	6	3	46
Dallas	8	4	62
Gastonia	77	37	579
High Shoals	1	0	7
Lowell	0	0	0
McAdenville	0	0	2
Mount Holly	16	8	121
Ranlo	1	0	6
Spencer Mountain	5	2	38
Stanley	0	0	2
Unincorporated Area	55	27	416
Lincoln County	**33**	**15**	**250**
Lincolnton	11	5	83
Unincorporated Area	22	10	167
Cleveland Gaston Lincoln Region Total	**240**	**110**	**1,823**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

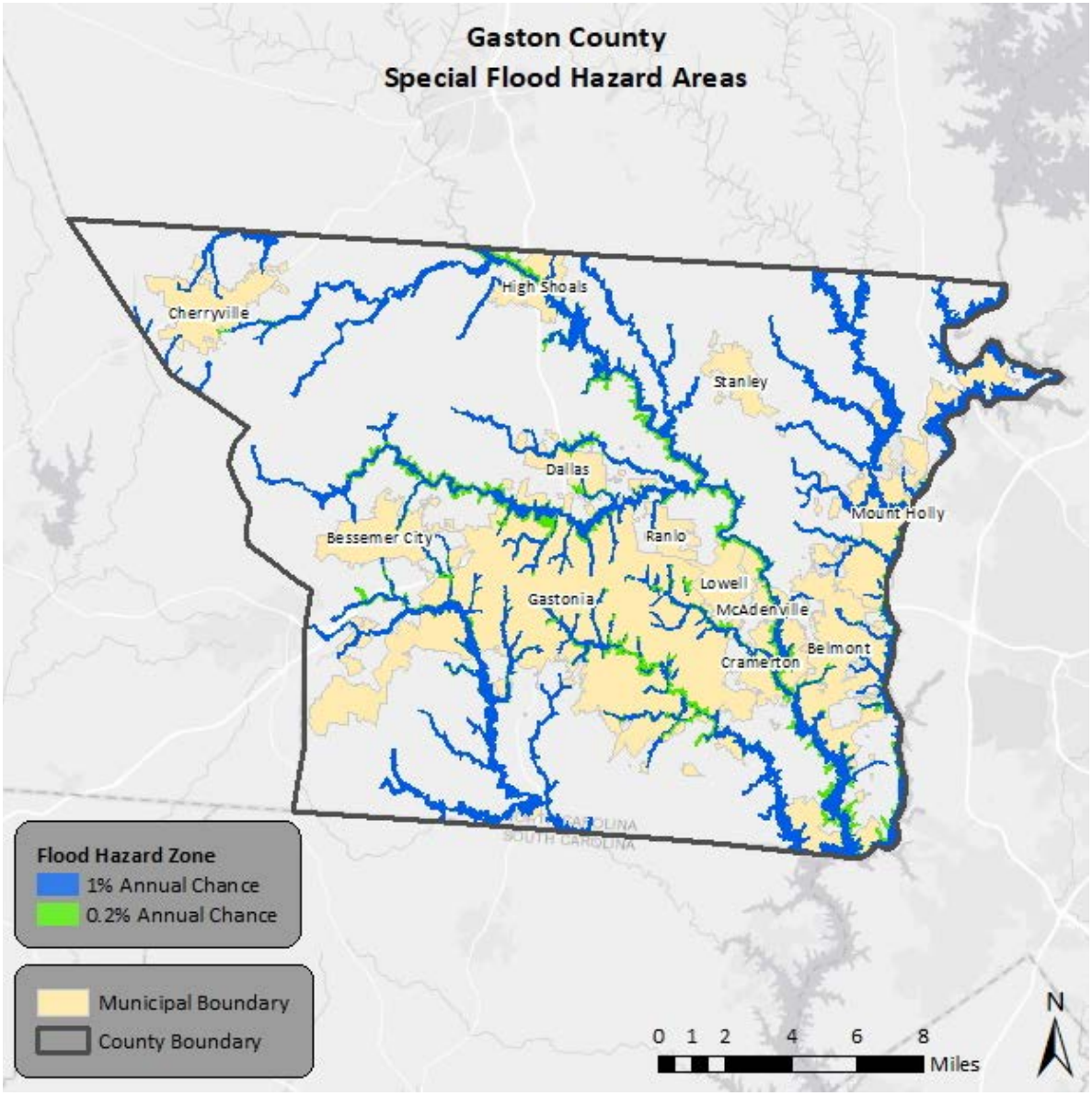
A national Census has not been conducted since 2010; therefore, 2010 Census tract level population counts are outdated for this update. However, population estimates from the US Census Bureau as of July 1, 2017 were available at a jurisdictional level. This data was analyzed to present at-risk populations to the flooding hazard in the Cleveland Gaston Lincoln region and can be seen below in **Figures 6.9, 6.10 and 6.11**.

FIGURE 6.9: CLEVELAND COUNTY FLOODPLAINS



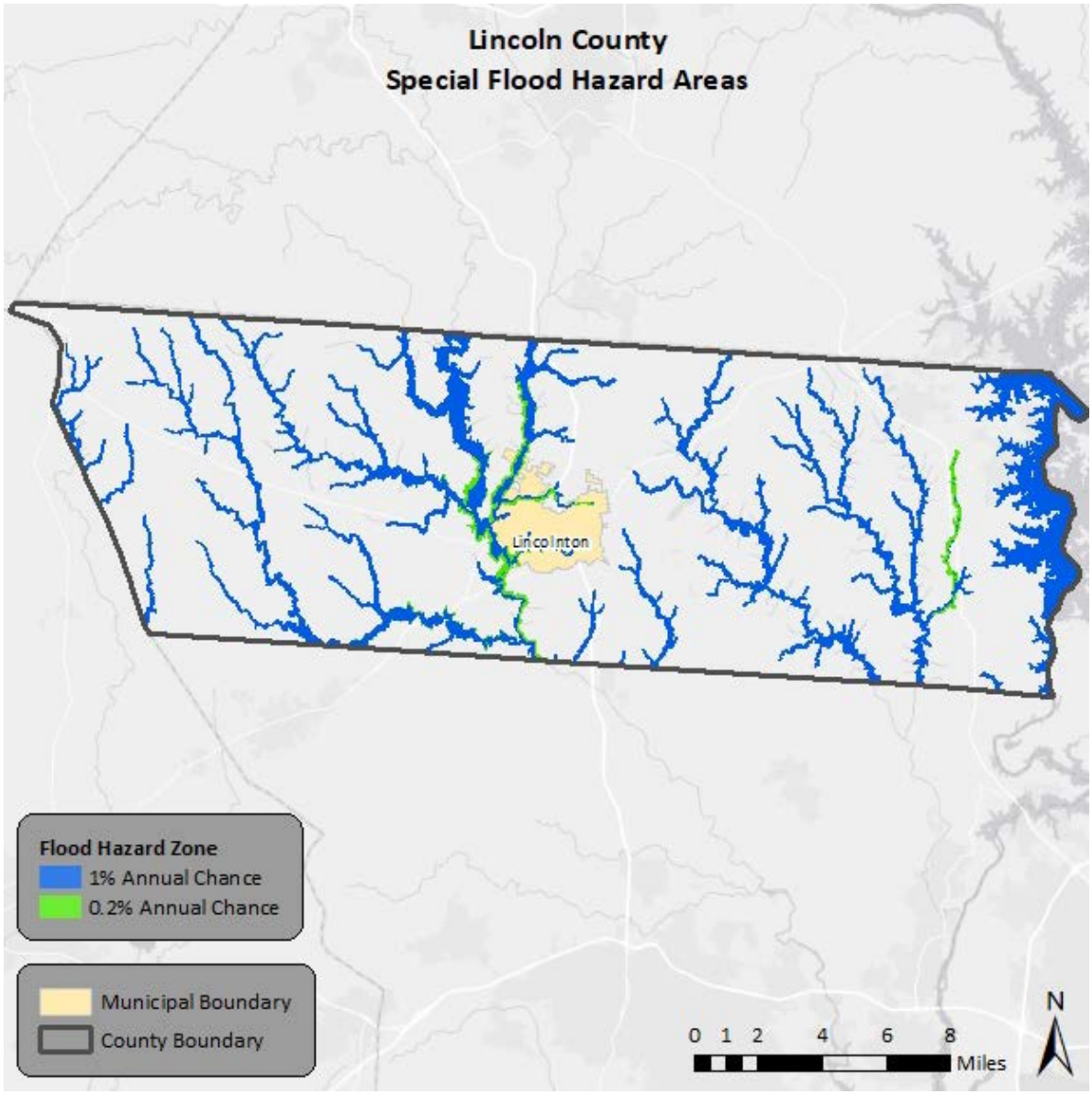
Source: FEMA DFIRM, US Census Bureau

FIGURE 6.10: GASTON COUNTY FLOODPLAINS



Source: FEMA DFIRM, US Census Bureau

FIGURE 6.11: LINCOLN COUNTY FLOODPLAINS



Source: FEMA DFIRM, US Census Bureau

CRITICAL FACILITIES

The critical facility analysis revealed that there are only three critical facilities located in the Cleveland Gaston Lincoln Region 1.0-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.) These facilities are a NC Department of Motor Vehicles building and a fire station that are located in Gaston County, and one fire station in Lincoln County. There are no critical facilities in a floodplain in Cleveland County. A list of specific critical facilities and their associated risk can be found in **Table 6.26** 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 should be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions. **Table 6.18** below lists repetitive loss properties and their associated payments for each county.

TABLE 6.18: 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
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**

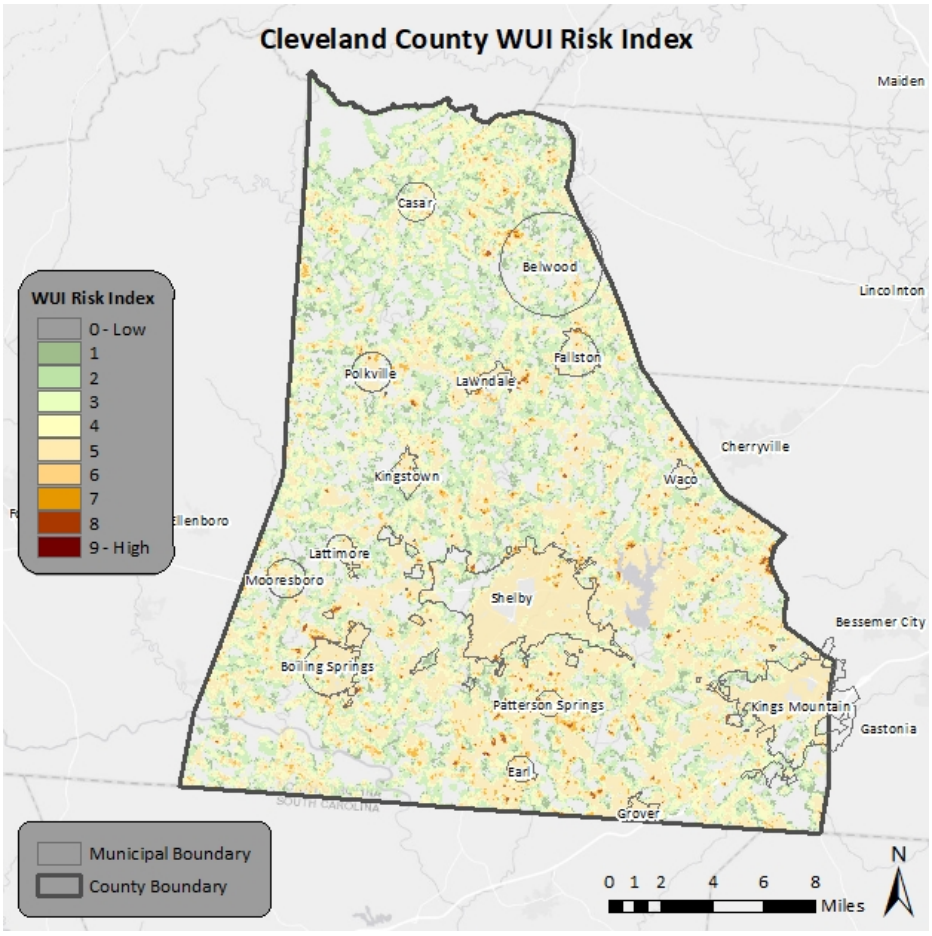
* These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

6.5.6. Wildfires

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.

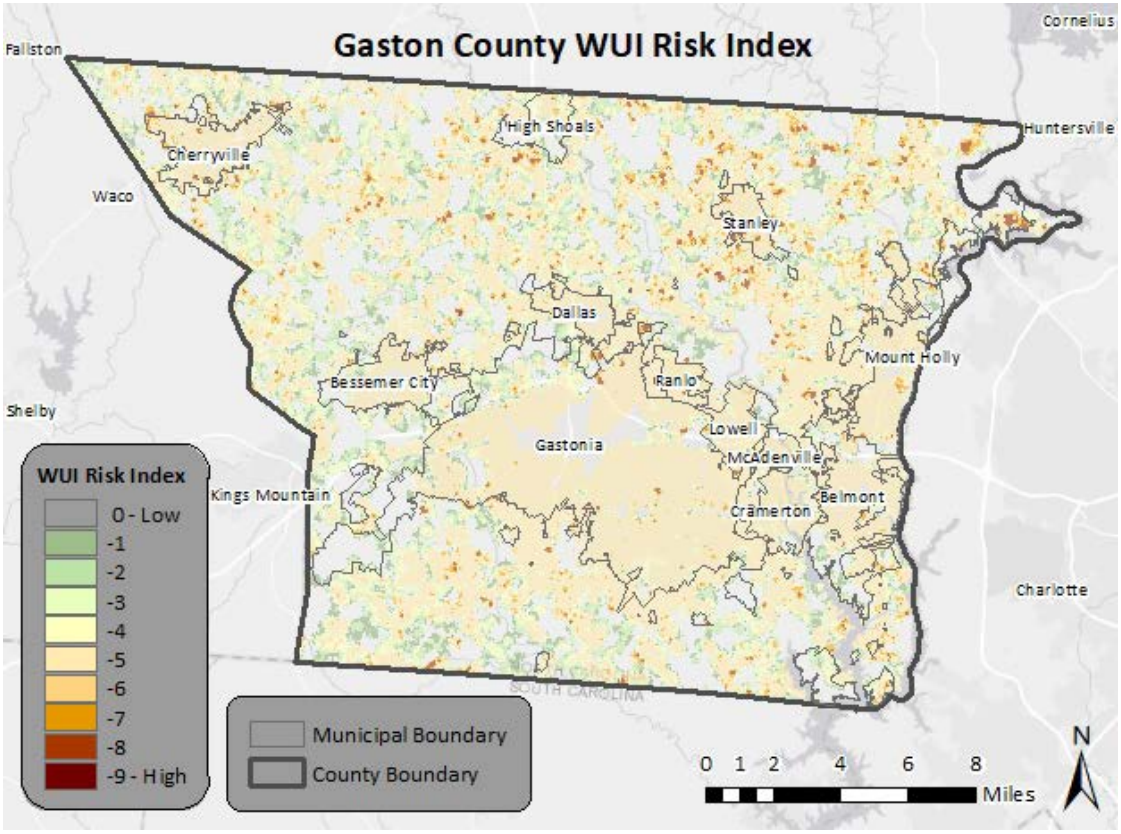
To estimate exposure to wildfire, the Wildland Urban Interface (WUI) Risk Index for the region was obtained through the Southern Wildfire Risk Assessment. The WUI uses a Response Function modeling approach and rates the potential impact of a wildfire on people and their homes. The index ranges from -1 to -9, with -9 being the most negative impact. For example, an area with high housing density and high flame lengths are rated -9, while an area with low housing density and low flame lengths are rated -1. At-risk areas fall within the range of -7 to -9. This index was layered with parcel data using GIS analysis. **Figures 6.12, 6.13, and 6.14** show the WUI Risk Index for each county in the region below.

FIGURE 6.12: WILDLAND URBAN INTERFACE RISK INDEX IN CLEVELAND COUNTY



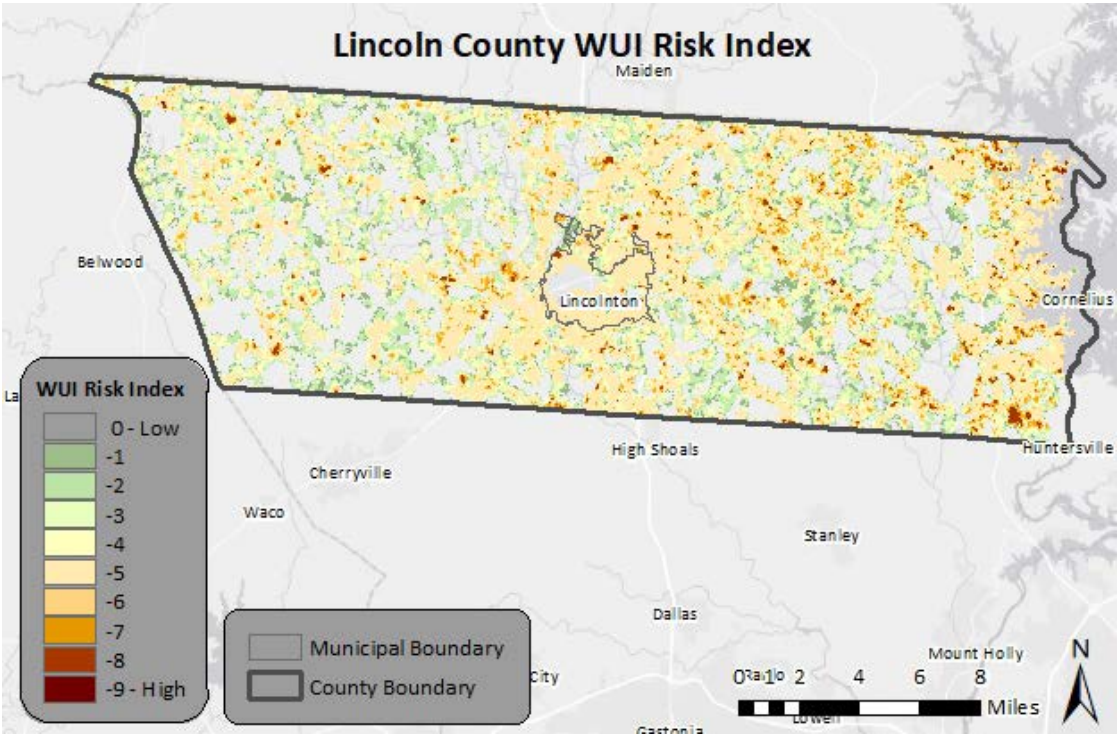
Source: Southern Wildfire Risk Assessment

FIGURE 6.13: WILDLAND URBAN INTERFACE RISK INDEX IN GASTON COUNTY



Source: Southern Wildfire Risk Assessment

FIGURE 6.14: WILDLAND URBAN INTERFACE RISK INDEX IN LINCOLN COUNTY



Source: Southern Wildfire Risk Assessment

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. Overall, there is likely considerably less risk in this region than in other areas of the country.

SOCIAL VULNERABILITY

Even though 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

Although no county had many critical facilities in the at-risk area (-7 or higher) for wildfires, Gaston County had the most with 3 facilities. These facilities were two schools and one fire station. Cleveland County had 2 at-risk facilities, and Lincoln County only had 1. This data reflects a slightly elevated risk in Gaston County for critical facilities to wildfires.

Table 6.19 shows the results of the GIS analysis.

TABLE 6.19: CRITICAL FACILITIES IN THE AT-RISK WUI RISK INDEX AREA

Location	Number of At-Risk Critical Facilities
Cleveland County	**2**
Gaston County	**3**
Lincoln County	**1**
Cleveland Gaston Lincoln Regional Total	**6**

Source: Southern Wildfire Risk Assessment, Local governments

Additional information was provided through the NCEM Risk Management Tool (RMT). This data describes vulnerability in both built and living environments and can be seen in below in **Table 6.20** and **Table 6.21**.

TABLE 6.20: BUILDING VULNERABILITY TO WILDFIRE HAZARDS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
CLEVELAND COUNTY	**11,995**	**14,005**	**$1,953,896,867**	**692**	**$833,591,885**	**131**	**$280,859,043**	**14,828**	**$3,068,347,796**
Belwood	504	460	$57,002,775	43	$48,759,641	3	$4,174,807	506	$109,937,223
Boiling Springs	119	357	$63,543,015	13	$7,930,624	8	$18,344,420	378	$89,818,059
Casar	211	203	$28,243,728	7	$4,326,596	6	$28,718,721	216	$61,289,045
Earl	132	119	$15,873,693	16	$10,888,208	0	$0	135	$26,761,901
Falston	323	301	$50,919,162	19	$17,264,519	5	$18,510,821	325	$86,694,502
Grover	23	23	$1,945,754	2	$1,896,684	0	$0	25	$3,842,439
Kings Mountain	1,288	1,809	$266,157,541	138	$549,100,550	17	$60,910,491	1,964	$876,168,581
Kingstown	66	63	$8,356,496	3	$2,715,851	1	$639,458	67	$11,711,805
Lattimore	98	79	$14,446,632	9	$4,835,705	10	$9,290,771	98	$28,573,109
Lawndale	193	179	$28,525,727	10	$33,503,127	4	$10,161,988	193	$72,190,842
Mooresboro	103	106	$13,910,360	8	$2,434,377	6	$4,770,765	120	$21,115,502
Patterson Springs	199	182	$15,115,691	16	$9,011,132	2	$1,904,536	200	$26,031,360

Jurisdiction	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Polkville	130	137	$15,001,330	6	$6,462,262	2	$7,355,893	145	$28,819,485
Shelby	1,880	2,355	$452,797,513	259	$737,558,207	75	$156,975,088	2,689	$1,347,330,808
Waco	154	138	$26,020,192	16	$7,358,070	4	$2,765,677	158	$36,143,939
Unincorporated Area	6,572	7,494	896,037,258	127	0	0	0	7,609	241,919,196
GASTON COUNTY	**8,698**	**14,419**	**$1,095,663,680**	**1,207**	**$410,886,033**	**227**	**$229,909,034**	**15,853**	**$1,736,458,748**
Belmont	629	953	$97,140,784	58	$162,879,762	42	$54,327,532	1,053	$314,348,079
Bessemer City	983	846	$74,290,513	133	$77,012,656	28	$41,031,575	1,007	$192,334,744
Cherryville	788	816	$68,988,146	145	$98,378,258	12	$12,850,216	973	$180,216,620
Cramerton	477	694	$79,754,141	50	$44,520,592	22	$24,962,258	766	$149,236,991
Dallas	218	439	$62,887,500	18	$23,507,448	42	$52,923,699	499	$139,318,647
Gastonia	2,373	3,577	$432,574,394	282	$277,300,342	96	$211,180,247	3,955	$921,054,982
High Shoals	183	315	$29,977,723	27	$7,886,608	6	$4,240,851	348	$42,105,182
Lowell	325	318	$28,129,221	31	$18,611,542	15	$18,077,480	364	$64,818,242
McAdenville	69	110	$15,716,279	4	$6,363,705	2	$3,550,502	116	$25,630,486
Mount Holly	85	436	$71,193,340	20	$74,126,484	7	$17,361,928	463	$162,681,752
Ranlo	158	204	$22,874,051	3	$1,440,691	1	$394,955	208	$24,709,697
Spencer Mountain	0	0	$0	0	$0	0	$0	0	$0
Stanley	1,017	1,034	$96,539,301	47	$66,363,417	9	$17,433,554	1,090	$180,336,272
Unincorporated Area	1,393	4,677	15,598,287	389	0	0	0	5,011	0
LINCOLN COUNTY	**7,066**	**16,457**	**$2,032,099,871**	**1,213**	**$1,476,611,189**	**165**	**$405,721,327**	**17,835**	**$3,914,432,387**
Lincolnton	1,399	2,101	$323,457,319	168	$271,195,694	34	$75,658,870	2,303	$670,311,884
Unincorporated Area	5,667	14,356	1,708,642,552	1,045	1,205,415,495	131	330,062,457	15,532	3,244,120,503
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**27,759**	**44,881**	**5,081,660,418**	**3,112**	**2,721,089,107**	**523**	**916,489,404**	**48,516**	**8,719,238,931**

Source: NCEM Risk Management Tool

TABLE 6.21: POPULATION VULNERABILITY TO WILDFIRE HAZARD FOR THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
CLEVELAND COUNTY	**3,815**	**1,513**	**25,495**
Belwood	103	41	685
Boiling Springs	160	64	1,072
Casar	32	13	218
Earl	31	12	206
Falston	75	30	503
Grover	8	3	51
Kings Mountain	606	244	4,086
Kingstown	18	7	119
Lattimore	33	13	221
Lawndale	49	19	326
Mooresboro	26	10	169
Patterson Springs	57	22	380
Polkville	34	13	228
Shelby	816	324	5,454
Waco	41	16	277
Unincorporated Area	1,726	682	11,500
GASTON COUNTY	**2,616**	**1,264**	**19,747**

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Belmont	262	127	1,977
Bessemer City	216	104	1,627
Cherryville	178	86	1,343
Cramerton	192	93	1,453
Dallas	129	62	972
Gastonia	1,225	592	9,248
High Shoals	71	34	533
Lowell	83	40	627
McAdenville	23	11	174
Mount Holly	143	69	1,079
Ranlo	57	28	433
Spencer Mountain	0	0	0
Stanley	220	106	1,663
Unincorporated Area	0	0	0
LINCOLN COUNTY	**3,737**	**1,665**	**28,047**
Lincolnton	597	266	4,482
Unincorporated Area	3,140	1,399	23,565
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**10,168**	**4,442**	**73,289**

Source: NCEM Risk Management Tool

6.5.7. Hazardous Substances

Although historical evidence and existing Toxic Release Inventory sites indicate that the Cleveland Gaston Lincoln Region is susceptible to hazardous substance events, there are few reports of damage. Therefore, a calculated annualized loss figure may not be completely reliable.

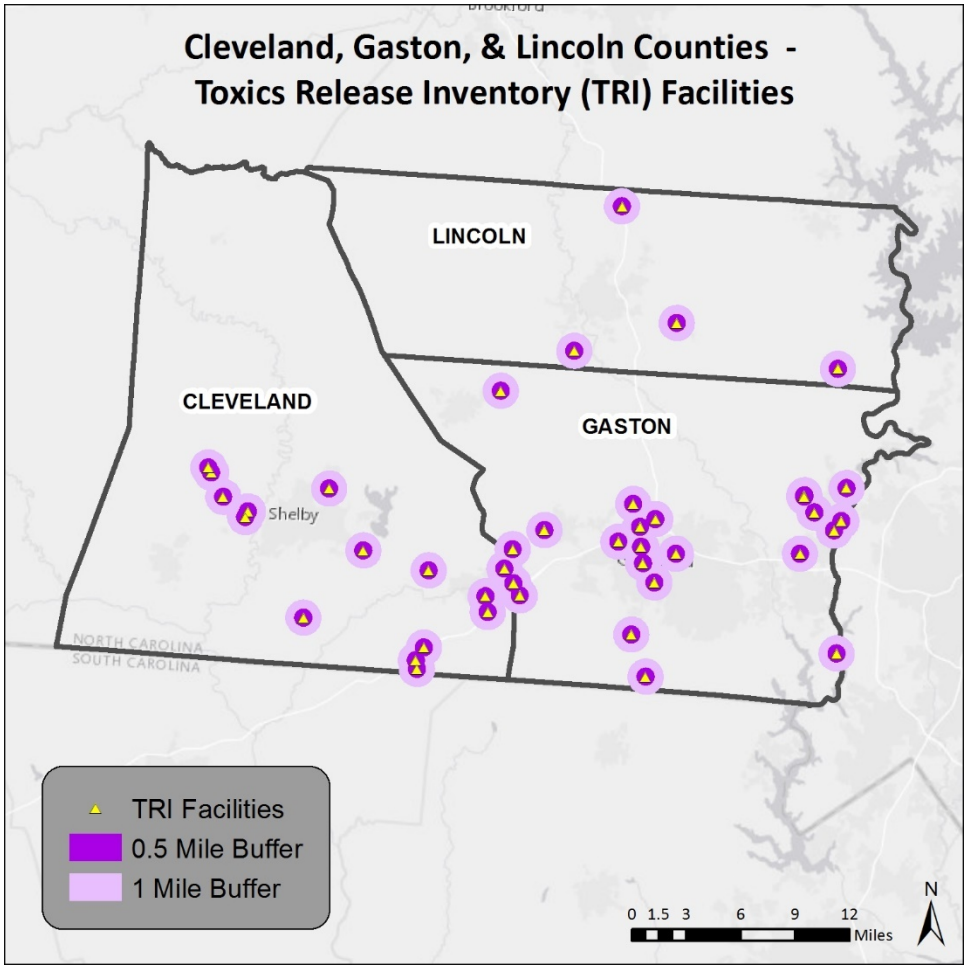
Most hazardous substance incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels[5]. In both scenarios, two sizes of buffers—0.5 mile and 1 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,

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

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 6.15.** 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 6.16** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.22** (fixed sites), **Table 6.23** (mobile road sites) and **Table 6.24** (mobile railroad sites)[6].

FIGURE 6.15: TOXIC RELEASE INVENTORY (TRI) FACILITIES IN THE CLEVELAND GASTON LINCOLN REGION



Source: EPA

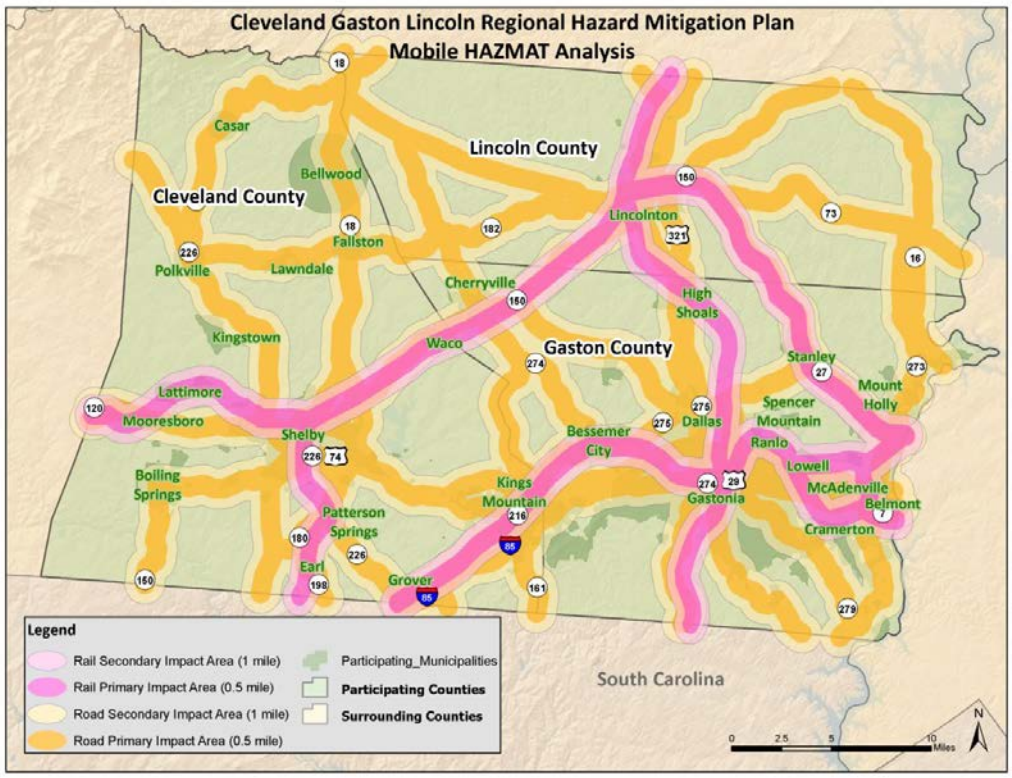
[6] Note that parcels included in the 1 mile analysis are also included in the 0.5 mile analysis.

TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES) IN THE CLEVELAND GASTON LINCOLN REGION

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
Cleveland County	**2,544**	**1,830**	**$349,046,261**	**7,577**	**5,513**	**$974,366,331**
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	6	3	$214,118	101	57	$3,208,567
Fallston	0	0	$0	0	0	$0
Grover	0	0	$0	0	0	$0
Kingstown	0	0	$0	0	0	$0
Kings Mountain	1,514	1,188	$132,035,022	3,786	3,031	$396,732,663
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	3	3	$19,890
Polkville	0	0	$0	0	0	$0
Shelby	606	374	$77,080,203	2,025	1,331	$248,394,992
Waco	0	0	$0	0	0	$0
Unincorporated Area	418	265	139,716,918	1,662	1,091	326,010,219
Gaston County	**8,312**	**6,439**	**$819,084,803**	**26,800**	**21,523**	**$2,543,754,390**
Belmont	131	107	$53,367,057	553	445	$132,083,477
Bessemer City	345	340	$24,002,584	1,502	1,033	$84,331,126
Cherryville	113	81	$22,387,830	259	174	$39,841,996
Cramerton	0	0	$0	0	0	$0
Dallas	1	1	$69,735	469	428	$41,820,161
Gastonia	4,853	3,947	$367,084,401	12,906	10,635	$1,142,869,078
High Shoals	0	0	$0	0	0	$0
Lowell	0	0	$0	0	0	$0
McAdenville	0	0	$0	0	0	$0
Mount Holly	1,145	881	$190,435,695	4,682	3,984	$554,296,822
Ranlo	0	0	$0	0	0	$0
Spencer Mountain	0	0	$0	0	0	$0
Stanley	0	0	$0	0	0	$0
Unincorporated Area	1,724	1,082	161,737,501	6,429	4,824	548,511,730
Lincoln County	**498**	**356**	**$291,619,020**	**2,274**	**1,593**	**$469,647,129**
Lincolnton	108	67	$23,094,999	1,062	764	$332,422,892
Unincorporated Area	390	289	268524021	1,212	829	137,224,237
Cleveland Gaston Lincoln Region Total	**11,354**	**8,625**	**1,459,750,084**	**36,651**	**28,629**	**3,987,767,850**

Source: EPA, Local governments

FIGURE 6.16: MOBILE HAZMAT BUFFERS IN THE CLEVELAND GASTON LINCOLN REGION



Source: NCDOT

TABLE 6.23: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES SPILL (MOBILE ANALYSIS – ROAD) IN THE CLEVELAND GASTON LINCOLN REGION

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
Cleveland County	**25,803**	**18,318**	**$2,206,623,066**	**37,374**	**26,241**	**$3,064,356,151**
Belwood	299	179	$12,899,462	477	281	$20,720,878
Boiling Springs	1,036	763	$134,977,686	1,693	1,262	$201,279,447
Casar	225	149	$11,811,644	231	154	$12,305,479
Earl	160	96	$5,868,719	161	96	$5,868,719
Fallston	428	290	$25,835,882	439	300	$26,412,388
Grover	316	420	$22,252,285	420	316	$22,252,285
Kingstown	4	3	$176,738	90	48	$1,871,122
Kings Mountain	2,946	2,221	$319,565,228	4,972	3,695	$508,900,033
Lattimore	16	11	$1,088,265	77	56	$4,442,144
Lawndale	396	279	$12,490,108	409	287	$12,774,439
Mooresboro	185	132	$7,017,257	203	146	$7,632,165
Patterson Springs	288	217	$14,540,719	288	217	$14,540,719
Polkville	367	232	$17,084,728	368	232	$17,084,728
Shelby	10,027	7,593	$931,351,165	12,501	9,549	$1,169,320,224
Waco	192	138	$9,647,762	192	138	$9,647,762

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	8,918	5,595	$680,015,418	14,853	9,464	$1,029,303,619
Gaston County	**58,189**	**46,271**	**$6,159,517,913**	**82,650**	**66,368**	**$8,674,981,013**
Belmont	4,001	3,140	$660,699,868	5,637	4,482	$920,431,020
Bessemer City	2,699	1,994	$165,216,657	3,038	2,257	$188,554,876
Cherryville	2,773	2,282	$221,241,613	3,239	2,670	$267,520,843
Cramerton	1,163	945	$160,648,771	2,050	1,683	$302,621,190
Dallas	2,085	1,690	$170,637,659	2,364	1,910	$187,569,332
Gastonia	20,959	17,511	$2,560,145,605	28,318	23,999	$3,401,254,952
High Shoals	277	218	$11,825,763	395	286	$16,431,129
Lowell	1,226	968	$110,103,255	1,609	1,322	$147,200,093
McAdenville	455	322	$54,399,191	461	325	$60,901,203
Mount Holly	3,984	3,396	$449,933,481	5,577	4,788	$707,021,237
Ranlo	703	543	$47,526,996	1,748	1,502	$137,097,326
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,206	1,022	$127,134,070	1,729	1,447	$190,734,329
Unincorporated Area	16,658	12,240	$1,420,004,984	26,485	19,697	$2,147,643,483
Lincoln County	**15,257**	**11,159**	**$2,220,769,949**	**28,443**	**21,028**	**$3,797,912,653**
Lincolnton	3,886	2,912	$621,427,008	8,218	6,362	$1,075,632,803
Unincorporated Area	11,371	8,247	$1,599,342,941	20,225	14,666	$2,722,279,850
Cleveland Gaston Lincoln Region Total	**99,249**	**75,748**	**$10,586,910,928**	**148,467**	**113,637**	**$15,537,249,817**

Source: NC DOT, Local governments

TABLE 6.24: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES SPILL (MOBILE ANALYSIS – RAILROAD) IN THE CLEVELAND GASTON LINCOLN REGION

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
Cleveland County	**8,533**	**6,336**	**$814,080,940**	**15,070**	**11,312**	**$1,399,766,290**
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	303	283	$17,931,256	419	316	$22,252,285
Kingstown	0	0	$0	0	0	$0
Kings Mountain	3,415	2,769	$231,450,229	4,891	3,920	$427,120,931
Lattimore	169	124	$11,132,488	201	147	$13,587,588
Lawndale	0	0	$0	0	0	$0
Mooresboro	98	70	$3,105,445	186	133	$6,992,122
Patterson Springs	0	0	$0	0	0	$0
Polkville	0	0	$0	0	0	$0
Shelby	2,828	2,037	$321,437,113	6,007	4,581	$595,279,077
Waco	192	138	$9,647,762	192	138	$9,647,762

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	1,528	915	$219,376,647	3,174	2,077	$324,886,525
Gaston County	**33,844**	**27,044**	**$3,414,033,964**	**54,718**	**44,087**	**$5,536,199,096**
Belmont	3,485	2,985	$618,163,333	3,857	4,575	$757,468,662
Bessemer City	2,393	1,741	$136,252,156	2,951	2,184	$181,212,934
Cherryville	2,158	1,797	$180,955,173	3,026	2,503	$243,786,241
Cramerton	1,424	1,241	$186,345,307	2,009	1,670	$296,206,437
Dallas	0	0	$0	0	0	$0
Gastonia	9,724	7,938	$897,978,335	16,385	13,559	$1,650,709,965
High Shoals	0	0	$0	0	0	$0
Lowell	1,570	1,299	$130,780,731	1,810	1,508	$170,373,482
McAdenville	200	150	$23,574,292	461	325	$60,901,203
Mount Holly	3,154	2,565	$410,652,979	5,376	4,566	$708,065,329
Ranlo	708	548	$47,621,375	1,624	1,383	$127,856,607
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,579	1,318	$180,422,938	1,869	1,577	$209,616,306
Unincorporated Area	7,449	5,462	$601,287,345	15,350	10,237	$1,130,001,930
Lincoln County	**9,172**	**7,097**	**$1,336,868,732**	**16,986**	**12,969**	**$2,771,486,529**
Lincolnton	4,168	3,371	$627,402,537	6,211	4,968	$995,565,368
Unincorporated Area	5,004	3,726	$709,466,195	10,775	8,001	$1,775,921,161
Cleveland Gaston Lincoln Region Total	**51,549**	**40,477**	**$5,564,983,636**	**86,774**	**68,368**	**$9,707,451,915**

Source: NC DOT, Local governments

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 163 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 124 facilities throughout the region. Gaston County has the most facilities in the primary impact zone with 105 facilities, while Lincoln County only has one facility, which is a fire station. Cleveland County has 18 facilities in the 0.5-mile zone. 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 6.26** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors revealed that there are 356 critical facilities located in the primary (0.5 mile) mobile HAZMAT buffer areas for roads and railroads throughout the region. 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 451 critical facilities located in the secondary (1 mile) buffer area of both roads

and railroads, 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 6.26** 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.

6.6 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 Cleveland Gaston and 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 6.25 presents a summary of potential annualized loss estimates 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. If no historical occurrences were reported, an accurate annualized loss estimate could not be obtained. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

TABLE 6.25: POTENTIAL ANNUALIZED LOSSES FOR THE CLEVELAND GASTON LINCOLN REGION

Hazard	Cleveland County	Gaston County	Lincoln County	Total
Drought	Negligible	Negligible	Negligible	Negligible
Excessive Heat	Negligible	Negligible	Negligible	Negligible
Tornadoes/Thunderstorms	$1,982,072	$1,440,865	$2,314,700	$5,737,637
Severe Winter Weather	$604,683	$1,061,230	$553,614	$2,219,528
Earthquakes				
Geological	Negligible	Negligible	Negligible	Negligible
Dam Failure	Negligible	Negligible	Negligible	Negligible
Flooding	$86,396	$2,859,579	$2,232,010	$210,759
Wildfires	Negligible	Negligible	Negligible	Negligible
Infectious Disease	Negligible	Negligible	Negligible	Negligible
Hazardous Substances	$272	$21,909	$13,671	$35,852
Radiological Emergency	Negligible	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible	Negligible
Cyber	Negligible	Negligible	Negligible	Negligible
Electromagnetic Pulse	Negligible	Negligible	Negligible	Negligible

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to natural hazards including drought, hurricane and coastal hazards, tornadoes/thunderstorms, and severe winter weather. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.26** 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**").

