Cleveland Gaston Lincoln Regional Hazard Mitigation Plan

2025 Update

JANUARY 2025











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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 2025 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), the Building Resilient Infrastructure and Communities (BRIC) program and the Flood Mitigation Assistance (FMA) program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

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 2025 update of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan. Copies of the 2020 plan can be obtained by contacting each County Emergency Management office or the NCEM Hazard Mitigation Planning Section.

This section is comprised 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 2025
- 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

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44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risk, and then determining how to best minimize or manage those risks. This process informs the development of the hazard mitigation plan, and more specifically, identifies specific mitigation actions to effectively address existing and evolving risks. Each mitigation action is designed to achieve both short-term goals and a long-term vision for the community.

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 and becomes an integral part of the 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.

Mitigation planning is intended to create long-term and ongoing benefits by breaking the cycle of disaster-related losses. A fundamental belief in hazard mitigation is that investments made before a disaster occurs can significantly reduce the need for post-disaster assistance by decreasing the demand for emergency response, repairs, recovery, and reconstruction. Additionally, effective mitigation practices enable residents, businesses, and industries to recover more quickly after a disaster, allowing the community's economy to get back on track sooner and with fewer interruptions.

The advantages of mitigation planning extend beyond merely reducing vulnerability to hazards. Measures such as acquiring or regulating land in high-risk areas can help achieve multiple community objectives (commonly referred to as co-benefits), including preserving open spaces, maintaining environmental health, and enhancing recreational opportunities. Therefore, it is crucial that any local mitigation planning process is integrated with other ongoing local planning efforts. Proposed mitigation strategies must also consider existing community goals and initiatives that could either support or impede 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 the regional plan had previously adopted separate county-level hazard mitigation plans following FEMA multi-jurisdictional guidelines and requirements. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each county-level 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

In 2014, all jurisdictions participating in the county-level plans collaborated to create a regional plan. No new jurisdictions joined the process, and all those involved in previous planning efforts contributed to the development of the 2014 regional plan. This approach aimed to streamline planning for the jurisdictions in the Cleveland Gaston Lincoln Region, allowing resources to be shared among participants and reducing the administrative burdens by combining the three existing county-level plans into one comprehensive multi-jurisdictional plan. The 2014 plan marked an important and successful beginning for regional hazard mitigation planning, which has continued into the 2025 update of the plan.

2.3 UPDATING THE PLAN IN 2025

FEMA requires hazard mitigation plans to be updated every five years to maintain eligibility for federal mitigation and public assistance funding. To prepare the 2025 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, ESP Associates, Inc. was contracted by North Carolina Emergency Management (NCEM) to provide professional mitigation planning services.

According to the scope of work, the consultant team adhered to the mitigation planning process recommended by FEMA (Publication Series 386 and the Local Mitigation Plan Review Guide) as well as guidelines from North Carolina Emergency Management (NCEM) mitigation planning staff. Notable changes in the 2025 update include increased emphasis on equity and inclusions, integration with climate resilience, enhanced community engagement, and inclusion of substantial damage estimates. These changes are briefly summarized below:

1. *Increased Emphasis on Equity and Inclusion* – Plans must demonstrate how they address the needs of vulnerable populations and promote equitable outcomes in hazard mitigation efforts.
2. *Integration with Climate Resilience* – There is a stronger focus on incorporating climate change considerations into hazard mitigation planning, including the assessment of future climate risks and how they impact hazard vulnerabilities.

3. *Enhanced Community Engagement* – FEMA now requires more robust community engagement processes, ensuring that a wider range of stakeholders, including marginalized communities, are involved in the planning process.
4. *Inclusion of Substantial Damage Estimates* – Communities must now include substantial damage estimates in their capability assessment to better understand potential financial impacts and vulnerabilities.
5. *Consideration of Mitigation Action Co-Benefits* – The co-benefits of mitigation actions were considered during the plan update to highlight additional advantages, such as improved public health, economic resilience, and environmental sustainability, in addition to reduced disaster risk.

The 2025 update incorporated requirements from the FEMA Community Rating System (CRS) and the Community Wildfire Protection Plan (CWPP). 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 the updated plan.

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

Source: Community Rating System Coordinator's Manual (2017 Edition)

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

CWPP Process	Hazard Mitigation Plan Integration Reference
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 Planning Policy Guide (2022) and Local Mitigation Planning Handbook (2023) for reference as they completed the Plan.

For the development of the 2025 plan, all the jurisdictions that participated in the development of the 2020 plan participated in this plan's development.

The process used to prepare this plan included twelve major steps that were completed over the course of approximately eleven months beginning in January 2024. 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

To facilitate the initial development of the regional plan and its subsequent update, the participating jurisdictions established the Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee. This committee serves as a community-based planning team composed of representatives from various county departments, municipalities, and other essential stakeholders identified as critical partners in the planning process.