TABLE 6.26: AT-RISK CRITICAL FACILITIES

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
CLEVELAND COUNTY																		
Boiling Springs Rural Fire Station #2	Fire/EMS	X	X	X	X	X	X			X								
Boiling Springs Rural Fire Station #1	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		
Number 3 Fire Station	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
Bethlehem Fire Station	Fire/EMS	X	X	X	X	X	X				X			X				
Kings Mountain Fire Station #2	Fire/EMS	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
Grover Fire Station	Fire/EMS	X	X	X	X	X	X				X			X	X		X	X
Oak Grover Fire Station	Fire/EMS	X	X	X	X	X	X			X				X				
Lattimore Fire Station	Fire/EMS	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
Cleveland County Fire Station	Fire/EMS	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
Fallston Fire Station	Fire/EMS	X	X	X	X	X	X			X					X	X		
Lawndale Fire Station	Fire/EMS	X	X	X	X	X	X			X					X	X		
Polkville Fire Station	Fire/EMS	X	X	X	X	X	X				X				X	X		
Casar Fire Station	Fire/EMS	X	X	X	X	X	X				X							
Shelby #3 Fire Station	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
EMS M14	Medical	X	X	X	X	X	X				X	X						
EMS M17	Medical	X	X	X	X	X	X			X			X	X	X	X		
Kings Mountain Hospital	Medical	X	X	X	X	X	X				X		X	X		X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
EMS M08	Medical	X	X	X	X	X	X				X				X	X	X	X
EMS Temp	Medical	X	X	X	X	X	X				X				X	X		
EMS M13	Medical	X	X	X	X	X	X				X				X	X		
EMS M12	Medical	X	X	X	X	X	X				X				X	X		
EMS STA 3	Medical	X	X	X	X	X	X				X		X	X	X	X		
Shelby Hospital	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Kings Mountain Police Department	Police	X	X	X	X	X	X				X		X	X		X	X	X
Grover Police Department	Police	X	X	X	X	X	X				X			X	X	X	X	X
Shelby Police Department	Police	X	X	X	X	X	X				X				X	X	X	X
County Sheriff's Office	Police	X	X	X	X	X	X				X			X	X	X	X	X
Boiling Springs Police Department	Police	X	X	X	X	X	X				X				X	X		
Casar Elementary	Education	X	X	X	X	X	X				X	X						
Burns Middle School	Education	X	X	X	X	X	X				X				X	X		
Burns High School	Education	X	X	X	X	X	X				X					X		
Fallston Elementary	Education	X	X	X	X	X	X				X				X	X		
Union Elementary School	Education	X	X	X	X	X	X				X				X	X		
Washington Elementary	Education	X	X	X	X	X	X				X							
North Elementary	Education	X	X	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
Kings Mountain Intermediate	Education	X	X	X	X	X	X				X			X				X
Kings Mountain Middle	Education	X	X	X	X	X	X				X		X	X				X
Kings Mountain High	Education	X	X	X	X	X	X				X		X	X				X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Davidson School	Education	X	X	X	X	X	X				X		X	X		X	X	X
Bethware Elementary	Education	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
Township 3 Elementary	Education	X	X	X	X	X	X			X			X	X	X	X		
Elizabeth Elementary	Education	X	X	X	X	X	X			X			X	X	X	X		
Shelby High	Education	X	X	X	X	X	X				X				X	X		
Marion Intermediate	Education	X	X	X	X	X	X			X				X		X		X
Shelby Middle	Education	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
James Love Elementary	Education	X	X	X	X	X	X			X				X	X	X		
Crest High	Education	X	X	X	X	X	X			X			X	X				
Crest Middle	Education	X	X	X	X	X	X			X				X				
Boling Springs Elementary	Education	X	X	X	X	X	X			X						X		
Springmore Elementary	Education	X	X	X	X	X	X			X								
GASTON COUNTY																		
Emergency Operations Center	EOC/Response	X	X	X	X	X	X			X			X	X		X		X
Tryonota VFD	Fire/EMS	X	X	X	X	X	X				X				X	X		
Cherryville FD	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Hughs Pond VFD	Fire/EMS	X	X	X	X	X	X				X				X	X		
Bessemer City FD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Agricultural Center VFD	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
High Shoals VFD	Fire/EMS	X	X	X	X	X	X			X					X	X		
Alexis VFD	Fire/EMS	X	X	X	X	X	X			X							X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Lucia Riverbend VFD	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Stanley FD	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		
Dallas VFD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Gastonia Fire Station 2	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Gastonia Fire Station 1	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Gastonia Fire Station 3	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Gastonia Fire Station 6	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Gastonia Fire Station 4	Fire/EMS	X	X	X	X	X	X			X					X	X		
Ranlo FD & Rescue	Fire/EMS	X	X	X	X	X	X				X					X	X	X
Lowell VFD	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
McAdenville VFD	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
Community VFD	Fire/EMS	X	X	X	X	X	X			X			X	X		X	X	X
Belmont FD	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Cramerton VFD	Fire/EMS	X	X	X	X	X	X	X	X	X						X	X	X
New Hope VFD	Fire/EMS	X	X	X	X	X	X			X					X	X		
Gastonia Fire Station 7	Fire/EMS	X	X	X	X	X	X				X							
Union Rd. VFD	Fire/EMS	X	X	X	X	X	X			X					X	X		
Gastonia Fire Station 5	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Gastonia Fire Station 8	Fire/EMS	X	X	X	X	X	X			X						X		
Mt. Holly FD & Rescue	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
East Gaston VFD	Fire/EMS	X	X	X	X	X	X			X			X	X			X	X
South Point FD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Crowders Mtn. VFD & Rescue 1	Fire/EMS	X	X	X	X	X	X			X								
Chestnut Ridge VFD	Fire/EMS	X	X	X	X	X	X			X		X	X	X				
Catawba Heights VFD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Crowders Mtn. VFD & Rescue 2	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Mountain Island VFD	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Belmont City Hall	Government	X	X	X	X	X	X			X				X	X	X	X	X
Cramerton Town Hall	Government	X	X	X	X	X	X			X						X	X	X
Mount Holly City Hall	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
NCNG Armory Belmont	Government	X	X	X	X	X	X			X				X	X	X		X
Stanley Town Hall	Government	X	X	X	X	X	X				X				X	X	X	X
Lowell Town Hall	Government	X	X	X	X	X	X			X					X	X	X	X
Ranlo Town Hall	Government	X	X	X	X	X	X			X						X	X	X
Social Services Bldg	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
Courthouse	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
Jail Annex	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
County Jail	Government	X	X	X	X	X	X				X		X	X	X	X	X	X
County Administration Bldg	Government	X	X	X	X	X	X				X		X	X	X	X	X	X
Gastonia City Hall	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
City of Gastonia Offices	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
City of Gastonia	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
Probation	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
Board of Elections	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
NCNG Armory Gastonia	Government	X	X	X	X	X	X			X						X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Mcadenville Town Hall	Government	X	X	X	X	X	X				X			X	X	X		X
Dept of Corrections	Government	X	X	X	X	X	X				X		X	X	X	X		
Dallas Community Bldg	Government	X	X	X	X	X	X				X		X	X	X	X		
High Shoals Town Hall	Government	X	X	X	X	X	X			X					X	X		
Cherryville Town Hall	Government	X	X	X	X	X	X				X				X	X	X	X
Bessemer City Town Hall	Government	X	X	X	X	X	X				X		X	X	X	X	X	X
Health Department	Government	X	X	X	X	X	X				X		X	X	X	X		X
Dallas Town Hall	Government	X	X	X	X	X	X				X			X	X	X		
NC DMV	Government	X	X	X	X	X	X				X		X	X	X	X		X
NC DMV	Government	X	X	X	X	X	X	X	X	X			X	X		X	X	X
NC Forestry Dept	Government	X	X	X	X	X	X			X			X	X	X	X	X	X
Social Security Administration	Government	X	X	X	X	X	X				X		X	X	X	X		
Old Courthouse	Government	X	X	X	X	X	X				X		X	X	X	X	X	X
Caromont Health (Gaston Memorial)	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Diagnostic Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Health Department	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Pathways	Medical	X	X	X	X	X	X			X			X	X	X	X		
Rehabilitation Center	Medical	X	X	X	X	X	X				X		X	X	X	X		X
Highland Health Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Gaston Family Health	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Gaston Family Medical Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
CaroMont Urgent Care	Medical	X	X	X	X	X	X			X								
CaroMont Health Dallas	Medical	X	X	X	X	X	X			X				X	X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
CaroMont Health Cherryville	Medical	X	X	X	X	X	X			X					X	X	X	X
CaroMont Health Stanley	Medical	X	X	X	X	X	X			X						X	X	X
CaroMont Health McAdenville	Medical	X	X	X	X	X	X				X				X	X		X
Carolina Health Mt. Holly	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Carolinas Health Urgent Care	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
CaroMont Medical Group	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Southpoint Rescue	Other	X	X	X	X	X	X			X						X	X	X
Belmont Branch Library	Other	X	X	X	X	X	X				X			X	X	X	X	X
Mt Holly Rescue & Gems #7	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Mount Holly Branch Library	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Union Road Branch Library	Other	X	X	X	X	X	X			X					X	X		
Mount Holly Post Office	Other	X	X	X	X	X	X			X			X	X		X	X	X
Belmont Post Office	Other	X	X	X	X	X	X			X				X	X	X	X	X
US Post Office Stanley	Other	X	X	X	X	X	X			X					X	X	X	X
Stanley CD Rescue	Other	X	X	X	X	X	X			X					X	X	X	X
Lowell Post Office	Other	X	X	X	X	X	X			X					X	X	X	X
Bradley Community Center	Other	X	X	X	X	X	X						X	X	X	X		X
Gastonia Water Plant	Other	X	X	X	X	X	X				X		X	X	X	X	X	X
Gaston Life Saving	Other	X	X	X	X	X	X				X		X	X	X	X	X	X
Schiele Museum	Other	X	X	X	X	X	X			X			X	X		X		X
Main Public Library	Other	X	X	X	X	X	X			X			X	X		X		X
USPS	Other	X	X	X	X	X	X			X					X	X		
Mcadenville Post Office	Other	X	X	X	X	X	X			X				X	X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Animal Control	Other	X	X	X	X	X	X			X			X	X	X	X		
Citizens Resource Center	Other	X	X	X	X	X	X			X			X	X	X	X		
Dallas Post Office	Other	X	X	X	X	X	X			X			X	X	X	X		
County Museum	Other	X	X	X	X	X	X			X			X	X	X	X		
Dallas Rescue	Other	X	X	X	X	X	X			X			X	X	X	X		
Alexis Post Office	Other	X	X	X	X	X	X			X							X	X
C Grier Beam Truck Museum	Other	X	X	X	X	X	X			X					X	X	X	X
Cherryville Post Office	Other	X	X	X	X	X	X			X					X	X	X	X
Cherryville Community Center	Other	X	X	X	X	X	X				X				X	X	X	X
Cherryville Historical Society	Other	X	X	X	X	X	X				X				X	X	X	X
Gems #6 & Cherryville Rescue	Other	X	X	X	X	X	X				X				X	X	X	X
Bessemer City Post Office	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Gems #3 & BC Rescue	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Gems #2	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Stanley Branch Library	Other	X	X	X	X	X	X			X					X	X	X	X
Bessemer City Branch Library	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Cherryville Branch Library	Other	X	X	X	X	X	X			X				X	X	X	X	X
Dallas Branch Library	Other	X	X	X	X	X	X				X		X	X	X	X		
Lowell Branch Library	Other	X	X	X	X	X	X				X				X	X	X	X
Dallas W/S Plant	Other	X	X	X	X	X	X				X		X	X	X	X		
Lucile Tatum Bldg	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
County Garage	Other	X	X	X	X	X	X			X			X	X	X	X	X	X
Cramerton Community Center	Other	X	X	X	X	X	X				X					X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
City Of Gastonia Engn Dept	Other	X	X	X	X	X	X				X		X	X	X	X		X
Gastonia Fleet Maint	Other	X	X	X	X	X	X				X		X	X		X	X	X
Cramerton Post Office	Other	X	X	X	X	X	X				X					X	X	X
Belmont PD	Police	X	X	X	X	X	X				X			X	X	X	X	X
Mount Holly PD	Police	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
Ranlo PD	Police	X	X	X	X	X	X				X					X	X	X
Gastonia PD	Police	X	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		
Cherryville PD	Police	X	X	X	X	X	X			X				X	X	X	X	X
Bessemer City PD	Police	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
Gaston County PD	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
Cramerton	Police	X	X	X	X	X	X			X						X	X	X
Mcadenville Elementary	Education	X	X	X	X	X	X			X				X	X	X		X
Lowell Elementary	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
Woodhill Elementary	Education	X	X	X	X	X	X			X			X	X	X	X		X
Gardner Park Elementary	Education	X	X	X	X	X	X				X					X		
Robinson Elementary	Education	X	X	X	X	X	X				X				X	X		
Carr Elementary	Education	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
Tryon Elementary	Education	X	X	X	X	X	X				X				X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Costner Elementary	Education	X	X	X	X	X	X				X			X	X	X		
Bessemer City Primary	Education	X	X	X	X	X	X				X		X	X		X		
Bessemer City Central Elementary	Education	X	X	X	X	X	X				X		X	X		X		
Edward D. Sadler Jr. Elementary	Education	X	X	X	X	X	X				X				X	X		
Pleasant Ridge Elementary	Education	X	X	X	X	X	X				X		X	X		X		X
H.H. Beam Elementary	Education	X	X	X	X	X	X				X		X	X	X	X	X	X
Lingerfeldt Elementary	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Chapel Grove Elementary	Education	X	X	X	X	X	X				X							
Sherwood Elementary	Education	X	X	X	X	X	X				X		X	X	X	X		
W. Beam Intermediate	Education	X	X	X	X	X	X				X				X	X	X	X
Page Elementary	Education	X	X	X	X	X	X				X				X	X	X	X
New Hope Elementary	Education	X	X	X	X	X	X				X				X	X		
W.A. Bess Elementary	Education	X	X	X	X	X	X				X				X	X		
Belmont Central Elementary	Education	X	X	X	X	X	X				X			X		X	X	X
Catawba Heights Elementary	Education	X	X	X	X	X	X				X		X	X		X	X	X
North Belmont Elementary	Education	X	X	X	X	X	X				X		X	X		X	X	X
Ida Rankin Elementary	Education	X	X	X	X	X	X				X		X	X	X	X	X	X
Pinewood Elementary	Education	X	X	X	X	X	X				X	X	X	X	X	X	X	X
Kiser Elementary	Education	X	X	X	X	X	X				X				X	X	X	X
Springfield Elementary	Education	X	X	X	X	X	X				X				X	X	X	X
Hawks Nest Intermediate	Education	X	X	X	X	X	X				X				X	X		
Cramerton Middle	Education	X	X	X	X	X	X				X				X	X		
Belmont Middle	Education	X	X	X	X	X	X				X			X	X	X	X	X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Mt. Holly Middle	Education	X	X	X	X	X	X				X		X	X		X	X	X
Stanley Middle	Education	X	X	X	X	X	X				X					X	X	X
Holbrook Middle	Education	X	X	X	X	X	X				X				X	X	X	X
York Chester Middle	Education	X	X	X	X	X	X				X		X	X	X	X		X
Grier Middle	Education	X	X	X	X	X	X			X			X	X	X	X		
W.C. Friday Middle	Education	X	X	X	X	X	X			X					X	X		
John Chavis Middle	Education	X	X	X	X	X	X			X					X	X		X
Bessemer City Middle	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Southwest Middle	Education	X	X	X	X	X	X			X			X	X		X		X
South Point High	Education	X	X	X	X	X	X			X					X	X		
Forestview High	Education	X	X	X	X	X	X			X					X	X		
East Gaston High	Education	X	X	X	X	X	X			X								
Ashbrook High	Education	X	X	X	X	X	X			X					X			
North Gaston High	Education	X	X	X	X	X	X			X						X		
Cherryville High	Education	X	X	X	X	X	X			X					X	X		X
Bessemer City High	Education	X	X	X	X	X	X			X			X	X	X	X		X
Hunter Huss High	Education	X	X	X	X	X	X			X			X	X		X		X
Warlick Academy	Education	X	X	X	X	X	X			X					X	X	X	X
Webb Street School	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Highland School of Technology	Education	X	X	X	X	X	X			X			X	X	X	X		
Piedmont Community Charter School - A	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Piedmont Community Charter School - B	Education	X	X	X	X	X	X			X					X	X		
Mountain Island Charter School	Education	X	X	X	X	X	X			X					X	X		X

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Assembly of Faith Christian School	Education	X	X	X	X	X	X			X				X	X	X		
Cramerton Christian Academy	Education	X	X	X	X	X	X			X					X	X	X	X
First Free Will Baptist Christian Academy	Education	X	X	X	X	X	X			X			X	X	X	X		
First Wesleyan Christian School	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Friendship Christian Academy	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Gaston Christian School	Education	X	X	X	X	X	X			X					X	X	X	X
Gaston Day School	Education	X	X	X	X	X	X			X						X		
Mount Zion Christian School	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Saint Michael Catholic School	Education	X	X	X	X	X	X			X			X	X	X	X		X
Stanley Christian Academy	Education	X	X	X	X	X	X			X					X	X	X	X
Tabernacle Christian Academy	Education	X	X	X	X	X	X			X			X	X	X	X		
Victory Christian Academy	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Christ Church Weekday School	Education	X	X	X	X	X	X			X					X	X		
The Grace School	Education	X	X	X	X	X	X			X		X	X	X		X		
Stuart W Cramer High	Education	X	X	X	X	X	X			X				X	X	X	X	X
Kings View Christian Academy	Education	X	X	X	X	X	X			X					X	X		
Belmont Abbey College	Education	X	X	X	X	X	X			X			X	X	X	X	X	X
Gaston College Kimbrell Campus	Education	X	X	X	X	X	X			X				X	X	X		X
Gaston College Dallas Campus	Education	X	X	X	X	X	X			X			X	X	X	X		
LINCOLN COUNTY																		
BOGER CITY	Fire/EMS	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		
NORTH BROOK	Fire/EMS	X	X	X	X	X	X			X						X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
NORTH 321	Fire/EMS	X	X	X	X	X	X			X			X	X				
DENVER 3	Fire/EMS	X	X	X	X	X	X			X								
UNION	Fire/EMS	X	X	X	X	X	X			X								
LINCOLNTON	Fire/EMS	X	X	X	X	X	X			X							X	X
ALEXIS 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
DENVER 1	Fire/EMS	X	X	X	X	X	X			X						X		
HOWARDS CREEK VFD	Fire/EMS	X	X	X	X	X	X			X					X	X		
PUMPKIN CENTER	Fire/EMS	X	X	X	X	X	X			X					X	X		
CROUSE	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
SOUTH FORK	Fire/EMS	X	X	X	X	X	X				X							
ALEXIS 1	Fire/EMS	X	X	X	X	X	X				X						X	X
DENVER 2	Fire/EMS	X	X	X	X	X	X				X							
AIRPORT	Fire/EMS	X	X	X	X	X	X				X				X	X		
LINCOLNTON2	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
ORE BANKS PUMPKIN CENTER	Fire/EMS	X	X	X	X	X	X				X							
East Lincoln 1	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
East Lincoln 2	Fire/EMS	X	X	X	X	X	X				X							X
Hughs Pond VFD	Fire/EMS	X	X	X	X	X	X				X							
Cooksville VFD	Fire/EMS	X	X	X	X	X	X				X							
N321 Substation	Fire/EMS	X	X	X	X	X	X				X							
Northbrook Substation	Fire/EMS	X	X	X	X	X	X				X							
Fire Boat	Fire/EMS	X	X	X	X	X	X	X	X		X							
HCF SUB STATION	Fire/EMS	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
East Lincoln Future Substation	Fire/EMS	X	X	X	X	X	X				X							
Lincoln County EMS	Medical	X	X	X	X	X	X				X				X	X	X	X
Lincolnton National Guard Armory	Other	X	X	X	X	X	X				X						X	X
Lincoln County Animal Shelter	Other	X	X	X	X	X	X				X					X		X
Lincolnton Correctional Center	Other	X	X	X	X	X	X				X				X	X		X
Shipley	Police	X	X	X	X	X	X				X							
NCSHP Troop F District V- Substation	Police	X	X	X	X	X	X				X							
Lincolnton Police Department	Police	X	X	X	X	X	X				X						X	
Lincolnton Sheriff's Department	Police	X	X	X	X	X	X				X							X
Lincoln County Sherriff	Police	X	X	X	X	X	X				X				X	X		
NORTH LINCOLN HIGH SCHOOL	School	X	X	X	X	X	X				X				X	X		
LINCOLONTON MIDDLE SCHOOL	School	X	X	X	X	X	X				X	X						
EAST LINCOLN MIDDLE SCHOOL	School	X	X	X	X	X	X			X					X	X		
EAST LINCOLN HIGH SCHOOL	School	X	X	X	X	X	X			X					X	X		X
J D Kiser	School	X	X	X	X	X	X				X							X
G.E. Massey	School	X	X	X	X	X	X				X				X	X	X	X
East Lincoln	School	X	X	X	X	X	X			X					X			
Lincolnton High School	School	X	X	X	X	X	X				X							X
Battleground	School	X	X	X	X	X	X				X							X
West Lincoln High School	School	X	X	X	X	X	X				X							
West Lincoln Middle School	School	X	X	X	X	X	X				X							
1889 NC 16	Police	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 Planning Committee.

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. 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	✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
Stormwater Management	✓		✓					✓							✓	
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	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				✓	✓
Stormwater Management	✓	✓					✓								✓	✓
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 plans include all of the municipalities in the counties.

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 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 both Gaston and Lincoln Counties have 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 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 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	8	$1,732,000	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**	03/25/15	07/02/08	--	--	--	--
Earl*	--	--	--	--	--	--
Fallston*	--	--	--	--	--	--
Grover**	09/16/19	07/02/08	--	--	--	--
Kings Mountain	04/30/86	07/02/08(M)	10	$2,368,000	3	$11,804
Kingstown	10/03/12	07/02/08	0	$0	0	$0
Lattimore*	--	--	--	--	--	--
Lawndale**	01/16/18	07/02/08	--	--	--	--
Mooresboro*	--	--	--	--	--	--
Patterson Springs*	--	--	--	--	--	--
Polkville	03/22/12	02/20/08	0	$0	0	$0
Shelby	04/03/78	07/02/08	36	$9,865,700	19	$361,473
Waco**	03/15/18	07/02/08	--	--	--	--
GASTON COUNTY†	05/01/80	09/02/15	58	$15,074,500	4	$20,282
Belmont	11/01/79	09/02/15	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	09/02/15	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	09/02/15	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
** Community joined NFIP since previous version of this plan was adopted.
(M) – No Elevation Determined, all Zone A, C and X
Source: NFIP Community Status information as of 9/30/18; NFIP claims and policy information as of 9/30/18

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 Earl, Fallston, Grover, Lattimore, Mooresboro, and Patterson Springs, 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, 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.

7.3.5 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

Table 7.4 provides a summary of the capability assessment results for the 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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 with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Personnel skilled in GIS and/or Hazus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Resource development staff or grant writers							✓									

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

7.3.6 Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of outside grant funding awards or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project, such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources.

The Capability Assessment Survey was used to capture information on the region's fiscal capability

through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other: HMGP, PDM, FMAP, SBA, additional state funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.6 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority or 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
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 Planning Committee 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 their 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 Committee meeting. 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]

[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. "Medium" and "Low" priority actions were labeled as such because they had a medium and lower qualitative benefit respectively when evaluated against the six factors used to determine action priority. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

- Funding availability
- 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.

As the actions were reviewed as part of the 2020 update of the plan, each community was asked to review the priority assigned to each action and ensure that the priority had not changed. If the priority of a particular action did change, the participating jurisdictions were asked to revise those priorities accordingly using same criteria as defined above.

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 project consultant reviewed the goals from the previous plan and discussed them with the Regional Planning Committee.

The proposed regional goals were presented, reviewed, voted upon, and accepted by the Regional Planning Committee at their second meeting. Minimal revisions to the wording of the goals were made. 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 8.1**. Consistent implementation of actions over time will ensure that community goals are achieved.

As part of the development of the 2020 update of this plan, the goals found in Table 8.1 were reviewed and discussed at the 2/21/19 meeting of the Regional Hazard Mitigation Planning Committee. It was determined that the goals are still applicable for the region and only minor revisions to the wording of the goals were recommended.

TABLE 8.1: 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 through coordination between the three participating counties to reduce future hazard 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 Planning Committee meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Committee 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 Planning Committee 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 2020 implementation status. Updates on the implementation status of each action are provided. Any changes to the relative priority of the actions are noted as well. 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 2020 planning process. Actions identified as completed in the 2014 version of the plan have been moved to Appendix E.

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

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 (2020)—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 32 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**	**10**
Belwood	9:7	5
Boiling Springs	9:9	3
Casar	9:11	4
Earl	9:13	5
Fallston	9:15	4
Grover	9:17	7
Kings Mountain	9:20	21
Kingstown	9:27	3
Lattimore	9:29	3
Lawndale	9:30	4
Mooresboro	9:32	7
Patterson Springs	9:35	3
Polkville	9:36	3
Shelby	9:38	10
Waco	9:42	3
Gaston County	9:43	**38**
Belmont	9:55	14
Bessemer City	9:60	14
Cherryville	9:64	10
Cramerton	9:67	12
Dallas	9:71	13
Gastonia	9:76	16
High Shoals	9:80	4
Lowell	9:83	14
McAdenville	9:87	13
Mount Holly	9:91	16
Ranlo	9:96	14
Stanley	9:101	14
Lincoln County	9:105	**24**
Lincolnton	9:111	23

Cleveland County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	County Planning	Local	2025	As of 2020, 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 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	2025	No policy has been developed as of 2020. This is to be completed in 2025 pending funding, staff resources and political will.
P-4	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	County Planning	Local	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	County Planning	Federal State	2025	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 (2020)
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: . Overall damage assessment/data collection (visual inspection from roadways). . Data compiled and geographical areas assigned to teams. . Second detailed assessment by area teams. . Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. . All construction that is repaired, replaced, dried or sealed will be inspected before covered. . 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 (2020)
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	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of the application. Projects may include, but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.	All	Medium	Cleveland County Emergency Management	Federal Grants	As funding becomes available.	New action for the 2020 plan update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	County Planning	Local	2025	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-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2025	As of 2020, 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 pending funding, staff resources and political will.
P-2	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
P-4	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	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 (2020)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	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.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Adopt Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2025	These regulations have not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on March 15, 2015. This action will be moved to the list of completed mitigation actions in the 2025 update.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2025	This Article has not been updated as of 2020. 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	2025	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 the National Flood Insurance Program	Flood	High	Emergency Management	Local	2025	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 (2020)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Adopt Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2025	As of 2020, 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-3	Join the National Flood Insurance Program	Flood	High	Emergency Management	Local	2025	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-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2025	As of 2020, 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	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2025	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 the National Flood Insurance Program	Flood	High	Emergency Management	Local	2025	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.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2025	As of 2020, 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 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	2025	No policy has been developed as of 2020. This is to be completed by 2025 pending funding, staff resources and political will.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
P-5	Review and revise the Planning Ordinance to allow for clustering of residential lots.	Flood	Medium	City Planning	Local	2025	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2025	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.
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: . Overall damage assessment/data collection (visual inspection from roadways). . Data compiled and geographical areas assigned to teams. . Second detailed assessment by area teams. . Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. . All construction that is repaired, replaced, dried or sealed will be inspected before covered. . 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 (2020)
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	2025	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-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.	2025	No work has been done on this through 2020. Upgrades were made to the existing water treatment plant. The City will continue to investigate this action and evaluate feasibility.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-15	Continue discouragement of the planting of canopy trees where they may grow into power lines; Continue to 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	Existing Plan which is to be reviewed and updated annually	Project Evergreen is an ongoing 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.
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.	2025	The Codes Administration Department and City Fire Department have a 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-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	2025	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-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	2025	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-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.	2025	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 (2020)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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.	2025	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	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 (2020)
Structural Projects							
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	2025	Interconnects do exist between COKM and Cleveland County Water. Additional interconnects 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	2025	To be carried out in the future whenever possible. Currently recommended for new developments but not a requirement.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	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.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	2025	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-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	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 January 16, 2018. This action will be removed for the 2025 update of this plan.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2025	As of 2020, 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 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	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2025	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 the National Flood Insurance Program	Flood	High	Emergency Management	Local	2025	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-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	The Town does not participate in the NFIP; therefore, it does not enforce regulatory floodplain maps. This action will be removed from future plan updates.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flood	High	Town	Federal State	2025	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.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2025	As of 2020, 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 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	2025	No policy has been developed as of 2020. This is to be completed in 2025 pending funding, staff resources and political will.
P-4	Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.	All	Medium	City Planning	Local	2025	This Article has not been updated as of 2020. This action to be completed in the future pending funding, staff resources and political will.
P-6	Revise and update the regulatory floodplain maps.	Flood	High	City Planning	Federal State	2025	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 (2020)
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: . Overall damage assessment/data collection (visual inspection from roadways). . Data compiled and geographical areas assigned to teams. . Second detailed assessment by area teams. . Portions of walls, floors, ceilings, etc. that have been exposed to water will be opened for evaluation. . All construction that is repaired, replaced, dried or sealed will be inspected before covered. . 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 (2020)
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	2025	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.
Property Protection							
PP-1	Create and maintain a list of repetitive flood loss properties.	Flood	Medium	City Planning	Local	2025	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 that property.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
Prevention							
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on March 15, 2018. This action will be removed from this plan for the 2025 update.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2025	No new shelters have been added over the past 5 years. However, the County has purchased a shelter support trailer that is available. There are plans to add another shelter in Cleveland County once funding becomes available, hopefully by 2025.
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. Additionally, hazard information is included in applications for building and zoning permits. 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 (2020)
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	2025, Annual assessments	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
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	2025, annually reviewed	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	The county still intends to develop a drought hazard specific checklist for availability during drought related conditions. Socialize implementation efforts and identify resource requirements.
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	2025	The County intends to develop a drought hazard specific checklist for availability during drought related conditions. Socialize implementation efforts and identify resource requirements.
P-10	Update countywide land use plan.	Drought/Heat Wave	Medium	Planning, County Commission	Local Funding	2025	The county intends to develop a drought hazard specific checklist for availability during drought related conditions. Socialize implementation efforts and identify resource requirements.
P-11	Implement County-wide water system.	Drought/Heat Wave	Low	Gaston County Commission	Local Funding, Grants, as available	No longer economically advantageous to implement. Commensurate with County Growth.	Economic solutions to a county-wide water system are no longer attainable. County is developing solutions to respond to emergency water needs while infrastructure grows from private investment.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-14	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	High	Fire Marshall, Municipalities	Local Funding, as available	2025	The County plans to develop a wildfire hazard specific checklist and continue to maximize mutual aid to facilitate plans through Department of Forestry.
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	2025	Attempting to work with Ongoing case by case assessments being conducted and emphasis being placed on areas with the greatest need.
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	2021	Develop a review process for identifying potential areas of concern NLT 2021.
P-19	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Medium	Planning/Land Records	Local Funding	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
P-20	Strengthen building codes so structures are “survivable”. ‘Safe Rooms may be included.	Tornado, Thunderstorm	Low	Emergency Management, Codes, Inspections	Local Funding	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
P-21	Require underground utilities for new subdivision construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Planning, Codes, Building Inspections	Local Funding	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Continue to upgrade Damage Assessment Plans throughout the county to automate requirements and make them both user friendly and quick. Work with municipalities to share resources in the future to facilitate processes.
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	2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.
P-25	Review Hazard Mitigation Plan annually with municipalities to increase visibility on projects and provide assistance where applicable.	All Hazards	High	Planning	Local Funding	Ongoing	Build initial meeting into Long Range Training Calendar NLT 2020.

P-26	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of the application. Projects may include, but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.	All	Medium	Gaston County Emergency Management	Federal Grants	As funding becomes available.	New action for the 2020 plan 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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
ES-4	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and scheduling of resources, and improve ES coordination efforts. Deliberate outreach effort from county to municipalities.
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	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	County Emergency Management is providing Public Information Campaigns in conjunction with the National Weather Service. Campaigns include, Severe Weather Preparedness Week, Hurricane Preparedness Week, and Winter Storm Preparedness Week. EM will continue to maximize these events.
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	Annual review and update	Researching proactive approaches to managing process in the future. Current plan is reactive in nature and requires upgrading. Beginning research in 2020.
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	Annual review and update	Education efforts are ongoing and greater emphasis is being placed on Dam Failure related exercise scenarios during future operations. Exercise scenarios and information will be published to Facebook page for public awareness.
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	Annual review and update	Ongoing part of daily summer operations. Efforts at attaining weather data are aligned with providing wet bulb index to citizens. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Emergency Management will work with zoning to develop a formal review process to identify the magnitude of this issue. Upon review a notification process will be developed for county residents.
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	Annual review and update	This program will likely be passive in nature over the course of this period. Although, Public Information will be posted via social media higher priority items will be provided with greater emphasis.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Maximize relationship with utilities in the area to emphasize reduction in consumption. Both Duke Energy and Two Rivers Utilities have a vested interest in this effort and are good emergency management partners.
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	Annual review and update	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Annual review and update	Recent storms have emphasized the need for greater efforts in this area. Conduct discussions with utility providers to establish more proactive approaches for problem resolution. Begin discussion NLT 2019.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. Information campaign will be a part of the overall effort.
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	Annual review and update	Effort are ongoing with Health and Human Services to incorporate pandemic related efforts into Emergency Operations Plan in the form of a Hazard Mitigation Checklist. Information campaign will be a part of the overall effort.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Current plans include a review of insurance needs and documents with county citizens. Currently, planned to begin in 2019.
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	Annual review and update	Emphasis is being placed on county ability to notify residence of pending emergencies. Previously utilized systems are ineffective, county is researching a variety of ways to improve notification processes. Current capability is less than 10% notification capability across the

City of Belmont Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the City of Belmont's Mitigation Action Plan for the 2025 update.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfire	Medium	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-7	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2025	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	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
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	2025	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	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, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2020	Belmont Update: Pending funding, staff resources and political will. Gaston County Update: Process will be reviewed by Gaston County Emergency Management Directorate to identify any required changes NLT 2020.
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	Required by code. Annually review	Underground utilities are required in the land development code (zoning ordinance).
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	2025	Belmont Update: Police, fire, water plant, and wastewater plant all have generators. All but a couple of sewer lift stations have them. Gaston County Update: Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
Structural Projects							
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 Public Works	Local Funding, Grants, as available	Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Belmont Update: Educate all county residents to enable NWS all-hazard alerts (or other emergency alert systems) on cell phones. Gaston County Update: Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

City of Bessemer City Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the City of Bessemer City's Mitigation Action Plan for the 2025 update.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
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	Low	Bessemer City	Local Funding as available	2025	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Bessemer City Mitigation Action plan for the 2025 update.
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-10	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Building code enforcement is a function of Gaston County. To date, “safe rooms” are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
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, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Develop relationship with municipal leadership to review current policies and procedures and define courses of action.
Emergency Services							
Action #	**Description**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Potential Funding Sources**	**Implementation Schedule**	**Implementation Status (2020)**
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Structural Projects							
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	Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

City of Cherryville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the City of Cherryville's Mitigation Action Plan for the 2025 update.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-11	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Emergency Management, Cherryville	Local Funding	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
ES-6	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and scheduling of resources, and improve ES coordination efforts. Deliberate outreach effort from county to municipalities.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

Town of Cramerton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.
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	2025	Maximize relationship with utilities in the area to emphasize reduction in consumption. Both Duke Energy and Two Rivers Utilities have a vested interest in this effort and are good emergency management partners.
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	2025	The County intends to develop a drought hazard specific checklist for availability during drought related conditions. Socialize implementation efforts and identify resource requirements.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-7	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Cramerton Mitigation Action plan for the 2025 update.
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	2025	Develop relationship with municipal leadership to review current policies and procedures and define courses of action. Municipality chooses to assume moderate risk in this category. EM has conducted site visits and concurs with municipal assessment.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
ES-4	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and
Structural Projects							
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	2025, Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

Town of Dallas Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the Town of Dallas' Mitigation Action Plan for the 2025 update.
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	2025	All facilities inspected routinely. Lines that power facilities are trimmed and maintained, and all generators and emergency monitoring equipment are maintained and repaired quarterly.
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	2025	In 2018, Dallas removed large trees, stumps, and all other vegetation around power lines and raw water intake stations.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	The fire department just updated our call response cards in 2018. We have standing mutual aid and automatic aid agreements in place.
P-8	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquake, Landslide, Sinkhole	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the Town of Dallas action plan in the 2025 update.
P-9	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Dallas	Local Funding	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
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	2025	Process will be reviewed by Emergency Management Directorate to identify any required changes NLT 2020.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Gaston County Planning	N/A	2025, Pending possible increase in number of insurance policies	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
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	Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Dallas Update: The Town of Dallas ensures that our citizens are aware of impending weather via a weather siren we have located just behind the fire department, which is centrally located within the town boundaries. The town also actively participates in the program called Nixle, which has the ability to send text messages to all persons that have signed up for this. Gaston County Update: Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Dallas Update: The Gaston County Firefighters Association has partnered with the County Emergency Manager to pursue this purchase. Gaston County Update: Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

City of Gastonia Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
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	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Property Protection							
PP-2	Encourage fire suppression systems.	Wildfire	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2025	Currently, municipality has an Emergency Manager with a fire background. Ongoing efforts continue around fire suppression systems as funding allows.
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	Annual update and review required	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Municipality has capability to establish Emergency Operations Center. Capabilities will grow in the coming years pending funding efforts.
ES-5	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and scheduling of resources, and improve ES coordination
Structural Projects							
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	Review annually	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Review annually	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Annual reviews	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Gastonia Fire Dept.	Local Funding, Grants, as available	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Gastonia Fire Dept.	Local Funding, Grants, as available	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

City of High Shoals Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.
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	2025	Municipality will adopt changes as tax base and growth allow.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

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 (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the City of Lowell's Mitigation Action Plan for the 2025 update.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
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	Low	Gaston County Emergency Management, Lowell	Local Funding as available	2025	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the City of Lowell action plan in the 2025 update.
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	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
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	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Lowell Mitigation Action plan for the 2025 update.
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, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	2025	Funding remains the prominent issue and implementation is in various stages across the county. Future engagements to streamline plans and identify potential funding sources will encourage future action on this issue.
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	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Lowell Mitigation Action plan for the 2025 update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Review annually	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings that can assist in public notification.

Town of McAdenville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the Town of McAdenville's Mitigation Action Plan for the 2025 update.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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-7	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the Town of McAdenville action plan in the 2025 update.
P-8	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, McAdenville	Local Funding	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
P-9	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	McAdenville	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Bessemer City Mitigation Action plan for the 2025 update.
P-10	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
ES-4	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and scheduling of resources, and improve ES coordination efforts. Deliberate outreach effort from county to municipalities.
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	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the McAdenville Mitigation Action plan for the 2025 update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

City of Mount Holly Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the City of Mount Holly's Mitigation Action Plan for the 2025 update.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the City of Mount Holly action plan in the 2025 update.
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	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Mount Holly	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Mount Holly Mitigation Action plan for the 2025 update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.
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	Annually review	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	2025	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2021	Project status being reviewed by new Emergency Management Director. To validate need and requirements.
ES-6	Provide greater support to high profile security events impacting municipalities.	Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2020	Newly added item with a proposed implementation process beginning in 2020. Developing IAP's will improve relationships, ensure availability and scheduling of resources, and improve ES coordination
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	Annual review and update	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	Annual review and update	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

Town of Ranlo Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the Town of Ranlo's Mitigation Action Plan for the 2025 update.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
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	2025, Annual review and update	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the Town of Ranlo action plan in the 2025 update.
P-10	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Ranlo	Local Funding	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Ranlo	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Ranlo Mitigation Action plan for the 2025 update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flood	High	Ranlo Planning Dept.	Local Funding	2025	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Maximize relationship with utilities in the area to emphasize reduction in consumption. Both Duke Energy and Two Rivers Utilities have a vested interest in this effort and are good emergency management partners.
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	Annual review and evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

Town of Stanley Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	Action to be managed by Gaston County moving forward.	Coordination with NC-DENR and Duke Energy is ongoing with GC Emergency Management. New leadership in Emergency Management will be developing a long-range planning calendar. Future engagements will be coordinated with municipalities on this issue driven by the county. This action will be removed the Town of Stanley's Mitigation Action Plan for the 2025 update.
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	Ongoing part of winter storm operations. This item will remain on the list to ensure constant vigilance.
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	2025	Develop a drought hazard specific checklist for availability during drought related conditions. Socialize implementation efforts and identify resource

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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-9	Enforce Building Code and educate inspectors as to mass earth movements.	Landslide, Sinkhole, Earthquake	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Building Code enforcement is a function of Gaston County. This Action will be removed from the Town of Stanley action plan in the 2025 update.
P-10	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornado, Thunderstorm	Low	Gaston County Emergency Management, Stanley	Local Funding	2025	Building code enforcement is a function of Gaston County. To date, "safe rooms" are not required. However, this action will remain in the action plan to ensure that it is revisited in the future.
P-11	Require underground utilities for new construction.	Winter Storm and Freeze, Hurricane, Tornado, Thunderstorm	Medium	Stanley	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	This is a function of Gaston County. As such, it will be removed from the Stanley Mitigation Action plan for the 2025 update.
P-12	Participate in Community Rating System (CRS).	Flood	Medium	Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2025	Ongoing efforts are being made to improve ISO inspection efforts and to partner with fire departments to assist in improving ratings. These efforts are part of a greater strategy that includes an awareness campaign and education process throughout the community to improve CRS ratings.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Although, not mandated, Emergency Management recommendations are being made during care facility Annual Emergency Plan Reviews. Efforts will continue toward greater regulatory guidance in this area.
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	2025	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.
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	2025	Maximize relationship with utilities in the area to emphasize reduction in consumption. Both Duke Energy and Two Rivers Utilities have a vested interest in this effort and are good emergency management partners.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025, Annual evaluation	Continue education efforts to promote emphasis on completion. Work directly with zoning to establish a plan to accomplish within a timeline. Plan development to begin 2020.
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	Annual review and update	Ongoing campaign across county "First 72onU" is an education effort to increase public awareness about threats and preparedness. Additionally, Gaston County has developed a Shelter Task Force that is specifically focused on shelter operations.
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	Annual review and update	Grant Applications pending for 5 weather stations and 50 weather radios to be placed in county fire and executive level leadership locations. Future plans involve weather radio distribution to social media sources with high followings

Lincoln County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
Prevention							
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2025	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.
P-7	Designate sites for the disposal of debris.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Public Works, Emergency Management	Local	2025	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	2025 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	2025	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-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Landslide	High	P&ID	Local	2025	Pending funding and staff time. This is a goal of the department. Over the past 5 years, these regulations were not developed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All	High	Emergency Management, GIS	Local, Grants	2025	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	2025	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	2025, 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	2025	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.
P-17	Increase the number of USGS streamflow gauges in the county.	Flood	Medium	USGS	Grants, Federal	2025	USGS continues to try to install additional streamflow gauges across the state but no new gauges in Lincoln County over the past 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Works	Local, Grants	2025	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	2025	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.
P-20	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of the application. Projects may include, but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.	All	Medium	Cleveland County Emergency Management	Federal Grants	As funding becomes available.	New action for the 2020 plan update.
Property Protection							
PP-1	Purchase property located in repetitively flooded areas.	Flood	Low	County	PDM, HMGP Grants	2025	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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.
ES-2	Assist in development of plans for backup fuel and power generation	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2025	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	2025, 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-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2025	As of 2019, currently active w/ City of Lincolnton, exploring other opportunities going forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025, Re-educate as new maps are produced	Completed, but this activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.
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	2025, 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	2025 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-6	Encourage the removal or trees and branches that could down power lines.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2025, 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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-7	Publicize and properly sign the location of emergency shelters.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2025, 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	2025	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 (2020)
Prevention							
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Winter Storm and Freeze	High	LEDA	Local	2025	The City 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.
P-7	Designate sites for the disposal of debris.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Public Works, Emergency Management	Local	2025	This is a goal of the City 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	Annually	City staff meets at least annually 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	2025	The City will continue to determine alternate water sources as needed. This action will be revisited during the next plan update.
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Landslide	High	P&ID	Local	2025	This action is incomplete pending funding and staff time. 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	2025	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	The City has not yet completed this action but will evaluate the feasibility of joining the program in the future. This action will be revisited during the next plan update.
P-15	Organize regular meetings with local fire officials and the North Carolina Division of Forest Resources.	Wildfire	High	Emergency Management, County Forester	Local	2025, Annually	Pending funding and staff time. The County EM holds monthly meetings with local fire officials and NC Div of Forest Resources staff and the City participates as invited/feasible.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans.	All	High	County	Local	2025	Ongoing. Over the past 5 years, some references have been made to mitigation in public policy documents, but much more is necessary.
P-17	Increase the number of USGS streamflow gauges in the county.	Flood	Medium	USGS	Grants, Federal	2025	USGS continues to try to install additional streamflow gauges across the state but no new gauges in Lincoln County over the past 5 years. This is not a responsibility of the City of Lincolnton but we will do what we can to support this effort.
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Works	Local, Grants	2025	Incomplete, little progress over the past 5 years, pending funding. Currently not funded, but we will continue to pursue funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
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	2025	Implementing this action is a goal of the County's LEPC. The LEPC has been advocating this over the past 5 years, but no change has been made yet. The City will continue to support the efforts of the County's LEPC.
Property Protection							
PP-1	Purchase property located in repetitively flooded areas	Flood	Low	County	Grants	As funds are made available	This action is incomplete but the City will continue to try to implement this action in the future as the need arises.
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	For City roads, this action is implemented through existing City policies and procedures. Additionally, NCDOT initiates road clearing efforts for NCDOT roads as early as possible and plans to continue to do so.
ES-2	Assist in development of plans for backup fuel and power generation.	Winter Storm and Freeze, Tornado, Hurricane, Thunderstorm	High	Emergency Management	Local	2025	The City will work with the County, as requested, to support development of plans for backup fuel and power generation.
Structural Projects							
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flood	Medium	NCDOT	State	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
S-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2025	As of 2019, currently active w/ Lincoln County, 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	2025, Re-educate as new maps are produced	This activity will be continued periodically as necessary. Future Educational Outreach Opportunities to be explored.
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	2025, Re-educate as new maps are produced	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	2025 with Annual review and update	Ongoing pending funding.
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	2025, Annual review and update of outreach strategies	Ongoing 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	2025, Annual review and update of outreach strategies	Ongoing 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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2020)
PEA-8	Educate public of road clearing priorities through use of a map.	Winter Storm and Freeze	Medium	NCDOT	State	2025	Ongoing 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 PROCEDURES

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.

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 Implementation and Integration
- 10.2 Monitoring, Evaluation and Enhancement
- 10.3 Continued Public Involvement
- 10.4 Evaluation of Monitoring, Evaluation and Update Process

10.1 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 Planning Committee 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 initial plan was adopted in 2015 for all three counties, and with each County-specific plan prior to that, 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
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding.

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Committee, individual county meetings, and the annual review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Regional Hazard Mitigation Plan is deemed by the Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.2 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the 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 Planning Committee shall meet in March of every year to evaluate and monitor the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the Regional Hazard Mitigation Planning Committee shall be documented in the form of a report that can be shared with interested City and County Council members. The Regional Hazard Mitigation Planning Committee will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within the Cleveland Gaston Lincoln Region which includes the counties of Cleveland, Gaston, and Lincoln. For future updates of the plan, North Carolina Emergency Management's Hazard Mitigation Planning Section will help coordinate the

reconvening of the Regional Hazard Mitigation Planning Committee for these reviews through coordination with each County's Emergency Management Departments. The Emergency Management Director from Cleveland, Gaston and Lincoln County will maintain ultimate responsibility for their respective County's plan implementation and monitoring, evaluation and update.

Five (5) Year Plan Review

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Planning Committee every five years to determine whether there have been any significant changes in the 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 participating jurisdiction 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. North Carolina Emergency Management's Hazard Mitigation Planning section will help coordinate the reconvening the Regional Hazard Mitigation Planning Committee and conducting the five-year review through coordination with each County's Emergency Management Departments.

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).

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 North Carolina Emergency Management's Hazard Mitigation Planning section to coordinate the reconvening of the Regional Hazard Mitigation Planning Committee, through coordination with each County's Emergency Management Department, and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

The results of the five-year review will be summarized by the Regional Hazard Mitigation Planning Committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, representatives from 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 Planning Committee for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the Regional Hazard Mitigation Planning Committee:

- There are errors, inaccuracies or omissions made in the identification of issues or needs in the Plan
- New issues or needs have been identified which are not adequately addressed in the Plan
- There has been a change in information, data, or assumptions from those on which the Plan is based

Upon receiving the recommendation from the Regional Hazard Mitigation Planning Committee and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the Regional Hazard Mitigation Planning Committee (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- Adopt the proposed amendments as presented
- Adopt the proposed amendments with modifications
- Refer the amendments request back to the Regional Hazard Mitigation Planning Committee for further revision, or
- Defer the amendment request back to the Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings

10.3 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement

44 CFR Part 201.6(c)(4)(iii):
The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the Regional Hazard Mitigation Planning Committee in local newspapers, public bulletin boards and/or County office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the Regional Hazard Mitigation Planning Committee
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place
- Utilizing the Cleveland Gaston and Lincoln county websites to advertise any maintenance and/or periodic review activities taking place, and
- Keeping copies of the Plan in public libraries.

10.4 EVALUATION OF PREVIOUS MONITORING, EVALUATION AND UPDATE PROCESS

Over the past five years, the participating jurisdictions have been independently implementing, monitoring and evaluating their own mitigation action plans. Progress made in implementing actions has been documented in Section 9: Mitigation Action Plan where each action contains a narrative about the implementation status of the action as of 2020. That said, the jurisdiction did waiver slightly from the monitoring and evaluation process defined in the original version of the plan, but still made significant process in implementing their mitigation action plans. During the 2020 update of this plan, the Regional Hazard Mitigation Planning Committee determined that the procedures for the upcoming five-year monitoring and evaluation process will remain as defined above, with minor revisions as noted, and will be re-evaluated during the next plan update process.

The five-year comprehensive update process began as early as 2018 when North Carolina Emergency Management made the decision to set aside HMGP funding from Hurricane Matthew to fund the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan. To facilitate this effort, NCEM assigned the plan update to their pre-qualified hazard mitigation planning consultants ESP Associates. Representatives from ESP Associates first reached out to Cleveland Gaston and Lincoln representatives in September to initiate the plan update process. More details about the plan update process are provided in Section 2, Planning Process.

For the next update of this plan, NCEM's Hazard Mitigation Planning section will continue take the lead on organizing and initiating the 5-year update of the plan.

Appendix A
Plan Adoption

44 CFR Requirement
44 CFR Part 201.6(c)(5): The plan shall include documentation that the plan has been formally adopted by the local governing body of the jurisdiction requesting approval of the plan.

This section of the Plan includes a copy of the local adoption resolution passed by the participating jurisdictions in the Cleveland Gaston Lincoln Region.

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

Appendix B
Planning Tools

This section of the Plan includes the following three (3) items:

1. A Blank Public Survey
2. A Blank Capability Assessment
3. Scoring Criteria for the Capability Assessment

PUBLIC SURVEY
FOR HAZARD MITIGATION PLANNING

We need your help!

Cleveland, Gaston, and Lincoln Counties and the municipalities within the counties are working together to become less vulnerable to natural disasters, and your participation in the process is important to us!

The counties, along with local jurisdictions and other partners, are working to update the multi-jurisdictional *Regional Hazard Mitigation Plan*. This Plan identifies and assesses our community's natural hazard risks and identifies strategies that determine how to best minimize or manage those risks.

This survey is 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 impacts of future hazard events.

Please help us by completing this survey by February 28, 2019 and returning it to:

Jamie Derose, ESP Associates, Inc
2200 Gateway Centre Blvd., Suite 216
Morrisville, NC 27560

Surveys can also be emailed to jderose@espassociates.com.

If you have any questions regarding this survey or would like to learn about more ways you can participate in the update of the *Cleveland Gaston Lincoln Regional Hazard Mitigation Plan*, please contact ESP Associates, Inc, planning consultant for the project. You may reach Jamie Derose (ESP Associates) at 919-415-2757 or by email at jderose@espassociates.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
- ❑ Kings Mountain
- ❑ Kingstown
- ❑ Lattimore
- ❑ Lawndale
- ❑ Lincolnton
- ❑ Lowell
- ❑ McAdenville
- ❑ Mooresboro
- ❑ Mount Holly
- ❑ Patterson Springs
- ❑ Polkville
- ❑ Ranlo
- ❑ Shelby
- ❑ Spencer Mountain
- ❑ Stanley
- ❑ Waco
- ❑ Other:_____

2. **Have you ever experienced or been impacted by a disaster?**

   - ❑ Yes
   - ❑ No

   a. **If "Yes," please explain:**

3. **How concerned are you about the possibility of your community being impacted by a disaster?**

   - ❑ Extremely concerned
   - ❑ Somewhat concerned
   - ❑ Not concerned

4. **Please select the <u>one</u> hazard you think is the *highest threat* to your neighborhood:**

   - ❑ Dam / Levee Failure
   - ❑ Drought
   - ❑ Earthquake
   - ❑ Erosion
   - ❑ Extreme Heat
   - ❑ Flood
   - ❑ Hailstorm
   - ❑ Hazardous Materials Incident
   - ❑ Hurricane / Tropical Storm
   - ❑ Landslide
   - ❑ Lightning
   - ❑ Nuclear Accident
   - ❑ Thunderstorm Wind / High Wind
   - ❑ Tornado
   - ❑ Wildfire
   - ❑ Winter Storm / Freeze

5. **Please select the <u>one</u> hazard you think is the *second-highest threat* to your neighborhood:**

   - ❑ Dam / Levee Failure
   - ❑ Drought
   - ❑ Earthquake
   - ❑ Erosion
   - ❑ Extreme Heat
   - ❑ Flood
   - ❑ Hailstorm
   - ❑ Hazardous Materials Incident
   - ❑ Hurricane / Tropical Storm
   - ❑ Landslide
   - ❑ Lightning
   - ❑ Nuclear Accident
   - ❑ Thunderstorm / High Wind
   - ❑ Tornado
   - ❑ Wildfire
   - ❑ Winter Storm / Freeze

6. **Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?**

   - ❑ Yes (please explain): _____
   - ❑ No

7. **Is your home located in a FEMA floodplain?**

   - ❑ Yes
   - ❑ No
   - ❑ I don't know

8. **Do you have flood insurance for your home/personal property?**

   - ❑ Yes
   - ❑ No
   - ❑ I don't know

   a. **If "No," why not?**

      - ❑ My home is not located in a floodplain
      - ❑ I rent
      - ❑ It's too expensive
      - ❑ I don't need it because it never floods
      - ❑ I don't need it because my home is elevated or otherwise protected
      - ❑ I never really considered it
      - ❑ Other (please explain): _____

9. **Have you taken any actions to make your home, neighborhood, or family safer from hazards?**

   - ❑ Yes
   - ❑ No

   b. **If "Yes," please explain:**

10. **Are you interested in making your home, neighborhood, or family more resistant to hazards?**

    - ❑ Yes
    - ❑ No

11. **Do you know what office to contact regarding risks from hazards in your area?**

    - ❑ Yes
    - ❑ No

12. What is the most effective way for you to receive information about how to make your home, neighborhood, or family more resistant to hazards?

- ❑ Newspaper
- ❑ Television advertising
- ❑ Television programs
- ❑ Radio advertising
- ❑ Radio programs
- ❑ Internet
- ❑ Email
- ❑ Mail
- ❑ Public workshops/meetings
- ❑ School meetings
- ❑ Other (please explain): _____

13. In your opinion, what are some steps your local government could take to reduce the risk of future hazard damages in your neighborhood?

14. Are there any other issues regarding the risks and losses from hazards or disasters that you would like to mention?

15. A number of community-wide activities can reduce vulnerability to hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each category is for your community to consider.

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 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:** _____

Local Capability Assessment Survey

Jurisdiction/Agency: _____ **Phone:** _____

Point of Contact: _____ **E-mail:** _____

1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction by placing an "**X**" in the appropriate box. Then, for each particular item in place, identify the department or agency responsible for its implementation and indicate its estimated or anticipated effect on hazard loss reduction (Strongly Supports, Helps Facilitate or Hinders) with another "**X**". Finally, please provide additional comments or explanations in the space provided or with attachments.

Planning / Regulatory Tool	In Place	Under Development	Department / Agency Responsible	Effect on Loss Reduction			Comments
				Strongly Supports	Helps Facilitate	Hinders	
Hazard Mitigation Plan							
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)							
Floodplain Management Plan							
Open Space Management Plan (or Parks & Rec./ Greenways Plan)							
Stormwater Management Plan / Ordinance							
Natural Resource Protection Plan							
Flood Response Plan							
Emergency Operations Plan							
Continuity of Operations Plan							
Evacuation Plan							
Other Plans (please explain under Comments)							

Local Capability Assessment Survey

Planning / Regulatory Tool	In Place	Under Development	Department / Agency Responsible	Effect on Loss Reduction			Comments
				Strongly Supports	Facilitates	Hinders	
Disaster Recovery Plan							
Capital Improvements Plan							
Economic Development Plan							
Historic Preservation Plan							
Floodplain Ordinance (or Flood Damage Prevention Ordinance)							
Zoning Ordinance							
Subdivision Ordinance							
Unified Development Ordinance							
Post-disaster Redevelopment / Reconstruction Ordinance							
Building Code							
Fire Code							
National Flood Insurance Program (NFIP)							
NFIP Community Rating System (CRS Program)							

Local Capability Assessment Survey

2. ADMINISTRATIVE AND TECHNICAL CAPABILITY - Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "**X**" in the appropriate box . Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff / Personnel Resources	Yes	No	Department / Agency	Comments
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				
Land surveyors				
Scientist familiar with the hazards of the community				
Staff with education or expertise to assess the community's vulnerability to hazards				
Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program				
Resource development staff or grant writers				

Local Capability Assessment Survey

3. FISCAL CAPABILITY - Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for State of Federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any other comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department / Agency	Comments
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: _____				

Local Capability Assessment Survey

4. POLITICAL CAPABILITY - Political capability can be generally measured by the degree to which local political leadership is willing to enact policies and programs that reduce hazard vulnerabilities in your community, even if met with some opposition. Examples may include guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum State or Federal requirements (e.g., building codes, floodplain management, etc.). Please identify some general examples of these efforts if available and/or reference where more documentation can be found.

Local Capability Assessment Survey

5. SELF-ASSESSMENT OF CAPABILITY - Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate or High) based upon best available information and the responses provided in Sections 1-4 of this survey.

	DEGREE OF CAPABILITY		
	LIMITED	**MODERATE**	**HIGH**
Planning and Regulatory Capability			
Administrative and Technical Capability			
Fiscal Capability			
Political Capability			
OVERALL CAPABILITY			

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

Appendix C
Local Mitigation Plan Review Tool

This section of the Plan includes a completed Local Mitigation Plan Review Tool.

Appendix D
Planning Process Documentation

This section of the Plan includes the following five (5) categories of items:

1. *CGL Regional Hazard Mitigation Planning Committee Meeting Agendas*
2. *CGL Regional Hazard Mitigation Planning Committee Meeting Sign-in Sheets*
3. *CGL Regional Hazard Mitigation Planning Committee Meeting Minutes*
4. *Neighboring Jurisdiction Outreach Documentation*
5. *Public Survey Summary Results*

AGENDA

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update

Kickoff Meeting

November 15, 2018

10:00 AM – Noon

1) **Introductions**

2) **Mitigation Refresher/Icebreaker Exercise**

3) **Project Overview**
   a) Key Objectives
   b) Project Tasks
   c) Project Schedule
   d) Project Staffing

4) **Roles & Responsibilities**
   a) ESP
   b) County Leads
   c) Participating Jurisdictions/Stakeholders

5) **Next Steps**
   a) Data collection efforts
   b) Begin public outreach
   c) Discuss next Hazard Mitigation Planning Team meeting

6) **Questions, Issues or Concerns**

AGENDA

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

Mitigation Strategy Workshop

February 21, 2019

10:00AM - Noon

1) **Introductions**

2) **Mitigation Recap**

3) **Project Schedule**

4) **Risk Assessment Findings**

   a) **Hazard Identification**
   b) **Hazard Profiles**
   c) **Hazard Vulnerability Assessment**

5) **Capability Assessment Findings**

6) **Mitigation Strategy**

7) **Mapping Exercise**

8) **Summary of Public Involvement**

9) **Plan Maintenance**

10) **Next Steps**

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Kickoff Meeting

November 15, 2018

10AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Josh Queen	Cleveland Co EM	Shelby	704-484-4841	josh.queen@clevelandcounty.com
Perry Davis	Cleveland Co. EM	Shelby	704-484-4841	Perry.Davis@clevelandcounty.com
Jason Wofford	Cherryville Fire	Cherryville	704-435-1730	jwofford@cityofcherryville.com
Jimmy Earp	GASTON CO. FIRE MARSHAL	GASTON CO	704-913-3696	jearp@gcps.org
Bobby Horton	Cleveland County EM	Shelby	704-484-4841	Bobby.Horton@ClevelandCounty.com
CHRIS FERGUSON	NCEM		(919) 825-2569	christopher.fergusone@ncdps.gov
Eric Carlton	Lincoln County Planning		704-736-8424	ecarlton@lincolncounty.org
Andrew C. Bryant	Lincoln County Planning	Lincolnton	(704) 736-8726	abryant@lincolncounty.org

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Kickoff Meeting

November 15, 2018

10AM - Noon

Name	Agency	City	Phone Number	E-mail Address
David L. Williams	Gaston County Planning	Gastonia NC	(704) 866-3473	david.williams@gastongov.com
Scott Bates	Lowell Police	Lowell, N.C.	704-824-8540	bates@lowellpd.org
BOB NIGHTINGALE	MT HOLLY FIRE DEPARTMENT	MOUNT HOLLY. NC	704 822 2927	RYAN. BAKER@MTHOLLY.US
Tiffany Faro	Town of Dallas →		757-755 0282	tfaro@dallasnc.net
Julia Baker-Granata	City of Gastonia	Gastonia	704-866-6748	jebaker@cityofgastonia
Jena L. Goodman	Gaston Co. Planning		704-866-3907	jena.goodman@gastongov.com
Willie King, Jr.	Gaston County Planning Off.	Gastonia	704.862.5510	willie.king@gastongov.com
Laura Elam	City of Lincolnton	Lincolnton	704-736-8930	lelam@lincolntonnc.org

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Kickoff Meeting

November 15, 2018

10AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Jean Derby	City of Lincolnton	Lincolnton	704 736 8930	JDerby@LincolntonNC.org

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Mitigation Strategy Workshop

February 21, 2019

10AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Tiffany Faro	Town of Dallas	Dallas	704.922-3176x 230	tfaro@dallasnc.net
Perry Davis	Cleveland Co. EM	Shelby	704-484-4841	Perry.Davis@clevelandcounty.com
Josh Queen	Cleveland Co EM	Shelby	704-484-4841	josh.queen@clevelandcounty.com
ALEX ROBINSON	CITY OF BELMONT	SAME	704 901 2066	ARobinson@CITYOFBELMONT.ORG
Jonathan Wilson	Mount Holly	Same	704-951-3014	jonathan.wilson@mtholly.us
David Williams	Gaston County	Gastonia	704 866 3473	david.williams@gaston.nc.us

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Mitigation Strategy Workshop

February 21, 2019

10AM - Noon

Name	Agency	City	Phone Number	E-mail Address
Jena Goodman	Planning Gaston	Gaston Co.	704-866-3907	Jena.goodman@gastongov.com
Jean Derby	City of Lincolnton	Lincolnton	704 736 8930	J Derby @ LincolntonNC.org
Andrew C. Bryant	Lincoln County	Lincoln	(704) 736-8726	abryant@Lincolncountync.org
Christopher Ferguson	NCEM		(919) 285-2569	christopher.ferguson@ncdps.gov
Willie King Jr.	Gaston County		704.862.5510	willie.king@gastongov.com
Ryan Baker	Mount Holly Fire	Mt. Holly	704-822-2927	Ryan.Baker@mtholly.us

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Public Meeting

November 15, 2018
4:00PM - 6:00PM

Name	Agency	City	Phone Number	E-mail Address
Angie Saunders	Gaston Regional Chamber	Gaston County	704-864-2621	angie@gastonchamber.com
Eric Hendrix	Gaston County Fire Marshal's Office	Gastonia	704-866-3231	EHENDRIX@GCPS.ORG
Jena Goodman	Gaston County Planning		704.866-3907	Jena.goodman@gastongov.com
Willie King, Jr.	Gaston County Planning Office	Gastonia	704.862.5510	willie.king@gastongov.com
June Jones	United Way G.C	Gastonia	7048644554	jjones@unitedwaygaston.org
Andrew Bryant	citizen	Gastonia	(704) 813-7884	andrewcbryant@gmail.com

MEETING MINUTES
CGL RHMP Update Kickoff Meeting
November 15, 2018
High Shoals Town Hall

The Mayor Pro Tem of High Shoals welcomed everyone to the Town Hall.

Nathan Slaughter, Department Manager from ESP Associates, Inc. and Project Manager for the update of the CGL Regional Hazard Mitigation Plan, began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting.

Mr. Slaughter led the meeting of the Regional Hazard Mitigation Planning Team and began by having attendees introduce themselves. The 17 attendees included representatives from various departments and local jurisdictions within each of the three counties participating in the plan update. All three counties were represented. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed the agenda and presentation slide handouts. He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

To continue, Mr. Slaughter provided detailed information about the project. He mentioned that the project is funded by a FEMA PDM grant, and that representatives from each County met together to hire ESP Associates, Inc. to manage the update, thus ensuring that Mr. Slaughter would remain the Project Manager. For this update, there was no local match requirement.

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained how we should think about mitigation: we want to mitigate hazard impacts of existing development in the community (houses, businesses, critical facilities, etc.), and ensure that future development is conducted in a way that doesn't increase vulnerability. This can be achieved by having good plans, policies, and procedures in place.

Following the overview, Mr. Slaughter led the group in an "icebreaker" exercise to refamiliarize meeting participants to various mitigation techniques. He briefly recapped 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, Jamie DeRose, Lead Planner from ESP, tabulated and shared the results with the group. The most mock money was spent on emergency services. These results were compared against those from the previous plan development's ice breaker exercise. This helped demonstrate how priorities in mitigation actions have changed since the previous update.

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

- Coordinate between the three participating counties to update the regional plan
- Update the plan to demonstrate progress and reflect current conditions
- Complete the update before the existing plan expires on May 4, 2020
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update the plan in accordance with Community Rating System (CRS) requirements, and

- Maintain compliance with State and Federal requirements

Next, he explained new elements to this update, which include the NCEM's RMT, Activity 510 compliance for CRS communities, Risk MAP, Community Wildfire Protection Plans, the NC Resilience Assessment, and EMAP compliance.

Mr. Slaughter reviewed the list of participating jurisdictions with the group, which all agreed to participate again. He also explained the planning process and specific tasks to be accomplished for the project, which include the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan, and plain maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point of contact to coordinate the gathering of GIS data required for the analysis. He also reviewed the list of identified hazards and the committee agreed to maintain the previous list of hazards for the three counties.

The project schedule was presented and Mr. Slaughter noted that the twelve-month schedule provided ample time to produce a quality plan and meet state and federal deadlines.

Mr. Slaughter discussed what data would need to be collected to complete the project. This includes GIS Data, Capability Assessment Revisions, a Public Participation Survey, and updates to existing Mitigation Actions.

Mr. Slaughter then reviewed the roles and responsibilities of ESP Associates, Inc, the County leads, and the participating jurisdictions. 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. The next HMPT meeting was scheduled for some time in February 2019 to discuss the findings of the risk and capability assessments and to begin updating existing mitigation actions and identify new goals.

MEETING MINUTES
CGL RHMP Update Public Meeting
November 15, 2018
Gaston County Citizens Resource Center

Nathan Slaughter, Department Manager from ESP Associates, Inc. and Project Manager for the update of the CGL Regional Hazard Mitigation Plan, began the meeting by meeting individually with each attendee. He gave a brief overview of the project and the purpose of the meeting.

He explained that the project is funded by a FEMA PDM grant and is conducted to comply with the Disaster Mitigation Act of 2000 and NC Senate Bill 300. He then discussed the region's high, moderate, and low risk hazards that the Regional Hazard Mitigation Planning Team had elected.

Next, Mr. Slaughter identified the six hazard mitigation planning techniques: prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness. He followed by providing the list of all participating counties and their respective jurisdictions.

Mr. Slaughter then showed an example of the previous Mitigation Action Plan and asked the following questions:

- Where are trouble spots in your neighborhood?
- How can mitigation be improved in your community?
- Which mitigation techniques need improvement?

The meeting concluded after the attendees gave their personal opinions and filled out the public survey.

January 24, 2019
Meeting with Gaston County Emergency Management
615 North Highland St.
Gastonia NC 28053
3PM -5:30 PM

Attendees:

- Nathan Slaughter, ESP Associates
- Keith Rapp, Gaston County Emergency Management
- Eric Hendrix, Gaston County Fire Marshal

At the request of new Gaston County Emergency Management Director, Keith Rapp, Mr. Slaughter met with Mr. Rapp and Mr. Hendrix at the Gaston County Emergency Operations Center in Gastonia to review and discuss the hazard mitigation plan update. Mr. Rapp was unable to attend the kickoff meeting for the regional plan update and is new to emergency management so Mr. Slaughter provided a general over view of hazard mitigation and the walked through the existing plan with Mr. Rapp and Mr. Hendrix.

The primary focus of conversation was on the mitigation strategy and what is required of Gaston County for updating the mitigation actions in the plan. Mr. Slaughter indicated that all existing actions need to be updated to determine if the actions have been completed, deleted or will be deferred. Mr. Slaughter said that for each action update, more detailed information will need to be provided for each status update to indicate why that status was given.

Mr. Rapp had several questions about specific projects and whether or not they would qualify for hazard mitigation grant funding. Mr. Slaughter addressed all questions and indicated that any actions that appear to potentially reduce vulnerability to hazards in Gaston County should be considered for inclusion in the plan, whether or not they specifically qualify for FEMA hazard mitigation funding.

Specific projects discussed included:

- Gages to be included in the North Carolina's FIMAN system for flood warning.
- Temporary flood wall barrier protection for Cramerton.
- Planning for shelters in Gaston County.
- Hazmat equipment needs.

Mr. Slaughter indicated that updated mitigation actions would be due later in March of 2019. The meeting concluded at 5:30 PM.

MEETING MINUTES
Mitigation Strategy Meeting
February 21, 2019
Town of Dallas Community Room

Nathan Slaughter, Project Manager from ESP Associates, began the meeting by welcoming the attendees and reviewing the meeting handouts, which included an agenda, existing plan goals for the regional plan, and a hard copy of the meeting presentation. Mr. Slaughter asked meeting attendees to introduce themselves and gave a refresher on mitigation, why we plan, and the key objectives of the project. He reviewed the participating jurisdictions, project tasks and project schedule. He stated that a draft of the updated Regional Hazard Mitigation Plan would be presented in May.

Jamie DeRose, Lead Planner from ESP Associates, then presented the findings of the risk assessment. She shared the list of all hazards that are addressed in the regional plan, and reviewed the list of hazards addressed in the North Carolina State Hazard Mitigation Plan. She discussed a couple of caveats for the risk assessment and indicated that best available data was used. While that information is helpful, events are often under-reported, so it is important to keep the end goal in sight. The purpose of the risk assessment was shared: to compare hazards and determine which should be the focus of the mitigation actions. Finally, she mentioned to the stakeholders that it ultimately is their risk assessment, so their recommendations for adjustment are welcomed and encouraged.

Ms. DeRose stated that since the last plan was updated, there have been two Presidential disaster declarations that have impacted the areas surrounding the region, which helped emphasize the need to continue updating the mitigation plan.

The following Hazard Profiles and summaries of each hazard were then shared:

- DROUGHT: There were 13 regional drought events between 2005 and 2018, and future occurrences are likely.
- EXTREME HEAT: The average maximum temperatures from the past 48 months were shared. Future occurrences are likely.
- HAILSTORM: There have been 423 recorded events since 1962. Future occurrences are likely.
- HURRICANE AND COASTAL STORM: 37 storm tracks have come within 75 miles of the region since 1854. 14 of those were classified as a hurricane or tropical storm. Future occurrences are likely.
- LIGHTNING: Since 1996, there have been 55 reported occurrences, which resulted in 15 injuries and nearly $6 million dollars in property damage. Future occurrences are highly likely.
- SEVERE THUNDERSTORMS: 484 severe thunderstorm events have been recorded since 1950. These events resulted in 4 deaths, 41 injuries and $3.3 million in property damages. Future occurrences are highly likely.
- TORNADOES: There have been 55 recorded events since 1950, causing 5 deaths, 77 injuries, and $125,181,374 in property damage. Future occurrences are likely.
- WINTER STORM AND FREEZE: 231 winter weather events that resulted in over $55 million in property damage have been recorded since 1993. Future occurrences are highly likely.
- DAM AND LEVEE FAILURE: Of the 236 dams in the region, 47 are considered high hazard dams. No serious breaches have been reported, and future occurrences are unlikely.

- EROSION: Although little information could be obtained on erosion occurrences in the region, erosion was addressed in the previous plan. Future occurrences are possible.
- FLOOD: 60 flood events have occurred since 1993, resulting in over $5 million in property damage. There have also been 106 reported NFIP losses since 1978 and approximately $773,246 in claims. There are 2 repetitive loss properties, and future occurrences are highly likely.
- EARTHQUAKE: No significant earthquake events have taken place in the region, but future occurrences are possible.
- LANDSLIDE: No records of severe landslides were reported, and future occurrences are possible.
- HAZARDOUS MATERIALS INCIDENTS: 24 serious HAZMAT events have been reported through the PHMSA. There are 52 TRI Facilities in the region. Future occurrences are possible.
- WILDFIRE: FEMA reports that 182 acres in the region are burned every year on average, although they are mostly small. Future occurrences are likely.
- NUCLEAR EMERGENCY: There are 2 nuclear facilities within 50 miles of the region. No major historical occurrences were found, and future occurrences are unlikely.

In concluding the review of Hazard Profiles, Ms. DeRose stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email her 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 and Flood. The committee reviewed most recent hazard profile data and discussed moving Hurricanes and Tropical Storms down in rankings, and moving HAZMAT and Extreme Heat up in rankings.

Ms. DeRose then displayed maps that presented each county's social vulnerability, as documented by the Center for Disease Control. The maps present how socially vulnerable areas in each county are as compared to the rest of North Carolina. Many indicators were used to determine the social vulnerability, and the factors were grouped into four themes that were based on census-tract levels.

After a brief break, Mr. Slaughter then presented the Capability Assessment Findings. ESP Associates used 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 ESP Associates.

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 moderate to high range for Planning and Regulatory Capability and in the low to 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, it was determined that all of the participating jurisdictions have moderate or high capabilities to implement hazard mitigation programs and activities.

Mr. Slaughter then transitioned to the Mitigation Strategy portion of the presentation. He began by reviewing some of the major concepts of mitigation and then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Planning Committee meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Emergency Services $110
- Prevention $64
- Structural Projects $64
- Property Protection $40
- Education and Awareness $35
- Natural Resource Protection $27

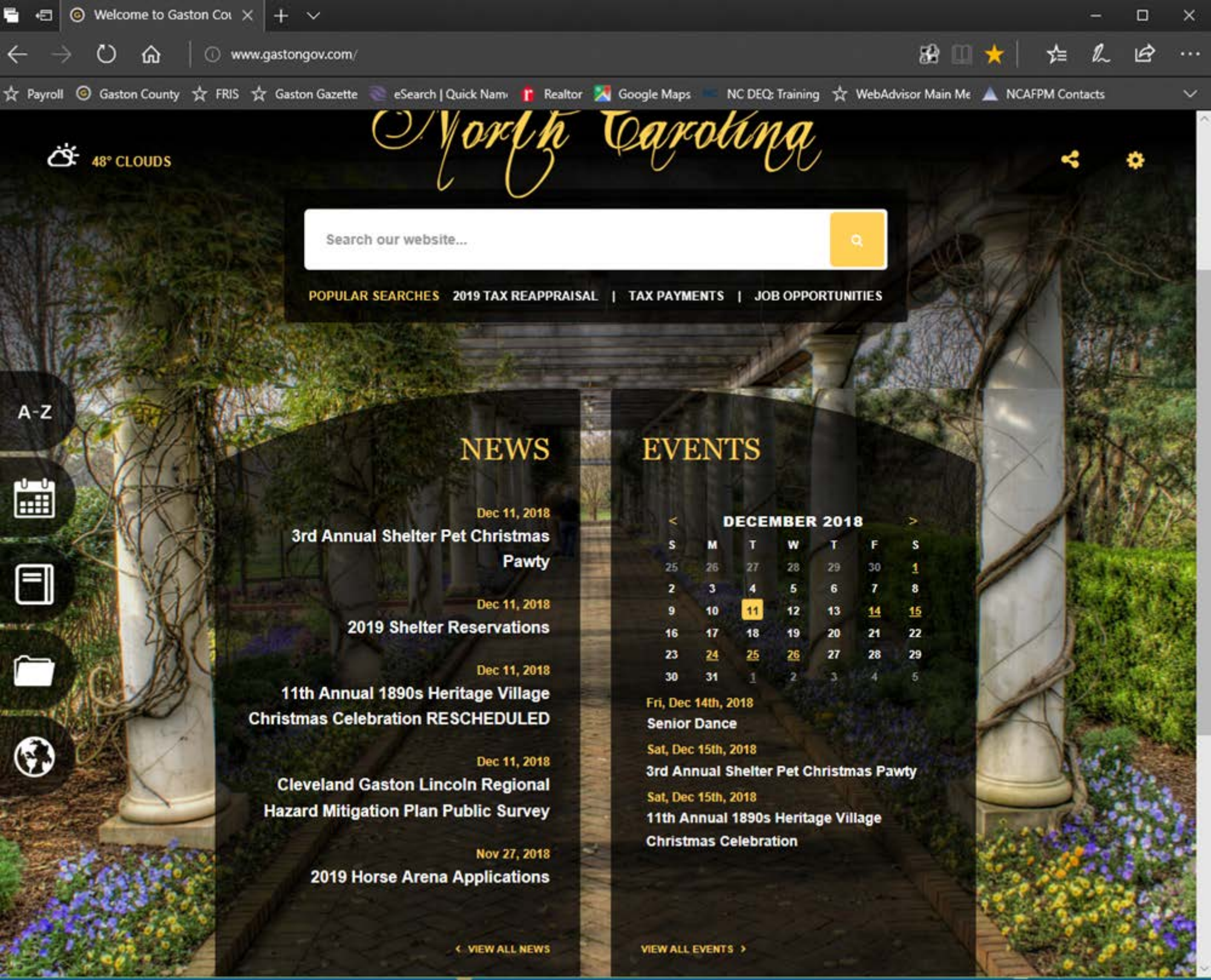
Mr. Slaughter gave an overview of the process for updating the Mitigation Strategy and presented the existing mitigation goals for the regional plan. He asked the Regional Hazard Mitigation Planning Committee to review the goals to determine whether or not they still reflect current vulnerabilities and current mitigation priorities. The committee members agreed that the fourth goal should be modified to include specific coordination between the three participating counties in the region.

Mr. Slaughter then indicated that each participating jurisdiction would need to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by March 21, 2019. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by March 21, 2019. Mr. Slaughter then presented sample mitigation actions for the committee members to consider to include in their plan update.

During a working lunch, the attendees split into three groups by county. They were instructed to look at large maps of their counties that included major roads and floodplains and identify vulnerable areas that could be considered for potential new mitigation actions.

Mr. Slaughter and Ms. DeRose then discussed the results of the public participation survey that was posted on several of the participating counties' and jurisdictions' websites. As of the meeting date, 237 responses had been received. Based on the preliminary results, respondents felt that hurricanes, winter storms, and tornadoes posed the greatest threats to their neighborhood. Most did not live in a floodplain or have flood insurance, but 65.4% of all respondents did not know who to contact regarding reducing their risks to hazards.

Finally, Mr. Slaughter discussed the next steps in the planning process. These included returning mitigation action updates and delivery of a draft plan in May 2019. He sincerely thanked the group for taking the time to attend and the meeting was adjourned.


Welcome to Gaston Cou
www.gastongov.com/
Payroll
Gaston County
FRIS
Gaston Gazette
eSearch | Quick Nam
Realtor
Google Maps
NC DEQ: Training
WebAdvisor Main Me
NCAFPM Contacts
North Carolina
48° CLOUDS
Search our website...
POPULAR SEARCHES
2019 TAX REAPPRAISAL
TAX PAYMENTS
JOB OPPORTUNITIES
A-Z
NEWS
Dec 11, 2018
3rd Annual Shelter Pet Christmas Pawty
Dec 11, 2018
2019 Shelter Reservations
Dec 11, 2018
11th Annual 1890s Heritage Village Christmas Celebration RESCHEDULED
Dec 11, 2018
Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Public Survey
Nov 27, 2018
2019 Horse Arena Applications
VIEW ALL NEWS
EVENTS
DECEMBER 2018
S M T W T F S
25 26 27 28 29 30 1
2 3 4 5 6 7 8
9 10 11 12 13 14 15
16 17 18 19 20 21 22
23 24 25 26 27 28 29
30 31 1 2 3 4 5
Fri, Dec 14th, 2018
Senior Dance
Sat, Dec 15th, 2018
3rd Annual Shelter Pet Christmas Pawty
Sat, Dec 15th, 2018
11th Annual 1890s Heritage Village Christmas Celebration
VIEW ALL EVENTS

Cleveland, Gaston, and Lincoln Counties and local municipalities are working to become less vulnerable to natural disasters. We want your help updating the Regional Hazard Mitigation Plan.

Take the survey at https://s.surveyplanet.com/NdZMVmm2d

Lincoln County Government
115 W. Main St.
Lincolnton, NC 28092
Contact Lincoln County

EMERGENCY ALERTS



NOTIFY ME SIGN UP TODAY

SERVICE REQUEST

E-SERVICES ACCESS

CONTACT US

History Corner



EXPLORE THE COUNTY'S PAST >

News and Announcements

- **Trails at Shanklin Library are Closed**
  The trails at the Shanklin Branch Library are closed to the public at this time. The County is working on a plan for repairs. The estimated completion date for this project is yet to be determined. We apologize for the inconvenience.

- **Regional Hazard Mitigation Plan Survey - We Need Your Help**
  Cleveland, Gaston, and Lincoln Counties and the municipalities within the counties are working together to become less vulnerable to natural disasters, and your participation in the process is important to us! Read on...

- **Public Comment Period for: 2018-2027 Metropolitan Transportation Improvement Program (MTIP) amendme**
  The Gaston-Cleveland-Lincoln Metropolitan Planning Organization (GCLMPO) has established a public comment period for the two long range transportation planning documents and their Unified Planning Work Program Read on...

- **State Transportation Officials Announce Projects for Next Decade**
  The state has included more than 1,600 transportation projects in the draft 2020-2029 transportation plan, which was released at Thursday's regular Board of Transportation meeting. Read on...

- **NCDOT Requesting Public Comment on NC Moves 2050 Plan**
  NC Moves 2050 ?is a strategic transportation plan connecting community across North Carolina. The plan is focused on creating a more responsive, diverse and inclusive transportation system for keeping people and freight moving safely and efficiently. Read on...

VIEW ALL NEWS >

QUICK LINKS

>Adoptable Pets from Animal Services
>**After Hours Essential Service Phone Numbers**
>Board of Commissioners Agenda and Minutes
>Board of Commissioners Meeting Video
>Business Personal Property Tax
>**Citizen Alert System**
>**County Construction Projects**
>**Elections**
>Employment Opportunities
>**GIS Revaluation Data**
>Foreclosure List
>Gov Deals
>**Pay Taxes Online**
>**Pay Utility Bills Online**
>Pending Zoning Cases

VIEW ALL LINKS >

CALENDAR

Mon, Feb. 11
Cardio Dance
Mon, Feb. 11
Exercise Class
Mon, Feb. 11
Baby Rhyme Time
Mon, Feb. 11
Pre-School Storytime - Shanklin Library
Mon, Feb. 11
Cornhole Practice
Mon, Feb. 11
Spades
Mon, Feb. 11
Bridge II
Mon, Feb. 11
Drop In Love Bug Craft
Mon, Feb. 11
Kids Art Class with Candy Shannon
Mon, Feb. 11
Adult Writers - "Limericks and Sonnets"
Tue, Feb. 12
Bluegrass Jam
Tue, Feb. 12
Pre-School Storytime - Shanklin Library
Tue, Feb. 12
Bridge
Tue, Feb. 12
Living Healthy With Diabetes
Tue, Feb. 12
Volunteer Meeting

VIEW ALL EVENTS >

www.lincolncounty.org/CivicAlerts.aspx?AID=921

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02Planning & Inspections

Posted on: November 5, 2018

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update – Public Meeting

Cleveland, Gaston, and Lincoln counties are working together to update the regional Hazard Mitigation Plan.

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All interested residents from these counties and participating jurisdictions are invited to attend the meeting. By applying a collective approach to hazard mitigation plan development, we will contribute to a more resilient community! We look forward to seeing you on the 15th!

November 15th, 2018
4PM-6PM

Gaston County Citizen's Resource Center
(Conference Rooms A & D)
1303 Dallas Cherryville Highway
Dallas, NC 28034

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News and Announcements

- **Lincoln County Government offices will be closed on Thursday, November 22 and Friday, November 23**
  All county offices will be closed for Thanksgiving
- **The East Lincoln Public Utility Office is Closed**
  The East Lincoln Utility payment office is temporarily closed until further notice. We apologize for the inconvenience. If you need assistance, please contact our Lincolnton office at 704-736-8497.
- **New Utility Bill Due Date**
  Beginning October 31, 2018, the due date for utility bills will be the 20th of each month. Any bill not paid by the due date will be subject to late fees and default fees. Read on...
- **A Tour of Two Inglesides**
  Two Inglesides. Ten miles apart. Two architectural styles. Both highly significant. Join Preservation North Carolina and Charlotte-Mecklenburg Historic Landmarks Commission on the afternoon of Sunday, December 2nd to celebrate their preservation! Read on...
- **Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update – Public Meeting**
  Cleveland, Gaston, and Lincoln counties are working together to update the regional Hazard Mitigation Plan. Read on...

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>**Pay Taxes Online**
>**Pay Utility Bills Online**
>**Property Analytics - GIS Information**

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CALENDAR

Thu, Nov. 1 - Thu, Dec. 27
Yoga Session

Thu, Nov. 15
Sassy Classy Seniors

Thu, Nov. 15
Pre-School Storytime - West Lincoln Branch Library

Thu, Nov. 15
Toddler Storytime (Ages 2 to 3)

Thu, Nov. 15
Trivia

Thu, Nov. 15
Canasta

Thu, Nov. 15
Elder law Program "Keep It In The Family"

Thu, Nov. 15
Financial Planning " Annuities"

Thu, Nov. 15
Art for All Ages - Turkey Painting

Thu, Nov. 15
LEGO Challenge

Thu, Nov. 15
Young Adult Writers - "Researching"

Fri, Nov. 16
Cardio Dance/Cool Down with Weights & Floor Exercises

Fri, Nov. 16
BINGO with a Theme "Thanksgiving Luncheon"

Fri, Nov. 16
Mexican Train

Sat, Nov. 17
Sensory Storytime - Ages 2 to 8

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02Planning & Inspections

Posted on: November 5, 2018

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4PM-6PM

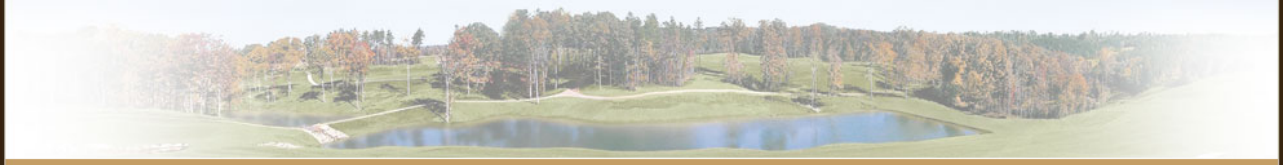
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Public Input Invited On Hazard Mitigation Plan



Wayne Howard
Staff Writer



Photo Courtesy of FEMA (Federal Emergency Management Agency)

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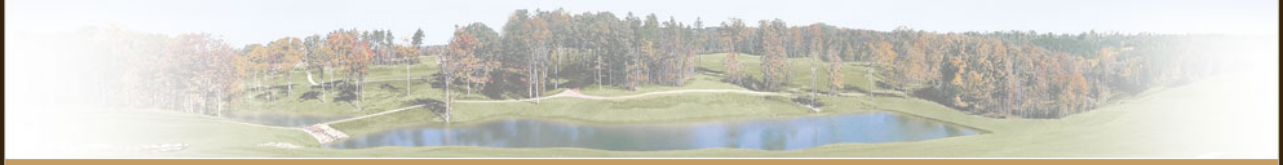
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Photo Courtesy of FEMA (Federal Emergency Management Agency)

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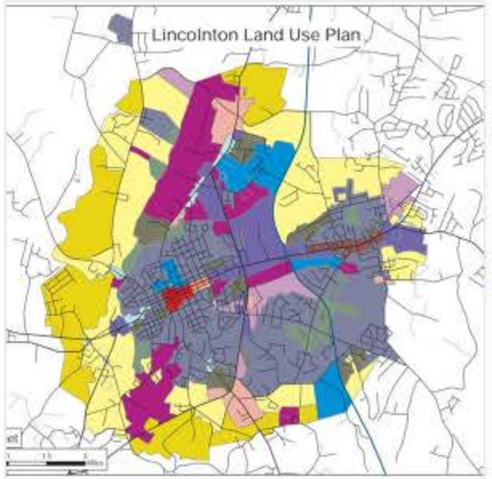
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Posts

City Of Lincolnton
Published by Jean Payne [?] · 47 mins ·

Your awareness of and opinions about natural hazards as part of the planning process is needed. Lincoln County has joined a three county regional initiative with Gaston and Cleveland Counties, with the purpose to plan and prepare the appropriate actions to take before a disaster strikes.

Survey open until 2/28; take the survey at this link:
https://s.surveyplanet.com/NdZMVmm2d ... See More



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Chat (12)

Nathan Slaughter

From: Nathan Slaughter
Sent: Wednesday, August 7, 2019 10:27 AM
To: frankie.hamrick@rutherfordcountync.gov; danny.searcy@rutherfordcountync.gov; Michael.Willis@burkenc.org; kyaussy@catawbacountync.gov; jeubanks@catawbacountync.gov; jsmyre@co.iredell.nc.us; kwolfe@co.iredell.nc.us; cbonham@ci.charlotte.nc.us; amjackson@charlottenc.gov; ycoem@yorkcountygov.com; rick.peterson@cherokeecountysc.com
Cc: Jamie DeRose
Subject: NOTIFICATION: Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

Good morning

You are receiving this email because a neighboring County (Cleveland County, Gaston County and/or Lincoln County NC), along with the municipalities within those counties and other participating partners, are now working to update the region's multi-jurisdictional *Cleveland Gaston Lincoln Regional Hazard Mitigation Plan* as required by the Federal Emergency Management Agency (FEMA). The purpose of this plan is to identify and assess the region's natural hazard risks and determine strategies for 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.

You are being notified of this planning process for two purposes:

1. FEMA requires that neighboring jurisdictions be provided an opportunity to be involved in the planning process.
2. You may want to contribute information to these jurisdictions to consider as they update their hazard mitigation plan.

I serve as the Project Manager for the update of the plan. Please let me know if you would like to contribute information, be invited to any upcoming meetings in the development of the plan or if you would like to receive a copy of the draft plan.

Should you have any questions about the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, please do not hesitate to contact me. Thank you for your time!

Nathan Slaughter, AICP, CFM
Department Manager – Hazard Mitigation
ESP Associates, Inc.
2200 Gateway Centre Boulevard – Suite 216
Morrisville, NC 27560
www.espassociates.com

nslaughter@espassociates.com
919.415.2726 | Direct
919.678.1070 | Office
919.244.9536 | Cell

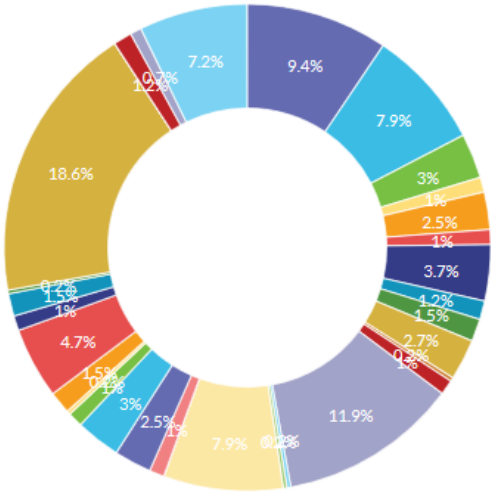
Neighboring Jurisdictions for the Cleveland Gaston Lincoln Region

Jurisdiction	Name	Title	Email
Rutherford County NC	Frankie Hamrick	Rutherford County EM Coordinator	frankie.hamrick@rutherfordcountync.gov
Rutherford County NC	Danny Searcy	Rutherford County Planning Director	danny.searcy@rutherfordcountync.gov
Burke County NC	Michael Willis	Burke County EM Director	Michael.Willis@burkenc.org
Catwaba County NC	Karyn Yaussy	Catawaba County EM Coordinator	kyaussy@catawbacountync.gov
Catwaba County NC	Jacky Eubanks	Catawba County Planning Director	jeubanks@catawbacountync.gov
Iredell County NC	Jody Smyre	Iredell County EM Director	jsmyre@co.iredell.nc.us
Iredell County NC	Kathy Wolfe	Iredell County Floodplain Manager	kwolfe@co.iredell.nc.us
Charlotte-Mecklenburg County NC	Cindy Bonham	Charlotte-Mecklenburg EM Director	cbonham@ci.charlotte.nc.us
Charlotte-Mecklenburg County NC	General Inquiries	Charlotte-Mecklenburg Planning	amjackson@charlottenc.gov
York County SC	Chuck Haynes	York County EM Director	ycoem@yorkcountygov.com
Cherokee County SC	Rick Peterson	Cherokee County EM Director	rick.peterson@cherokeecountysc.com

Q1

1. Where do you live?

Multiple Choice



Choices	Totals
Unincorporated Cleveland County	38
Unincorporated Gaston County	32
Unincorporated Lincoln County	12
Belwood	4
Belmont	10
Bessemer City	4
Boiling Springs	15
Casar	5
Cherryville	6
Dallas	11
Earl	1

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0

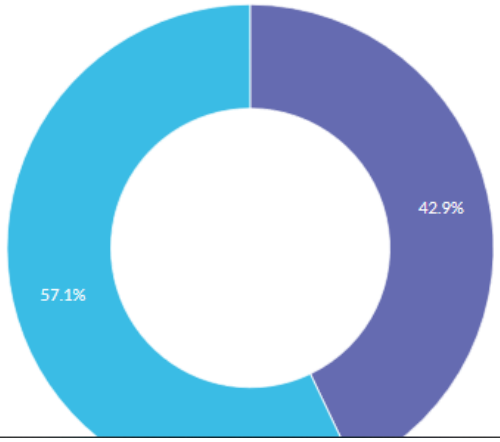
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Question Details >

Q2

2. Have you ever experienced or been impacted by a disaster?

Multiple Choice



Choices	Totals
Yes	173
No	230

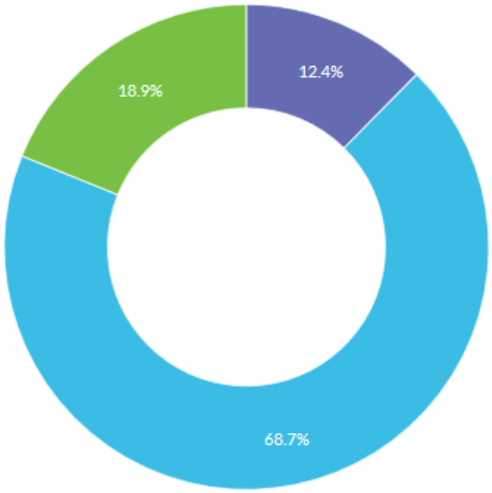
Q3 3. If "Yes," please explain.
Essay

Latest Responses	Date
Hurricane Hugo and multiple tornados	Mar 13
lived in Stanley when hurricane Hugo hit	Mar 12
loss of power	Mar 12
Rain and snow....	Mar 11
Tornado	Mar 8

Unanswered 240 Answered 163

Question Details >

Q4 4. How concerned are you about the possibility of our community being impacted by a disaster?
Multiple Choice



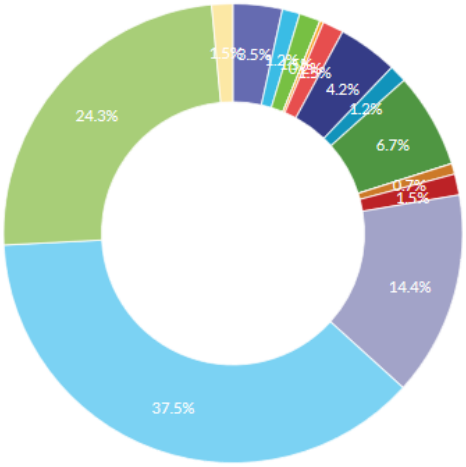
Choices	Totals
Extremely concerned	50
Somewhat concerned	277
Not concerned	76

Unanswered 0 Answered 403

Question Details >

Q5 5. Please select the one hazard you think is the highest threat to your neighborhood:

Multiple Choice



Choices	Totals
Acts of Terror	14
Dam/Levee Failure	5
Drought	6
Earthquake	0
Expansive Soils	1
Extreme Heat	6
Flood	17
Hailstorm	5
Hurricane Remnants	27
Land Subsidence	0
Landslide	3

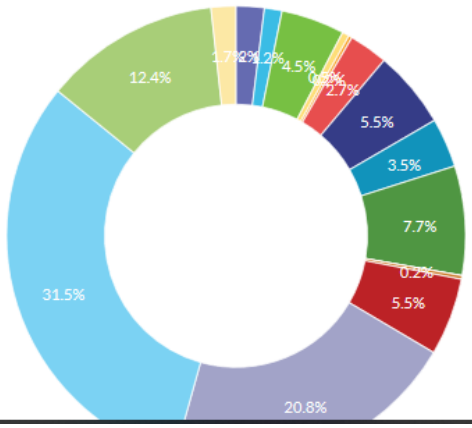
Unanswered 0

Answered 403

Question Details >

Q6 6. Please select the one hazard you think is the second highest threat to your neighborhood:

Multiple Choice



Choices	Totals
Acts of Terror	8
Dam/Levee Failure	5
Drought	18
Earthquake	2
Expansive Soils	1
Extreme Heat	11
Flood	22
Hailstorm	14
Hurricane Remnants	31

Q7 7. Are there any other hazards that you feel pose a wide-scale threat to your community?

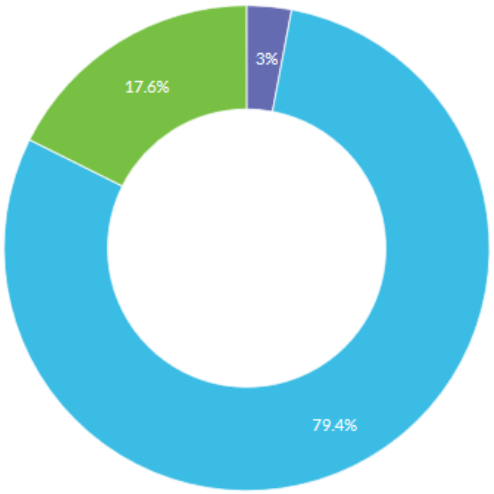
Essay

Latest Responses	Date
Drought, unsafe water, winter storms, terrorism to Lithium plant	Apr 25
Flooding	Mar 13
uncontrolled wild fire	Mar 12
no	Mar 12
Tornado	Mar 11

Unanswered 247 Answered 156 Question Details ›

Q8 8. Is your home located in a floodplain?

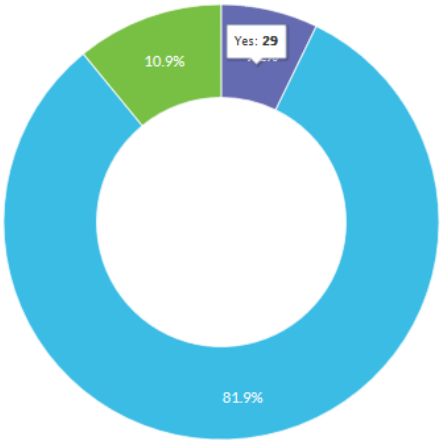
Multiple Choice



Choices	Totals
Yes	12
No	320
I don't know	71

Unanswered 0 Answered 403 Question Details ›

Q9 9. Do you have flood insurance?
Multiple Choice

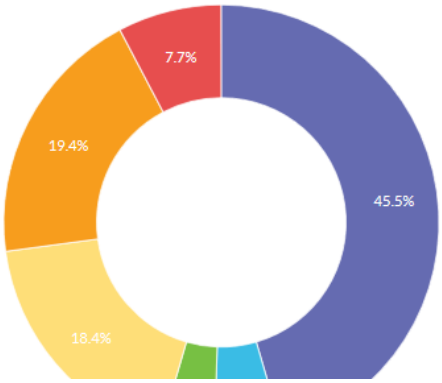


Choices	Totals
Yes	29
No	330
I don't know	44

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Question Details >

Q10 10. If you do not have flood insurance, why not?
Multiple Choice



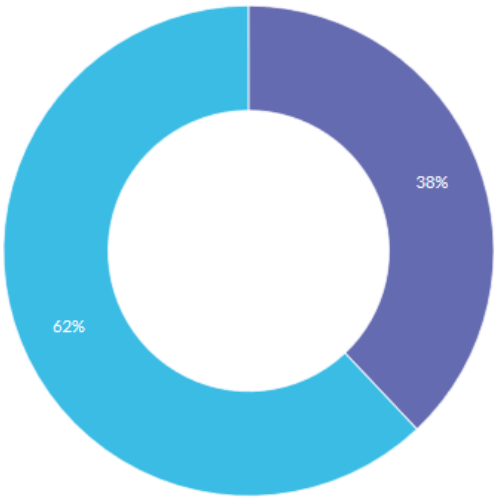
Choices	Totals
Not located in a floodplain	171
Too expensive	19
Not necessary because it never floods	15
Not necessary because I'm elevated or otherwise protected	69
Never really considered it	73
Other	29

Q11 11. If "Other," please explain.
Essay

Latest Responses	Date
Rent an apartment and have Renter's insurance	Mar 11
I am not in a flood zone but if it is really bad im afraid it will become a flood zone	Mar 11
my home is located on a hill above the flood plain.	Mar 7
not sure if I dont	Mar 5
too expensive	Mar 5

Unanswered 373 Answered 30 Question Details >

Q12 12. Have you taken any steps to make your home or neighborhood more resistant to hazards?
Multiple Choice



Choices	Totals
Yes	153
No	250

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Q13 13. If "Yes," please explain.