Starting in January 2024, the members of the Regional Hazard Mitigation Planning Committee engaged in regular discussions, local meetings, and planning workshops to address and complete tasks related to the preparation of the Plan. This collaborative group coordinated all aspects of plan development and provided invaluable input throughout the process. In addition to their regular meetings, committee members maintained ongoing communication and were kept informed via an email 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, and
- Support the adoption of the 2025 *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	AGENCY/DEPARTMENT/ TITLE	Internal Kickoff Mtg (1/9/24)	Stakeholder Kickoff Mtg (4/1/24)	HIRA/Mitigation Strategy Mtg (8/8/24)	Virtual Public Mtg (1/21/25)
CLEVELAND COUNTY					
Childress, Gerald	City of Kings Mountain, Chief of Police				✓
Culberton, Mark	Cleveland County, EM		✓		
Davis, Perry	Cleveland County, Director of EM/Fire Marshal	✓			
Horton, Bobby	Cleveland County, Deputy Fire Marshal	✓	✓	✓	✓

NAME	AGENCY/DEPARTMENT/ TITLE	Internal Kickoff Mtg (1/9/24)	Stakeholder Kickoff Mtg (4/1/24)	HIRA/Mitigation Strategy Mtg (8/8/24)	Virtual Public Mtg (1/21/25)
Queen, Josh	Cleveland County, Fire Inspector		✓	✓	
Main, Greg	City of Kings Mountain, Fire Chief				✓
GASTON COUNTY					
Falls, Corky	City of Belmont, Chief of Police		✓		
Goodman, Jena	Gaston County, Planning GIS Manager/E-911 Addressing Coordinator	✓	✓		✓
Hardee, Alex	Towns of Cramerton and Belmont, Fire Department		✓		
Hook, Allen	Gaston County, EM Planner	✓	✓	✓	
Hunter, Scott	Gaston County, Director of EM/Fire Marshal				
Sellers, Justin	Gaston County, Division Chief EM		✓		
Wilson, Brian	Gaston County, EM Planner	✓	✓		
LINCOLN COUNTY					
Bryant, Andrew	Lincoln County, Director of Development Services			✓	✓
Burrell, Byron	Lincoln County, GIS Analyst			✓	
Franklin, Rachel	Lincoln County, Community Health Manager			✓	
Holland, Joshua	Lincoln County, EM Planner	✓	✓	✓	✓
Howell, Mark	Lincoln County, EM Coordinator	✓	✓	✓	
Rhoades, Maegan	Lincoln County, Planner			✓	
Rombs, Ronald	Lincoln County, Director of Emergency Services				
Rubow, Justin	Lincoln County, System Administrator			✓	
Wyant, Mattie	Lincoln County, Public Health Educator			✓	
GASTON COUNTY CRS STEERING COMMITTEE					
Garrett, Steve	NCEM State Floodplain Manager			✓	
Goodman, Jena L.	Gaston County, Planning GIS Manager/E-911 Addressing Coordinator	✓	✓		
Hunter, Scott	Gaston County, Director of EM/Fire Marshal				
Jones, June	United Way of Gaston County				

NAME	AGENCY/DEPARTMENT/ TITLE	Internal Kickoff Mtg (1/9/24)	Stakeholder Kickoff Mtg (4/1/24)	HIRA/Mitigation Strategy Mtg (8/8/24)	Virtual Public Mtg (1/21/25)
Saunders, Angie	Gaston Regional Chamber				
Sketo, Wesley	Wildfire Mitigation Forester, NC Forest Service			✓	
Webster, Andrea	NCORR, Resilience Policy Advisor			✓	
REGIONAL STAKEHOLDERS					
Baker, Carl	NCEM Hazard Mitigation Plans Section	✓	✓	✓	
Crew, Chris	NCEM Hazard Mitigation Plans Section	✓	✓	✓	
Delude, Hannah	ESP Associates	✓		✓	✓
Flores, John	ESP Associates	✓	✓	✓	
Kudla, Kymberly	FEMA Region 4		✓		
Mello, John	NCEM Hazard Mitigation Plans Section	✓	✓		
Slaughter, Nathan	ESP Associates	✓	✓	✓	✓

Cleveland County hosted the Kickoff Meeting as documented on pages 2.10.

The Regional Hazard Mitigation Planning Committee includes representatives from local and regional agencies involved in hazard mitigation activities and agencies that have the authority to regulate development.

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	AGENCY / TITLE
Cleveland County	
Willis, Rodney	Mayor of Belwood
Parker, Zachary	Manager of Boiling Springs
Walker, Eddie	Mayor of Casar
Anderson, Noah	Mayor of Earl
Weaver, Doris	Mayor of Fallston
Willis, Tony	Mayor of Grover

NAME	AGENCY / TITLE
Gerald, Janet	Mayor of Kingstown
Beal, Alton	Mayor of Lattimore
Padgett, Ray	Mayor of Lawndale
Coggins, Christopher	Mayor of Mooresboro
Van Canipe, Lee	Mayor of Patterson Springs
Schoolcraft, Robyn Cook	Mayor of Polkville
Howell, Rick	Manager of Shelby
Barrett, Jr. John E. (Butch)	Mayor of Waco
Gaston County	
Ross, Joshua	Manager, Bessemer City
Wofford, Jason	Fire Chief, Cherryville
Stroupe, Maria	Manager, Dallas
Peoples, Michael	Manager, Gastonia
Strange, Brandi	Manager, High Shoals
Attaway, Scott	Manager, Lowell
Robinette, Jim	Manager, McAdenville
Blanton, Jonathan	Manager, Mount Holly
Black, Lynn	Manager, Ranlo
Kirkland, Cathy	Manager, Stanley
Lincoln County	
Derby, Jean	Planning Director, Lincolnton

Additional participation and input from other identified stakeholders and the 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)
- 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, track progress, and update their mitigation actions on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of the plan involved a series of meetings and workshops designed to facilitate discussion, build consensus, and initiate data collection efforts with local government staff, community officials, and other identified stakeholders. Importantly, these meetings and workshops encouraged ongoing input and feedback from relevant participants throughout the drafting stages of the plan. Below is a summary of the key meetings and community workshops conducted during the plan update process.