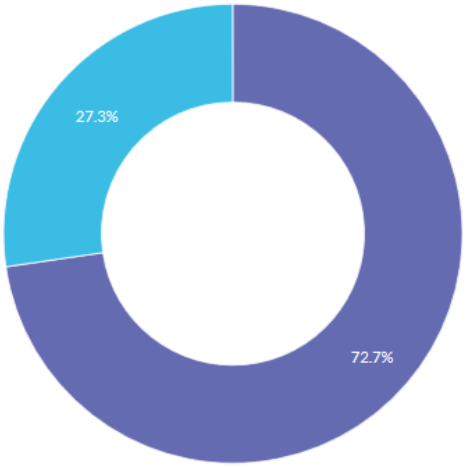
Essay

Latest Responses	Date
Tree trimming in progress	Apr 25
removed trees near house and power lines	Mar 12
got a generator, fixed back patio and underneath house for water	Mar 11
not to much loose items or furniture in the front and back of the house.	Mar 11
Cut vulnerable trees	Mar 7

Unanswered 278 Answered 125 Question Details >

Q14 14. Are you interested in making your home or neighborhood more resistant to hazards?

Multiple Choice



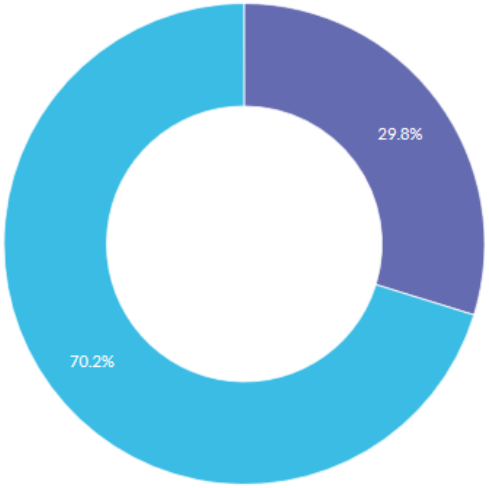
Choices	Totals
Yes	293
No	110

Unanswered 0 Answered 403 Question Details >

Q15

15. Do you know what office to contact to find out more information about how to reduce your risks to hazards in your area?

Multiple Choice



Choices	Totals
Yes	120
No	283

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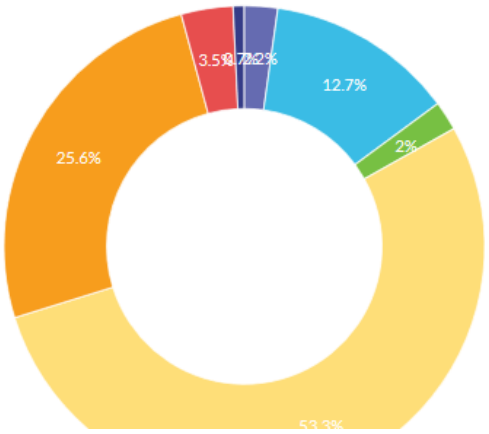
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Question Details ›

Q16

16. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

Multiple Choice



Choices	Totals
Newspaper	9
Television	51
Radio	8
Internet (Including Social Media)	215
Mail	103
Public Workshops/Meetings	14
School Meetings	3

Q17 17. Are there any other ways you prefer to receive information? If so, please explain.
Essay

Latest Responses	Date
email	Mar 13
email radio television	Mar 7
mail	Mar 7
Newspaper	Mar 7
e-mail	Mar 6

Unanswered 294 Answered 109 Question Details >

Q18 18. 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?
Essay

Latest Responses	Date
Don't allow hazardous waster near water sources	Apr 25
Regular risk assessments. Up to date weather, crime, breaking news alerts.	Mar 13
Send out flyers and provide a guided self assessment of your property	Mar 13
more patrol to deter criminal acts like theft	Mar 12
how can goverment prevent disaster damage?	Mar 12

Unanswered 238 Answered 165 Question Details >

Q19 19. 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?

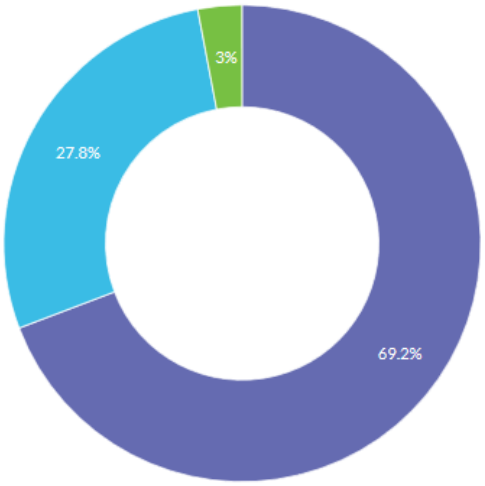
Essay

Latest Responses	Date
no	Mar 12
Mail handouts periodicalally	Mar 7
People who are not on city water and sewage probably need more information on sanitation when there is long periods of power outage. No water in faucets not able to flush commode adequate hand washing more difficult no refrigeration etc	Mar 6
How the info is given is important, Many have no clue of what hazards are in there areas, Like flooding areas and safe routes	Mar 5
plowing, deicing secondary roads	Mar 5

Unanswered 341 Answered 62 Question Details ›

Q20 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. In the next six questions, please tell us how...

Multiple Choice



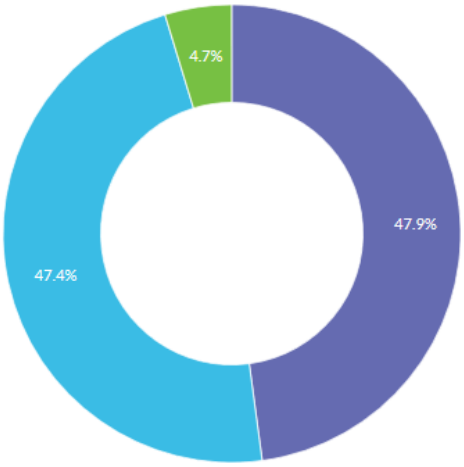
Choices	Totals
Very important	279
Somewhat important	112
Not important	12

Unanswered 0 Answered 403 Question Details ›

Q21

21. 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...

Multiple Choice



Choices	Totals
Very important	193
Somewhat important	191
Not important	19

Unanswered
0

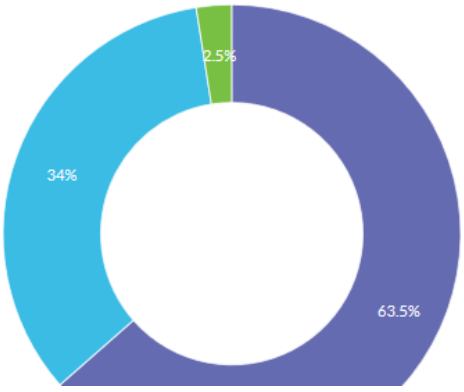
Answered
403

Question Details >

Q22

22. 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...

Multiple Choice

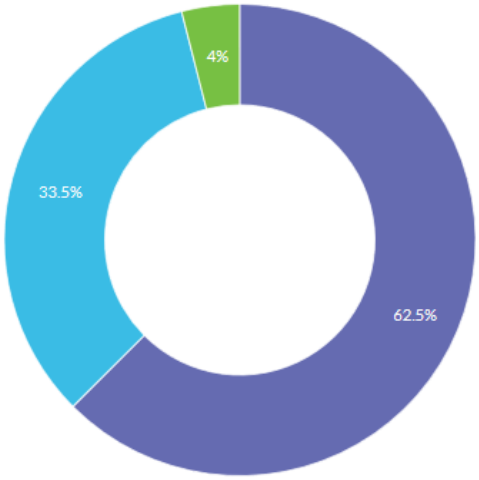


Choices	Totals
Very important	256
Somewhat important	137
Not important	10

Q23

23. 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...

Multiple Choice



Choices	Totals
Very important	252
Somewhat important	135
Not important	16

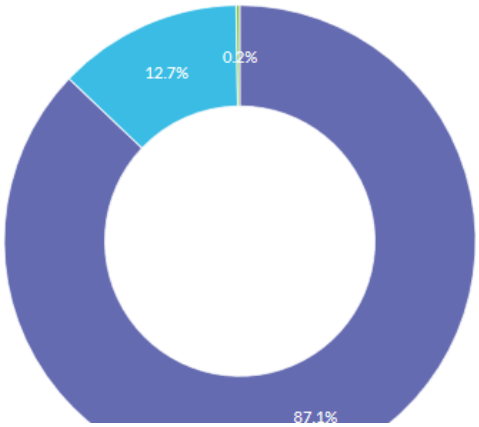
Unanswered	Answered
0	403

Question Details ›

Q24

24. Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning system evacuation planning, emergency response training, and...

Multiple Choice

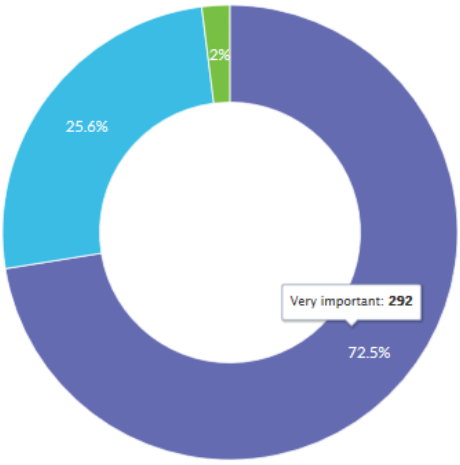


Choices	Totals
Very important	351
Somewhat important	51
Not important	1

Q25

25. 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...

Multiple Choice



Choices	Totals
Very important	292
Somewhat important	103
Not important	8

Unanswered 0

Answered 403

Question Details >

Q26

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...

Essay

Latest Responses	Date
Prevention is costly but in the long run it will save money, grief, and stress. well worth it.	Mar 11
Connie Jones 2026 Moonlit Tr Vale NC 28168	Mar 6
Donovan Watford	Mar 5
Tim Davis tim.davis@gastongov.com	Mar 4
Ed Carson 837 Carson Road Gastonia, North Carolina 28052 (704) 864-1816	Mar 3

Unanswered 377

Answered 26

Question Details >

Follow up. Completed on Monday, December 10, 2018.

From: Willie King <Willie.King@gastongov.com>

Sent: Fri 12/7/2018 4:26 PM

To: Bates@lowellpd.org; jhawkins@cityofcherryville.com; arobinson@cityofbelmont.org; brian.dupont@mtholly.us; hjenkins@townofstanley.org; Kevin Krouse; joyf@cityofkm.com; 'T Faro'; jross@bessemercity.com; Thompson, Jason; lwilliams@cityofhighshoals.net; josh.watkins@cramerton.org; mayor@townofmcadenville.org; Jonathan Wilson

Cc: David Williams; Jena Goodman; Keith A. Rapp; Eric Hendrix; Ramey, Joe; Nathan Slaughter; Jamie Derose

Subject: FW: {External} CGL RHMP Public Survey

THIS MESSAGE ORIGINATED OUTSIDE OF ESP ASSOCIATES, INC. USE CAUTION WHEN OPENING ATTACHMENTS, CLICKING LINKS, OR RESPONDING TO REQUESTS FOR INFORMATION.

Municipal Partners,

Good Friday Afternoon, and hopefully this finds you doing well. Apologies if you have already been posted on this matter; however, this is just an effort to help convey the message of the consultant found below regarding the **RHMP Survey** to solicit your thoughts as well as the thoughts of the citizens in your community.

Thanks for your time and consideration, and a special thanks from the County Manager's Office, and the County Planning Director for your time and input on the RHMP.

Sincerely,

Willie King, Jr.

Development Services Manager

Development Services Division

Gaston County Planning and Development Services Dept.

704.862.5510

From: Jena Goodman
Sent: Thursday, November 15, 2018 2:25 PM
To: 'jjones@unitedwaygaston.org'; angela@gastonrealtors.com; info@hbacharlotte.com; lauren@gastonchamber.com; info@bethlehembc.com; tdickerson@gastonymca.org; dlockett@gastontogether.org
Cc: Jena Goodman; Willie King
Subject: Hazard Mitigation Public Meeting Today 4-6pm drop in
Importance: High

Re: Update of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

Dear: Community stakeholders

Cleveland, Gaston, and Lincoln Counties are joining together to update the region's multijurisdictional hazard mitigation plan, and your help is needed! A grant has been awarded by FEMA through the North Carolina Division of Emergency Management, which will allow the three counties to work together for this update. The plan serves as the blueprint to make our communities more resistant to disasters and is the key to breaking the cycle of disaster damage, reconstruction, and repeated damage. Since disasters have the potential to begin and end at the local level, your professional expertise will help this important planning initiative.
The general purposes of the plan are to:

- Protect life and property by reducing the potential for future damages and economic losses resulting from natural hazards,
- Allow the participating communities to qualify for pre and post disaster grant funding,
- Speed recovery and redevelopment following disaster events,
- Demonstrate a firm local commitment to hazard mitigation principles, and
- Comply with state and federal legislative requirements

There will be a public meeting held on **Thursday, November 15, 2018 from 4 PM until 6 PM** to kick off this planning effort. The meeting will be held at Citizen Resource Center at 1301 Dallas Cherryville Highway Dallas. Please make plans to attend to learn about how this plan impacts your community and how you can participate!

Should you have any questions, feel free to contact Nathan Slaughter at 919.415.2726 or Jamie DeRose at 919.415.2757.

Jena Goodman
Planning GIS Manager
Gaston County Planning and Development Services
(704) 866-3907
(704) 866-3908 (fax)
jena.goodman@gastongov.com
www.gastongov.com

Appendix E
Completed Mitigation Actions

This section of the Plan includes the mitigation actions that have been completed by the participating jurisdictions.

APPENDIX E
COMPLETED MITIGATION ACTIONS

Cleveland County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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-9	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	Completed 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)
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-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 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.

Town of Belwood Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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-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.

Town of Boiling Springs Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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.

Town of Casar Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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-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.

Town of Earl Completed Mitigation Actions

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-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.

Town of Fallston Completed Mitigation Actions

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-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.

Town of Grover Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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-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.

City of Kings Mountain Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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-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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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)
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	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.
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.

Town of Kingstown Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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.

Town of Lattimore Completed Mitigation Actions

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 Lattimore and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
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.

Town of Lawndale Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on January 16, 2018. This action will be removed for the 2025 update of this plan.
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.
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.

Town of Mooresboro Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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-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.

Town of Patterson Springs Completed Mitigation Actions

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 Patterson Springs and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update
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.

Town of Polkville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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
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.

City of Shelby Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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-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)
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-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.

Town of Waco Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-2	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on March 15, 2018. This action will be removed from this plan for the 2025 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 Waco and helps ensure adequate evacuation warning during major hazards events. This action will be removed in the next update.
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.

Gaston County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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-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.
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.

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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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-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

City of Belmont Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
Emergency Services							
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

City of Bessemer City Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
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

City of Cherryville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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-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.
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.

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-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

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Public Education and Awareness							
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 Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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-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.

Town of Dallas Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.

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-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.
Emergency Services							
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

City of Gastonia Completed Mitigation Actions

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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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-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.
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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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.

City of Lowell Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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 using 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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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-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-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

Town of McAdenville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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-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

City of Mount Holly Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
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, Mount Holly	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-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

Town of Ranlo Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
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

Town of Stanley Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Emergency Services							
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
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

Lincoln County Completed Mitigation Actions

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.

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-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.
P-11	Identify and map areas of steep slopes in the county.	Landslide	High	GIS	Local	Completed	Map created
Property Protection							
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.
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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
Structural Projects							
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.
Public Education and Awareness							
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.

City of Lincolnton Completed Mitigation Actions

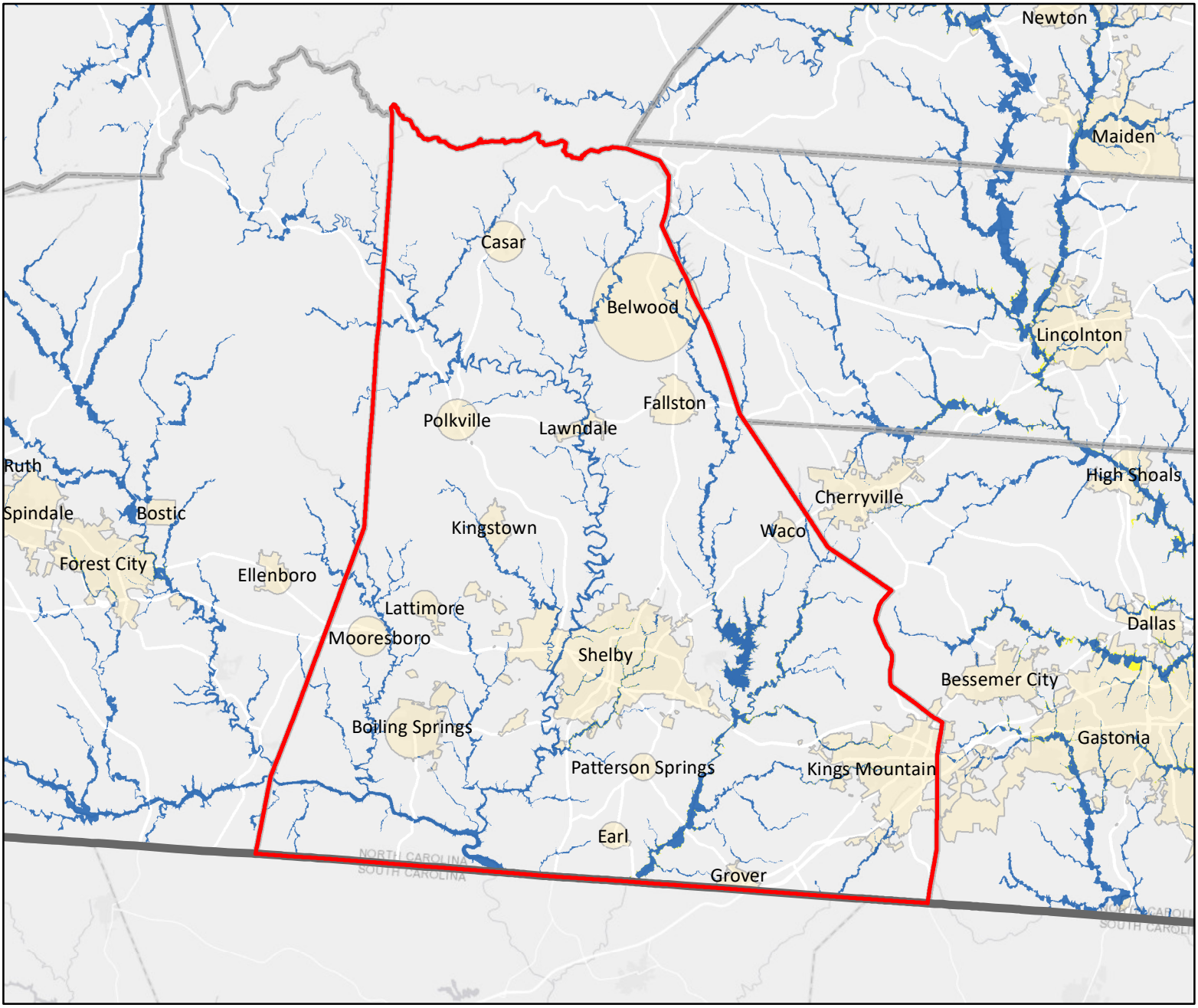
Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
Prevention							
P-1	Encourage developers not to modify flood plain and to work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	This action is continuously implemented through the enforcement of the City's Flood 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 is implemented on an as needed basis through placement of warning signage during flooding.
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 City staff's participation in meetings and trainings. One example of implementation is through the City'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-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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2014)
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.
P-11	Identify and map areas of steep slopes in the county.	Landslide	High	GIS	Local	Completed	Map created
Property Protection							
PP-2	Locate future facilities outside of identified hazard areas.	Flood, Landslide	High	All Departments	Local	Completed	Complete through the enforcement of City Ordinances/Policies. As of 2014, this action is complete, but it will need to be updated going forward.
PP-3	Continue to prohibit construction in the 100-year flood plain.	Flood	High	P&ID	Local	Completed	Complete through the enforcement of City's Flood Ordinance. 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 City's 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 City's 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)
Public Education and Awareness							
PEA-4	Educate citizens of the dangers of flash flooding on their property and along roadways.	Flood	Medium	Emergency Management	Local	Completed	Ongoing pending funding. Education Outreach takes place 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	Ongoing 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.

Appendix F
Flood Hazard Maps

Cleveland County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

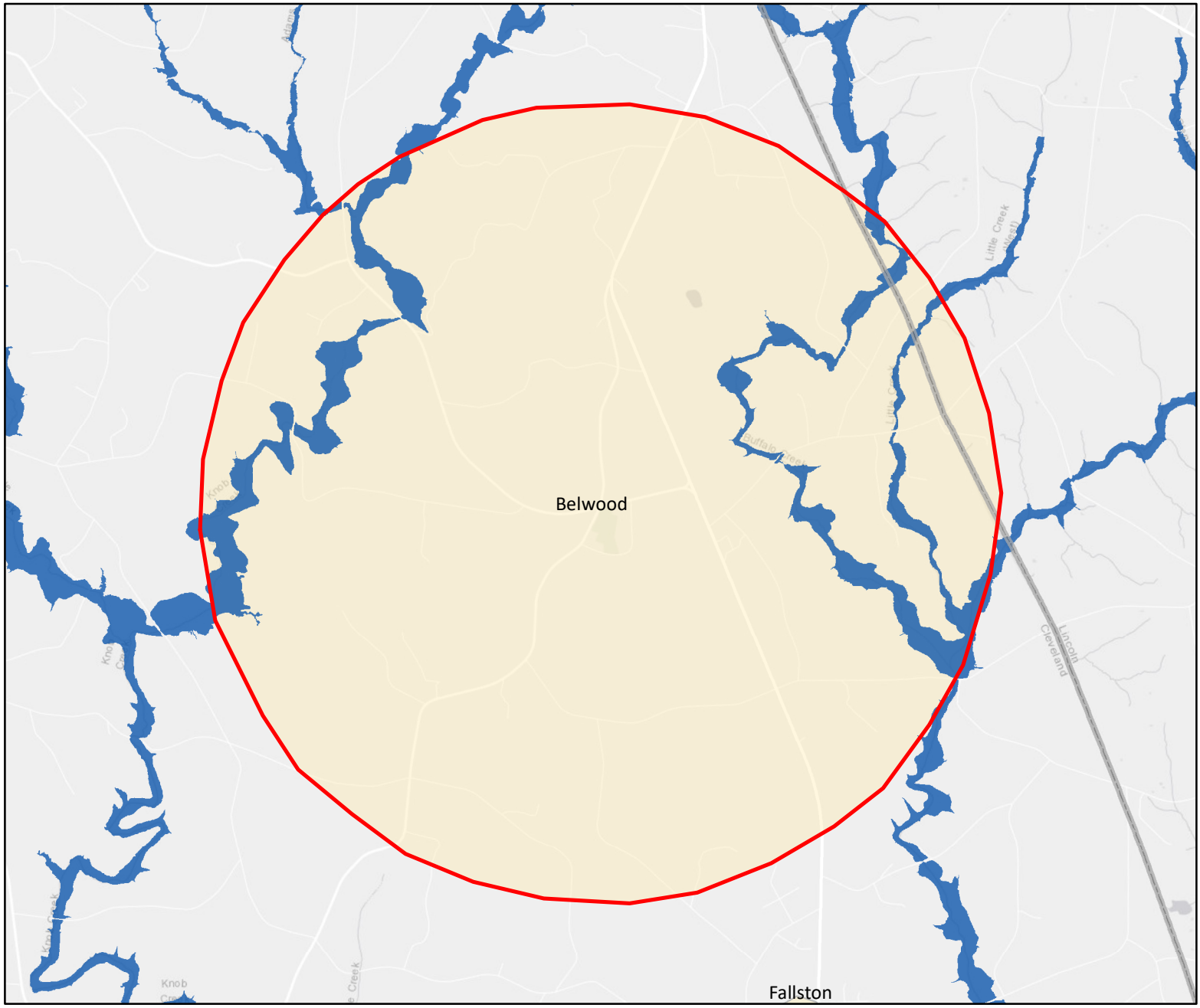
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 3.25 6.5 13 Miles

N

Belwood - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

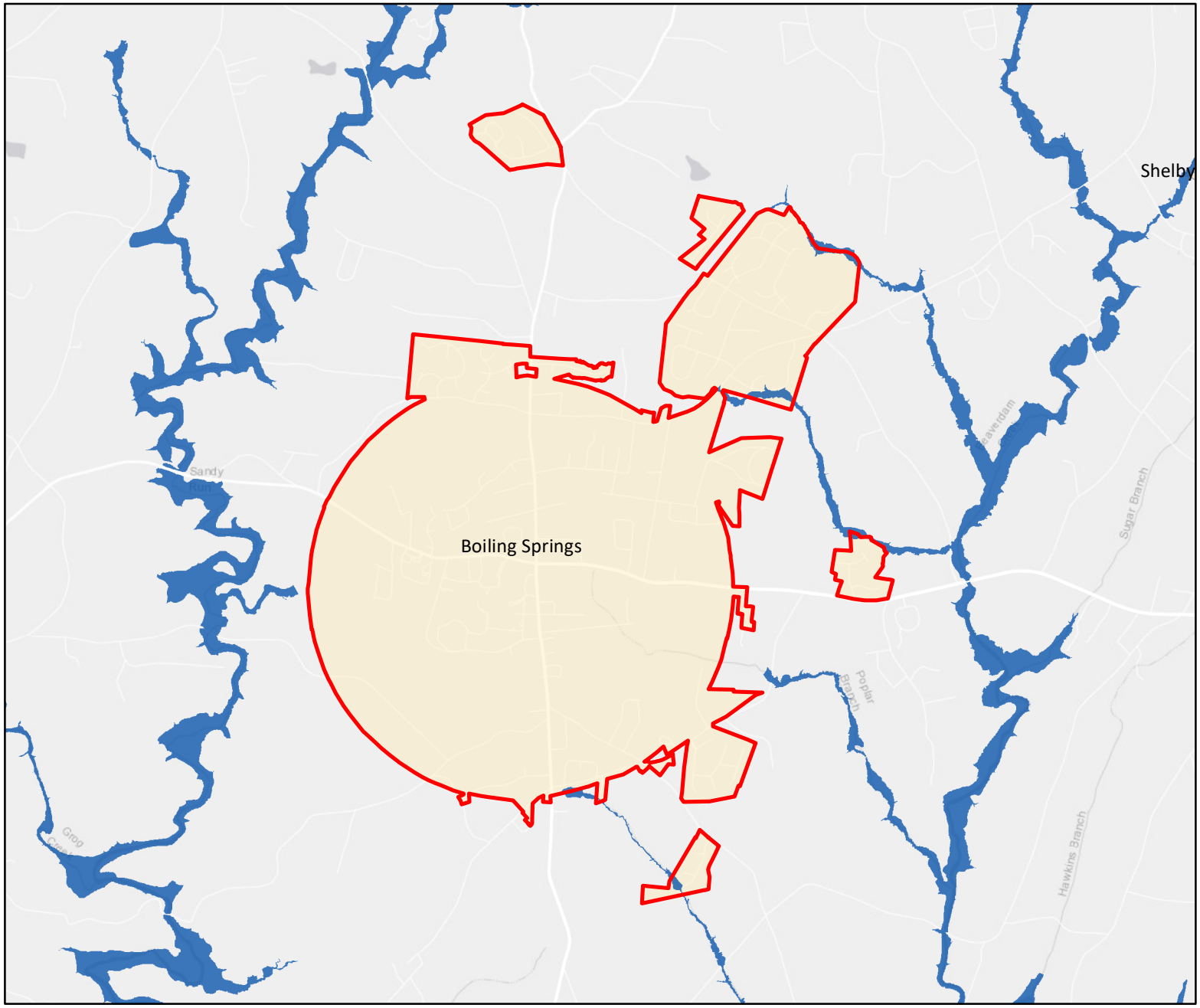
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.425 0.85 1.7 Miles

N

Boiling Springs - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

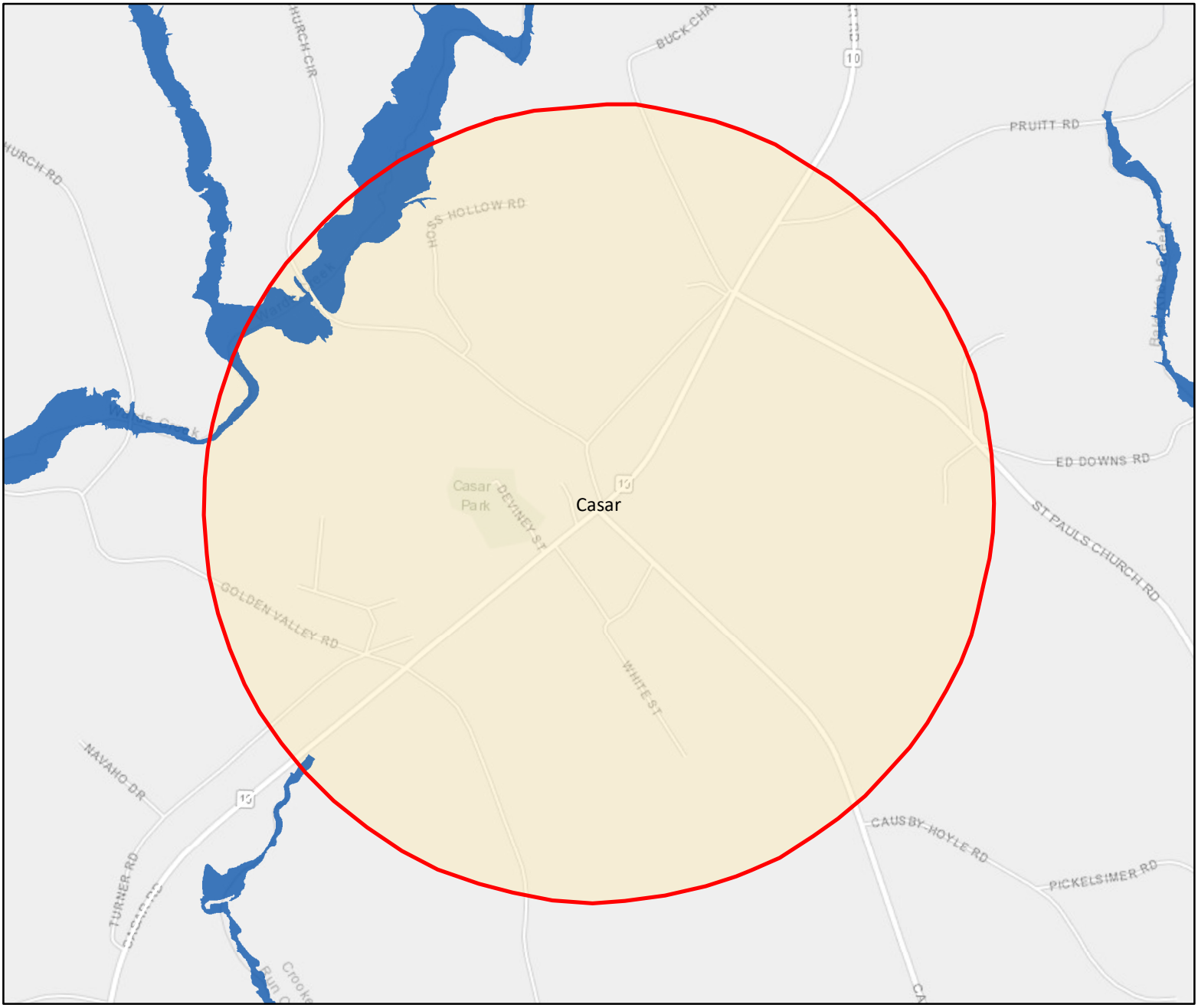
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.4 0.8 1.6 Miles

N

Casar - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

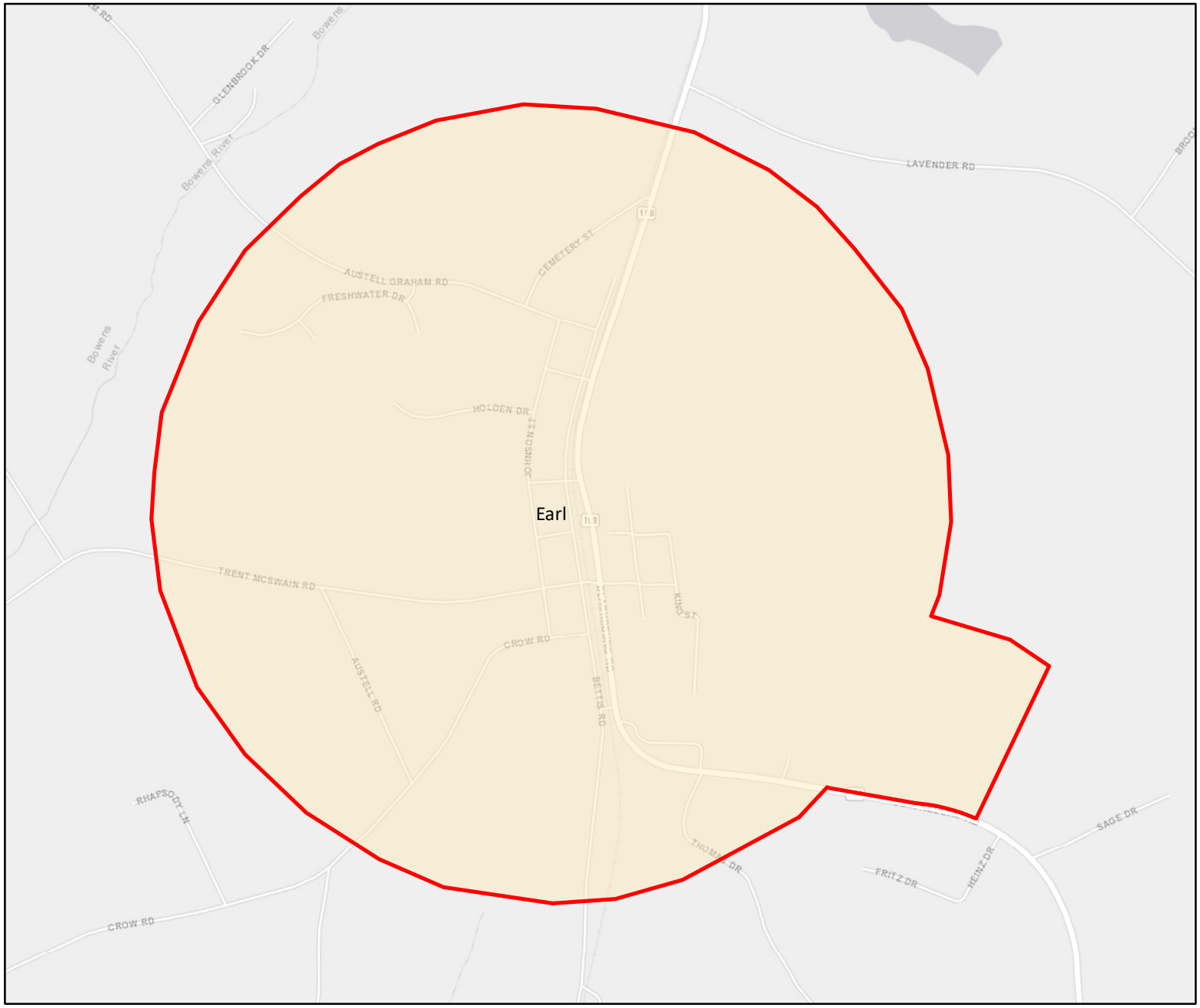
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.15 0.3 0.6 Miles

N

Earl - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

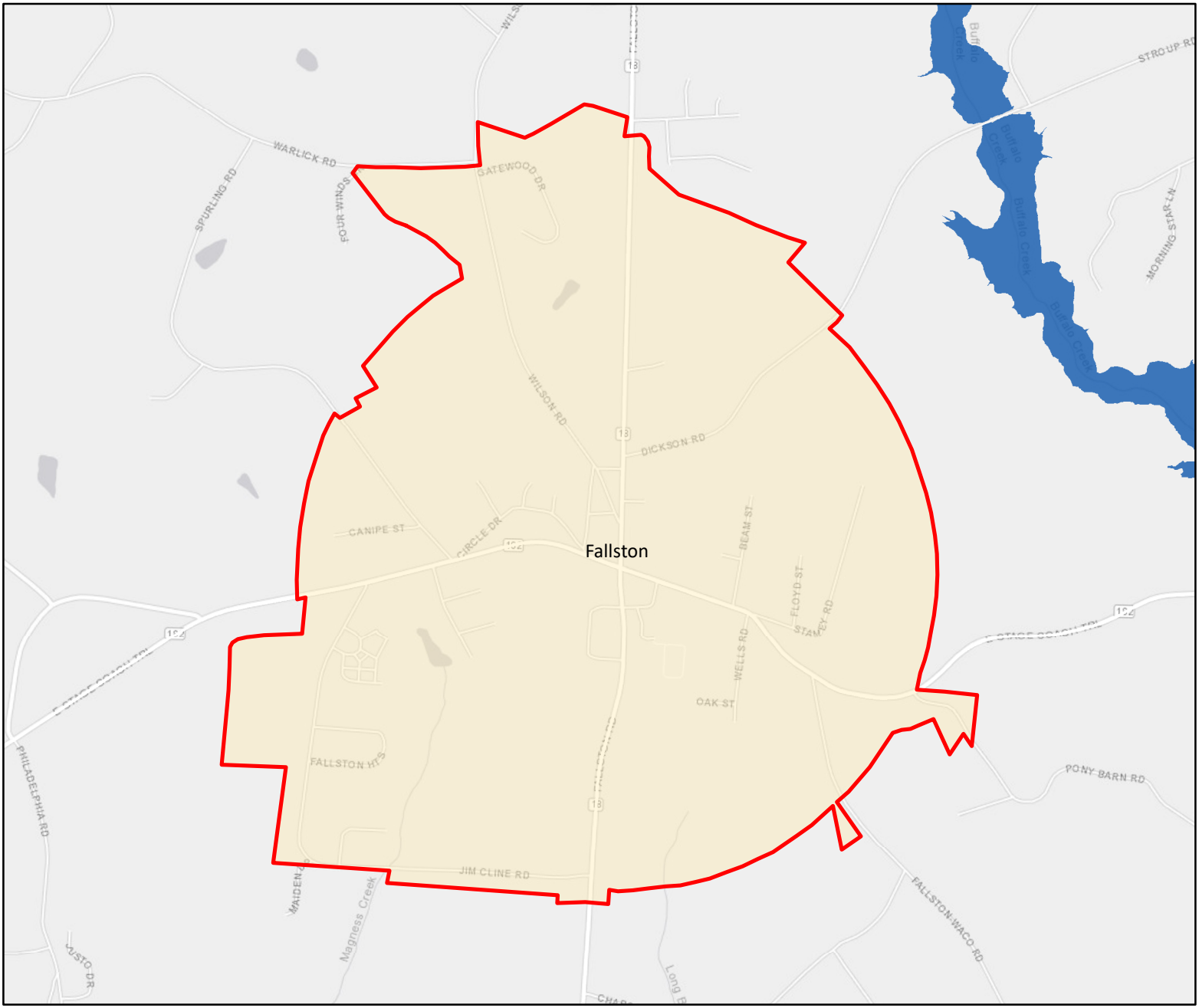
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.1 0.2 0.4 Miles

N

Fallston - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

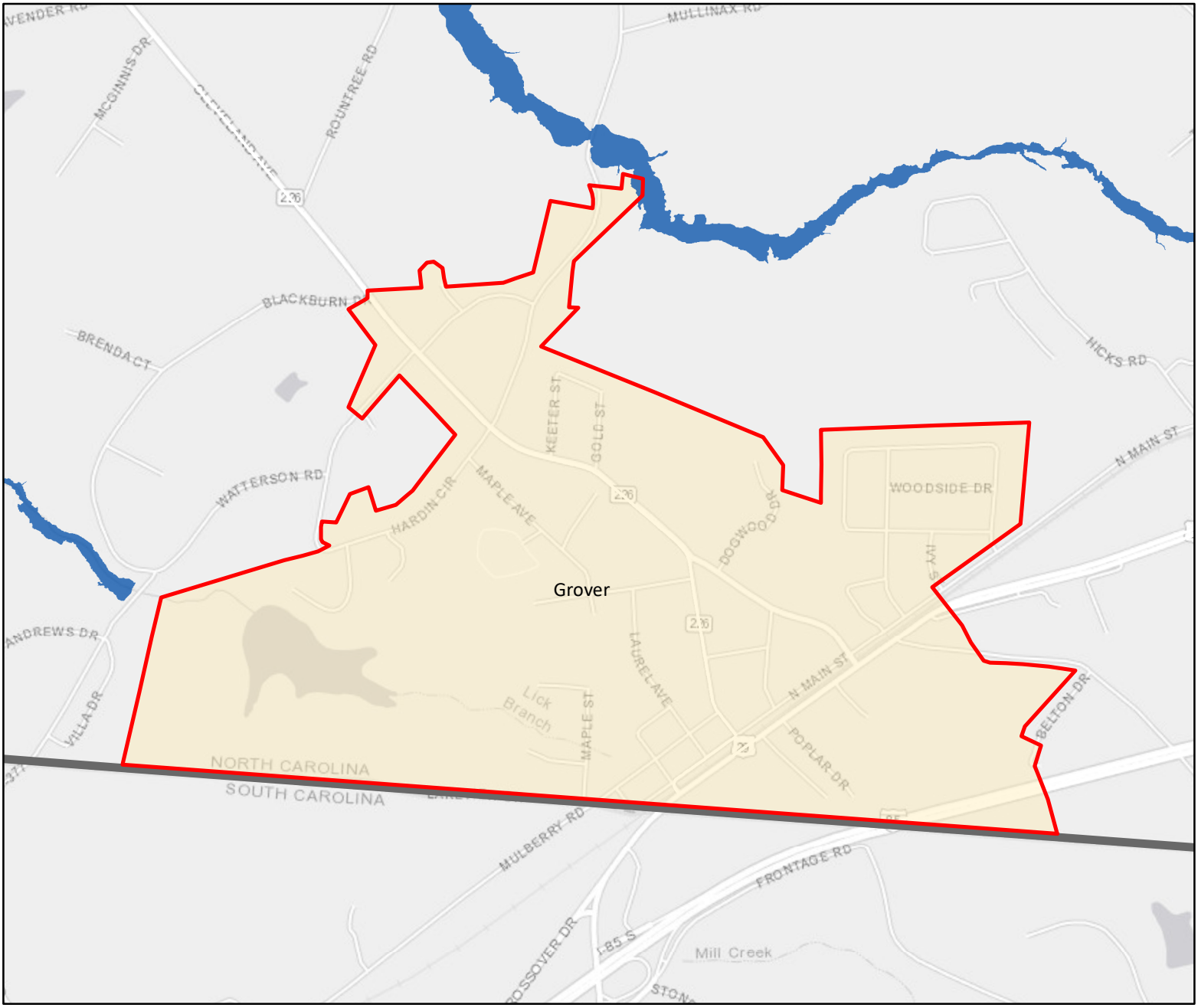
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.2 0.4 0.8 Miles

N

Grover - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

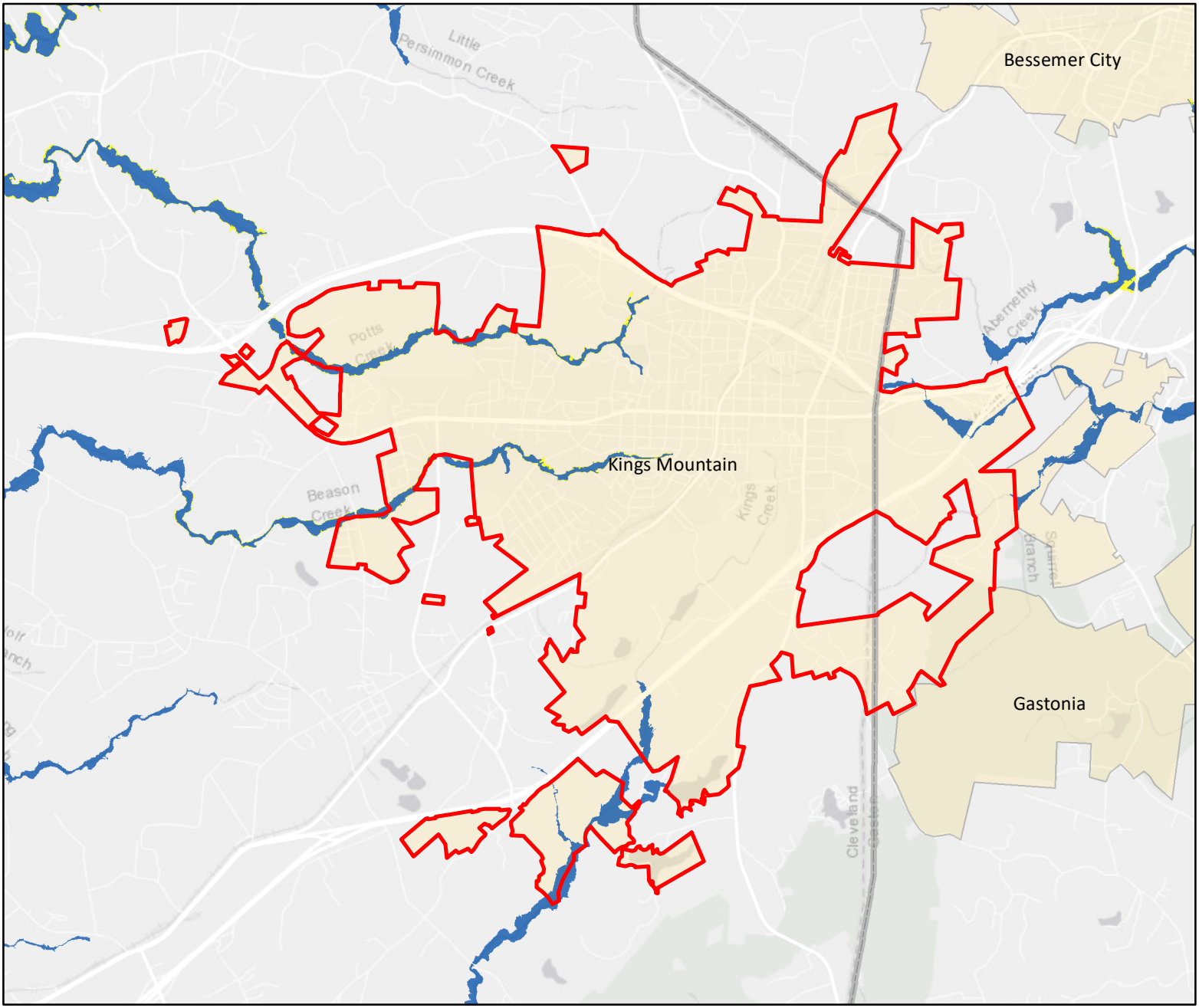
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.15 0.3 0.6 Miles