In addition, local staff frequently held routine discussions and additional meetings to address planning tasks specific to their departments or agencies. These meetings often focused on the approval of specific mitigation actions that each department or agency would undertake and include in the Mitigation Action Plan.

2.5.1 Meeting Summary

Internal Kickoff Meeting with County Leads and NCEM Representatives
January 9th, 2024
Virtual Meeting
The internal kickoff meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update marked the beginning of the planning process, following the last update in 2020. Key stakeholders from the three counties gathered to discuss the plan's objectives and outline the collaborative process ahead. Nathan Slaughter and John Flores from ESP Associates facilitated the meeting, which included a welcome and introductions.

The project overview highlighted the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), emphasizing that hazard mitigation planning is essential for maintaining eligibility for federal funding programs, such as Flood Mitigation Assistance (FMA), Building Resilient Infrastructure and Communities (BRIC), and the Hazard Mitigation Grant Program (HMGP). The participants acknowledged the inevitability of both natural and man-made hazards, stressing the importance of planning as municipalities grow and more people and assets are put at risk.

The planning process will involve organizing resources and forming a Hazard Mitigation Planning Committee comprised of county and municipal stakeholders. Public involvement will be integral, with plans for surveys and public meetings to gather input and feedback.

The meeting also covered essential aspects of risk assessment, including hazard identification and vulnerability assessment, to understand the potential impacts of various hazards. Participants discussed the need for an "All-Hazards" approach aligned with the state Hazard Mitigation Plan (HMP).

The development of the mitigation plan will include revisiting existing planning goals and mitigation alternatives, with opportunities to add new actions based on the risk assessment findings. Chris emphasized the importance of outreach to utility and transportation officials to explore large-scale projects eligible for funding.

Adoption and implementation will involve collaboration with each county and municipality, with a focus on overcoming challenges faced in previous planning cycles. The meeting underscored the need for documentation of community participation, particularly from underserved populations, as well as considerations for climate change and equitable outcomes.

The project schedule includes planning for a larger kickoff meeting with more stakeholders and a series of follow-up meetings. The draft plan is expected to be completed by November 2024, ahead of the expiration of the current plan in May 2025.

Next steps involve determining potential meeting locations and ensuring that all contacts are represented in the planning process. Overall, participants expressed appreciation for the collaborative effort and looked forward to the next phase of the planning process. Nathan will follow up with the counties on locations for upcoming meetings.

Larger Stakeholder Kickoff Meeting with Hazard Mitigation Planning Committee
April 1st, 2024
Cleveland County Emergency Management Office
In April 2024, the kickoff meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update brought together the Hazard Mitigation Planning Committee (HMPC) to discuss key objectives and strategies for enhancing community resilience against hazards.

The meeting aimed to define hazard mitigation and explore its various types, focusing on existing developments' vulnerability and ensuring future developments minimize risks. Key mitigation techniques discussed included prevention strategies, property protection measures, natural resource management, structural projects, and emergency services enhancements. The meeting emphasized the importance of education and public awareness in fostering community resilience.

The update reflects changing risks due to increased development and a shift toward an “all hazards” approach, incorporating climate change considerations. The committee acknowledged the need to address new vulnerabilities, particularly among socially vulnerable populations, and to adopt effective strategies that maximize the value of implemented measures.

Compliance with the Disaster Mitigation Act of 2000 was highlighted, emphasizing the need for active planning to address areas with repetitive damage. The meeting discussed funding opportunities through various programs, including HMGP, FMA, BRIC, and CRS, and the expanded eligibility for BRIC projects.

The meeting outlined a four-step update process: organizing resources, conducting a risk assessment, developing a mitigation plan, and final adoption and implementation. Emphasis was placed on engaging smaller communities and stakeholders, utilizing data analysis for hazard identification, and preparing for public involvement.

Attendees were encouraged to analyze stakeholder input, share public surveys, and finalize dates for upcoming public meetings. Ongoing assessments of risks and capabilities were also highlighted, with actionable items for stakeholders to review the Mitigation Action Plan and engage with smaller communities.

The meeting concluded with a call for community involvement, emphasizing the importance of documenting engagement efforts and gathering feedback for the plan update. Participants were

provided with contact information for follow-up and encouraged to schedule the next meeting promptly.

Meeting Minutes from Mitigation Strategy Meeting
August 9th, 2024
Lincoln County Emergency Management Office
On August 8, 2024, the Hazard Identification and Risk Assessment (HIRA)/Mitigation Strategy Meeting convened relevant stakeholders to discuss the third update of the Regional Hazard Mitigation Plan, reflecting 15 years of work in the region. The meeting was facilitated by Nathan Slaughter from ESP Associates, contracted through the State Emergency Management (EM) agency.

The primary goals included identifying hazards, assessing vulnerabilities, determining potential impacts, and educating participants about the hazard mitigation planning process. Stakeholders were invited to engage actively and provide insights into community needs and priorities.

Agenda Highlights:

- Hazard Identification: A review of hazards documented in previous plans, including FEMA Major Disasters and other significant risks like drought, extreme heat, hurricanes, tornadoes, and flooding.
- Asset Inventory: Analysis of population changes, critical facilities, and social vulnerability in the region.
- Hazard Profiles: Detailed assessments of 18 hazards, including their background, location, frequency, and potential interactions with other hazards. The session underscored the compounding effects of multiple hazards occurring simultaneously.
- Climate Change Considerations: Emphasis on how climate change is likely to increase the frequency and intensity of certain hazards, particularly extreme heat and drought.

Key Discussions:

- Extreme Heat: Presentations highlighted the increasing risks associated with rising temperatures, including public health impacts and emergency response needs. Data indicated a significant rise in extreme heat days projected for the future.
- Flooding: Identified as the leading weather-related hazard, the meeting examined the extent of floodplain areas and historical flooding occurrences.
- Wildfire Risks: The region's vulnerability to wildfires, particularly in the Wildfire Urban Interface (WUI), was discussed, with resources shared for potential funding opportunities to mitigate risks.
- Emerging Hazards: New hazards such as infectious diseases, hazardous substances, and cyber threats were noted, reflecting the evolving landscape of risks affecting the region.

The tabulated Preliminary Risk Indicator (PRI) results were presented, categorizing hazards into high, moderate, and low-risk groups. High-risk hazards identified included tornadoes, thunderstorms, excessive heat, severe winter weather, and flooding. Low-risk hazards were not prioritized for mitigation.

Comments on Specific Hazards:

- Excessive heat was noted for its immediate impact on sensitive populations but is easier to mitigate with advance warning.
- Cyber threats were highlighted as unpredictable, with six attacks on municipalities reported this year, emphasizing the need for robust cyber defenses.
- A radiological emergency was considered low risk despite high consequences, while food emergencies were suggested to be higher priority due to their potential public health impacts. Communication about food safety was identified as a crucial mitigation measure.

The Four-Step Mitigation Strategy:

- Organizing Resources: Planning for public involvement and coordinating efforts.
- Risk and Capability Assessments: Conducting hazard identification, vulnerability assessments, and evaluating community capabilities. Findings indicated increased capabilities across most municipalities.
- Mitigation Strategy Development: Setting goals and reviewing alternatives, with a focus on aligning actions with FEMA BRIC grant requirements.
- Plan Adoption and Implementation: Discussing the distribution of documents and follow-up actions required for stakeholders.

Initial findings from a public survey revealed tornadoes/thunderstorms as the highest perceived threat, with significant interest in hazard resilience measures. A majority preferred information via internet/social media.

Stakeholders were urged to submit updated and new mitigation actions, review draft assessments, and prepare for the draft plan submission in late November. The meeting concluded with a commitment to distribute all relevant documents and resources for further collaboration and input.

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

A critical aspect of the mitigation planning process is public participation. Input from individual citizens and community members enhances the planning team's understanding of local concerns and significantly increases the likelihood of successfully implementing mitigation actions. By fostering community buy-in among those directly affected by public officials' decisions, the planning process becomes more effective. As residents engage in decisions impacting their safety, they develop a deeper appreciation for the hazards present in their community, motivating them to take necessary steps to mitigate these risks. Public awareness is essential to any community's overall mitigation strategy, aimed at making homes, neighborhoods, schools, and businesses safer.

To encourage public involvement in the development of the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, three methods were utilized: (1) virtual public meetings; (2) public surveys available in both hard copy and online formats; and (3) draft plan deliverables accessible for public review on county and municipal websites and at government offices. The public had two key opportunities to contribute

to the regional plan's development at distinct stages of the planning process: first, during the drafting stage, and second, upon completion of the final draft, before official approval and adoption. Additionally, a public participation survey was made available at various locations throughout Cleveland, Gaston, and Lincoln Counties, as well as on county and municipal websites. Documentation of these efforts can be found in **Appendix D**.

Furthermore, in addition to the two previously mentioned opportunities for public comment, each participating jurisdiction will hold public meetings before the final plan is officially adopted by local governing bodies. These meetings will take place at different times once FEMA grants conditional approval of the plan. Adoption resolutions will be included in **Appendix A.**

Meeting Minutes from Public Meeting
January 21st, 2025
Virtual Meeting

In January of 2025, the public meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update was held to educate and inform the public on the development of the draft plan as well as next steps. In addition to raising public awareness, the aim of this meeting was to offer the public an opportunity to ask questions and provide feedback/input to enhance plan relevance.

The meeting aimed to define hazard mitigation and explore its various types, focusing on existing developments' vulnerability and ensuring future developments minimize risks. Key mitigation techniques discussed included prevention strategies, property protection measures, natural resource management, structural projects, and emergency services enhancements. The update reflects changing risks due to increased development and a shift toward an “all hazards” approach, incorporating climate change considerations.

The project overview highlighted the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), emphasizing that hazard mitigation planning is essential for maintaining eligibility for federal funding programs, such as Flood Mitigation Assistance (FMA), Building Resilient Infrastructure and Communities (BRIC), and the Hazard Mitigation Grant Program (HMGP).