N

Kings Mountain - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

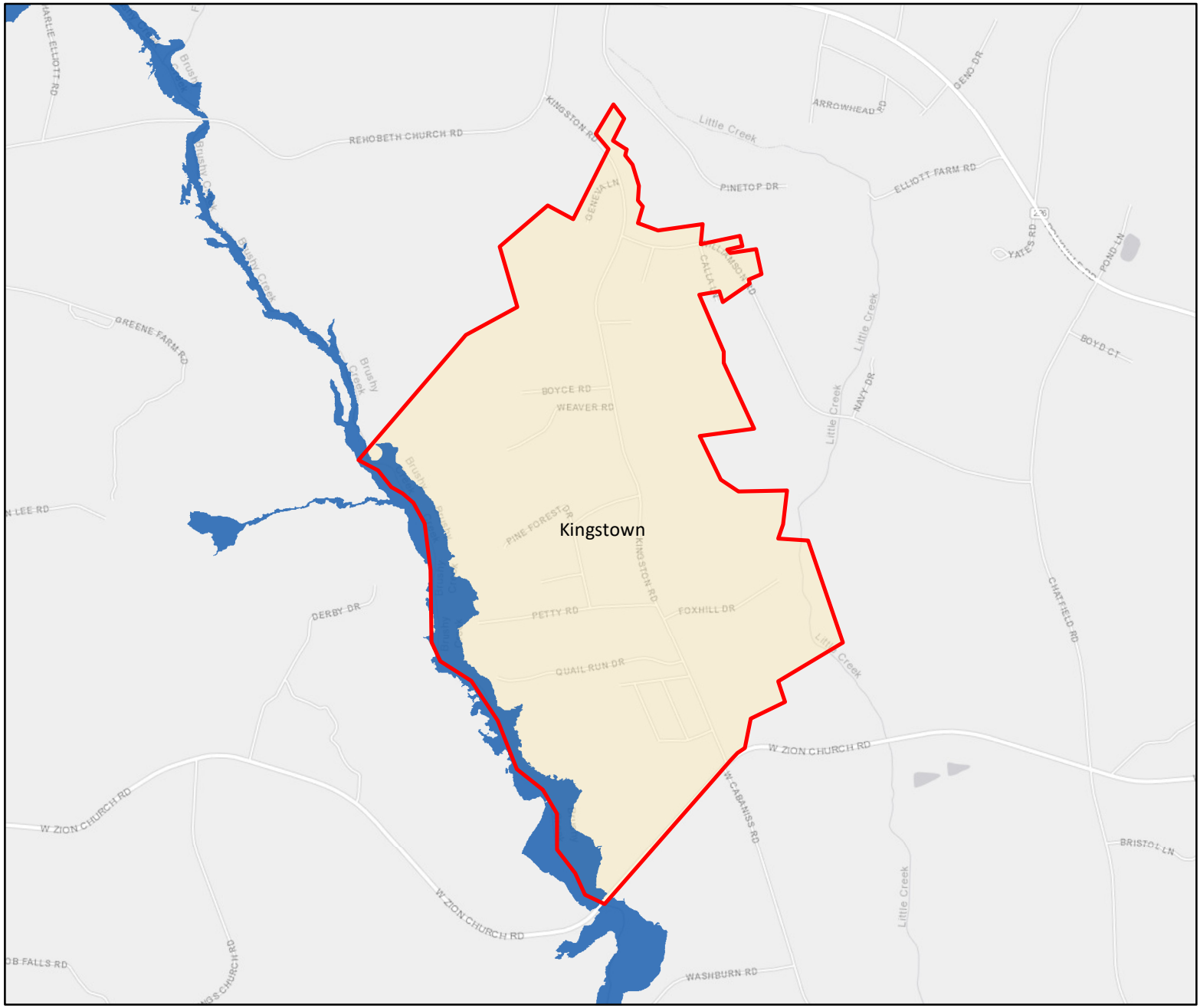
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.5 1 2 Miles

N

Kingstown - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

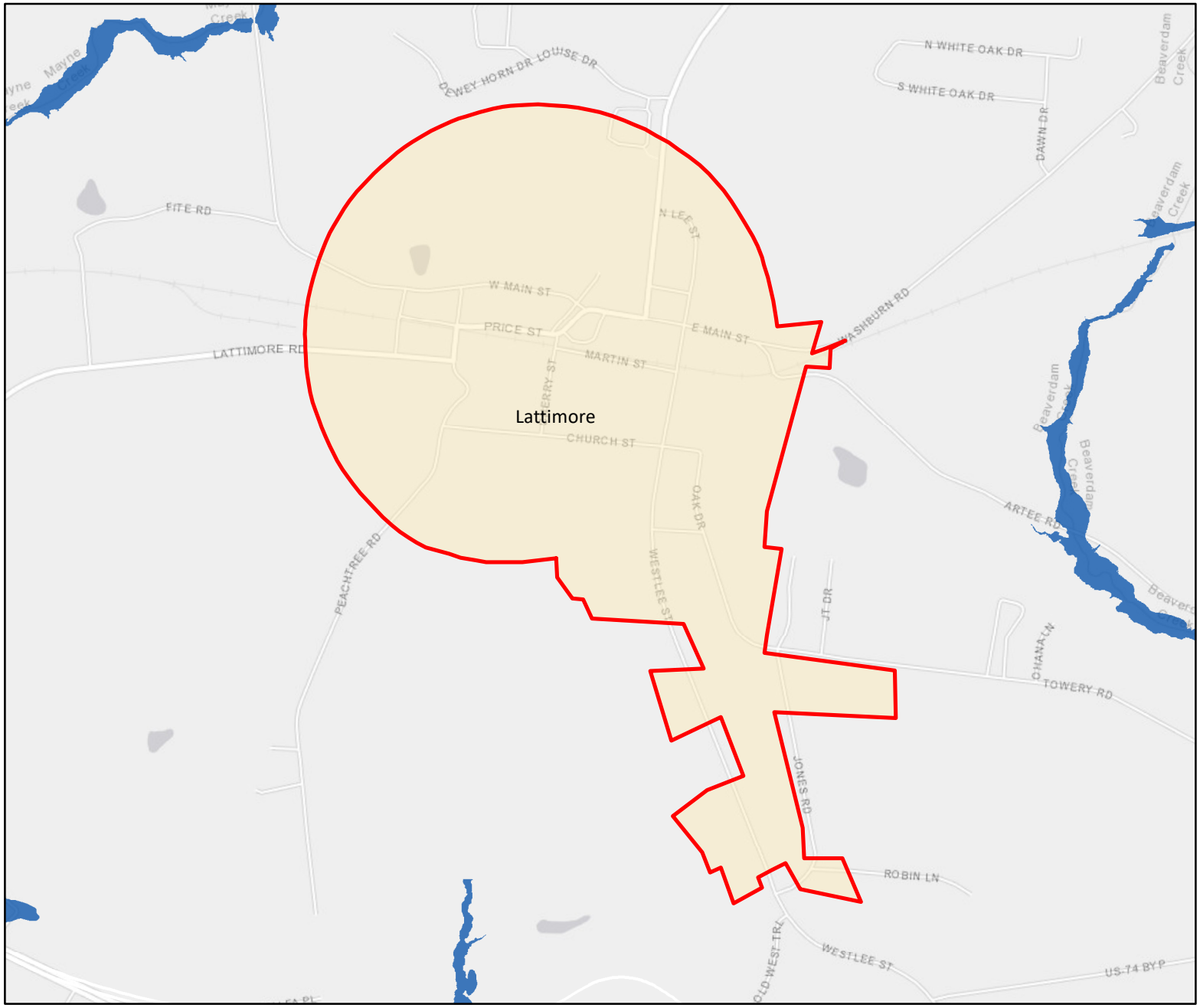
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.225 0.45 0.9 Miles

N

Lattimore - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

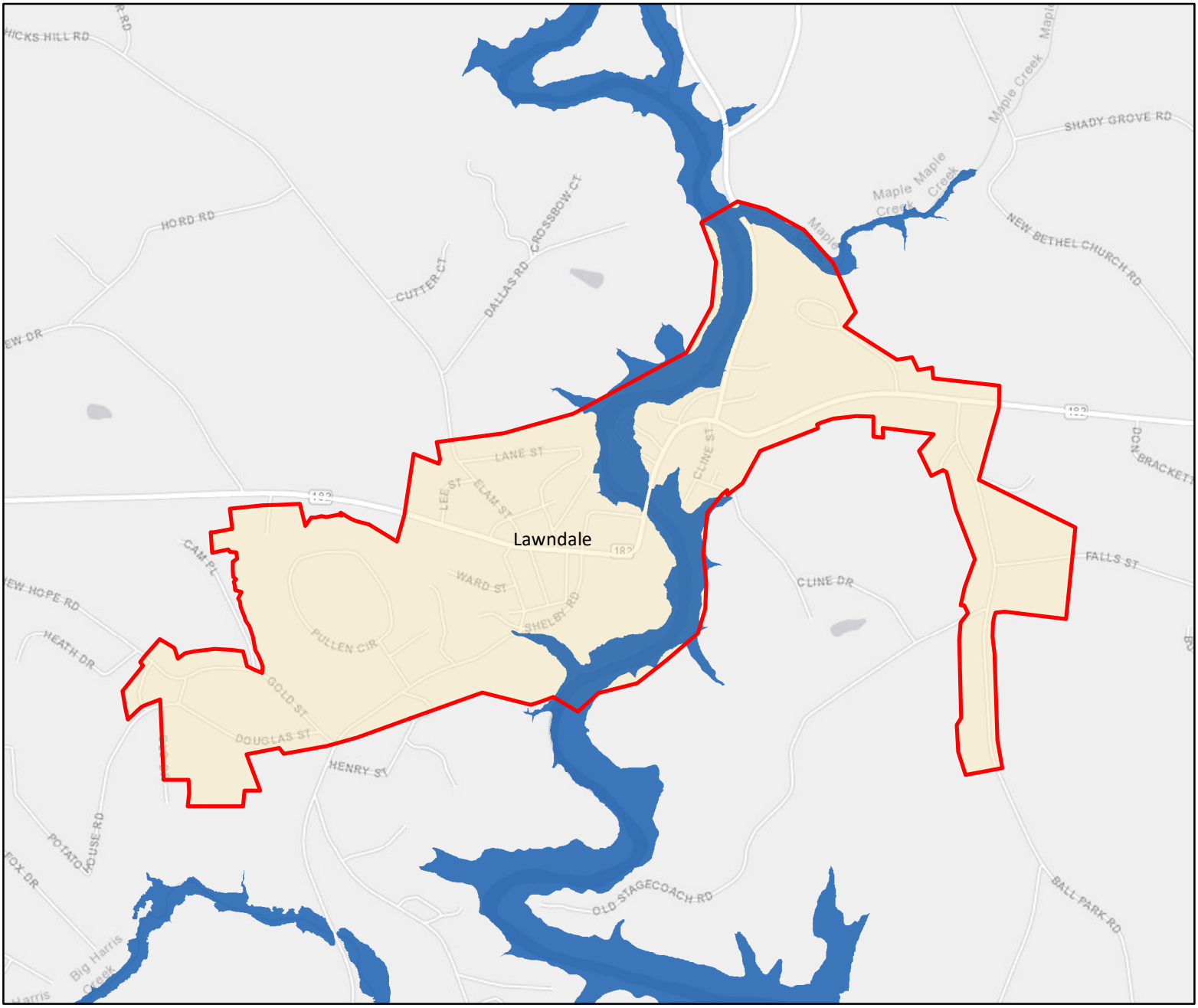
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.175 0.35 0.7 Miles

N

Lawndale - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

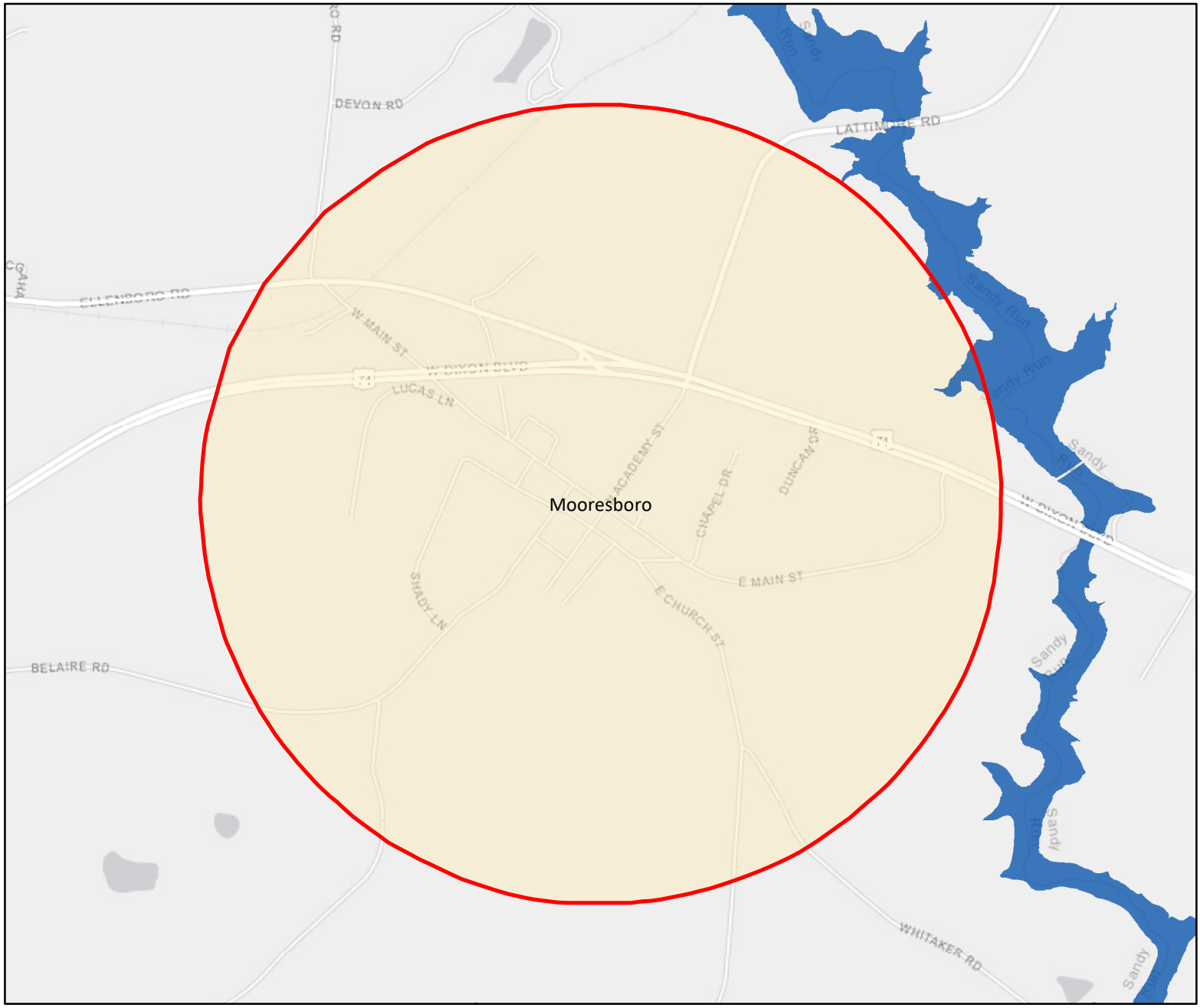
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.175 0.35 0.7 Miles

N

Mooresboro - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

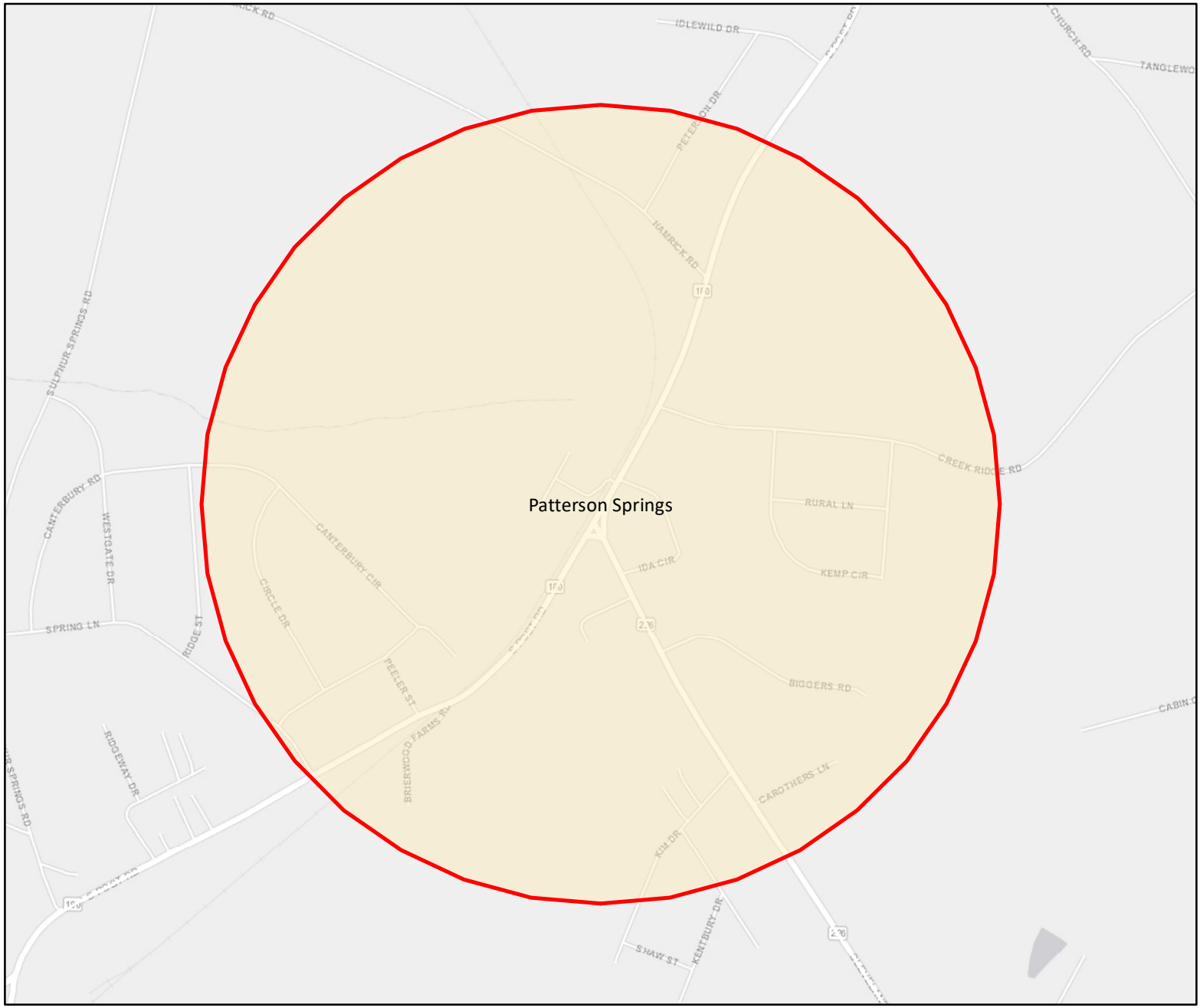
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.15 0.3 0.6 Miles

N

Patterson Springs - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

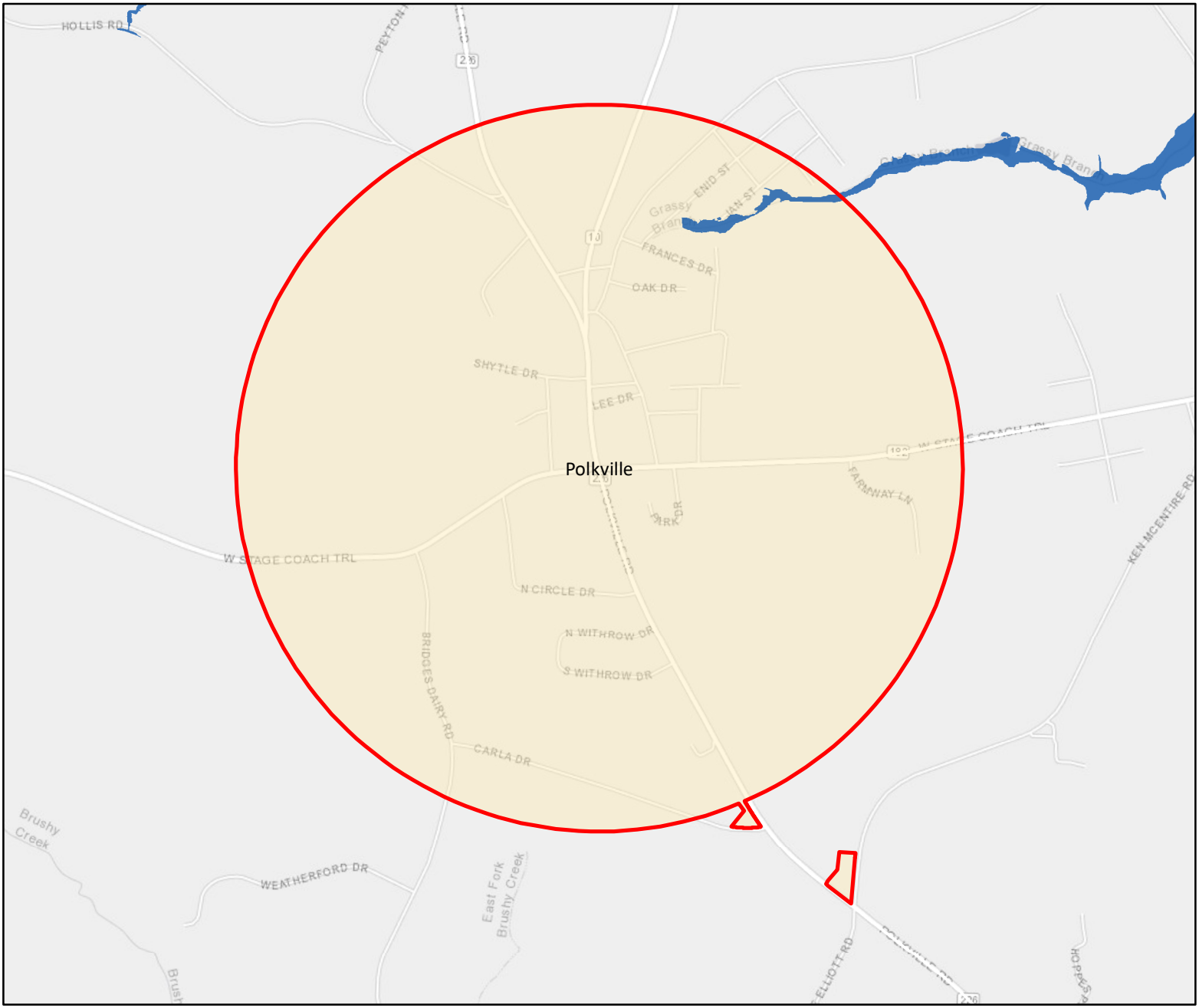
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.1 0.2 0.4 Miles

N

Polkville - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

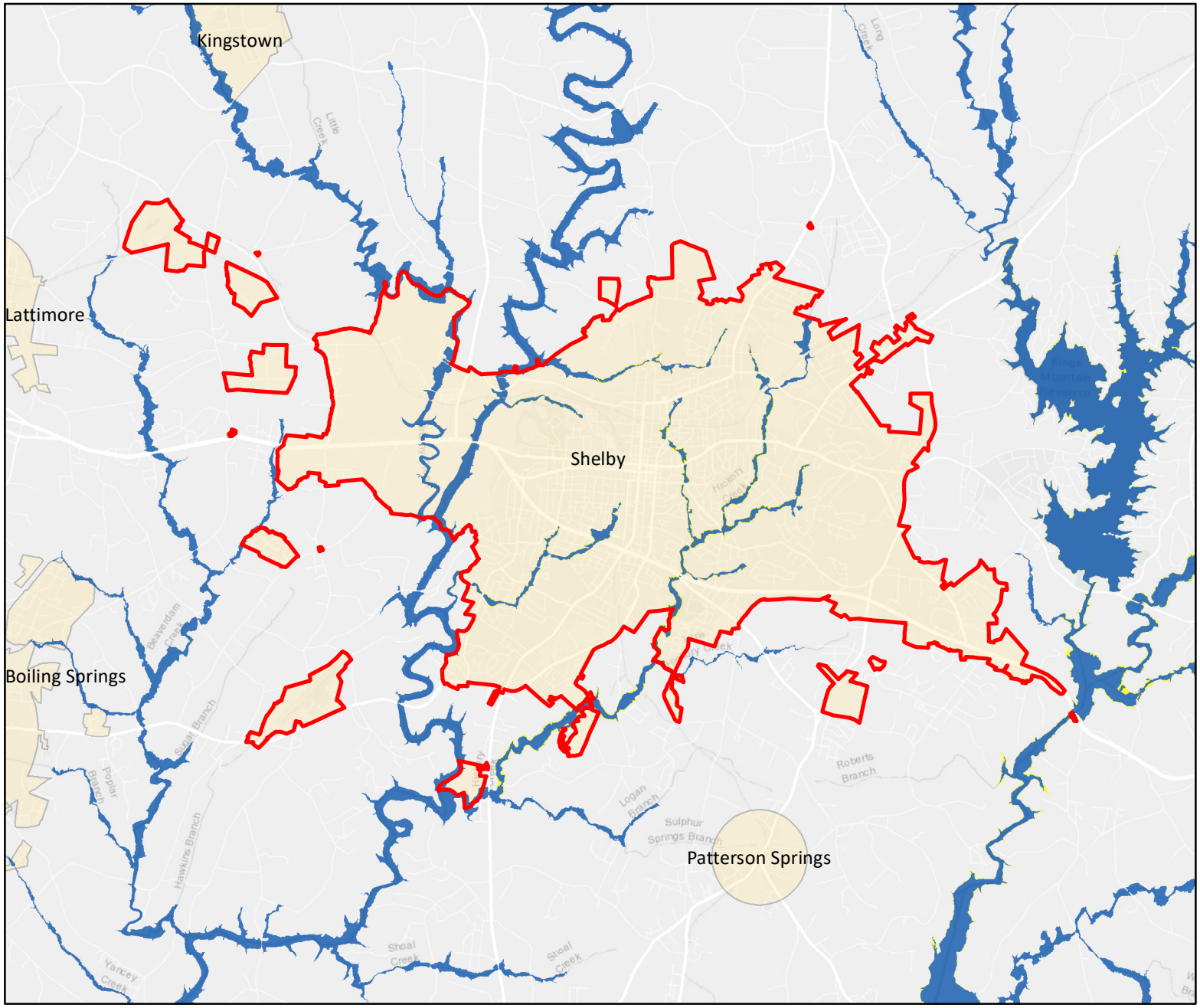
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.175 0.35 0.7 Miles

N

Shelby - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

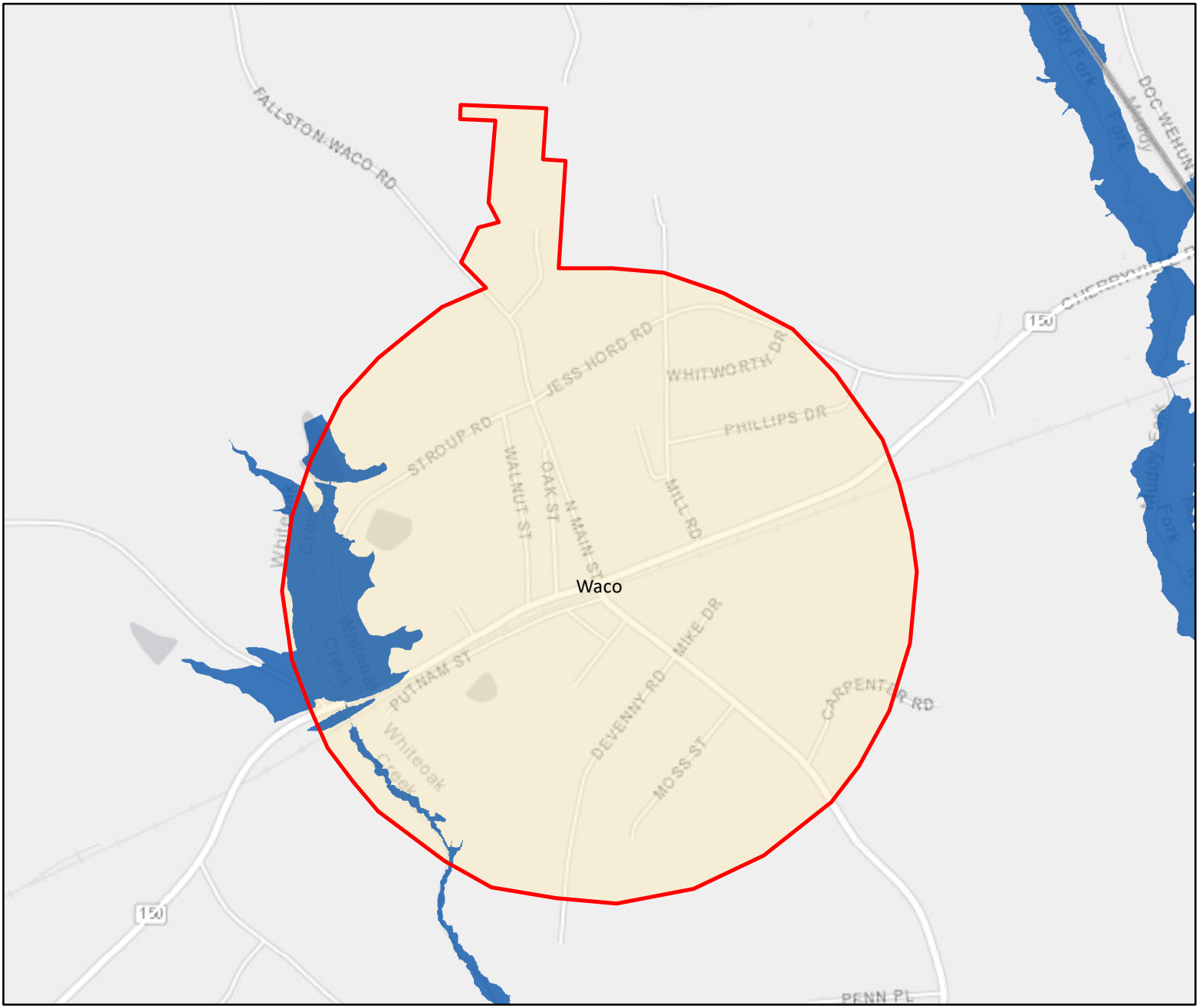
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.75 1.5 3 Miles

N

Waco - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

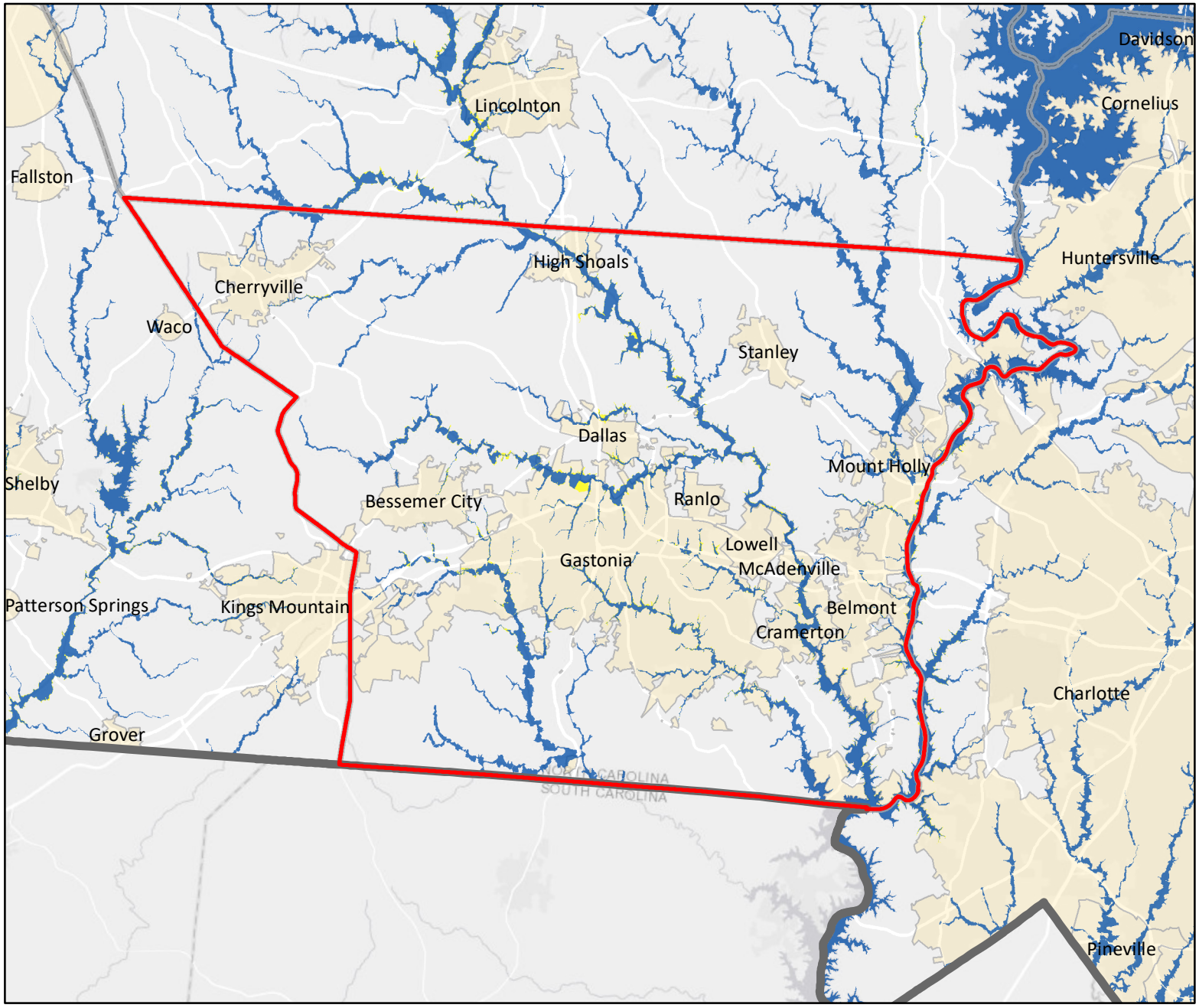
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.125 0.25 0.5 Miles

N

Gaston County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

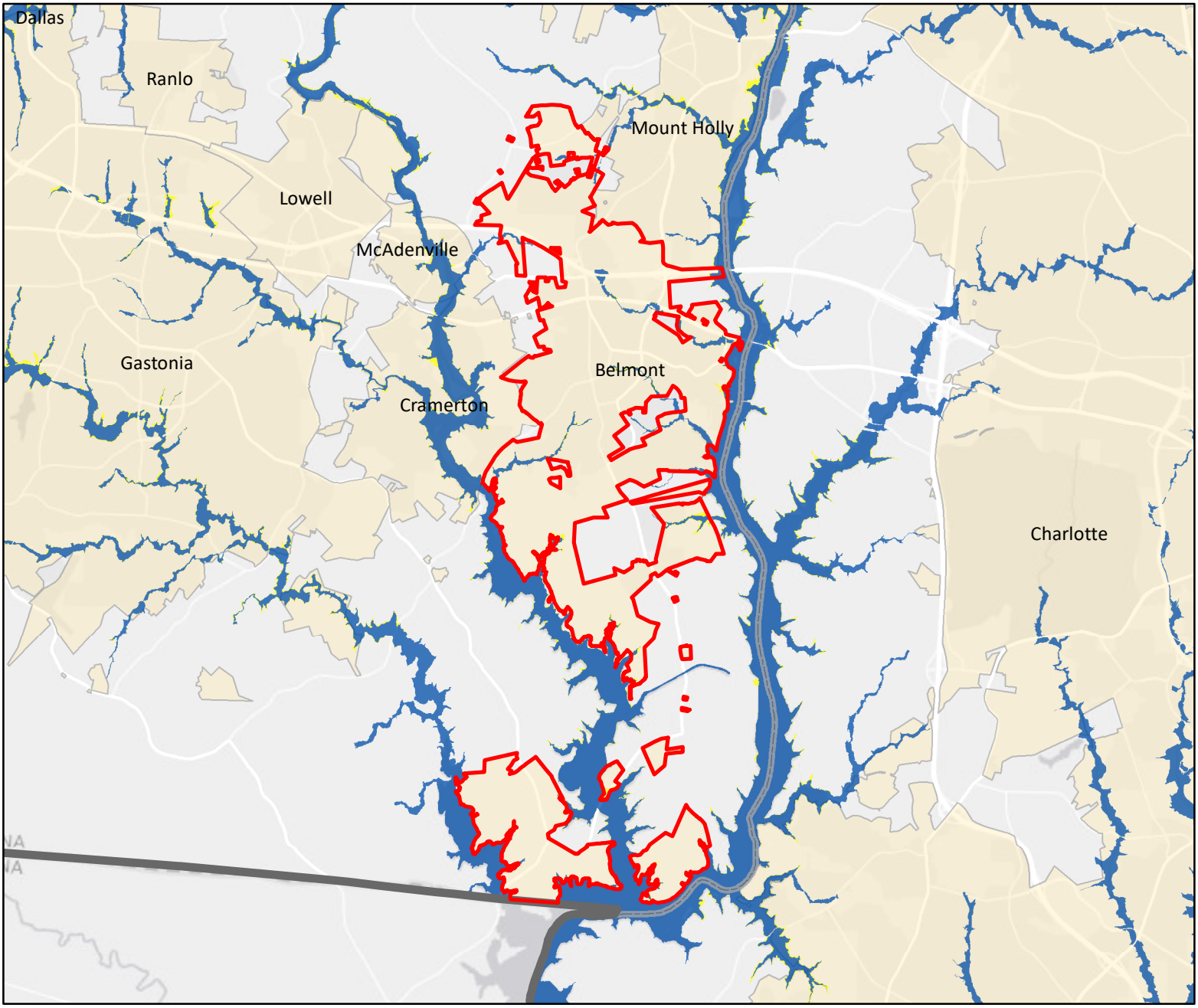
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.75 5.5 11 Miles

N

Belmont - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

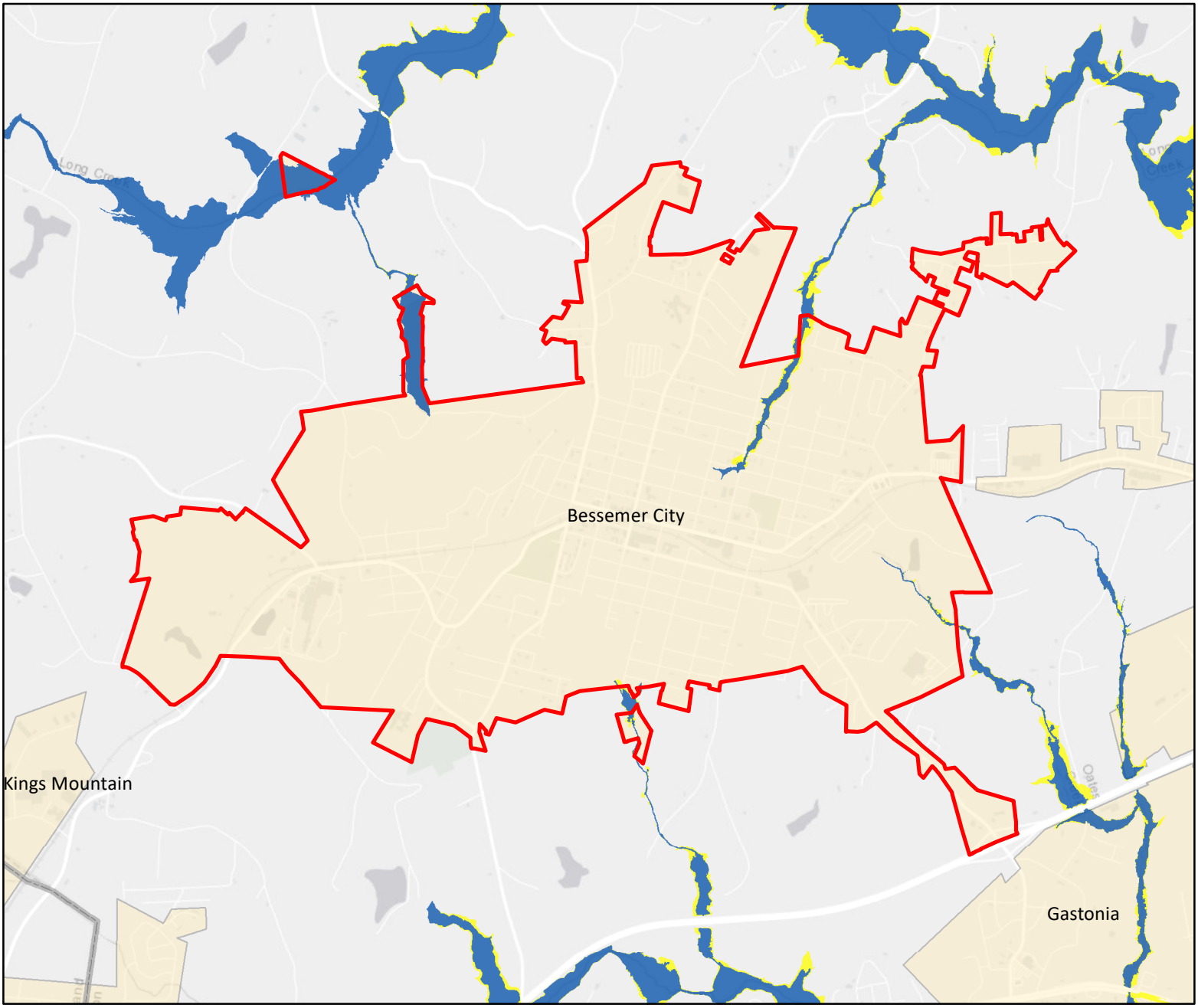
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 1 2 4 Miles

N

Bessemer City - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

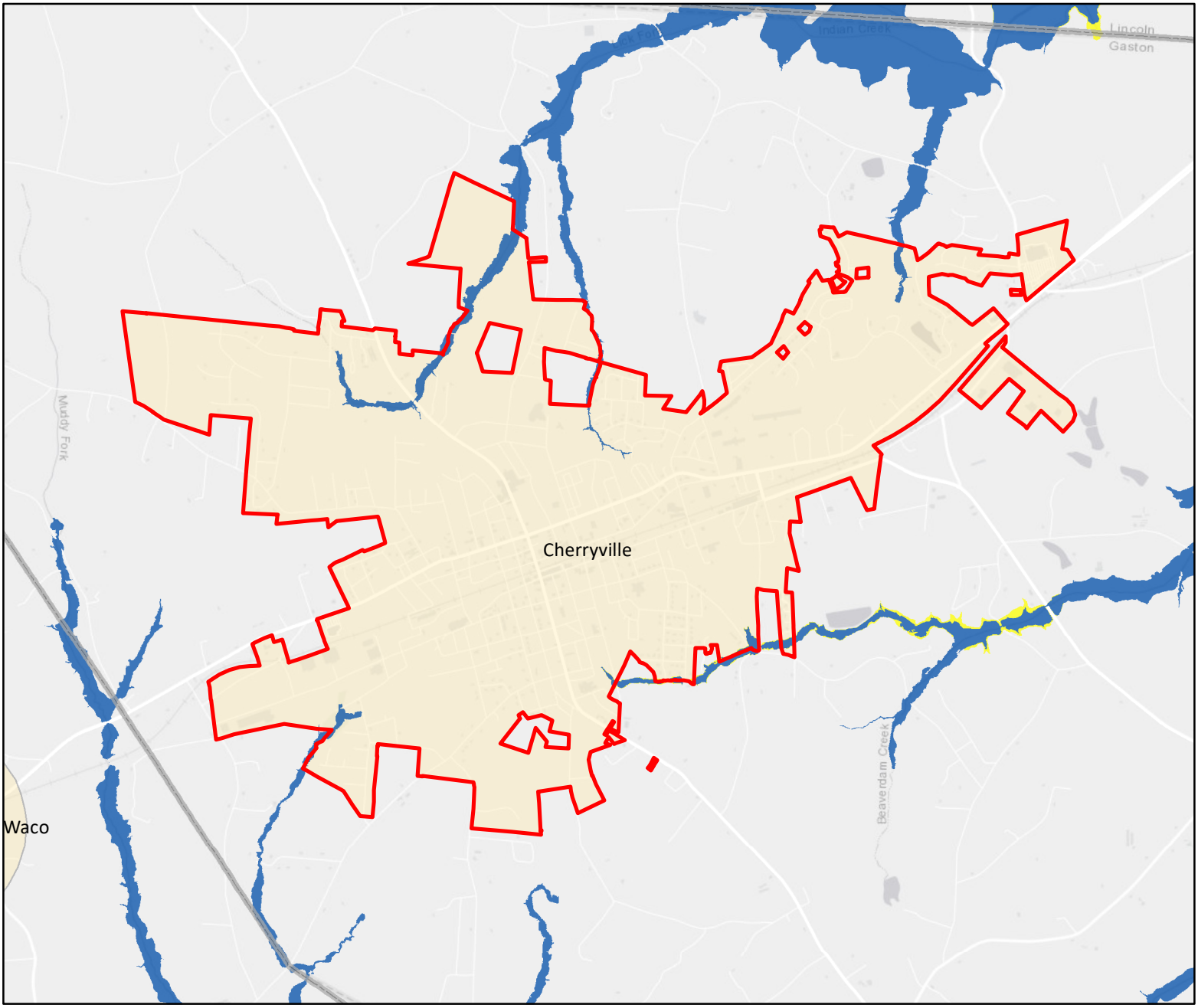
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.35 0.7 1.4 Miles

N

Cherryville - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

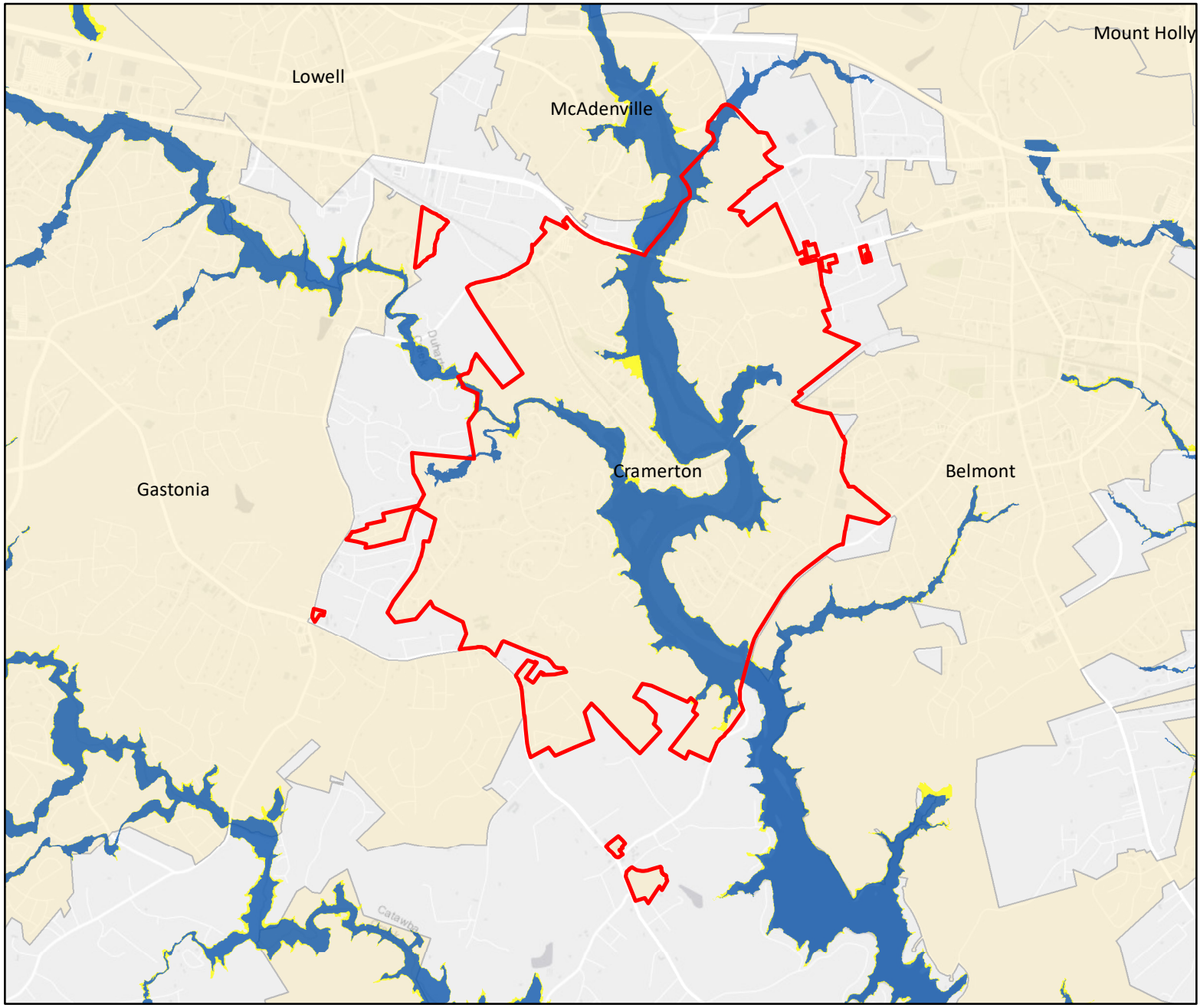
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.4 0.8 1.6 Miles