The planning process was reviewed, which outlined a four-step update process: organizing resources, conducting a risk assessment, developing a mitigation plan, and final adoption and implementation. The structure of the plan was also reviewed during this meeting to facilitate clarity and understanding, sharing the breakdown of plan sections such as hazard identification, risk assessment, and mitigation action strategies.

Key findings were also shared with meeting participants including the priority risk index (PRI) as well as public survey findings. The tabulated PRI results were presented, categorizing hazards into high, moderate, and low-risk groups. High-risk hazards identified included cyber, excessive heat, tornadoes/thunderstorms, flooding, and infectious disease. Initial findings from the public survey revealed tornadoes/thunderstorms as the highest perceived threat, with significant interest in hazard resilience measures.

Next steps were shared toward the end of the meeting, including the integration of any additional feedback received at the public meeting, the submittal of the plan to both NCEM and FEMA for review and approval, and the local adoption process. For timing purposes, the local adoption process can occur

simultaneously with NCEM and FEMA review, so once approved, the plan will be officially adopted. The adoption process may vary per community, but the most common approach is adoption by resolution.

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Committee successfully engaged citizens in the mitigation planning process through the Public Participation Survey. This survey was specifically designed to gather data and insights from residents of Cleveland, Gaston, and Lincoln Counties who might not be able to attend public meetings or participate in other ways.

Copies of the Public Participation Survey were distributed to the Regional Hazard Mitigation Committee, ensuring they were available for residents to complete at local public offices. Additionally, a link to an electronic version of the survey was posted on the websites of each county and municipality. In total, 281 survey responses were received, providing valuable input for the Committee to consider updating the plan. Selected survey results are presented below.

- Approximately 51 percent of survey respondents had been impacted by a disaster, mainly hurricanes, tornadoes, and winter storms.
- Respondents ranked Tornadoes/Thunderstorms as the highest threat to their neighborhood (39 percent), followed by Flooding (11 percent), and Excessive Heat (9 percent).
- Approximately 48 percent of respondents have taken actions to make their homes more resistant to hazards and 82 percent are interested in making their homes more resistant to hazards.
- 71 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services and Prevention were ranked as the most important activities for communities to pursue in reducing risks.

Full results from the public survey can be found in **Appendix D.**

2.7 INVOLVING THE STAKEHOLDERS

44 CFR Requirement

44 CFR Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other non-profit interests to be involved in the planning process.

At the outset of the planning process for this development plan, the project consultant collaborated with the Emergency Management leaders from each of the three counties to initiate outreach to stakeholders for their involvement. The consultant distributed a list of recommended stakeholders derived from FEMA Publication 386-1, titled *Getting Started: Building Support for Mitigation Planning* This list highlighted the diverse range of stakeholders considered for participation in the plan's development. Each County Emergency Management leader utilized this list as a reference while inviting stakeholders from their respective counties to engage in the planning process.

Additionally, FEMA's *Local Mitigation Planning Policy Guide* (2023) and *Local Mitigation Planning Handbook* (2023) were consulted to ensure all elements for participation were addressed.

To ensure representation from underserved communities and socially vulnerable populations, the participating jurisdictions invited representatives from the Health Departments and the Social Services Departments from each of the three counties, and the United Way of Gaston County. Each of these stakeholders actively participated and works directly with the underserved and socially vulnerable populations in the region. In addition to contributions from various county-level departments, other key stakeholders involved in the plan's development included:

- Gaston Regional Chamber of Commerce,
- Federal Emergency Management Agency (FEMA),
- North Carolina Office of Recovery and Resiliency (NCORR),
- North Carolina Emergency Management (NCEM), and
- North Carolina Forest Service.

The Regional Hazard Mitigation Committee actively promoted open and widespread participation in the mitigation planning process. The region also excelled in local outreach efforts by designing and distributing the Public Survey. This initiative allowed local officials, residents, businesses, academics, and other private interests in the Cleveland-Gaston-Lincoln region to engage and provide input throughout the local mitigation planning process. Neighboring jurisdictions were also invited to participate in the plan update process. Documentation of this effort can be found in **Appendix D**.

2.8 DOCUMENTATION OF PLAN PROGRESS

This plan update documents the progress made in hazard mitigation planning for the participating jurisdictions in the Cleveland-Gaston-Lincoln Region. Since the initial Hazard Mitigation Plans were developed in the late 1990s and early 2000s, numerous mitigation actions have been completed and implemented across these jurisdictions. These actions are designed to reduce the overall risk posed by natural hazards to the people and properties in the region. A detailed account of these completed actions can be found in **Appendix E**.

Further details on the progress of plan implementation are provided in the Capability Assessment. Community capabilities have continued to improve in each participating jurisdiction through the adoption of new plans, policies, and programs that promote hazard mitigation at the local level. The status of local capabilities for these jurisdictions is outlined in Section 7: Capability Assessment. The participating jurisdictions demonstrate their ongoing commitment to hazard mitigation and planning by reconvening the Regional Hazard Mitigation Committee to update the plan and actively involving 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 2025 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
Hook, Allen	Gaston County, Emergency Management Planner	X	X	X	X	X	X
Goodman, Jena L.	Gaston County, Planning GIS Manager/E-911 Addressing Coordinator	X	X	X	X	X	X
Wilson, Brian	Gaston County, Emergency Management Planner	X	X	X	X	X	X
Sellers, Justin	Gaston County, Division Chief of Emergency Management	X	X	-	X	-	X
Hunter, Scott	Gaston County, Emergency Management Director/Fire Marshal	X	X	-	X	-	X

- Gaston County also established a separate CRS Steering Committee comprised of 50% public sector and 50% private sector/citizen representation. This was done to meet the requirements of CRS Planning Step 2. The makeup of the steering committee is discussed earlier in this section.
- Multiple outside stakeholders were asked to participate in the plan update process. An email was sent to the following stakeholders to invite 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

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 situated in the southern part of Western North Carolina, just west of Charlotte. As its name suggests, this region encompasses Cleveland, Gaston, and Lincoln Counties, along with their respective municipalities. An orientation map is provided as **Figure 3.1**.

This region boasts numerous scenic areas and tourist attractions, including Lake Norman, which extends partially into Lincoln County, Crowders Mountain State Park in Gaston County, and the historic Herschell-Spillman carousel located in Shelby City Park in Cleveland County. Residents take full advantage of a diverse range of outdoor activities offered by the lakes and mountains. Mountain Island Lake and Lake Wylie are two popular destinations for water-based recreation. While enjoying the charm of small-town life, residents also benefit from the proximity to the Charlotte metropolitan area, allowing them to experience the best of both worlds.

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	464 square miles
Gaston County	356 square miles
Lincoln County	296 square miles

Source: US Census Bureau

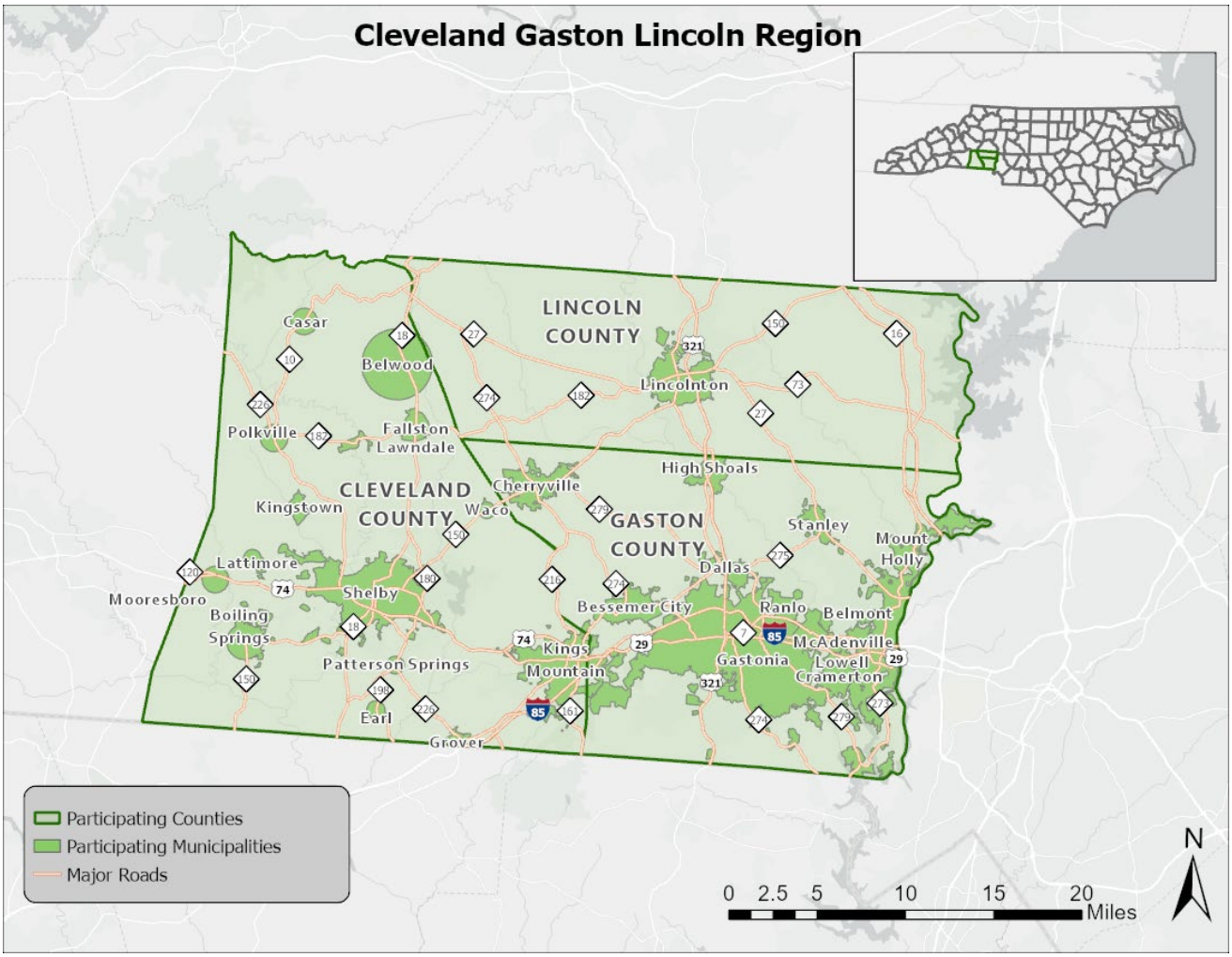
The Cleveland Gaston Lincoln Region experiences a moderate climate, characterized by mild winters and hot, humid summers. However, variations in elevation and topography can significantly influence local weather patterns. Generally, spring months are marked by unpredictable conditions, with rapid changes where sunny skies can quickly give way to rain within a few hours. From March to May, average high temperatures hover in the mid-sixties, while lows typically fall to the lower forties. By late April, the weather usually becomes milder, with May bringing warmer temperatures.