N

Cramerton - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

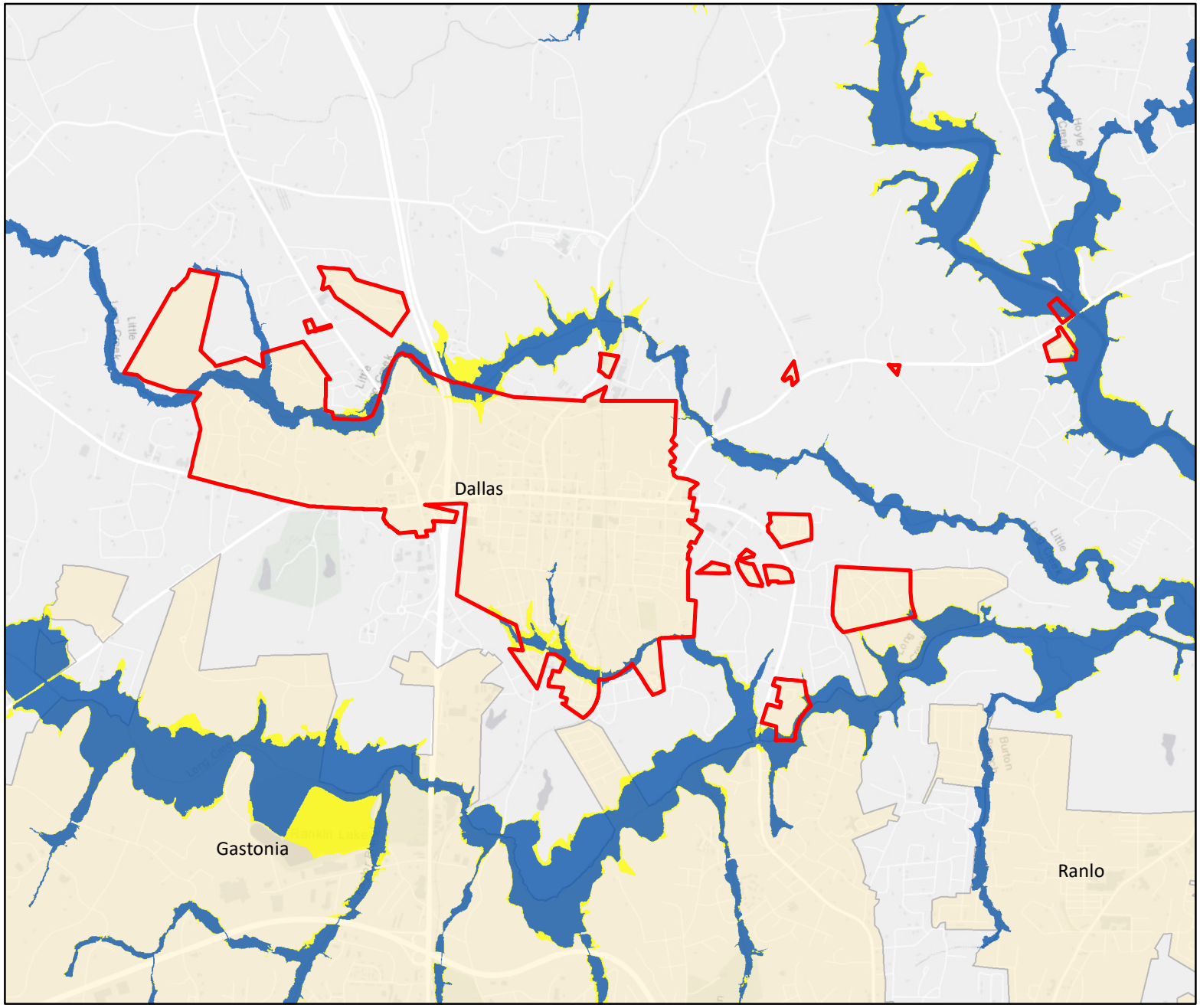
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.425 0.85 1.7 Miles

N

Dallas - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

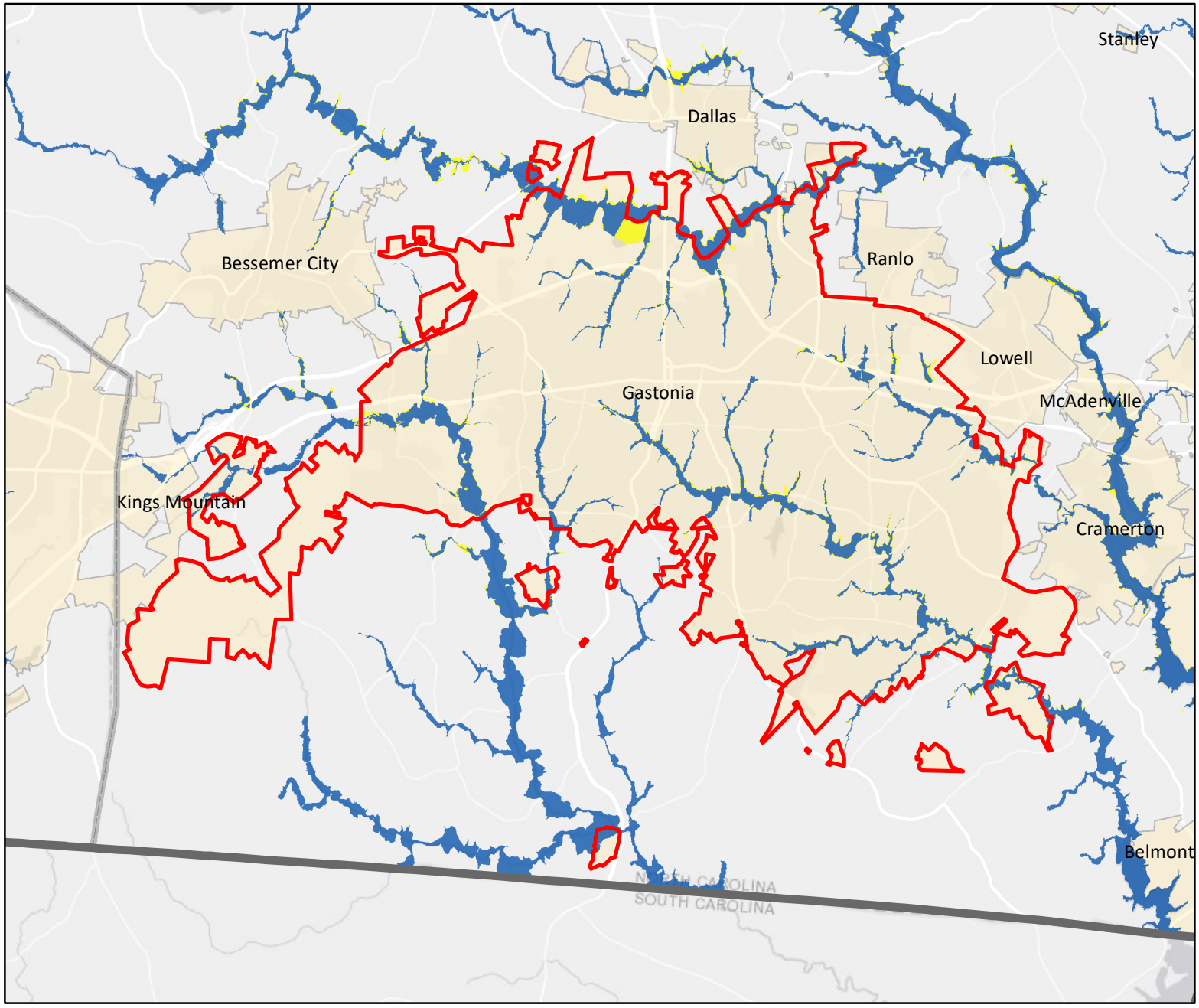
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.425 0.85 1.7 Miles

N

Gastonia - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

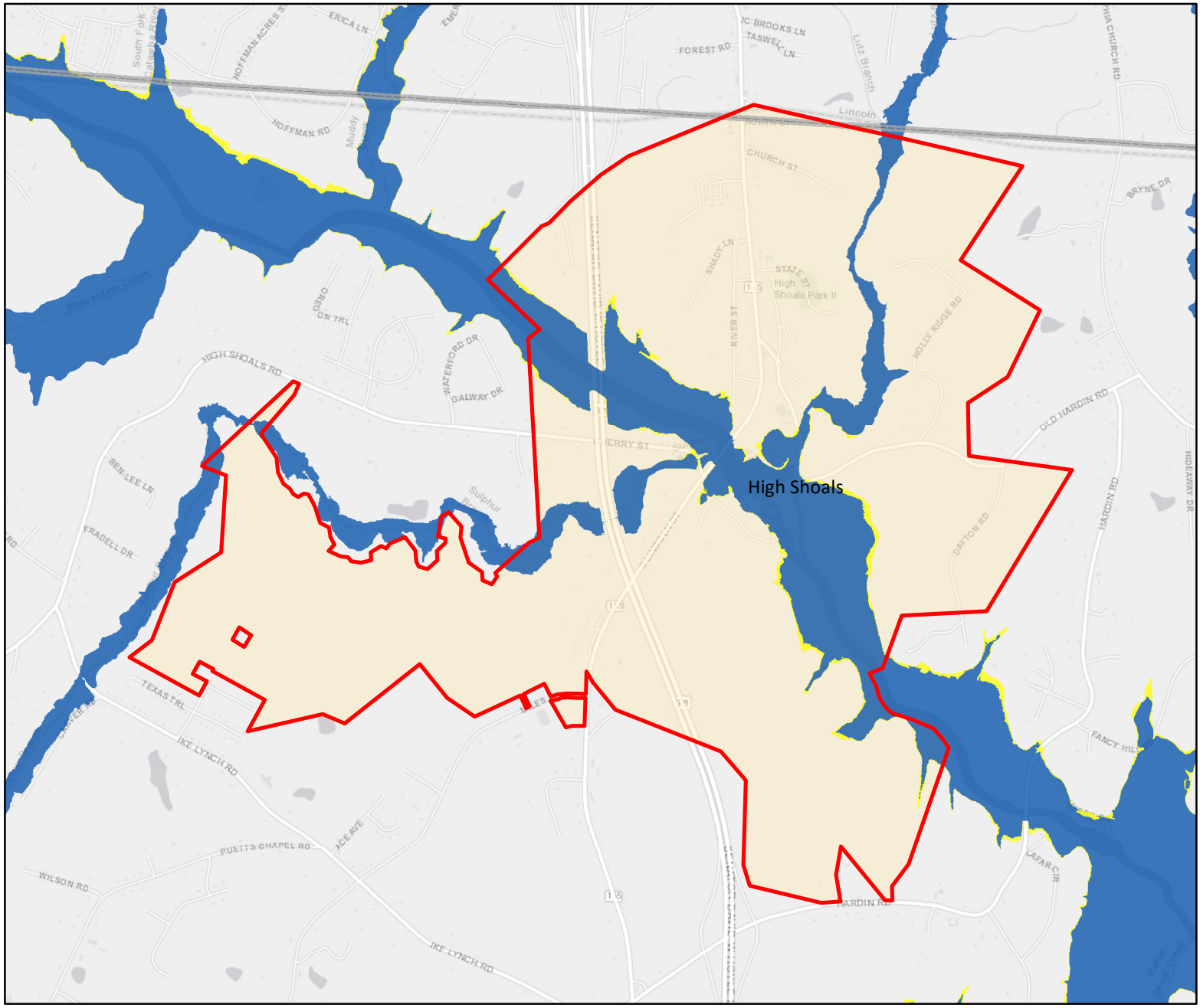
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 1.25 2.5 5 Miles

N

High Shoals - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

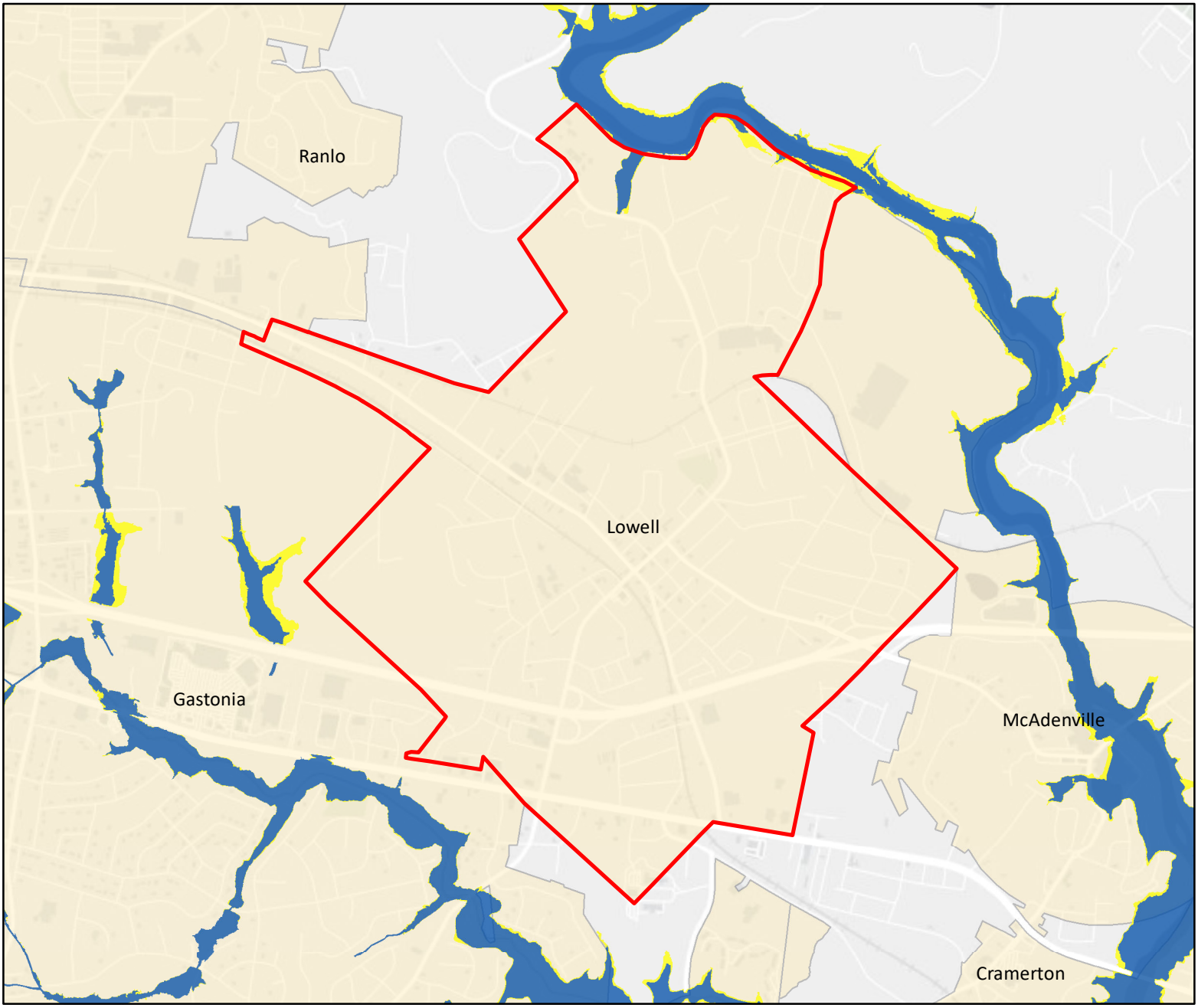
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.225 0.45 0.9 Miles

N

Lowell - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

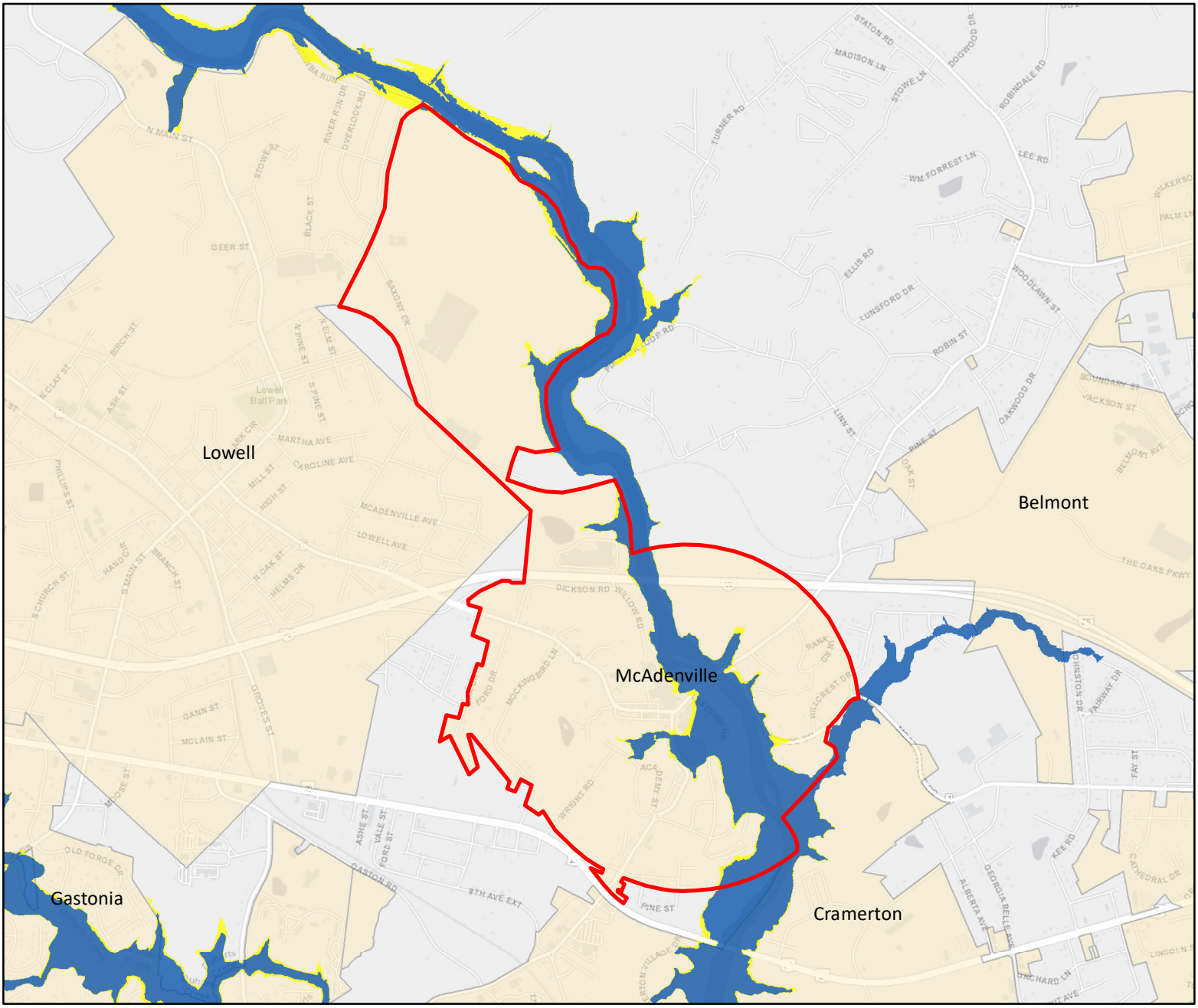
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.25 0.5 1 Miles

N

McAdenville - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

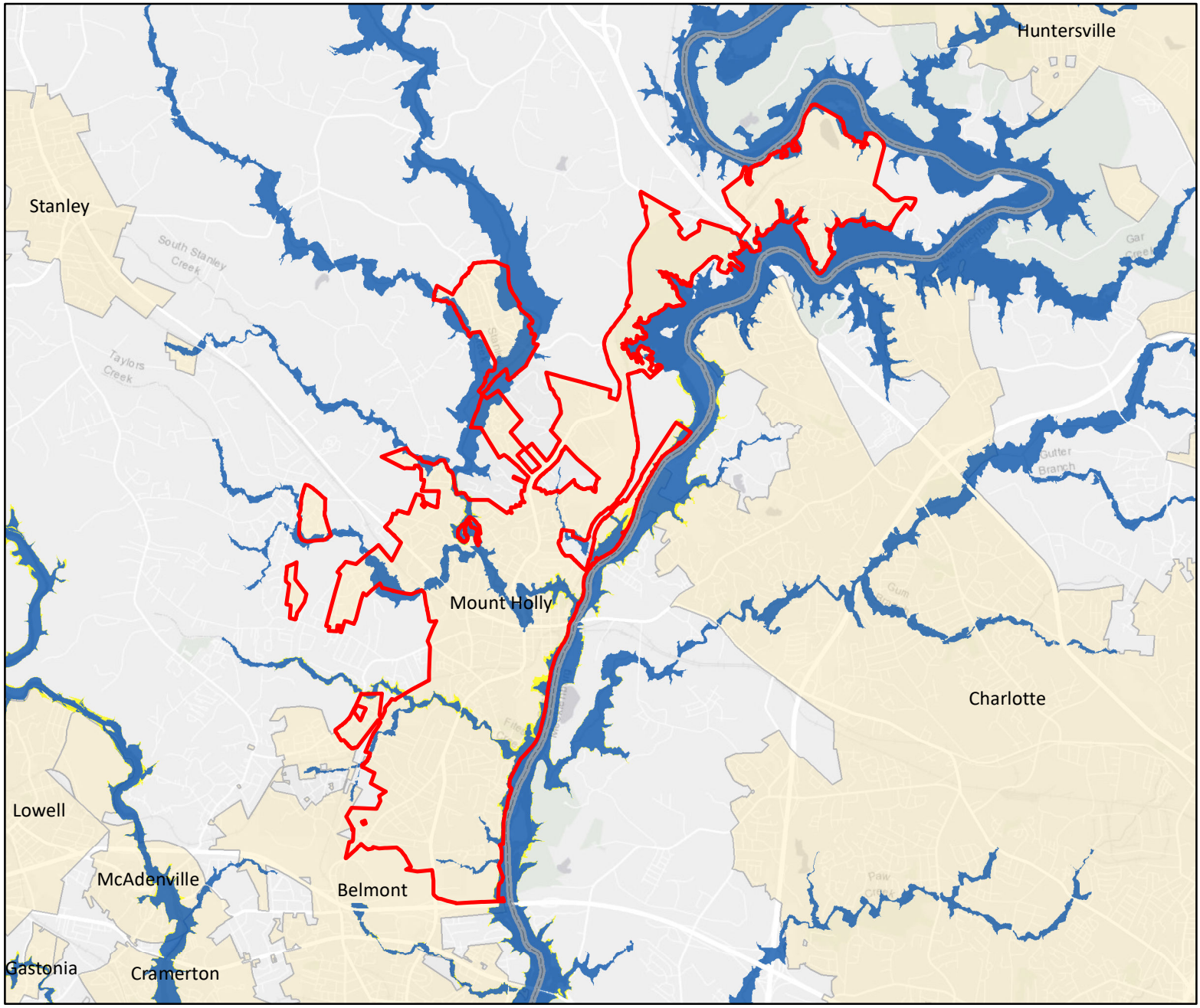
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.25 0.5 1 Miles

N

Mount Holly - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

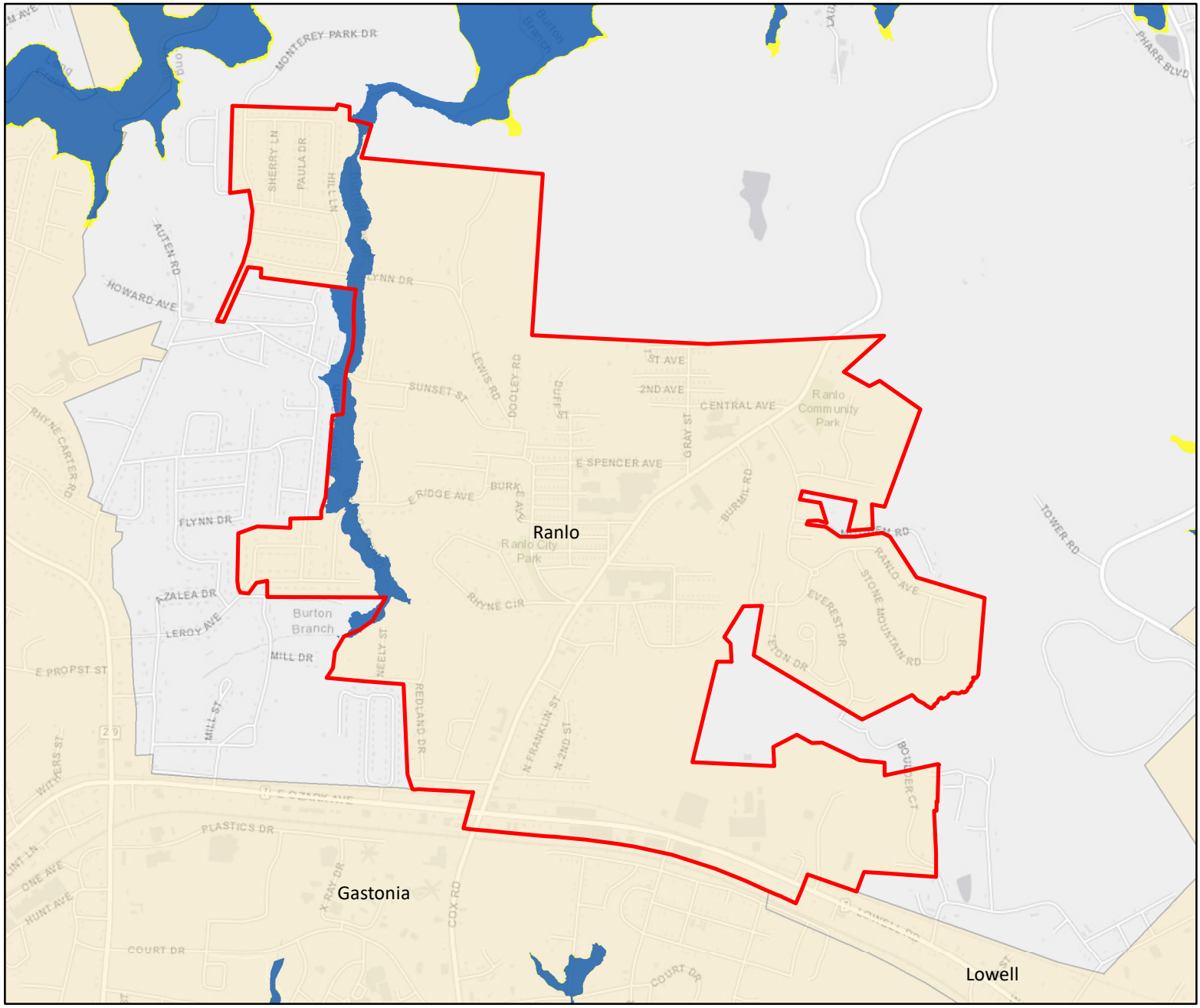
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.75 1.5 3 Miles

N

Ranlo - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

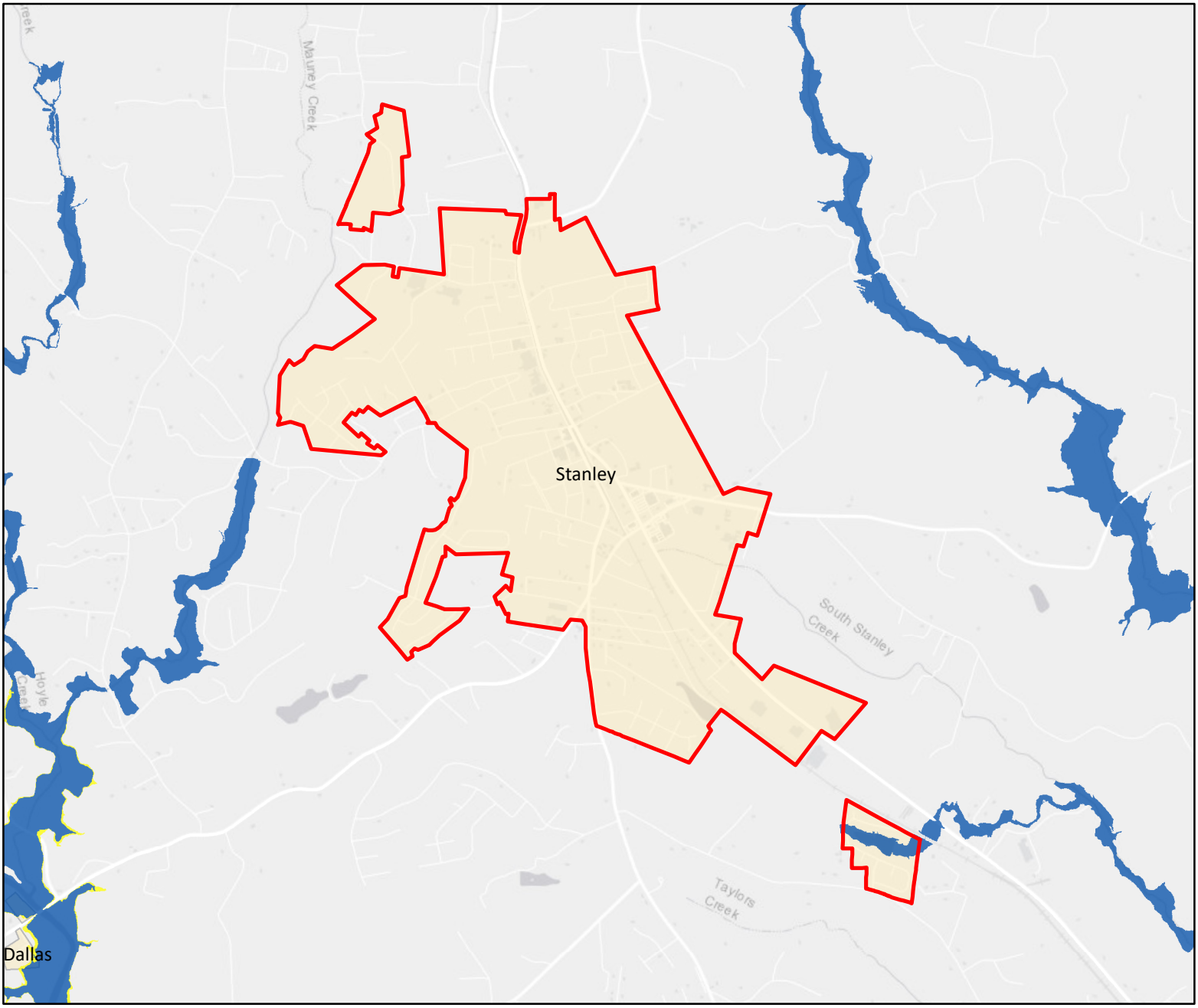
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.2 0.4 0.8 Miles

N

Stanley - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

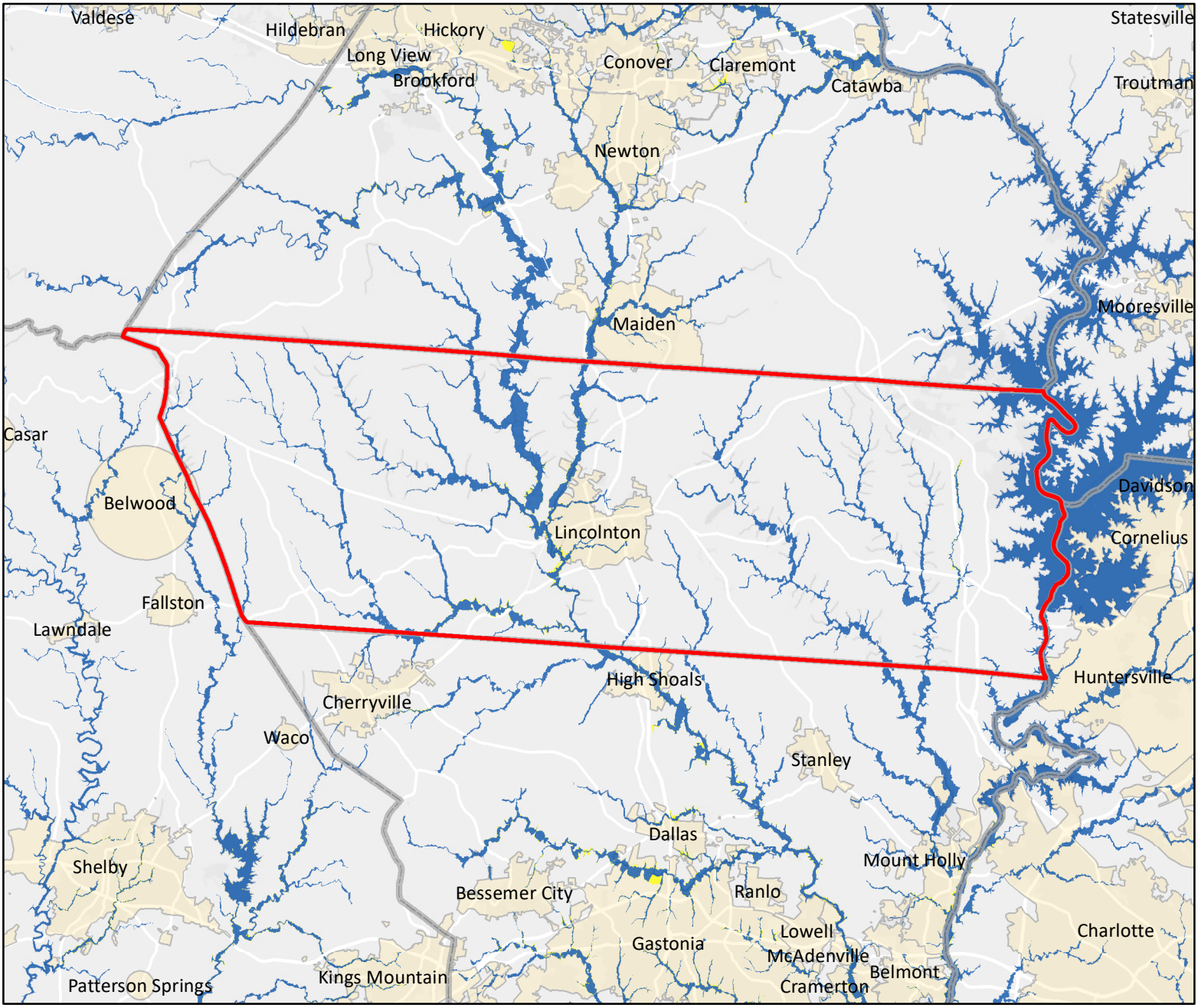
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.35 0.7 1.4 Miles

N

Lincoln County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

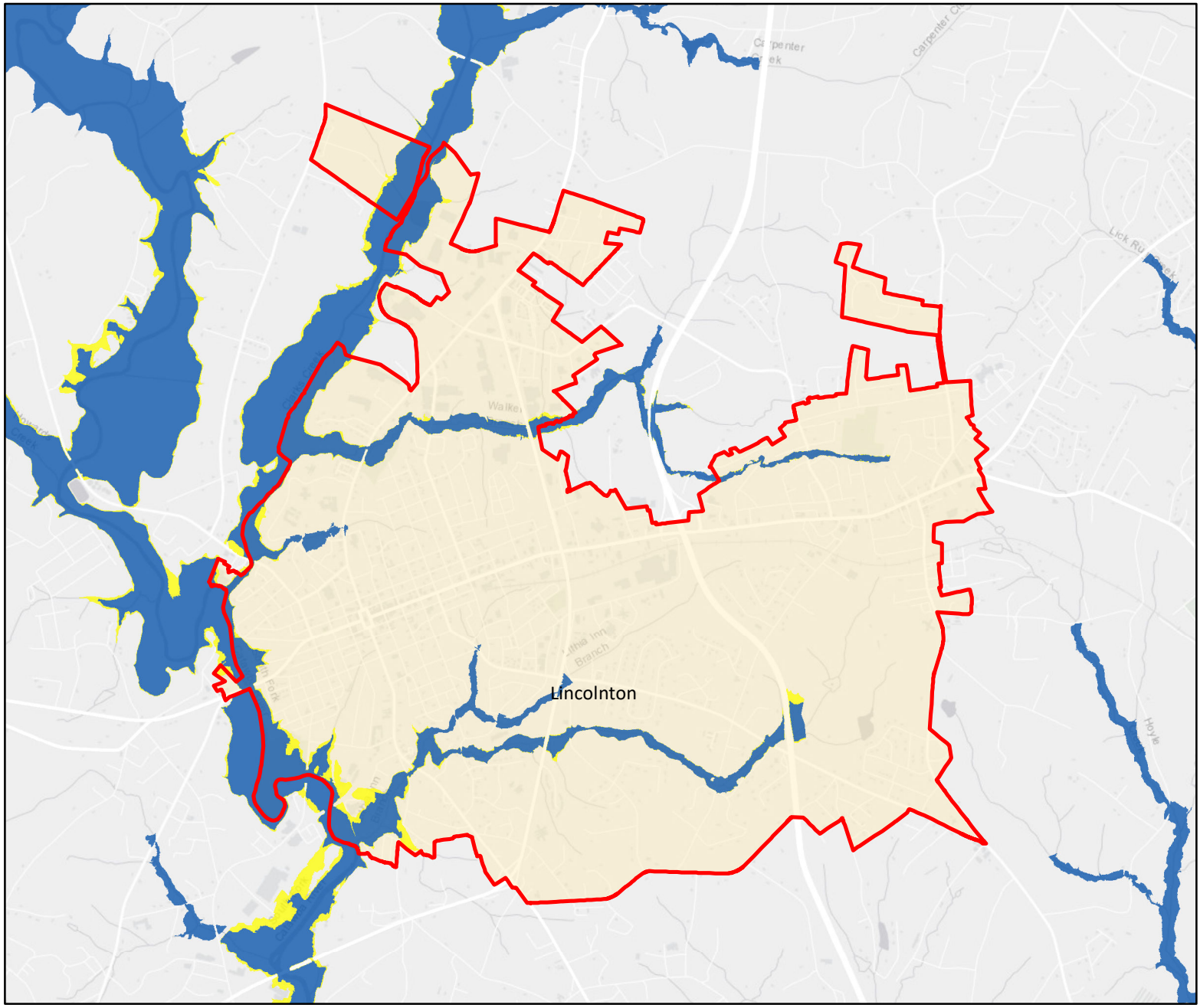
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 3 6 12 Miles

N

Lincolnton - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.425 0.85 1.7 Miles

N

Appendix G:
NCEI Storm Event Data

This section of the Plan includes the historic storm event data as reported to the National Centers for Environmental Information.

- G.1 – Cold/Wind Chill
- G.2 – Drought
- G.3 – Extreme Heat
- G.4 – Flood
- G.5 – Hail
- G.6 – Heavy Rain
- G.7 – Heavy Snow
- G.8 – High Wind
- G.9 – Ice Storm
- G.10 – Lightning
- G.11 – Sleet
- G.12 – Tornado
- G.13 – Thunderstorm
- G.14 – Winter Storm

TABLE G.1: COLD/WIND CHILL EVENTS (2000-2019)

Location	Date	Description
Cleveland, Gaston, Lincoln County	1/6/2014	An arctic cold front blasted through the western Carolinas during the morning of the 6th, bringing gusty winds and the coldest air mass to have affected the region since 1994. By early evening, winds of 10 to 20 mph, with stronger gusts combined with temperatures falling into the 20s and teens to produce wind chill values below 0 across the Piedmont and foothills. Although wind gradually diminished overnight, low temperatures fell into the single digits across the Piedmont and foothills. The low temperature of 6 at the Charlotte/Douglass International Airport shattered the previous daily record of 12 that had stood for more than a century.
Cleveland, Gaston, Lincoln County	1/7/2015	A strong arctic cold front moved through the western Carolinas during the morning and afternoon of the 7th, bringing gusty winds and very cold air to the Piedmont and foothills. By late evening, sustained winds of 5 to 15 mph combined with air temperatures in the teens to yield wind chill values near 0. Although winds gradually diminished overnight, air temperatures fell to around 10 degrees in many areas by daybreak, and wind chills of 0 to 5 above lingered until temperatures began warming during late morning. However, temperatures remained at or below freezing in many areas throughout the 8th. Record daily lows were set in the Charlotte area on the morning of the 8th.
Cleveland, Lincoln County	2/19/2015	A strong arctic cold front blasted through the western Carolinas during the afternoon and evening of the 18th, bringing strong winds and very cold air to the region. Overnight, sustained winds of 5 to 15 mph combined with air temperatures in the teens to yield wind chill values around 0 by daybreak on the 19th. Although winds diminished, air temperatures failed to warm above the 20s throughout the 19th, while record lows between 0 and 10 above were recorded the morning of the 20th.
Cleveland, Gaston, Lincoln County	3/16/2017	The 2017 growing season began early across western North Carolina, due to an unusually warm February and early March that saw average temperatures of almost 10 degrees above normal. An episode of cold arctic high pressure in the middle of March led to a hard freeze on the morning of the 16th, when low temperatures in the lower to mid 20s were reported. This caused significant damage to berry, wheat, apple, and peach crops. While subsequent days of freezing temperatures caused further damage, the vast majority of the damage occurred on the 16th.

TABLE G.2: DROUGHT EVENTS (2000-2019)

Date	Description
August 2000	The 2-year drought was reaching a critical stage by late summer. Many 80 to 100-foot wells were going dry. Area lakes were at record low levels causing property damage to docks, boats, etc.
September 2000	Overall, drought conditions continued across western North Carolina despite some locations receiving near their month's average rainfall. Low stream flow and municipal water supply remained the largest issues with many towns and cities enacting water restrictions. Citizens were quoted as saying this is the driest, they have ever seen it. Despite the drought conditions, impact on crops seemed to be minimal.
October 2000	Effects of the drought intensified as many areas received absolutely no rain during the month, setting records for the longest stretch without measurable rainfall in several locations. Wells and mountain streams continued to dry up and lake levels continued to drop. Many communities were forced to start more stringent water conservation measures.
November 2000	The long-term drought continued to affect the region. Rainfall during the month was near or slightly above normal, but this had little effect on the ground water levels. Numerous wells dried up during the fall, and well borers and drillers could not keep up with the demand. Large lakes reported record low levels and some communities continued or initiated water control measures.
February 2001	The long-term drought's impact became more severe, even during the winter, as water levels in lakes dropped and stream flow on rivers reached the lowest in memory. More and more communities began water restrictions and started preparing for a busy fire weather season.
March 2001	Despite beneficial rain during March, the drought continued to grip most of the area. Severe water restrictions were implemented in parts of the North Carolina piedmont, where reservoir had dropped to all-time low levels. In Concord, food establishments were asked to use paper and plastic products to conserve water.
April 2001	Some relief to the long-term drought occurred at mid-month, but for the most part, the rainfall deficit for the three-year period actually grew larger by the end of April. Mandatory water restrictions continued at a few mountain locations, with voluntary water restrictions urged at many others. Numerous wells went dry during April.
May 2001	Unprecedented drought conditions continued. Some rivers and lakes reached record-low levels. Well-drilling companies in the North Carolina piedmont were recording twice as much business as usual.
August 2001	The effects of the long-term drought became more severe, especially in the North Carolina piedmont. Critical water conditions were beginning to concern officials and residents of Charlotte.
December 2001	Very little active weather during December signaled that the drought was still present - and becoming critically important to more and more people. The Charlotte area recorded an all-time record dry calendar year with just 26.23 inches of rainfall during 2001. Records have been kept in the area since 1878. Many communities initiated either mandatory or voluntary water restrictions. At Kings Mountain, NC - a new pump was required at Lake Moss because the water level dropped below 2 of the 3 existing pumps. Record low ground water supplies, lake levels, and stream flows were reported across all of the region.
August 2002	The water supply situation reached crisis levels in some communities, as the effects of the long-term drought continued to plague western North Carolina. Particularly hard hit were several Piedmont communities along the Interstate 77 corridor. The city of Shelby was forced to buy water from surrounding communities and even from private companies and citizens. In Statesville, emergency construction of wells and a dam was necessary to prevent the city from running out of water, as the South Yadkin River reached historically low levels. Water levels on area lakes were as much as 10 feet below full pond. Most of the larger towns and cities along the I-77 corridor had imposed mandatory water restrictions by the end of the month, including the Charlotte metro area.
May 2004	A period of dry weather that began in August of 2003 resulted in moderate drought conditions across portions of western North Carolina by late spring of 2004. Streamflow and lake levels began to run below normal, and a few communities instituted water restrictions.