From September to mid-November, the region enjoys clear skies and cooler weather, alternating between warm days and chilly nights. Daytime highs are generally in the 70s and 80s during September, but they drop to the 50s and 60s by early November. The first frost often occurs in late September, with

nighttime lows approaching freezing by November. During the autumn months, occasional rain showers contribute to the region's status as the driest period of the year.

Winter in the Cleveland Gaston Lincoln Region is typically moderate, though extremes can occur. From mid-November through February, many days see high temperatures of 50°F or more, occasionally reaching the 70s. However, winter lows usually dip to or below freezing, with temperatures sometimes falling into the 20s. Snow is most common in January and February, with accumulations of an inch or more occurring several times each season.

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 2010 and 2020, all the participating counties experienced population growth where Lincoln County had the most significant growth with a 10.9% increase. Population counts from the US Census Bureau for 2020 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	2020 Census Population	% Change 2010-2020
Cleveland County	84,714	96,827	98,078	99,519	1.5%
Gaston County	175,093	190,365	206,086	227,943	10.6%
Lincoln County	50,319	63,780	78,265	86,810	10.9%

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

Based on the 2022 Census estimates, the median age of residents of the participating counties ranges from 39.9 to 44.3 years. The racial characteristics of the participating counties are presented in **Table 3.3**.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2023)	Black or African American, Percent (2023)	American Indian or Alaska Native, Percent (2023)	Asian, Percent (2023)	Native Hawaiian or Other Pacific Islander, Percent (2020)	Persons of Hispanic Origin, Percent (2023) *	Two or More Races, Percent (2023)
Cleveland County	75.1%	20.9%	0.5%	1.2%	0.0%	5%	2.2%
Gaston County	74.9%	19.9%	0.7%	1.9%	0.1%	10.2%	2.5%
Lincoln County	90%	6.4%	0.6%	1.1%	0.1%	8.4%	1.9%

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

The data presented above highlights the racial and ethnic composition of Cleveland, Gaston, and Lincoln Counties in 2023, revealing significant variations among the jurisdictions. Cleveland County maintains a predominantly White population, accompanied by a notable African American community. The presence of other racial and ethnic groups, including American Indian or Alaska Native and Asian residents, remains minimal, while the Hispanic population accounts for a small but relevant portion of the community.

In Gaston County, a similar demographic trend is observed, with a majority of White residents and a substantial African American population. The Hispanic community is particularly prominent here compared to the other counties. Lincoln County, on the other hand, features the highest percentage of White residents and a lower representation of Black or African American individuals. Across all three counties, the presence of individuals identifying as belonging to two or more races is relatively small. These findings reflect the diverse demographic landscape of the region and indicate potential areas for community engagement and support initiatives.

3.3.1 Housing

According to the US Census Bureau, in 2020 there were an estimated 178,936 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**.

TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

Jurisdiction	Housing Units (2015)	Housing Units (2020)	Median Home Value (2018-2022)
Cleveland County	43,291	43,630	$155,000
Gaston County	89,702	98,136	$206,700
Lincoln County	33,864	37,170	$241,200

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 is located in Cleveland County and serves as the wholesale energy provider to the NC Electric Membership Corporation and NC Municipal Power Agency Number 1.

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 112 EMS and fire stations, 28 police stations, and 139 schools located within the study area.

There are 311 care facilities are located in the Cleveland Gaston Lincoln Region. The largest is Caromont Regional Medical Center, a 476-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. There are several smaller hospitals located throughout the region as well, such as 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 2024, Cleveland County had a labor force of 48,909 workers. As of 2024, the top five employers in Cleveland County were the Cleveland County Board of Education, Charlotte Mecklenburg Hospital Authority, Wal-Mart Associates, Cleveland County, and Greenheck Fan Corporation. The unemployment rate was 3.3 compared to the State rate of 3.8.

Gaston County had a labor force of 117,932 workers. As of 2024, the top five employers in Gaston County were the Caromont Health, Daimler Trucks North American, Gaston County Schools, County of Gaston, and Wal-Mart Associates. The unemployment rate was 3.1 compared to the State rate of 3.8.

Lincoln County had an average annual employment of 47,947 workers. As of 2024, the top five employers in Lincoln County were Lincoln County Schools, Charlotte Mecklenburg Hospital Authority, Wal-Mart Associates, and the Timken Company. The unemployment rate was 2.8 compared to the State rate of 3.8.