Date	Description
May 2007	The effects of an extended period of dry weather were exacerbated by an abnormally dry May, with many locations reporting one of the driest Mays in recorded history. By the end of May, many climatological stations were reporting yearly rainfall deficits as high as 10 inches. The result was severe to extreme drought conditions across much of western North Carolina by the end of the month. Water restrictions were implemented in some counties across extreme western North Carolina. The very dry conditions added to agriculture hardships caused by a hard freeze and widespread damaging winds in April.
June 2007	Despite an increase in thunderstorm activity, drought conditions persisted across much of western North Carolina. The persistent drought continued to cause hardships to agricultural interests that were still recuperating from the April freeze. Dollar values for the drought damage should be included in either the August or September Storm Data for this region.
July 2007	Drought conditions persisted across much of western North Carolina during July. By the end of July, voluntary water restrictions were instituted in almost all North Carolina counties along and west of I-77. Some mandatory restrictions were introduced in Union County, NC. Agricultural interests continued to be especially hard hit. The absence of rain negatively affected the hay crop, creating concern for the loss of livestock. Dollar values for the drought damage should be included in either the August or September Storm Data for this region.
August 2007	Severe to extreme drought conditions persisted across much of western North Carolina during August. By the end of the month, voluntary water restrictions continued in almost all North Carolina counties along and west of I-77. Stream flows and groundwater levels approached record low levels. Water levels on some reservoirs decreased by as much as 1 foot every 10 days. Agricultural interests continued to be especially hard hit, and the North Carolina governor requested federal disaster aid by the end of the month. Dollar values for the drought should be included in either the September or October Storm Data for this region.
September 2007	Extreme drought conditions persisted across western North Carolina through September, as the region experienced another month of well-below normal precipitation. By the end of the month, most locations were running a yearly rainfall deficit of 11-17 inches. Stream flows and groundwater levels were near record low levels, with many streams running at 5 percent or less of normal flow. Water levels on area reservoirs were some of the lowest in recorded history. Agricultural interests continued to be especially hard hit. Farmers continued to struggle to feed livestock due to a lack of hay and poor pasture conditions, forcing many cattle to be sold or slaughtered. Agricultural and other losses attributed to the drought are estimated to be in the hundreds of millions of dollars.
October 2007	Unusually dry weather continued across western North Carolina through October. Although a soaking rain near the end of the month resulted in near-normal monthly precipitation for the mountains, the piedmont saw another month of well-below normal rainfall. Most areas were on pace to break yearly rainfall deficit records. By the end of the month, exceptional drought conditions were reported across the majority of the area. Water flow on area streams continued at 3 to 6 percent of normal, while lake levels remained at near-record lows. Although most cities and towns were requesting voluntary water restrictions be observed, mandatory restrictions were ordered in quite a few communities. Also, private wells were beginning to dry up in many areas. Agriculture continued to be severely impacted by the drought. As of this writing, county by county dollar estimates of drought damage have not been made available.
November 2007	November provided no relief from the effects of the long-term drought. In fact, another month of well-below normal rainfall made an already dire situation even worse. Many locations remained on pace to set annual records for rainfall deficit. By the end of the month, the vast majority of the region was experiencing exceptional drought conditions. Streamflow on area rivers remained extremely low, generally less than 10 percent of normal. Meanwhile, lakes continued to gradually fall toward record low levels.
December 2007	The latter half of December saw a transition to a wetter pattern across the southeast. Most observing stations in western North Carolina reported above normal monthly rainfall for the first time since January 2007. However, this was not enough to put much of a dent in the long-term

Date	Description
	drought as extreme to exceptional drought conditions persisted into the New Year. Although the increase in rainfall did allow for some recharge of area streams, many were still running at less than 25 percent of normal flow at the end of the month.
January 2008	January saw a return to dry weather across western North Carolina. Most observing stations across the region reported a rainfall deficit of 1 to 2 inches during the month, resulting in another month of exceptional drought conditions across most of the area. Water levels on area lakes remained within a foot or two of record low stages. However, rivers and streams remained somewhat recharged from the December rains, with streamflow on most waterways running 25 to 75 percent of normal.
June 2008	Although near normal rainfall was observed across much of the area during the late winter and early spring, another period of abnormally dry weather in May and June exacerbated severe to extreme drought conditions over the region. Much of the area saw less than 2 inches of rain during this period of time. By the end of the month, much of the mountains and foothills of western North Carolina were running 10 inches below normal annual rainfall. Total rainfall deficits since the beginning of 2007 were around 20 inches or more in the hardest hit areas. By the end of the month, flow on almost all major streams was running less than 10 percent of normal. Many area crops suffered.
July 2008	Unusually dry weather continued through the month of July, with severe to extreme drought conditions persisting across the area. Afternoon and evening thunderstorms provided some degree of relief across portions of the North Carolina piedmont, but locations across the region reported annual rainfall deficits of nearly 11 inches by the end of the month. Mandatory water restrictions were instituted across much of the North Carolina foothills. Water well levels began to descend below record low levels, most of which were recorded during the 1999-2002 drought. The vast majority of major streams across the area continued to run 1-10 percent of normal flow. Agriculture continued to be hard hit, with some areas reporting a 100 percent loss of the corn crop.
August 2008	Dry weather persisted across much of the area for most of August, although portions of the North Carolina Piedmont began to see relief from the dry conditions early in the month, due to an increase in daily thunderstorm activity. Elsewhere, exceptional drought conditions persisted and even expanded slightly westward to cover more of far western North Carolina and northeast Georgia. During the early part of the month, flows on most of the major streams across the area were running at record low levels, with the French Broad River setting a minimum flow record that had stood for almost 100 years. Only a handful of streams were running at more than 1 to 7 percent of normal. Groundwater levels were 2-5 feet below normal. Significant agricultural impacts persisted, with losses to summer crops, including hay, estimated at 30%. The dry weather also affected the livestock industry, due to shortages of pasture crops necessary for feeding. By the end of the month, Tropical Storm Fay had dropped up to 11 inches of rainfall across the area, providing some relief from the drought conditions, especially across the North Carolina Piedmont.
September 2008	The heavy rain brought by Tropical Storm Fay in late August provided some relief to the drought conditions across the area. However, another dry month resulted in a persistence of extreme to exceptional drought conditions across the region. Voluntary water restrictions remained widespread during the month. A few communities held onto mandatory restrictions early in the month, but many of these were lifted by the end of the month. Well water remained near record low levels in many areas, while lake levels persisted well below normal stages. Rainfall from Fay resulted in some improvement in streamflow, although most rivers and major streams remained at less than 25 percent of normal, with many still running at less than 10 percent of normal. By the end of the month, government officials had requested a federal disaster declaration for most of the counties in the area, due to crop damages.
October 2008	Another abnormally dry month resulted in a persistence of severe to exceptional drought conditions over much of the mountains and foothills of North Carolina. Some slight improvement was observed in well water levels, but they remained near record lows. Most rivers and major streams continued to flow at less than 10 percent of normal. Voluntary water restrictions

Date	Description
	continued in most areas, with a few areas continuing to institute mandatory restrictions. Meanwhile, severe crop losses resulted in a federal disaster declaration for much of the larger agricultural communities across the area.
November 2008	Another month of below normal rainfall resulted in a persistence of severe to exceptional drought conditions over much of western North Carolina through November. In fact, drought conditions actually worsened in some areas, with portions of the central North Carolina mountains deteriorating to exceptional drought conditions late in the month. Slight improvements in well water levels continued across the area. Most rivers and major streams continued to flow at less than 10 percent of normal. Voluntary water restrictions continued in most areas, with a few areas continuing to institute mandatory restrictions.

TABLE G.3: EXTREME HEAT EVENTS (2000-2019)

Date	Description
6/29/2012	A very hot and humid airmass that spent several days building west of the Appalachians finally made it east of the mountains, bringing very hot conditions to foothills and Piedmont of North Carolina. The high temperature at Charlotte-Douglas International Airport hit 104 degrees on both the 29th and 30th, tying the all-time high. The heat index hit 105 degrees. Excessive heat affected areas east of Charlotte. The ASOS at Monroe, NC reported a heat index value of 110 degrees on 30th. Lower dewpoints over the foothills resulted in sub-advisory and warning level heat index values. The heat lasted through July 1st, before thunderstorms brought somewhat cooler conditions.
7/1/2012	Oppressive heat continued the first day of July, with Charlotte-Douglas International Airport tying the all-time record high temperature of 104 degrees for a 3rd consecutive day. The ASOS at Monroe reported a high temperature of 105 degrees with a max heat index of at least 111 degrees. Once again, Hickory in the foothills failed to reach even heat advisory criteria. Widespread thunderstorms developed during the afternoon hours, bringing a few days of relief from the heat.

TABLE G.4: FLOOD EVENTS (2000-2019)

Date	Description
11/12/2002	Clogged storm drains contributed to flooding of several streets.
3/20/2003	An extended period of moderate to heavy rain combined with heavy upstream rainfall to cause slow rises on numerous creeks and streams, which culminated in an extended period of flooding across the county. The South Fork of the Catawba River overflowed its banks in the Lowell/McAdenville area, resulting in some of the worst flooding observed in the area in 35 years. The river crested at 16.6 feet at McAdenville. Several adjacent buildings were flooded, and some vehicles received extensive damage. Twenty-five people required rescuing from a flooded mobile home park along Crowders Creek.
3/20/2003	After heavy early morning rain caused flash flooding, moderating rainfall contributed to slower rises, but continued and additional flooding along numerous creeks and streams across the county. Numerous low-lying roads and bridges were washed out. The South Fork of the Catawba River flooded areas near the Gaston County line.
4/10/2003	Moderate to heavy overnight rainfall resulted in flooding along creeks and streams which began during the morning and continued into the late evening. Significant flooding occurred along the South Fork of the Catawba River, while many smaller streams also overflowed their banks.
4/10/2003	An extended period of moderate to heavy rainfall resulted in slow rises and eventual flooding along numerous creeks and streams across the county, including along the South Fork of the Catawba River near Lowell. Some urban flooding also developed.
5/22/2003	An extended period of heavy rainfall resulted in slow rises along creeks and streams, which culminated in flooding which began during the late morning in the Kings Mountain area, and expanded to include much of the county by late afternoon. Significant flooding developed in the Shelby area during the midafternoon.
5/22/2003	Several creeks and streams flooded across the county.
5/22/2003	Slow rises along creeks and streams culminated in flooding that began during mid-day. Numerous creeks flooded, especially along the highway 321 corridor. A dike along Crowder's Creek broke, causing water to flow into a mobile home park. At least one mobile home was destroyed, while others sustained damage.
7/13/2003	Although heavy rainfall ended across the county shortly after midnight, flooding continued through the pre-dawn hours.
7/13/2003	Flooding continued across the county through dawn, with many roads remaining closed.

Date	Description
9/7/2004	An extended period of moderate to heavy rain associated with the remnants of Hurricane Frances led to gradual rises along creeks and streams, culminating in flooding across the county by late evening. In addition to smaller streams, the South Fork of the Catawba River and several of its tributaries exceeded flood stage. Several roads were flooded, as was a mobile home park near Kings Mountain. A large sinkhole in Kings Mountain forced the closure of another road.
9/8/2004	Flooding first developed during the early morning hours when the Broad River and its tributaries overflowed their banks around Polkville. Flooding developed downstream to Boiling Springs where a family was evacuated. Flooding persisted on small streams and the Broad River through much of the day.
9/8/2004	Water releases upstream in the Catawba River basin caused rises on the river and Lake Norman. A few homes were flooded and evacuations were required. Flooding also occurred along the South Fork Catawba River as runoff from upstream rainfall continued to work downstream.
12/10/2004	The South Fork of the Catawba River flooded low-lying areas in and around Cramerton.
10/7/2005	Flooding began near the Rutherford county line when a pond flooded Winn Rd. Eventually, numerous roads and bridges were flooded across the western part of the county, including Wood Rd. In addition, the Broad River exceeded its flood stage by 5 feet at Boiling Springs, forcing some evacuations. Western portions of the county likely received in excess of 10 inches of rain in the 48-hour period ending on the morning of the 8th.
10/7/2005	Flooding began in the Cat Square area, when overflowing creeks flooded several roads with as much as 10 inches of water. Later in the evening, flooding developed in Vale, with water over a bridge on Trinity Church Rd, and water in the basements of several homes. Portions of the county received as much as 9.5 inches of rain in the 48-hour period ending on the morning of the 8th.
1/26/2010	Although heavy rainfall ended over the county shortly after midnight, runoff resulted in persistent high-water conditions through much of the rest of the night.
2/5/2010	River flooding developed along the South Fork Catawba River near Lowell during the afternoon of the 5th and persisted through the early part of the 7th.
7/27/2013	Numerous roads remained flooded across the northwest part of Lincoln County into the evening hours. While the flooding then receded in the western part of the county, new flooding developed along the South Fork Catawba River and its tributaries, lasting through much of the day on the 28th.
7/28/2013	The South Fork Catawba River went into flood starting during the early morning hours of the 28th. Several roads along the river flooded. Back water effects also flooded some roads along tributaries of the river. The river gauge at Lowell crested at 17.5 feet early on the 29th, the second highest crest at that location in over 70 years of gauge readings. Many streets along the river in downtown Cramerton were flooded. Water entered a few buildings, though sand bagging efforts prevented water from entering most structures.
4/20/2015	An automated stream gauge on the South Fork Catawba River near Lowell briefly reached established flood stage after widespread rainfall amounts of 2-3 inches fell in the basin during the 20th and 21st. Portions of Riverside Park and Goat Island Park were flooded in the Cramerton and McAdenville areas.
12/30/2015	Although heavy rain began to taper off across Gaston County during the afternoon, runoff from the earlier rainfall, combined with an occasional burst of moderate to heavy rain, resulted in only slow recession of water levels into the evening.
6/9/2019	A stream gauge on the South Fork Catawba River at Lowell exceeded its established flood stage after heavy rain fell throughout the Catawba River basin on the 8th and 9th. The stream eventually reached moderate flood stage on the 10th. Multiple roads flooded along the river in Cramerton and McAdenville. Media reported a 14-year-old boy drowned when he went swimming in the swollen river in the area around the Stanley-Spencer Mountain Rd bridge during the evening of the 10th.
6/9/2019	A dam pool stage gauge reported and emergency manager confirmed flooding of the Catawba River upstream of the Mountain Island Lake dam occurred after widespread rainfall amounts of 4 to 7 inches fell within the basin across the northern foothills, with much of that falling over the course of

Date	Description
	several hours. Numerous homes were inundated with flood water along such roads as Riverside Dr, Fox Ridge Ln, and several roads in the Nivens Cove area. Several homes were judged to be a total loss. Several people also had to be rescued from their homes during peak flow. The pool elevation behind the dam peaked at just under 107 ft during the early morning hours of the 10th, which was its highest level since August 1940.

Source: NOAA, NCEI

TABLE G.5: HAIL EVENTS (2000-2019)

Location	Date	Mag.	Description
Cleveland County			
Casar, Fallston	5/24/2000	1.75	A few thunderstorms crossed the mountains, then exploded and quickly became large supercells as they moved into the foothills late in the afternoon. This storm went on to produce nickel to baseball size hail in Cleveland county.
Shelby	8/25/2000	0.75	A severe thunderstorm moved slowly southeast during the late evening and produced dime size hail.
Shelby	6/24/2001	1.75	Golf ball-sized hail observed by emergency management personnel in downtown Shelby.
Boiling Springs	3/16/2002	0.88	
Casar	5/7/2002	0.75	
Polkville	5/7/2002	1.75	
Polkville	5/7/2002	1.75	
Shelby	5/7/2002	0.75	
Casar	4/29/2003	0.88	
Polkville	7/12/2003	0.75	
Polkville	7/12/2003	0.75	
Shelby	7/21/2003	1	
Belwood	8/17/2003	1.75	
Shelby	5/19/2005	0.88	
Shelby	7/28/2005	1.75	Golf ball size hail in the Patterson Springs area.
Boiling Springs	4/3/2006	0.75	
Fallston	4/3/2006	1	
Boiling Springs	4/8/2006	0.75	
Polkville	4/25/2006	0.75	Hail between dime and nickel size along highway 226 between Kingstown and Polkville.
Lawndale	5/13/2006	0.88	
Casar	5/14/2006	1.75	
Shelby	5/18/2006	0.88	Reported at the intersection of highway 74 and Beaverdam Rd.
Grover	5/20/2006	1.75	
Shelby	5/20/2006	1.75	Several reports of hail between half dollar and golf ball size.
Lawndale	5/26/2006	0.75	
Shelby	6/10/2006	0.75	Penny size hail reported at the intersection of Plaster Ave and S Lafayette St. Also, large hail of unspecified size in the city around this time.

Location	Date	Mag.	Description
Polkville	6/22/2006	0.75	
Lattimore	7/4/2006	1	
Casar	9/10/2006	0.75	Reported on Beechnut Creek Rd.
Waco	5/12/2007	0.75	Reported on Deal Rd.
Grover	6/12/2007	0.75	Scattered severe storms developed over western North Carolina for a second day in a row. The storms mainly produced large hail.
Lattimore	6/16/2007	0.75	Scattered severe storms developed over the Foothills and western Piedmont of North Carolina during the afternoon hours.
Mooresboro	6/24/2007	0.75	Reported on Goodge Grove Church Rd.
Lawndale	8/14/2008	0.75	Reported on highway 182.
Mooresboro	9/30/2008	0.75	A strong cold front triggered several severe storms over western North Carolina during the afternoon and evening hours.
Grover	4/10/2009	0.75	Elevated thunderstorms produced large hail over the Piedmont and foothills of western North Carolina.
Waco	5/9/2009	0.75	A cold front moved through western North Carolina during the evening hours. The front was preceded by several severe thunderstorms.
Fallston	6/16/2009	1.75	Golf ball size hail was reported on Wilson Rd in Fallston.
Patterson Springs	3/29/2010	0.75	Thunderstorms produced a little small hail over the northwest piedmont of North Carolina during the late afternoon hours.
Lawndale	5/18/2010	0.75	A thunderstorm developed over the western North Carolina piedmont during the late afternoon hours. It produced one report of small hail.
Earl, Shelby	5/28/2010	0.75	A weak upper low triggered numerous thunderstorms over western North Carolina. Several of the storms produced damaging wind and large hail.
Boiling Springs	4/9/2011	1.75	Thunderstorms initiated over the mountains of North Carolina during the afternoon hours. As the afternoon progressed, several supercell thunderstorms developed which tracked southeast across the foothills and piedmont along a slow-moving surface cold front. With unusually steep lapse rates over the region, several of the storms produced large hail. Fortunately, the supercells were a little elevated in nature, and only one, brief, weak tornado developed. Still, hail ranging up to the size of a softballs did quite a bit of damage over the region.
Casar	4/9/2011	1.75	Hail up to the size of golf balls fell in a nearly continuous swath from southwest of Casar near the Rutherford County line, across the Lawndale, Fallston and Waco to near Kings Mountain.
Casar	4/9/2011	1.25	A third long track hail storm brought hail up to the size of half dollars from southwest of Casar, across the Shelby area, to near the South Carolina border.
Shelby	4/9/2011	1	A second severe storm produced large hail in the Shelby area.
Casar	5/10/2011	1.25	Hail up to half dollar size was reported 3 to 4 miles southwest of Casar.
Pottville	5/10/2011	0.88	An isolated multicell severe thunderstorm developed over the North Carolina foothills during the afternoon hours. The storm produced large hail as it moved southward across the region.
Shelby	5/10/2011	0.88	A squall line developed over the Ohio Valley during the afternoon hours. The thunderstorm complex rapidly moved to the southeast, crossing the Appalachian Mountains and affecting much of western North Carolina and the northwest piedmont of South Carolina during the late evening hours.
Casar	5/13/2011	1	Quarter size hail was reported on Pheasant Creek Rd, about 4 miles west northwest of Casar.
Casar	5/13/2011	0.88	Nickel size hail was reported on Camp Knob Rd.

Location	Date	Mag.	Description
Casar	6/2/2011	0.75	Scattered thunderstorms developed across the North Carolina Mountains starting in the early afternoon hours. The storms moved across the southern foothills and piedmont, tracking a little to the north of a weak cold front. Several of the storms produced large hail.
Shelby	6/2/2011	0.75	Penny size hail was reported on Sulphur Springs Rd.
Patterson Springs	3/31/2012	0.88	Nickel size hail fell near the intersection of highway 198 and South Post Rd.
Patterson Springs	4/26/2012	0.75	Penny size hail was reported at the intersection of highways 180 and 74.
Earl	5/16/2012	0.75	A few thunderstorms developed over the southern Piedmont of North Carolina as an upper low moved across the region. The storms produced a few reports of small hail as they drifted to the south.
Shelby	5/16/2012	0.75	A few thunderstorms developed over the southern Piedmont of North Carolina as an upper low moved across the region. The storms produced a few reports of small hail as they drifted to the south.
Shelby	7/5/2012	0.88	Hail fell across the southwest side of Shelby.
Shelby	5/12/2014	0.88	Public reported nickel size hail near Shelby.
Polkville	6/10/2014	0.75	Spotter reported 3/4-inch diameter hail near Polkville.
Lawndale	6/16/2014	1	Spotter reported quarter size hail.
Shelby	6/16/2014	1.75	Spotter reported golf ball size hail north of Shelby. Another spotter reported quarter size hail closer to town.
Earl	4/20/2015	1.5	Public reported hail larger than half dollars near Earl.
Patterson Springs	4/20/2015	0.75	Spotter reported 3/4-inch hail near Shelby.
Lawndale	7/8/2016	1	Media reported quarter size hail at Ballpark Rd and Old Stage Coach Rd.
Polkville	5/31/2018	1	Spotter reported quarter size hail on West Stage Coach Trail.
Lattimore	8/19/2019	1	Public reported quarter size hail in the Lattimore area.
Gaston County			
Gastonia	4/1/2001	0.75	
Gastonia	5/25/2001	0.75	Spotter reported dime-sized hail in Gastonia.
Gastonia	6/26/2001	0.75	Dime-sized hail observed.
Gastonia	8/2/2002	1.5	
Belmont	5/15/2003	1.75	Hail tore large holes in the fiberglass roof of a business.
Bessemer City	5/15/2003	0.75	
Mt Holly	5/15/2003	1.75	
Stanley	5/15/2003	1	
Belmont	7/9/2003	0.75	
Gastonia	7/9/2003	1	
Dallas	7/12/2003	0.75	
Gastonia	7/12/2003	0.75	
Mt Holly	7/12/2003	0.75	
Belmont	7/16/2003	0.75	
Gastonia	7/16/2003	1	

Location	Date	Mag.	Description
Gastonia	7/19/2003	1.75	
Cherryville	8/5/2003	1	
Cherryville	8/5/2003	0.75	
Mt Holly	8/5/2003	0.75	
Dallas	5/22/2004	0.75	
Gastonia	5/23/2004	1	
Lowell	5/10/2005	1	
Belmont	6/19/2005	0.88	Hail of unknown size at the intersection of I-85 and highway 273 and along highway 74 at the Catawba River in the Belmont area. Pea to nickel size hail in Mt Holly.
Gastonia	4/22/2006	0.88	
Dallas	4/25/2006	0.75	
Dallas	5/18/2006	0.75	Reported at the intersection of Ray Farm and Miles Rd.
Belmont	5/20/2006	0.75	
Bessemer City	5/20/2006	0.88	
Gastonia	5/20/2006	1	Numerous trees blown down in the Dallas area, with about 1000 customers without power. Also, nickel to quarter size hail near I-85 between Gastonia and Dallas, with penny size hail in Gastonia at Acres Center Shopping Center on highway 74.
Cherryville	5/26/2006	1	
Cherryville	5/26/2006	1	Quite a few trees blown down Landers Chapel Rd
Cherryville	5/26/2006	1.25	
Cherryville	5/26/2006	1.75	
Gastonia	6/11/2006	1	Six trees down blocking part of Lynnwood Ave along with quarter size hail. A large oak tree fell on a trailer on Glenallen Dr in this same area. Several trees also fell along Carson Dr, with one tree damaging the roof of a home and a shed. Also, the metal roof was blown off a shed near downtown at Long Ave and Broad St. Approximately 10,000 customers lost power in the county.
Dallas	7/2/2006	0.88	
Gastonia	4/11/2007	0.75	Reported on the east side of Gastonia.
Dallas	5/12/2007	1	Reported near the intersection of Friday Park Rd and Old Dallas Highway.
Gastonia	6/11/2007	0.88	Severe storms affected the western Piedmont of North Carolina during the afternoon hours.
Mt Holly	6/11/2007	0.75	Severe storms affected the western Piedmont of North Carolina during the afternoon hours.
Cherryville	6/24/2007	0.75	
Gastonia	6/24/2007	0.88	Reported at the intersection of highway 321 and I-85.
Gastonia	6/25/2007	0.75	Reported at the intersection of Crisp Rd and Spencer Mountain Rd.
Gastonia	7/27/2007	0.75	Scattered severe storms affected western North Carolina during the late afternoon and evening hours.
Dallas	4/26/2008	1	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
Dallas	5/20/2008	0.88	Several clusters of severe thunderstorms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.

Location	Date	Mag.	Description
Gastonia	5/20/2008	1	Reported on Bethany Rd.
Stanley	5/20/2008	1	Several clusters of severe thunderstorms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.
Stanley	5/20/2008	0.75	Several clusters of severe thunderstorms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.
High Shoals	6/22/2008	0.88	Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina.
Cherryville	8/16/2008	0.75	Thunderstorms developed over the North Carolina foothills and Piedmont during the overnight hours. A few of the storms produced damaging winds. The storms eventually produced flash flooding in the region as well.
Gastonia	4/10/2009	0.88	Elevated thunderstorms produced large hail over the Piedmont and foothills of western North Carolina.
Mt Holly	4/10/2009	0.75	Elevated thunderstorms produced large hail over the Piedmont and foothills of western North Carolina.
Cherryville	5/9/2009	0.88	A cold front moved through western North Carolina during the evening hours. The front was preceded by several severe thunderstorms.
Gastonia	3/28/2010	1	Strong wind shear and moderate instability developed over the region ahead of a cold front. Several severe storms affected the western Carolinas during the afternoon and evening hours. Large hail and straight-line winds were the most commonly reported severe weather, though one supercell thunderstorm produced two tornadoes over the western piedmont of North Carolina.
Cherryville, Gastonia, McAdenville	4/5/2011	0.88	A fast-moving line of thunderstorms swept across much of the western Carolinas and northeast Georgia during the late evening hours of the 4th and early morning hours of the 5th. Strong low-level gradient winds and the rapid bowing of the line as it crossed the region contributed to widespread straight-line wind damage.
Bessemer City	4/9/2011	2.75	Baseball size hail fell at the intersection of Holland Memorial Church Rd and highway 274.
Cherryville	4/9/2011	1.75	Hail up to the size of golf balls fell in a nearly continuous swath from Cherryville, across the Bessemer City area, to near Gastonia, to the Crowders community and then to the South Carolina state line.
Cherryville	4/9/2011	1.25	Another severe thunderstorm, moving along a path just a few miles east of the earlier storm, produced another round of large hail.
Dallas	4/9/2011	0.75	Thunderstorms initiated over the mountains of North Carolina during the afternoon hours. As the afternoon progressed, several supercell thunderstorms developed which tracked southeast across the foothills and piedmont along a slow-moving surface cold front. With unusually steep lapse rates over the region, several of the storms produced large hail. Fortunately, the supercells were a little elevated in nature, and only one, brief, weak tornado developed. Still, hail ranging up to the size of a softballs did quite a bit of damage over the region.
Gastonia	4/9/2011	2.75	Hail up to the size of baseballs damaged airplanes at the Gastonia airport.
Belmont	6/5/2011	1	Quarter size hail fell at the intersection of Reese St and Bartlett St.
Gastonia	7/4/2011	1	Dime to quarter size hail fell at Hudson Blvd. and Highway 321.
Belmont	8/11/2011	1.25	Quarter size hail fell at the intersection of Hickory Grove Rd and Lees Rd, with hail up to half dollar size reported on the northeast side of Belmont.
Cramerton	8/11/2011	1	Quarter size hail fell along Hickory Grove Rd.

Location	Date	Mag.	Description
Gastonia	8/20/2011	0.75	Upslope flow behind a weak cold front helped to trigger a few thunderstorms over western North Carolina during the afternoons of the 20th and 21st. Some of the storms produced small areas of wind damage and large hail.
Bessemer City	6/13/2013	0.88	Nickel size hail was report in and a little to the east of Bessemer City.
Cramerton	6/13/2013	0.75	Penny size hail was reported off Lowell Bethesda Rd.
Gastonia	6/13/2013	1	Quarter size hail was reported along highway 321 near Radio St.
Bessemer City	6/25/2013	0.75	Penny size hail was reported a few miles southwest of Bessemer City.
Cramerton	5/9/2014	1	Spotter reported dime to quarter size hail.
Gastonia	5/27/2014	1.25	Spotter reported hail larger than quarters near the state line.
Gastonia	6/10/2014	1.5	Public reported larger than half dollar size hail.
Gastonia	6/10/2014	0.75	Public reported up to penny size hail on the west side of Gastonia.
Lowell	6/10/2014	0.88	Ham radio operator reported large than dime size hail near the intersection of Redbud Ln and New Hope Rd.
Lowell	6/13/2014	1.5	Spotter reported quarter size hail. Newspaper reported ping pong ball size hail in the Gastonia area as well.
Bessemer City	8/20/2014	0.75	Public reported penny size hail on I-85.
Belmont	4/20/2015	1.25	The public and a spotter reported quarter to half dollar size hail in the Belmont area.
Gastonia	4/20/2015	1.75	Spotters reported hail to the size of golf balls in the Gastonia and Dallas areas.
Stanley	4/20/2015	1	Spotter reported quarter size hail near Stanley.
Dallas	5/2/2016	0.88	Public reported nickel size hail at North Gaston High School.
Stanley	3/1/2017	1.5	Public reported ping pong ball size hail north of Stanley.
Belmont	4/15/2018	2	Multiple reports of hail up to around 2 inches in diameter were received from the public.
Gastonia	8/1/2019	0.75	Public reported penny size hail fell briefly.
Lincoln County			
Lincolnton	5/2/2000	1.75	A cluster of strong to severe thunderstorms tracked east across the western piedmont during the early evening. The storms produced dime to golf ball size hail and some wind damage. The most severe storm occurred in Lincoln county where golf ball size hail fell for 10 minutes and piled high enough to survive the night and still be on the ground the next morning. Icy roads and dense fog developed along NC Hwy 27 East out of Lincolnton as a result of the hail's longevity. Scattered trees and limbs were also blown down around Lincolnton and south of Denver.
Lincolnton	5/13/2000	0.75	Thunderstorms developed in the mountains in the early afternoon with several becoming severe a few hours later. Just west of Lincolnton several trees and power lines were downed, some on mobile homes. Lightning from the storm in Lincolnton knocked out power to the 911 center.
Lincolnton	6/1/2002	1	
Lincolnton	7/3/2002	0.75	
Lincolnton	7/4/2002	0.75	
Lincolnton	5/2/2003	0.75	
Lincolnton	5/15/2003	1.75	

Location	Date	Mag.	Description
Lincolnton	7/16/2003	0.75	
Lincolnton	8/5/2003	0.75	
Lincolnton	5/20/2005	0.75	
Lincolnton	6/19/2005	1	Nickel to quarter sized hail at the intersection of highways 182 and 27.
Lincolnton	5/14/2006	1.75	
Lincolnton	5/26/2006	0.88	Large tree limbs blown down in Lincolnton
Lincolnton	6/10/2006	0.75	Dime size hail on Orchard Rd, approximately halfway between Lincolnton and Denver
Lincolnton	6/12/2007	0.75	Scattered severe storms developed over western North Carolina for a second day in a row. The storms mainly produced large hail.
Lincolnton	6/14/2007	0.75	Scattered severe storms affected western North Carolina during the afternoon and early evening hours.
Lincolnton	6/24/2007	0.75	Reported on highway 182 west of Lincolnton.
Lincolnton	5/11/2008	2.5	An isolated supercell thunderstorm developed over the South Mountains in the North Carolina Piedmont. The storm then tracked east, producing large to very large hail and brief tornadoes during its 3-hour lifetime. There was quite a bit of hail damage, particularly in the city of Concord in Cabarrus County, though no damage estimates were available.
Lincolnton	6/9/2008	0.75	Several severe storms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.
Lincolnton	6/22/2008	0.75	Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina.
Lincolnton	7/6/2008	1	Several severe storms affected western North Carolina during the afternoon hours.
Lincolnton	9/25/2011	2	Scattered thunderstorms developed along and east of a stationary front over western North Carolina during the afternoon hours. One of the storms produced wind damage and large hail.
Lincolnton	3/24/2012	0.75	Hail up to penny size covered the ground.
Lincolnton	6/24/2013	1	Nickel to quarter size hail was reported on the north side of Lincolnton.
Lincolnton	6/18/2014	1	FD reported quarter size hail.

Source: NOAA, NCEI

TABLE G.6: HEAVY RAIN EVENTS (2000-2019)

Location	Date	Description
All Region	4/6/2003	A prolonged period of moderate to heavy rainfall resulted in mainly minor urban flooding across portions of the North Carolina piedmont.
Shelby	4/10/2003	Persistent moderate to heavy rainfall led to some minor urban flooding.
Gastonia	8/14/2003	Heavy rain resulted in standing water on I-85 near the highway 321 exit. One lane of the interstate was closed.
Lincolnton	5/9/2004	Up to 3 inches of rain fell across the city in a short period of time, resulting in flooding of poor drainage areas. Water was around 5 feet deep at one intersection.
Shelby	6/16/2004	Poor drainage caused high water to develop briefly on a portion of the highway 74 business loop.
Lincolnton	6/30/2004	Several trees were blown down. In addition, some streets flooded due to poor drainage.
Lincolnton	7/26/2004	Heavy rainfall caused some street flooding in Lincolnton, including parts of highway 27E.
Lincolnton	8/12/2004	Heavy rainfall resulted in flooding of a few low spots and poor drainage areas.
Boiling Spgs	12/10/2004	Heavy rainfall during the previous day and again late at night, caused area streams to run high. On one stream, Beaver Dam Creek, a buildup of debris in the fast-moving water may have contributed to the collapse of a bridge. The bridge was inspected in June, prior to the remnants of hurricanes Frances and Ivan affecting the area, and found to be in fair" condition. Three vehicles were driven into the water before barricades could be placed. There was one fatality (indirect) and two injuries (indirect)."
Gastonia	9/13/2006	A multiple vehicle accident developed during a period of heavy rain on highway 321 in northern Gaston County. One man was killed (indirect).
Kings Mtn	5/26/2009	Heavy rain caused a pump station to fail on Crocker Rd, spilling 8100 gallons of sewage into Beason Creek. Also, poor drainage caused flooding of a section of East Gold St in Kings Mountain.
South Gastonia	5/27/2009	Water from Crowders Creek covered much of a golf course on the west side of Gastonia.
Gastonia	8/22/2012	Saturated soil owing to recent heavy rainfall caused a tree to fall on a vehicle at Garrison Bvd and highway 321.

TABLE G.7: HEAVY SNOW EVENTS (2000-2019)

Date	Description
1/18/2000	Low pressure moved east across Tennessee and weakened as it ran into a surface high pressure ridge along the East Coast. Nevertheless, enough moisture was available to cause heavy snow to fall from Avery county, east across the northern foothills and northwest piedmont. Precipitation began as light rain in the mid-evening hours on the 17th, but quickly turned to snow as the atmosphere cooled to below freezing. Snowfall ranged between 3 and 6 inches across the area by noon on the 18th, with a narrow band of 1 to 3-inch accumulation of snow and sleet to the immediate south.
1/22/2000	A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to western North Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over western North Carolina, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy by mid-afternoon across the mountains and by evening across the foothills and piedmont. A general 4 to 7-inch snowfall occurred in the mountains. Generally, 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Freezing rain and sleet mixed with the snow for a short time before the precipitation ended, and for the most part, caused little additional problems. Ice accumulations reached damaging levels there around 3 am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages.
1/24/2000	Low pressure rapidly deepened near the Carolina coast, wrapping abundant moisture back across the piedmont of the Carolinas. Snow fell all day and into the night, heavy at times south and east of Interstate 85. By the time snow ended, accumulations ranged from a trace to 4 inches to the immediate north and west of Interstate 85, to 4 to 8 inches from eastern Rowan county to Charlotte and Gastonia. This storm followed no more than 36 hours after the area received several inches of snow and ice from a previous storm over the weekend.
11/19/2000	Light to moderate snow started in the mountains and spread southeast, lasting through the day. Generally, 1 to 3 inches of snow fell, but some higher elevations of the central and southern mountains reported more than 4 inches.
1/3/2002	Flurries and light snow began in the early evening and became moderate to heavy by late evening on the 2nd. Heavy snowfall accumulations were reached across this portion of the foothills and piedmont overnight on the 3rd, with 4 to 6 inches observed by noon.
1/23/2003	Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid-morning. Otherwise, snow accumulations were generally in the 3 to 6-inch range.
2/26/2004	Heavy snow began to fall across the foothills, piedmont, and northern mountains of North Carolina during the late morning. Although snowfall intensity decreased dramatically during the early-to-middle portion of the afternoon, heavy snow redeveloped during the late afternoon, and continued into the evening and overnight hours. Scattered thunderstorms contributed to intense snowfall rates of 2 to 3 inches per hour from time to time, especially in the piedmont, where total snowfall of 12-22 inches occurred. The heaviest amounts occurred in the southwest piedmont, particularly in southern portions of Charlotte metro. Thousands of people were stranded on I-77 during the early afternoon, and some required rescue. The weight of the snowfall caused damage to numerous roofs, while some roofs completely collapsed. Across the foothills and northern mountains, accumulations were considerably lighter, generally in the 4-8-inch range, although amounts of 10-16 inches fell along the Blue Ridge north of I-40.
3/1/2009	Rain changed to snow during the early evening across portions of the foothills and the western Piedmont of North Carolina. Snow became heavy at times throughout the evening, and up to 4 inches had accumulated across the area by 10 pm. Snow, heavy at times and accompanied by

	occasional lightning, continued into the late evening and early overnight hours. By the time the snow tapered off, accumulations of 3-6 inches were common across the area. However, localized amounts of up to 9 inches were reported, especially along a corridor extending from Shelby to Hickory. The heavy wet snow caused quite a few trees and power lines to fall, resulting in numerous power outages. Some structures received minor to moderate roof damage due to the weight of the snow. Some customers were without power for several days. A tree fell on the library in Belmont, NC, causing damage to the roof. Numerous traffic accidents also occurred.
1/29/2010	Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. ||Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice.
12/25/2010	A developing coastal storm brought a mix of light rain and snow to portions of the piedmont of western North Carolina during Christmas afternoon. By early evening, precipitation had changed to all snow in most areas northwest of Charlotte, and by late evening, these areas had experienced a rare white Christmas. Shortly after midnight, the precipitation had changed to all snow in the Charlotte metro area. Snow continued to fall steadily overnight, with areas northwest of Charlotte reporting heavy snowfall totals by midnight, with heavy totals not reached until shortly before sunrise along the I-85 corridor. Total accumulations ranged from 2 to 5 inches across the area by the time the snow tapered off to flurries and light snow showers later in the morning.
1/10/2011	Moderate to heavy snow associated with a Gulf Coast storm system spread northward across the foothills and western piedmont of North Carolina during the early morning hours. The heavy snow accumulated quickly, and by sunrise parts of the southwest foothills and piedmont had received 4 inches of snow. The snow was lighter across the northern most foothills and piedmont, where only an inch or two of snow had fallen by mid-morning. The snow became lighter during the day, but continued to accumulate. By early afternoon, snowfall totals ranged from around 7 inches over the southern foothill and southwest piedmont locations, to around 3 inches over the northern most parts of the foothills and piedmont. During the afternoon, precipitation changed to light to moderate freezing rain, which continued into the evening hours. This added as much as a tenth to a quarter inch of ice to the heavy snowfall totals, resulting in sporadic power outages, particularly in the Charlotte metro area. Persistent cold air resulted in only gradual improvement in road conditions, with some businesses and schools remaining closed for several days.
1/6/2017	As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont.
1/17/2018	As a strengthening upper level disturbance and associated cold front approached the region from the Tennessee Valley, light precipitation developed across portions of the Piedmont and foothills of North Carolina during the early morning hours. While the precipitation started as rain or a rain/snow mix in most areas, a transition to snow had occurred in most locations by sunrise. As the snow band moved east throughout the morning, snowfall rates increased, with heavy snowfall accumulations reported by early afternoon. By the time the snow tapered off to flurries, total accumulation ranged from 3 to 6 inches across much of the area.

TABLE G.8: HIGH WIND EVENTS (2000-2019)

Date	Wind Speed (mph)
3/28/2000	50
3/6/2001	55
3/20/2001	55
4/17/2001	35
3/6/2001	55
3/20/2001	55
4/17/2001	35
2/4/2002	50
12/25/2002	50
3/7/2004	60
4/2/2005	55
4/16/2007	60
2/10/2008	55
1/7/2009	50
2/10/2010	50
2/24/2016	50
4/26/2019	50

TABLE G.9: ICE STORM EVENTS (2000-2019)

Date	Description
1/29/2000	Weakening low pressure in the Ohio River Valley, developing low pressure along the Gulf Coast and cold, arctic air in place across the Carolinas resulted in a wintry mess across western North Carolina. This was the last in a series of 5 winter storms that wreaked havoc on western North Carolina in an 11-day span. The ice storm in the mountains consisted mainly of a couple inches of sleet. However, the combined accumulation of the mixture of sleet and snow was generally 2 to 3 inches. Some freezing rain mixed in during the morning of the 30th. Across the foothills and piedmont, precipitation which briefly began as some light sleet and snow, turned quickly to freezing rain. The freezing rain was heavy enough across the southern piedmont, including the Charlotte area, to result in a 1/4 to 1/2-inch glaze. Scattered power outages resulted, with Gaston county reporting 2500 people without power. The entire Duke Power system reported 77,000 people without power.
12/4/2002	Freezing rain began over the extreme southern mountains of North Carolina during the early afternoon on the 4th, and had spread into the southwest piedmont by mid-afternoon. Resultant damage due to ice accumulation began during the mid-to-late afternoon. The intensity of the freezing rain increased after midnight, and by sunrise on the 5th, devastating ice accumulations of 1/2 to 1 1/2 inches were observed. The hardest hit area was Charlotte metro. Hundreds of thousands lost power, and the outages lasted for as long as 2 weeks in some areas.
12/14/2003	Freezing rain began during the early morning hours, and ice accretion of 1/4 to 1/2 inch had occurred by late morning. Scattered power outages resulted, especially in locations from Shelby to Hickory to northern Iredell County.
12/15/2005	Ice accretion began to cause damage in the northwest piedmont of North Carolina by late morning. Quite a few trees fell and power outages numbered in the tens of thousands. Several trees and large limbs fell on and damaged homes and vehicles. A 58-year-old male was killed when a tree fell through the roof of his home south of Kannapolis. Total ice accumulation ranged from a half inch or more near and west of Interstate 77 to around an eighth of an inch further east toward the Triad. Fortunately, traffic problems were few, as the temperature hovered right around freezing through the event, causing only a few slick spots.

TABLE G.10: LIGHTNING EVENTS (2000-2019)

Location	Date	Description
Cleveland County		
Shelby	1/19/2001	A worker at a concrete plant was shocked by lightning traveling through a drain pipe. Minor injuries were reported.
Shelby	1/19/2001	A worker at a concrete plant was shocked by lightning traveling through a drain pipe. Minor injuries were reported.
Shelby	5/24/2001	Lightning was suspected to have caused a fire which destroyed a plastic recycling plant.
Shelby	5/24/2001	Lightning was suspected to have caused a fire which destroyed a plastic recycling plant.
Shelby	7/3/2002	Lightning ignited several grass fires.
Lattimore	7/4/2002	Lightning struck and killed 6 cows and a bull.
Shelby	8/14/2003	A couple of house fires were started by lightning strikes.
Shelby	8/22/2003	Lightning struck a man.
Lawndale	8/19/2004	Lightning struck a water plant, damaging the phone system and a pump system, resulting in a loss of service for 2000 customers.
Shelby	6/11/2006	Lightning struck a tree, then traveled along power lines to ignite a fire at a home. The home was practically a total loss.
Polkville	6/22/2006	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.
Waco	6/16/2009	Lightning struck a home on Cedar Lake Farm Rd, igniting a fire that caused significant damage.
Shelby	5/16/2010	Lightning struck a home on Arbor Way Dr, causing significant damage, mainly to the roof of the home.
Boiling Spring	7/8/2011	Lightning struck a home on Wall Ave, starting a fire that damaged the roof and attic.
Lawndale	6/1/2018	County comms reported a woman on Shelby Rd was injured when lightning struck and caused a power surge to her stove.
Gaston County		
Belmont	6/15/2000	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.
Cherryville	7/4/2002	Lightning caused a minor injury at a baseball field. Lightning was also blamed for the loss of equipment at a radio station.
Gastonia	8/24/2002	Lightning damaged equipment at the 911 center, disrupting service.
Gastonia	2/22/2003	Lightning struck a home, causing 3 minor injuries, and significant damage to the home.
Dallas	5/26/2004	Lightning struck a trailer.
Cherryville	7/4/2004	A lightning strike killed 7 cattle.
Belmont	7/12/2004	Lightning ignited a fire at a church, destroying the steeple and causing additional damage.

Location	Date	Description
Gastonia	5/10/2005	Lightning struck and injured a person.
Gastonia	6/27/2005	Lightning sparked several structural fires in the county.
Gastonia	7/28/2005	Several structural fires caused by lightning.
Gastonia	5/18/2006	Lightning ignited a fire at a home, causing extensive damage to the second story.
Gastonia	7/28/2009	Lightning ignited a fire at a business on W Airline Ave.
Stanley	5/2/2011	Lightning struck a barn, igniting a fire that destroyed the structure and its contents.
Lincoln County		
Lincolnton	8/31/2003	Lightning ignited a fire at a church, causing significant damage.
Lincolnton	5/9/2004	Lightning ignited fires at several homes.
Lincolnton	6/2/2006	Lightning struck a church, igniting a fire that almost completely destroyed the building and its contents.
Lincolnton	6/22/2006	

TABLE G.11: SLEET EVENTS (2000-2019)

Date	Description
2/22/2001	Cold, dry air plunged south over western North Carolina following the passage of a cold front the day before. Moisture return began almost immediately thereafter, ahead of an advancing storm system from the Gulf Coast region, and as an upper level disturbance approached the area, precipitation became widespread. Air was cold enough in the mountains to support mostly snow, while in the foothills and piedmont, the dry air in the lower levels of the atmosphere created ideal conditions for a sleet/snow mixture. In the mountains, thundersnow occurred. In the lower elevation foothill and piedmont, sleet was predominant, although most locations that received any wintry precipitation at all reported a sleet/snow mixture. This made for a horrific morning rush hour, with numerous accidents and school closures. The wintry precipitation tapered off from the west during the day.
2/16/2003	A light freezing rain developed over the piedmont and foothills of North Carolina during the early morning hours. By mid-morning, the precipitation began to intensify, and a transition to sleet occurred. The sleet accumulated rapidly to a depth of 1 inch in most locations, while periods of afternoon, evening, and overnight sleet increased total accumulations to around 2 inches in most areas. Numerous traffic accidents and road closures resulted.
1/25/2004	During the early afternoon, snow began to mix with sleet across the foothills and northern piedmont, before becoming all sleet later in the evening. In the southern piedmont, precipitation fell almost exclusively as sleet. Total sleet accumulations were generally between 1 and 2 inches across the area. A light freezing rain developed during the evening, which resulted in a thin glaze of ice on top of the layer of sleet. Very slick roads were responsible for hundreds of traffic accidents, some of which involved injuries and fatalities. Numerous injuries also occurred due to falls.

TABLE G.12: TORNADO EVENTS (2000-2019)

Date	Scale	Description
Cleveland County		
7/12/2003	F1	This weak tornado blew down numerous trees along its 6-mile path. Trees fell on and destroyed a vehicle.
9/17/2004	F0	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.
9/27/2004	F1	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.
4/19/2008	EF1	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.
4/28/2008	EF0	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.
6/16/2009	EF0	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.
6/16/2009	EF1	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.
4/9/2011	EF0	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.
11/16/2011	EF0	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.
10/8/2017	EF0	The path of this tornado, which was unusually long-tracked for being such a weak event, began southeast of Polkville near the intersection of Felcher Rd and Highway 226, and moved north-northeast, crossing W Stage Coach Trail, Casar Lanwdale Rd, moving just east of Casar, before crossing into Burke County near Dirty Ankle Rd before lifting in the Ramsey community of southeast Burke County. Numerous mostly small to medium size trees were snapped, with some large hard and softwoods uprooted along the length of the path. Structural damage was limited to shingles removed from homes and some metal sheet roofing material removed from a couple of buildings and chicken houses. A

Date	Scale	Description
		metal carport was also torn from a home and blown 50-100 yards. While peak wind gusts probably reached 80-85 mph, those winds were only realized along a small portion of the path. Peak wind gusts along the majority of the track were 60-75 mph.
10/23/2017	EF0	A weakening tornado moved into Cleveland County from Cherokee County, SC between Twin Bridges Rd and McCraw Rd. The tornado blew down multiple trees and large limbs before dissipating shortly after crossing into North Carolina.
10/23/2017	EF0	This tornado crossed into Cleveland County from Rutherford County in the vicinity of the Highway 120/ Ellenboro Rd intersection, snapping and uprooting numerous trees as it moved northeast toward Polkville. A small frame home was shifted off its foundation on Rehobeth Church Rd near the intersection of Crowder Ridge Rd. It was also in this area that the tornado appeared to make a slight jog to the right, moving in more of a north/northeast direction toward Polkville, where trees were blown down on several homes.
10/23/2017	EF1	NWS survey found the path of a tornado that touched down near Lawndale, resulting in structural damage as uprooted and snapped trees fell on houses. The tornado continued northeast, with sporadic trees downed along its path, with a slight uptick in structural damage near Belwood, again due to trees falling on homes. The tornado passed into Lincoln County in the Toluca community near Highway 10.
Gaston County		
7/12/2003	F1	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. Many trees and power lines were blown onto homes and vehicles. Several buildings had significant roof damage, while numerous others incurred minor roof damage
3/8/2005	F0	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.
1/13/2006	F1	This 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.
5/26/2006	F1	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 golf balls fell.
11/15/2006	F1	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 door.
1/5/2007	F0	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.

Date	Scale	Description
5/9/2008	EF2	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 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 warehouse, causing 7 million dollars in damage. Another industrial business in this area lost most of its roof.
3/28/2010	EF1	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 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.
4/19/2019	EF0	NWS storm survey concluded that a weak tornado touched down along Aderholdt Rd, just north of Bittersweet Ln. A large tree was blown down onto a house at this location, injuring one occupant. The tornado continued almost due north, knocking down a few trees and large limbs before crossing into Lincoln County near Landers Chapel Rd.
Lincoln County		
5/15/2003	F1	This tornado destroyed a barn and caused roof damage to several houses and mobile homes. The porch of a church was destroyed. Numerous trees were also blown down.
10/16/2003	F1	This weak tornado touched down in the Arden Oaks development. Numerous trees were snapped off or uprooted and power lines were 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.
7/13/2005	F1	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.
11/15/2006	F0	An NWS survey found a short damage track near the highway 73 and highway 16 intersection consistent with a tornado.
11/15/2006	F2	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.
4/19/2008	EF1	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.
4/19/2008	EF1	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.
5/11/2008	EF0	A tornado touched down briefly in an open field in the Cat Square area.
7/13/2010	EF1	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

Date	Scale	Description
		trees were uprooted or snapped off, some of which fell on homes. Some homes received minor roof damage and damage to gutters and flashing as well.
7/13/2010	EF1	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.
10/26/2010	EF2	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.
10/23/2017	EF1	NWS storm survey followed the damage path of a tornado that began near Lawndale in Cleveland County into extreme northwest Lincoln County. The tornado blew down multiple trees and tree limbs as it passed near the intersection of Highways 10 and 18, then crossed into Catawba County in the vicinity of Willis Rd.
4/19/2019	EF0	NWS storm survey determined that a weak tornado that touched down in northern Gaston County crossed into Lincoln County near Landers Church Rd. The tornado tracked north/northeast, blowing down numerous trees and large limbs, including through the south side of Linconton and the east side of the downtown area before lifting near Highway 155 on the north side of town.

Source: NOAA, NCEI

TABLE G.13: THUNDERSTORM WIND EVENTS (2000-2019)

Location	Date	Description
Cleveland County		
Belwood, Polkvilee	5/13/2000	Thunderstorms developed in the mountains in the early afternoon with several becoming severe a few hours later. In Cleveland county, 1.5-foot diameter trees were blown down in Belwood, and a number of structures were damaged in Polkville.
Shelby	5/24/2000	A few thunderstorms crossed the mountains, then quickly became large supercells as they moved into the foothills late in the afternoon. This storm went on to produce nickel to baseball size hail in Cleveland county.
Shelby	7/11/2000	Scattered thunderstorms rumbled in the foothills, with a couple becoming severe during the late evening. A roof was blown off a trailer in the Green Creek community east of Columbus and shingles were blown off roofs in Shelby. Otherwise, numerous trees and power lines were blown down causing power outages.
Shelby	8/10/2000	Trees were blown down on several streets.
Shelby	8/18/2000	Straight-line winds as high as 75 mph destroyed an outbuilding, blew the roof off a metal building and onto a house across the street, and downed numerous trees and power lines. Many trees and power lines fell on houses and cars. Power was out to much of the area for several hours.
Boiling Springs	4/1/2001	The roof was torn off a utility building.
Casar	7/8/2001	Trees down near the intersection of N.C. 10 and Olive Grove Road.
Shelby	10/25/2001	Trees were blown onto a garage and some power lines.
Polkville	5/7/2002	
Shelby	5/13/2002	Some trees and powerlines were blown down.
Shelby	5/13/2002	Numerous trees and powerlines were blown down.
Shelby	7/3/2002	Numerous trees were blown down.
Shelby	7/3/2002	Numerous trees were blown down.
Shelby	7/3/2002	Numerous trees were blown down across the area.
Waco	7/3/2002	Several trees were blown down along Old Post Rd and Tobe Ridge Rd.
Mooresboro	7/4/2002	Numerous trees were blown down. One tree smashed a car windshield.
Shelby	7/4/2002	Numerous trees and powerlines were blown down.
Polkville	7/22/2002	A couple of trees were blown down across roads.
Shelby	9/14/2002	A number of trees were blown down in and around Shelby.
Lawndale	5/2/2003	Numerous trees and power lines were blown down. The roof was blown off of a building.
Casar	6/8/2003	Some trees were blown down.
Polkville, Shelby	7/12/2003	Numerous trees and power lines were blown down. The roof was blown off a utility building in Shelby.
Fallston	7/29/2003	Two mobile homes had their roofs blown off and some outbuildings were blown over. Numerous trees were uprooted or snapped off.
Shelby	8/16/2003	Several trees were blown down.
Grover	8/17/2003	A tree was blown down onto a house. Power outages were also reported.
Waco	8/17/2003	Some trees were blown down.
Shelby	8/22/2003	Numerous trees were blown down on highway 74 between Shelby and Kings Mountain. One tree fell on and damaged a barn and a grain storage unit.
Boiling Springs	11/19/2003	Some trees were blown down.

Location	Date	Description
Grover	11/19/2003	Some trees were blown down along highway 226.
Shelby	5/22/2004	This wind gust was estimated at the intersection of highway 226 and Double Springs Rd.
Polkville	4/22/2005	Several trees down in Shelby, and some out in the county.
Shelby	7/5/2005	Trees and power lines blown down along a half to three quarter mile swath off highway 74 west of Shelby. In addition, some shingles were removed from a house and a porch was shifted from its foundation.
Boiling Springs	7/7/2005	Quite a few trees down in the Boiling Springs area.
Shelby	7/7/2005	
Lawndale	4/22/2006	Large tree limbs snapped off.
Casar	4/25/2006	Trees down.
Unincorporated Area	6/11/2006	Numerous trees and power lines down, mainly across the western and southern portion of the county. Two trees fell on major roads in Shelby. Trees fell on 3 homes in Shelby, and 2500 people lost power in the area.
Lattimore	6/22/2006	Several trees down near highway 74 between Lattimore and Mooresboro.
Waco	6/22/2006	Quite a few trees down in the Waco area. Also, the metal undercarriage of a mobile home was knocked in about 10 feet.
Shelby	7/15/2006	Wind damage near the intersection of Caleb Rd and Lakeview Dr. A shed was destroyed, trailers received some roof damage, and a trampoline was blown 5 blocks. Trees were also blown down in the area. Also, some car windows were blown out.
Casar	7/20/2006	Several trees down on roads around Casar.
Polkville	10/11/2006	The porch was blown off a mobile home and several trees were blown down on Harris Creek Rd.
Casar	1/1/2007	Several trees down.
Lattimore	6/16/2007	A mobile home was blown off its foundation on Crawly Gin Rd.
Shelby	6/16/2007	Spotter reported several trees blown down in the Shelby area. One fallen tree destroyed a garage.
Grover	6/24/2007	Trees blown down on Lavender Rd and on Long Branch Rd in the Grover area.
Mooresboro	6/24/2007	Several trees were blown down along highway 74 in the Mooresboro area.
Waco	6/24/2007	Large tree limbs blown down.
Boiling Springs	6/25/2007	A tree down on highway 150 south of Boiling Springs and another tree down on highway 198 near Earl.
Waco	7/27/2007	Two mobile homes were blown off their foundations and flipped about 100 feet on Lauren Sloan Dr west of Waco. Several trees were blown down in this same general area. Also, a barn was damaged near the intersection of highway 150 and Old Stubbs Rd. Also, several large limbs were blown down just south of Waco, with 1 limb on a house.
Casar	8/21/2007	Trees blown down.
Casar	8/22/2007	A tree and large limbs blown down on Warlick Rd and additional trees blown down between Polkville and Casar.
Mooresboro	8/25/2007	Siding stripped off a house and trees blown down.
Shelby	8/29/2007	Two trees blown down along highway 74 near Buffalo Creek.
Fallston	3/4/2008	Trees blown down.
Casar	6/28/2008	Two trees were blown down on Golden Valley Rd.
Earl	6/28/2008	Trees were blown down near the intersection of highway 180 and 198 near Earl. Large tree limbs and power lines were also blown down in Patterson Springs.

Location	Date	Description
Shelby	7/8/2008	Trees were blown down on Royster Ave.
Boiling Springs	7/9/2008	Trees were blown down on McKinney Rd, Maple Springs Church Rd, Flint Hill Church Rd and Patrick Ave. A mobile home was also knocked off its foundation on Holly Hill Rd. Tree limbs as large as 13 inches in diameter were also blown down on College Farm Rd.
Pottville	7/22/2008	Several trees were blown down in and around Polkville.
Belwood	7/23/2008	Numerous trees and power lines were blown down.
Pottville	7/29/2008	A tree was blown down near the intersection of highway 74 and Washburn Switch Rd and another tree was blown down on power lines on Union Church Rd.
Belwood	8/2/2008	Trees were blown down on Carpenters Grove Church Rd about 5 miles north of Fallston. Two trees fell on a mobile home on highway 18 in the Bellwood community, and the roof was blown off a barn in the same area.
Polkville	8/14/2008	Large tree limbs and the top of a tree were blown out in the area around Bracketts Cedar Park. A tree was also blown down on highway 10 about 3 miles north of Polkville.
Shelby	9/30/2008	Power lines were blown down on Webb Farm Rd. A tree was also blown down in Mooresboro at the same time.
Boiling Springs	5/28/2009	Trees and power lines were blown down from Old Cliffside Rd to the east side of Boiling Springs.
Patterson Springs	6/11/2009	Trees were blown down, including one that fell on a home on Cleveland Ave.
Shelby	6/11/2009	Numerous trees were blown down across the south side of Shelby. Some trees fell on homes and automobiles.
Belwood	6/16/2009	Several large tree limbs were blown down near the Lincoln County line.
Waco	6/16/2009	NWS survey found extensive straight-line wind damage surrounding the tornado paths from Fallston to areas southwest of Kings Mountain. Very large hail driven by wind caused significant damage to some structures. Some trees fell on and blocked I-85.
Pottville	8/5/2009	Several trees were blown down, with minor damage to a home.
Mooresboro	3/28/2010	A large tree and several large limbs were blown down between Mooresboro and Boiling Springs.
Lawndale	4/8/2010	Straight line winds affected an area between Lawndale and Belwood. Several trees were uprooted, one of which fell on a manufactured home on West Stagecoach Trail just west of Lawndale. In addition, half the roof was blown off a barn on Old Belwood Rd.
Earl	5/28/2010	Trees were blown down along Lavendar Rd, about 2 miles south of Patterson Springs.
Patterson Springs	5/28/2010	Numerous large tree limbs were blown down in the Patterson Springs area.
Shelby	6/10/2010	Numerous trees and power lines were blown down in and around Shelby.
Waco	6/13/2010	A tree and numerous large limbs were blown down off highway 150 just west of Waco.
Fallston	6/19/2010	A tree was blown down on Jay Ct.
Casar	6/28/2010	Multiple trees were blown down in the Walker Rd area. At least one tree fell on a car. Also, part of the roof of a garage was blown off.
Pottville	6/28/2010	Trees and power lines were blown down from Polkville to Belwood.
Lawndale	7/17/2010	A tree was blown down on Kistler Rd where there was also damage to the siding of a church. Another tree was blown down on Peter Key Rd. The roof of a building was damaged in this area.
Lattimore	7/26/2010	A tree and several large limbs were blown down about 3 miles north northwest of Lattimore.
Shelby	8/5/2010	A tree was blown down on an occupied car on Warren St in Shelby. The five people inside the car received minor injuries, mainly in the form of lacerations. Also, two trees

Location	Date	Description
		were down on Earl Rd, about 1.5 miles southeast of Shelby and on Patterson Dr in Patterson Springs.
Shelby	11/30/2010	A tree was blown onto a house in Shelby.
Mooresboro	4/5/2011	Numerous trees were blown down across all of Cleveland County. Trees fell on and damaged homes on Robinwood Dr in Shelby and Ware Loop Dr in Kings Mountain. A mobile home was destroyed by a falling tree off Bell Rd in Kings Mountain. Several outbuildings were damaged or destroyed. A wind gust of 65 mph was measured at the Shelby Airport as the line or storms moved over the area.
Patterson Springs	4/9/2011	Large tree limbs were blown down and some siding stripped off a home about 5 miles south of Shelby.
Boiling Springs	5/10/2011	Several trees were blown down in and around Boiling Springs, including on College Farm Rd.
Shelby	5/10/2011	Multiple trees were blown down across the southern part of the county. The damage was a little more concentrated from Shelby to Kings Mountain. At least one tree fell on a home in Shelby. In addition, a church had part of its roof removed on Hudson St in Shelby. Additional damage was reported in Grover, where a tree fell on a rec vehicle.
Shelby	6/9/2011	A few trees were blown down in the Shelby area.
Earl	6/11/2011	Ham radio operator and trained spotter reported multiple trees down along Blacksburg Rd, from South Post Rd down to Earl. One tree was on a house at Earl.
Mooresboro	6/18/2011	Trees and power lines were blown down at Devon Rd and Mooresboro Rd in Mooresboro and in the Lattimore area. Multiple trees were also down in the Boiling Springs and Patterson Springs areas. A tree fell on a home on Long Branch Rd in the Patterson Springs community.
Shelby	6/21/2011	Multiple 3 to 4-inch diameter tree limbs were blown down along highway 18 in Shelby.
Boiling Springs	7/8/2011	Part of the roof was blown off an old, vacant building and a few trees were blown down in the McBrayer Homestead Rd area.
Patterson Springs	7/30/2011	Several trees were blown down between Sulphur Springs Rd and South Post Rd.
Casar	7/31/2011	A tree was blown down on Casar-Lawndale Rd, with at least one other tree down in the same area.
Shelby	8/21/2011	Several large tree limbs were blown down on Shoal Creek Church Rd.
Lawndale	7/1/2012	Multiple trees and power lines were blown down near the intersection of highway 74 and Beaver Dam Church Rd.
Lattimore	7/5/2012	Multiple trees were blown down on Plato Lee Rd about 5 miles west of Shelby.
Patterson Springs	7/5/2012	Several trees fell through a mobile home on Lindsey Dr, about 2 miles north of Earl. Multiple trees, large limbs and power lines also blew down into the Earl area.
Grover	7/19/2012	Trees and power lines were blown down.
Earl	10/2/2012	Two trees were blown down a little to the southwest of the town of Earl.
Earl	6/25/2013	A few trees were blown down about 3 miles to the east northeast of Earl.
Boiling Springs	7/4/2013	Multiple trees were blown down across the southern part of the county.
Polkville	7/4/2013	Multiple trees were blown down from Polkville to Casar.
Casar	7/17/2013	Multiple large trees were uprooted and some power lines were blown down in the Casar area.
Mooresboro	7/17/2013	Numerous trees were blown down in the Mooresboro area. Some trees fell on structures and power lines.
Patterson Springs	7/24/2013	A gas station canopy was lifted and blown on top of a vehicle on the southeast side of Shelby. Also, newspaper reported several trees blown down along Earl Rd in Patterson Springs and a tree on a home on Joe's Lake Rd.

Location	Date	Description
Shelby	8/31/2013	Several trees were blown down across the city of Shelby.
Shelby	6/16/2014	Newspaper reported multiple trees and power lines blown down across Shelby.
Casar	6/20/2014	County comms reported three trees blown down between Golden Valley Rd (2.5 WNW Casar) and Cook Rd (3.5 W).
Shelby	7/15/2014	County comms reported two trees blown down near Shelby. Also, a 56-mph gust was measured by FAA observing equipment (AWOS) at the Shelby-Cleveland County Airport (4 SW Shelby).
Patterson Springs	9/13/2014	EM reported part of a metal roof was peeled back on a mobile home near the end of Biggers Lake Rd. Although the mobile home was surrounded by trees, no adjacent tree damage was reported.
Grover	6/20/2015	HAM radio operator reported trees blown down near the intersection of Watterson Rd and Villa Dr and trees down on Cleveland Ave in Grover. Media reported trees down on Stony Point Rd and Mary Grove Church Rd near Waco, and trees down at Hope Ct and Jenny Dr in Patterson Springs.
Boiling Springs	7/21/2015	County comms reported multiple trees blown down in southwest Cleveland County. Media reported one tree fell on and destroyed a mobile home on Camp Creek Rd.
Pottville	2/24/2016	Media and county comms reported numerous trees and large limbs blown down across the northern part of the county.
Lawndale	5/1/2016	Spotters and newspaper reported multiple trees blown down throughout Shelby, east toward Kings Mountain, with at least one tree on a house (on Earl Rd).
Casar	5/12/2016	Ham Radio operator reported a couple of trees blown down, a flag pole bent at a 90-degree angle, and siding off a home near the intersection of Casar-Belwood Rd and Hull Rd.
Boiling Springs	6/4/2016	Media reported multiple large tree limbs blown down on Cliffside Rd and Steel Bridge Rd. Spotter reported a tree blown down on a mobile home on Beechwood Rd.
Mooresboro	7/8/2016	Public reported large tree limbs blown down as well as power poles.
Pottville	7/8/2016	Media reported trees blown down on Hollis Rd near Polkville.
Waco	7/8/2016	HAM Radio operator reported multiple trees blown down at the intersection of Fallston Rd and Clineland Rd.
Lawndale	7/16/2016	County comms reported many trees blown down across the county, particularly in Shelby and vicinity.
Shelby	8/27/2016	County comms reported multiple trees and power lines down along Highway 18 on the east side of Shelby.
Shelby	9/1/2016	Spotter reported a tree blown down on a house on Country Club Rd and a power pole snapped with lines down on Immanuel Church Rd.
Pottville	5/28/2017	County comms reported a few trees blown down around Polkville.
Patterson Springs	6/13/2017	Public reported a few large tree limbs blown down.
Mooresboro	10/23/2017	NWS storm survey and other sources reported downburst damage to the east of a tornado path in Cleveland County, from Mooresboro to Lawndale. Numerous trees were blown down in this area, some of which fell on homes.
Shelby	6/26/2018	Media reported multiple trees blown down on roads in Shelby, including Trade St Alley at Dorton St, West Marion St, McGowan Rd, Gidney St and South DeKalb St. A tree brought down power lines which started a fire on Ford St.
Boiling Springs	6/27/2018	County comms reported multiple trees blown down south of Boiling Springs.
Shelby	8/8/2018	County comms center reported numerous trees and power lines blown down in the Shelby area.

Location	Date	Description
Waco	6/16/2009	NWS survey found extensive straight-line wind damage surrounding the tornado paths from Fallston to areas southwest of Kings Mountain. Very large hail driven by wind caused significant damage to some structures. Some trees fell on and blocked I-85.
Waco	6/13/2010	A tree and numerous large limbs were blown down off highway 150 just west of Waco.
Waco	7/8/2016	HAM Radio operator reported multiple trees blown down at the intersection of Fallston Rd and Clineland Rd.
Gaston County		
Belmont	5/13/2002	A flat roof was blown off of a building.
Belmont	7/2/2002	Numerous powerlines and trees were blown down, including a 60-diameter tree. Some trees were blown on houses. Siding was torn off of a house. 5700 homes were without power."
Belmont	8/2/2002	Some trees and large limbs were blown down.
Belmont	7/9/2003	Several trees were blown down.
Belmont	7/29/2003	Some trees were blown down. One tree fell on and damaged a pool.
Belmont	6/19/2005	3-inch diameter limbs down.
Belmont	8/20/2005	Several trees and large limbs down on S Forest Ln.
Belmont	9/3/2012	Multiple power lines were blown down on Peach Orchard Rd near Alberta Ave.
Belmont South	7/9/2012	Multiple trees were blown down along South Point Rd and Reese Wilson Rd.
Belmont South	4/15/2018	Law enforcement and public reported multiple trees blown down along Highway 273 south of Belmont. A large tree fell on a house and briefly trapped occupants near the intersection of South Forest Ln and Brook Forest Dr.
Belmont South	4/8/2019	Amateur radio operator reported trees blown down on South Point Rd & Nixon Rd. One tree fell on and damaged the roof of a home.
Bessemer City	6/22/2001	12 X 12 aluminum building blown over and destroyed.
Bessemer City	8/22/2003	A line of trees was blown down on Chestnut Ridge Church Rd.
Bessemer City	8/3/2006	Several trees blown down along Long Shoals Rd.
Bessemer City	6/24/2007	Trees blown down near the intersection of Maine Ave and highway 274.
Bessemer City	7/9/2008	A large pine tree was blown down on Bessemer City Rd and another was blown down near the intersection of Long Shoals Rd and Gaston Chapel Rd.
Bessemer City	8/5/2009	Numerous trees were blown down from Bessemer City to Dallas.
Bessemer City	5/10/2011	Multiple trees were blown down from Bessemer City to the city of Gastonia. One tree fell on and destroyed a mobile home on Capps Rd, about 5 miles west of Gastonia. Another tree fell on and destroyed a vehicle on Taylor Dr, 2.5 miles southwest of town. Additional trees and large limbs blown down in the Crowders Mountain area.
Bessemer City	6/13/2013	Trees were blown down in the Bessemer City area.
Bessemer City	6/1/2018	County comms reported numerous trees blown down across the county. One tree fell on a house on East Georgia Ave in Bessemer City. Public reported a large tree limb fell on a vehicle in Gastonia.
Bessemer City	4/8/2019	County comms reported trees blown down in the Bessemer City area.
Cherryville	8/10/2000	Several trees were blown down.
Cherryville	7/4/2002	Several trees were blown down. One tree fell on a house.
Cherryville	5/26/2006	Several trees, up to 12 inches in diameter, snapped off in the downtown area.
Cherryville	5/26/2006	Quite a few trees blown down Landers Chapel Rd
Cherryville	6/22/2006	Quite a few trees down in the Cherryville area. A spotter estimated 60 mph winds. Some residents were without power for approximately 15 hours.

Location	Date	Description
Cherryville	7/4/2006	Trees down on Tott-Dillinger Rd and on Dellview Rd. Very large tree limbs down, some as large as 1.5 feet in diameter 2.5 NW Cherryville.
Cherryville	6/24/2007	A large tree down and other trees blown down on power lines near the intersection of Sunbeam Farm Rd and St Marks Church Rd.
Cherryville	8/21/2007	Trees and power lines blown down.
Cherryville	8/16/2008	Large tree limbs were blown down.
Cherryville	5/16/2010	A tree and a power line were blown down on Tot Dellinger Rd.
Cherryville	10/27/2010	Several trees were blown onto power lines in the Cherryville area.
Cherryville	4/5/2011	Large tree limbs were blown down near Cherryville with large trees blown down near Dallas. A tree fell on and damaged a home on Kiser Rd and on Dameron Rd, both in Bessemer City. Two transmission towers were blown down and part of the roof of a home was torn off a home on Springs Rd about 4 miles north of Dallas. Also, a shed was damaged on Ole Hill Rd near Dallas.
Cherryville	6/5/2011	Large tree limbs were blown down about 2 miles northwest of Cherryville.
Cherryville	8/1/2013	Multiple trees were blown down along highway 279.
Cherryville	7/3/2014	FD reported two trees fell on separate mobile homes on Dalton St, injuring one person. The roof was also blown off a car wash.
Cherryville	7/8/2016	Multiple sources reported numerous trees blown down from the Cherryville area to the east side of Gastonia. One tree fell on a home at E Second Ave and Columbia St in Gastonia. Part of the roof was removed from a building and the tops of several trees were snapped on Tryon Courthouse Rd between Bessemer City and Cherryville. A tree fell on a storage shed and another tree fell on an ATV on Mountain Meadows Dr north of Bessemer City.
Cherryville	8/8/2018	Law enforcement reported trees and power lines blown down along Sellerstown Rd with additional trees down on Mauney Rd and a tree on a home in the High Shoals area.
Cherryville	9/9/2018	County comms reported multiple trees blown down in the Cherryville area.
Cramerton	8/10/2000	Several trees were blown down.
Cramerton	7/20/2005	Five large trees blown down on 13th St, with some windows broken out. One tree fell on a vehicle. At least one other tree and several large limbs were blown down elsewhere in town.
Cramerton	7/22/2006	Several trees blown down in the southeast corner of the county.
Cramerton	5/2/2009	A few trees were blown down in the Cramer Mountain area.
Cramerton	7/18/2012	A tree was blown down on Cramerton Rd near Lowell-Bethesda Rd. A tree was blown down on power lines on Lane Rd at Hickory Grove Rd and a tree was blown down on highway 27 two miles northwest of Mt Holly.
Cramerton	6/20/2019	Fire dept/rescue reported a tree blown down on a house on Union New Hope Rd.
Dallas	5/13/2002	Numerous trees were blown down. One fell onto a mobile home, causing extensive damage.
Dallas	5/2/2003	Numerous trees and power lines were blown down. One tree fell into a trailer.
Dallas	11/19/2003	Trees and power lines were blown down.
Dallas	5/26/2004	Some power lines were blown down.
Dallas	4/3/2006	Small trees and a few large limbs blown down.
Dallas	5/20/2006	Numerous trees blown down in the Dallas area, with about 1000 customers without power. Also, nickel to quarter size hail near I-85 between Gastonia and Dallas, with penny size hail in Gastonia at Acres Center Shopping Center on highway 74.
Dallas	5/26/2006	Trees and power lines down along highway 321.

Location	Date	Description
Dallas	3/4/2008	Several trees and power lines blown down between Dallas and Mt Holly.
Dallas	8/11/2011	Multiple trees were blown down throughout the city of Dallas. Two trees fell on homes. Downed trees also crushed at least two vehicles.
Dallas	6/13/2014	Newspaper reported multiple trees and large limbs blown down across Gaston County, particularly in the Dallas and Lowell areas.
Dallas	6/20/2014	Spotters reported power lines blown down at S Gaston St and E Church St and a tree on a house on S Gaston St in Dallas, and a carport damaged and large tree limb down on Jessica Ln (2 NE Dallas). Spotter also reported a tree across the road at S Willow St and E 2nd Ave in Gastonia and county dispatch reported a tree on a house on Carpenter St (2 ENE Gastonia).
Dallas	8/27/2016	County comms reported multiple trees blown down in the central part of the county, including Gastonia and Dallas.
Dallas	6/20/2019	Fire dept/rescue reported a tree blown down on a house on Joe Cloninger Rd.
Gastonia	5/13/2000	Thunderstorms developed in the mountains in the early afternoon with several becoming severe a few hours later. Other severe thunderstorms moved into or developed in the foothills and piedmont during the early evening. Hail up to the size of walnuts and some wind damage occurred in the mountains and foothills. Several trees were blown down near Fairview. In Cleveland county, 1.5-foot diameter trees were blown down in Belwood, and a number of structures were damaged in Polkville. Just west of Lincolnton several trees and power lines were downed, some on mobile homes. Lightning from the storm in Lincolnton knocked out power to the 911 center. Numerous trees and power lines were downed and a couple of storage buildings were blown over northeast of Gastonia. In Dallas, a trailer park sustained damage to a storage building, 3 young Bradford pear trees, underpinning, a power meter, and heavy doghouse. Mecklenburg county police reported 7 to 10 trees downed north of Charlotte. Considerable damage occurred in Cabarrus county with numerous trees blown down through the northern and central parts of Concord. Winds were estimated as high as 70 mph in western Cabarrus county due to a significant number of downed trees, with many on houses and some blocking roads. Crews had to work most of the night to clear trees and restore power. A deputy said he observed a tornado touch down, lift, and touch down again before ending as a waterspout over Coddle Creek Reservoir. However, there was not enough evidence to confirm the event as a tornado.
Gastonia	8/10/2000	Several trees were blown down.
Gastonia	8/18/2000	Numerous trees and power lines were downed, including a 150-year-old oak. Many trees and power lines fell on vehicles and there were widespread power outages.
Gastonia	4/1/2001	Trees were downed in the vicinity of Gastonia between 11:15 am EDT and 11:20 EDT. A couple of trees fell on power lines, resulting in some small fires.
Gastonia	10/25/2001	Trees blown down on Gaston Boulevard.
Gastonia	7/22/2002	A few trees were blown down.
Gastonia	8/2/2002	Some trees and powerlines were blown down. A house was heavily damaged when a tree fell on it.
Gastonia	8/24/2002	Several trees were blown down. Some trees fell on homes and vehicles.
Gastonia	7/9/2003	Several large trees were blown down, including a 100-foot oak tree on Spencer Mountain Rd.
Gastonia	7/12/2003	Large tree limbs were blown down.
Gastonia	7/19/2003	Several trees were blown down.
Gastonia	7/19/2003	Power lines were blown down.
Gastonia	7/19/2003	Numerous trees and power lines were blown down near the South Carolina border.

Location	Date	Description
Gastonia	7/20/2003	Numerous trees were blown down. Some were snapped off at a height of 30 feet.
Gastonia	5/23/2004	Numerous trees, some 4 to 5 feet in diameter, were blown down east of Crowder's Mountain.
Gastonia	5/23/2004	Large tree limbs were blown down.
Gastonia	6/8/2004	A few trees were blown down along Lou Dr.
Gastonia	3/8/2005	A squall line developed in the lee of the mountains during the morning, and began producing damaging winds as it moved across the southern piedmont. Numerous trees, large limbs, and power lines were blown down in the county, with 2 trees falling on mobile homes. Some outbuildings were also damaged or destroyed. WFO Columbia relayed a report of a canopy on a gas station collapsing on some vehicles. A small airplane was flipped at AKH, where some sheet metal and a door was blown off a hangar. A tree also fell on and heavily damaged a mobile home in Mt Holly.
Gastonia	7/28/2005	Trees down.
Gastonia	6/10/2006	Two trees down on the main road through Crowders Mountain State Park.
Gastonia	6/11/2006	Six trees down blocking part of Lynnwood Ave along with quarter size hail. A large oak tree fell on a trailer on Glenallen Dr in this same area. Several trees also fell along Carson Dr, with one tree damaging the roof of a home and a shed. Also, the metal roof was blown off a shed near downtown at Long Ave and Broad St. Approximately 10,000 customers lost power in the county.
Gastonia	6/11/2006	Several trees down on South New Hope Rd and Robinwood Rd
Gastonia	7/15/2006	Numerous trees down in and around Gastonia. At least one tree fell on a car.
Gastonia	4/15/2007	Several trees blown down or snapped off on Central Ave and South Main St in Belmont. A metal roof was blown off a shed on Central Ave. Also, a tree was blown down on power lines on Myrtle School Rd and another tree snapped a power pole on Thomas Trail.
Gastonia	6/11/2007	Two trees blown down at the intersection of Bessemer City Rd and Jenkins Rd.
Gastonia	7/27/2007	Trees down on Bordeaux Ave and a tree on a home on Deerwood Dr.|Trees also blown down on homes and power lines along Main St east of town.
Gastonia	6/26/2008	Power lines were blown down along Bellevue Terrace.
Gastonia	4/5/2011	Several trees were blown down in the vicinity of Gastonia. Some trees were blown onto homes, including on Lee St.
Gastonia	6/10/2011	Numerous trees and power lines were blown down in the Gastonia area. The roof was also blown off an entrance way at Eastridge Mall.
Gastonia	5/16/2012	Trees and power lines were blown down from Vance St to Sherry Lane, then northward into the Dallas area.
Gastonia	7/10/2012	A tree was blown down on a house and power lines were blown down on Jackson Rd.
Gastonia	6/10/2014	Spotter reported a tree blown down at Ozark Ave and New Hope Rd (1.5 ENE Gastonia) and media reported another tree down across I-85 North near Cox Rd (3 E).
Gastonia	7/5/2016	Spotters reported a large tree blown down on power lines at N Modena St and E Harrison Ave in Gastonia and at Church St and Cedar St in McAdenville.
Gastonia	3/1/2017	Spotter reported five large oak trees blown down in the Gastonia area.
Gastonia	3/28/2010	Two large trees were blown down on Steeplechase Dr about 4 miles southeast of Gastonia.
Gastonia	4/5/2011	Trees were blown onto a home along Redbird Lane about 6 miles south of Gastonia.
Gastonia	6/19/2017	EM reported two trees blown down and a power pole on fire due to lightning.
High Shoals	8/3/2006	The tin roof was ripped off a building and some shingles stripped from a few homes. Several trees were also blown down in this area.

Location	Date	Description
High Shoals	7/31/2008	Trees were blown down on Cherry St and South Lincoln St.
Long Shoals	8/20/2014	Amateur radio operator reported a tree blow down at Hephziba Church Rd & Forest Dillinger Rd (6 N Bessemer City), a tree and high-tension wires down at Hoke Dr & Garden Terrace (2 W Dallas) and a tree down on three vehicles at N Morris St & Radio St on the north side of Gastonia. Also, a tree was down on Shannon Bradley Rd at Salem Dr (3 W Gastonia).
Lowell	11/15/2006	Several trees crushed a truck and the front porch of a home in Lowell.
Lowell	7/16/2010	Trees were blown down on South Church St in Lowell and on Poplar St in McAdenville.
Lowell	7/15/2017	County comms reported multiple trees blown down on in the East Gastonia/McAdenville/Cramerton/Lowell area.
McAdenville	8/11/2011	Numerous trees, power lines, and utility poles were blown down in the Cramerton and Belmont areas, with multiple trees on homes, including trees on about a dozen mobile homes on Parkdale Dr alone. Two homes were struck by downed trees on Lakewood Rd in Cramerton. Windows were blown out of several buildings in downtown Belmont by wind. At least one person received minor injuries due to broken glass.
McAdenville	12/22/2013	Trees and power lines were blown down along Lowell Spencer Mountain Rd, with several power outages reported in Lowell.
McAdenville	6/16/2014	County comms reported two trees blown down across roads in Lowell.
Mt Holly	5/10/2000	A severe thunderstorm blew down numerous trees, with at least 4 falling across houses, in a 4-block area in Mount Holly. Approximately 1000 people were without power. An airport weather observer and trained spotter in the same area reported quarter size hail at the Charlotte Douglas International Airport. The hail lasted for some time and winds gusted between 40 and 50 mph, causing some limbs to fall.
Mt Holly	7/12/2003	Numerous power lines and trees, some as large as 4-5 feet in diameter, were blown down. Some large trees fell on vehicles and houses.
Mt Holly	5/23/2004	Some trees were blown onto power lines.
Mt Holly	5/31/2004	Large tree limbs were blown down.
Mt Holly	6/25/2007	Multiple trees blown down.
Mt Holly	4/27/2008	Several trees blown down across the city.
Mt Holly	6/5/2011	Numerous trees blown down in the eastern part of Gaston County, from Mount Holly, to Cramerton, McAdenville, and Belmont. Falling trees damaged a home in McAdenville and at least two homes and some vehicles in Belmont.
Mt Holly	7/6/2018	County comms reported a tree blown down along Highland St in Mount Holly and another tree down on Central Ave in Belmont.
North Belmont	8/14/2011	Two large pine trees were blown down near the intersection of Perfection Ave and Catawba Ave.
Ranlo	7/8/2008	A tree was blown down on Lowell Spencer Mountain Rd at Main St. and a tree was blown onto a house in the Lowell area.
Gastonia	6/13/2010	Two trees were blown down just west of Gastonia.
Gastonia	8/18/2010	A tree was blown down on Chapel Grove Rd and another was blown down at the intersection of Elizabeth Lane and Elizabeth Dr, about 6 miles southwest of Gastonia.
Gastonia	9/5/2011	Trees were blown down on Stagecoach Rd.
Gastonia	3/23/2012	A partially rotted tree fell on and crushed a vehicle on Stagecoach Rd, killing two occupants and seriously injuring a third.
Gastonia	6/4/2017	County comms reported a tree blown down on Fallswood Drive. Spotter reported another tree blown down in the Crowders area.
Stanley	8/8/2011	Multiple trees were blown down in the Jackson Park area of Stanley. At least one tree fell on a home. Another tree fell on railroad tracks and was later hit by a train.

Location	Date	Description
Stanley	9/1/2012	A large tree fell on and crushed a garage on highway 27 near the Lincoln County border.
Stanley	5/12/2014	County comms reported a tree fell on a power line near Stanley. FD reported a tree and several large limbs down in Belmont.
Stanley	9/10/2015	County comms reported multiple trees and power lines blown down in Stanley.
Stanley	5/29/2017	County comms reported multiple trees blown down on Hovis Rd and on Rhyne St.
Stanley	7/18/2017	FD reported three trees blown down between Stanley and Mount Holly.
Stanley	10/23/2017	Law enforcement reported a tree was blown down on a home at Summerow Rd and Mauney Rd.
Lincoln County		
Lincolnton	5/2/2000	A cluster of strong to severe thunderstorms tracked east across the western piedmont during the early evening. The storms produced dime to golf ball size hail and some wind damage. The most severe storm occurred in Lincoln county where golf ball size hail fell for 10 minutes and piled high enough to survive the night and still be on the ground the next morning. Icy roads and dense fog developed along NC Hwy 27 East out of Lincolnton as a result of the hail's longevity. Scattered trees and limbs were also blown down around Lincolnton and south of Denver.
Lincolnton	5/13/2000	Thunderstorms developed in the mountains in the early afternoon with several becoming severe a few hours later. Other severe thunderstorms moved into or developed in the foothills and piedmont during the early evening. Hail up to the size of walnuts and some wind damage occurred in the mountains and foothills. Several trees were blown down near Fairview. In Cleveland county, 1.5-foot diameter trees were blown down in Belwood, and a number of structures were damaged in Polkville. Just west of Lincolnton several trees and power lines were downed, some on mobile homes. Lightning from the storm in Lincolnton knocked out power to the 911 center. Numerous trees and power lines were downed and a couple of storage buildings were blown over northeast of Gastonia. In Dallas, a trailer park sustained damage to a storage building, 3 young Bradford pear trees, underpinning, a power meter, and heavy doghouse. Mecklenburg county police reported 7 to 10 trees downed north of Charlotte. Considerable damage occurred in Cabarrus county with numerous trees blown down through the northern and central parts of Concord. Winds were estimated as high as 70 mph in western Cabarrus county due to a significant number of downed trees, with many on houses and some blocking roads. Crews had to work most of the night to clear trees and restore power. A deputy said he observed a tornado touch down, lift, and touch down again before ending as a waterspout over Coddle Creek Reservoir. However, there was not enough evidence to confirm the event as a tornado.
Lincolnton	8/18/2000	Power lines were downed and a house was damaged by high winds.
Lincolnton	8/18/2000	Multiple trees were blown down and a mobile home was blown over.
Lincolnton	5/13/2002	Numerous trees and powerlines were blown down. A mobile home was crushed by falling trees.
Lincolnton	6/1/2002	A large vent was blown off of a building, and numerous trees were blown down. At least one tree fell on an automobile.
Lincolnton	8/24/2002	Several trees were blown down.
Lincolnton	5/2/2003	Numerous trees and power lines were blown down. One tree fell on a mobile home.
Lincolnton	5/31/2003	A couple of trees were blown down.
Lincolnton	6/8/2003	A few trees and large tree limbs were blown down. The roof was blown off a shed.
Lincolnton	7/9/2003	A large tree fell into power lines, causing a widespread power outage.
Lincolnton	7/12/2003	Some large tree limbs were blown down. A couple of transformers were also blown down.

Location	Date	Description
Lincolnton	8/17/2003	Two large trees were blown down.
Lincolnton	11/19/2003	Several trees and power lines were blown down.
Lincolnton	5/9/2004	Trees were blown down.
Lincolnton	6/30/2004	Several trees were blown down. In addition, some streets flooded due to poor drainage.
Lincolnton	4/17/2006	Large tree limbs on power lines near Maiden and power lines down near High Shoals.
Lincolnton	4/22/2006	A large tree was blown onto a house, and a steal beam on the ground was shifted several feet.
Lincolnton	5/26/2006	Scattering of limbs and trees down.
Lincolnton	5/26/2006	Large tree limbs blown down in Lincolnton
Lincolnton	6/22/2006	Numerous trees and power lines down across the western part of the county.
Lincolnton	1/1/2007	A tree was blown down across Howard Creek School Rd, and numerous limbs were downed east of Vale.
Lincolnton	6/13/2007	NWS survey found numerous small trees snapped off or bent over and a few large trees blown down between Camp Creek Rd and Furnace Rd, just north of highway 73. A few homes received minor roof damage and the roof was blown off a shed. Also, several trees were blown down on Low Bridge Rd, in this same area.
Lincolnton	6/24/2007	Large tree limbs blown down along highway 182 west of Lincolnton.
Lincolnton	8/21/2007	Numerous trees blown down across the western part of the county.
Lincolnton	6/22/2008	A tree fell on a home on Charles Heavener Rd, briefly trapping a man inside.
Lincolnton	6/28/2008	Numerous trees were blown down in and around Lincolnton.
Lincolnton	6/29/2008	A tree fell across Ed Willis Rd. A vehicle collided with the fallen tree, killing the 19-year-old female driver.
Lincolnton	7/9/2008	Multiple trees were blown down across the western part of the county.
Lincolnton	7/22/2008	Trees and power lines were blown down west of Lincolnton. A barn was damaged on Reepsville Rd when a tree fell on it. Other outbuildings received damage as well.
Lincolnton	5/9/2009	Several trees were blown down around the city.
Lincolnton	6/13/2010	Numerous trees were blown down in and around Lincolnton.
Lincolnton	7/13/2010	Trees were blown down on Amnert St in Lincolnton.
Lincolnton	4/9/2011	A tree was blown down onto a house in the city of Lincolnton and another tree was blown down near the intersection of South Fork Rd and Southside Rd about 2 miles south of town.
Lincolnton	9/25/2011	Numerous trees were blown down across the city. One tree fell on a post office building, while at least six roads were blocked by fallen trees.
Lincolnton	6/24/2013	A tree was blown down near Startown Rd and North Hill Dr about two miles north of town. Powers were also blown down in Lincolnton around the same time.
Lincolnton	4/3/2017	County comms reported two trees blown down in the Lincolnton.
Lincolnton	6/3/2018	Media reported multiple trees and power lines blown down in the Lincolnton area.
Lincolnton	6/14/2018	County comms reported around a half dozen trees blown down onto power lines and roads across the city of Lincolnton, including on E Sycamore St and N Cedar St. A tree was also on an apartment building on Tait St.
Lincolnton	6/13/2013	Trees were blown down near the intersection of Laboratory Rd and Riverview Rd.
Lincolnton	6/18/2014	FD reported two trees blown down on a house and trees down on power lines south of Lincolnton. Also, Ham radio operator reported at least two trees blown down along Highway 321 in this area.

TABLE G.14: WINTER STORM EVENTS (2000-2019)

Date	Description
1/29/2005	Light sleet, occasionally mixed with snow, fell for much of the early morning hours across the piedmont. The precipitation began to increase in intensity during mid-to-late morning. Precipitation began to change over to freezing rain during the afternoon, and this continued into the evening hours. Up to an inch of snow fell across the area during the morning, but sleet and ice made the greatest impact. Most locations received between 1/2 to 1 inch of sleet. In addition, freezing rain deposited a glaze of ice over the sleet during the afternoon and evening, creating extremely dangerous driving conditions, and numerous accidents.
2/1/2007	Light snow began around sunrise across the southern piedmont and foothills of North Carolina. The precipitation became heavy at times during mid-morning before mixing with sleet and freezing rain. By late morning, up to 3 inches of snow had accumulated across the area, while some locations received light accumulations of sleet. A mix of sleet and freezing rain continued across the southern foothills through early afternoon. By late morning, up an eighth of an inch of ice and as much as a half inch of sleet had accumulated on top of 2-3 inches of snow. By early afternoon, most of the precipitation had transitioned to rain.
12/18/2009	A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the foothills and piedmont during the afternoon, and continued to fall heavily throughout the afternoon and evening. Snowfall rates of 1-2 inches per hour became common over the foothills. The heavy, wet snow combined with gusty winds to cause a few trees and power lines to fall. Scattered power outages were reported. ||Total accumulations over the foothills ranged from 4-6 inches in the lower elevations near the piedmont to as much as 14 inches closer to the Blue Ridge. Over the piedmont, the snow mixed with rain and sleet at times, which cut down on the amount of accumulation, especially in areas closer to the I-85 corridor. Total accumulations ranged from 2 inches near the I-85 corridor, to 6 or 7 inches in areas along and north of I-40. After the storm ended, continuous melting and refreezing of ice and snow resulted in several mornings of treacherous driving across the area, with numerous accidents reported.
2/12/2010	Light snow developed during the evening rush across portions of the Carolina piedmont and southern foothills. The snow intensified through the evening, and began to quickly accumulate. By mid-evening, 1 to 3 inches of snowfall had occurred across the area. Numerous traffic accidents resulted, particularly in the Charlotte metro area. The snow continued until around midnight, with total accumulations of 2 to 4 inches across the area.
2/16/2015	Snow and sleet overspread portions of the North Carolina foothills and Piedmont during the afternoon. Precipitation changed quickly to sleet in most areas, before mixing with freezing rain from southwest to northeast during the late afternoon and early evening. Sleet and freezing caused deteriorating road conditions by late evening, when heavy accumulations of sleet and/or freezing rain were reported across much of the area. Most locations saw around a half inch to an inch of sleet, along with around a tenth of an inch of ice accretion. However, areas south of I-85 saw more in the way of freezing rain, with up to a quarter inch of ice accretion reported in addition to light sleet accumulations. Scattered power outages were therefore more concentrated there. Roads became very treacherous and impassable in many areas until melting began on the afternoon of the 17th.
2/25/2015	After the light snow that fell across portions of the Piedmont on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the North Carolina Piedmont during the evening. Heavy snowfall accumulations were reported in many areas north of the I-85 corridor by midnight. Due to occasional transitions to rain undercutting snowfall rates, total accumulations were generally in the 2 to 4-inch range, although localized amounts as high as 7 inches were reported across the northwest Piedmont. The snow tapered off before sunrise.

Date	Description
1/22/2016	Light snow developed around daybreak across the southwest Piedmont of North Carolina in association with an area of low pressure. The snow became moderate to heavy throughout the morning, and eventually mixed with and changed to sleet. By early afternoon, a couple of inches of sleet and snow had accumulated across the area. Snow mixed with sleet and freezing rain continued into the afternoon and by late afternoon, the transition to sleet and freezing rain was complete. Total accumulations ranged from 1-2 inches of sleet and snow near the South Carolina border to as much as 4 inches of sleet/snow north of I-85. Up to a tenth of an inch of ice also accumulated on top of the snow and sleet, resulting in very hazardous driving conditions and scattered power outages.
1/6/2017	As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread the North Carolina Piedmont throughout the 6th. As cold air gradually spilled in from the north, precipitation slowly transitioned from rain to sleet and snow. By daybreak on the 7th, locations across far northern Gaston, Mecklenburg, and Cabarrus Counties had received as much as 5 inches of snow, while locations near the South Carolina border were just beginning to transition to sleet. By the time the precipitation had tapered off to flurries during late morning, mostly snow had fallen near the Iredell, Rowan, and Lincoln County lines, and total accumulations there ranged from 4 to 6 inches. Meanwhile, locations from Gastonia, through Uptown Charlotte to Concord saw quite a bit of sleet, with total accumulations of sleet and snow ranging from 1 to 3 inches. Locations closer to the South Carolina border saw primarily sleet and rain, with some sleet accumulations as high as one half inch.
12/8/2018	Rain and snow developed shortly after midnight across the North Carolina Piedmont, becoming all snow in most areas by daybreak, with some sleet mixing in along and south of the I-85 corridor. Snow, moderate to heavy at times, continued across the North Carolina Piedmont through the morning of the 9th, before tapering off (or changing to rain) by early afternoon. Sleet and rain mixed in with the snow at times, especially closer to the I-85 corridor, including much of Charlotte and vicinity. This cut down on storm total amounts in those areas, where amounts were generally in the 1 to 3-inch range. However, totals north and west of the city generally range from 4 to 6 inches, with locally higher amounts of up t0 8 inches reported closer to I-40.

Source: NOAA, NCEI