SECTION 4
HAZARD IDENTIFICATION

This section describes how the planning team identified the hazards to be included in 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 numerous 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 Committee members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2023). To maintain consistency, the Cleveland Gaston Lincoln Planning Committee agreed 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 hazards identified and included in the plan have changed. A list of all previous hazards covered in the 2020 Cleveland Gaston Lincoln Regional Hazard Mitigation Plan is viewable in **Table 4.1**, along with a summary of the hazards assessed in this 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 4.2.

TABLE 4.1: 2025 CLEVELAND GASTON LINCOLN HAZARDS UPDATE

2020 Cleveland Gaston Lincoln Identified Hazards		2025 Cleveland Gaston Lincoln Identified Hazards		Subhazards covered in 2025 Plan
Natural Hazards	Drought	Drought	**Natural Hazards**	Agricultural Drought, Hydrological Drought
	Excessive Heat	Excessive Heat		
	Hurricane and Coastal Hazards	Hurricane and Coastal Hazards		Storm Surge associated with Hurricanes and Nor'easters, High Wind associated with Hurricanes and Nor'easters, Torrential Rain, Tornadoes associated with Hurricanes, Severe Winter Weather associated with Nor'easters
	Tornadoes/Thunderstorms	Tornadoes/Thunderstorms		Hailstorm, Torrential Rain associated with Severe Thunderstorms, Thunderstorm Wind, Lightning, Waterspout, High Wind
	Severe Winter Weather	Severe Winter Weather		Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold
	Dam Failures	Dam Failures		
	Flooding	Flooding		
	Earthquakes	Earthquakes		
	Geological	Geological		Landslides, Sinkholes, Erosion
Other Hazards	Wildfires	Wildfires		
	Infectious Disease	Infectious Disease		Vector-Borne Disease, Foreign Animal Disease
Technological Hazards	Hazardous Substances	Hazardous Substances	**Technological Hazards**	Hazardous Materials, Hazardous Chemicals, Oil Spill, Road/Rail Incidents
	Radiological Emergency-Fixed Nuclear Facilities	Radiological Emergency – Fixed Nuclear Facilities		
	Terrorism	Terrorism		Chemical, Biological, Radiological, Nuclear, Explosive
	Cyber	Cyber		Mass power/utility disruption
	Electromagnetic Pulse	Electromagnetic Pulse		
		Civil Disturbance		
		Food Emergency		

4.2 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the Cleveland Gaston Lincoln regional planning area. Since 1974, eleven presidential disaster declarations have been reported in the Cleveland Gaston Lincoln Region by FEMA, which can be seen in **Table 4.2** below. This includes three storms related to winter storm events, three storms related to hurricanes and coastal hazards, two storms related to tornadoes, an infectious disease pandemic (COVID-19), and two severe storms 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 STORMS/FLOODING	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
2020	4487	COVID-19 PANDEMIC	X	X	X
2020	4543	SEVERE STORMS, TORNADOES, & FLOODING	X	X	
2024	4827	TROPICAL STORM HELENE	X	X	X

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan (5/28/2020 to 12/31/2023), there have been 114 hazard events recorded for the region in the National Centers for Environmental Information (NCEI) 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 and may be underreported by regional jurisdictions. 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	0	3
Flood	1	2	0
Hail	9	8	7
Heavy Snow	1	1	1
Heavy Rain	0	0	1
High Wind	0	0	0
Lightning	0	0	1

Strong Wind	1	1	1
Thunderstorm Wind	28	17	15
Tornado	2	1	0
Tropical Storm	0	1	2
Winter Storm	0	0	0
Winter Weather	2	2	2
TOTAL NUMBER OF REPORTED EVENTS	**46**	**34**	**34**

* 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. Source: NCEI Storm Events Database

Appendix H 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. Additional detailed information about previous historical hazard 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 to warrant listing and evaluation in the risk assessment. For each hazard considered, the table indicates whether the hazard was identified as a significant listed hazard, 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). Hazards not identified for inclusion at this time may be listed during future evaluations and updates of the risk assessment if deemed necessary by the planning committee 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 listed 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 website • Review of the NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • 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 hazards are not discussed in the North Carolina State Hazard Mitigation Plan. • Avalanche is not included in the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan.
Drought	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • 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 23 of the last 24 years (2000-2024) in the Cleveland Gaston Lincoln Region, according to the North Carolina Drought Monitor. • Droughts are discussed in the NC State Hazard Mitigation Plan. • Drought is included in the previous Cleveland Gaston Lincoln plan.
Hailstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of NOAA NCEI Storm Events Database	• Hailstorm events are discussed in the State Plan under the Tornadoes/ Thunderstorm hazard. • NCEI reports 454 hailstorm events (3/4 inch size hail to 4.5 inches) for the Cleveland Gaston Lincoln Region between 1962 and 2023. For these events, there

Hazards Considered	Was this hazard identified as a significant hazard to be listed 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	was over $2.4 million (2023 dollars) in property damages. • Although hail is not addressed as an individual hazard in the previous Cleveland Gaston Lincoln plan, it is addressed under Tornadoes/Thunderstorms. Given the frequency of the event, individual analysis is warranted.
Excessive Heat	**YES**	• Review of NOAA NCEI Storm Events Database • Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• NCEI reports 7 heat events for Cleveland Gaston and Lincoln counties since 1950, including 1 injury. • Excessive heat is discussed in the State Plan. • Temperatures have reached as high as 107 degrees Fahrenheit at several points in the region. • Heat wave or excessive heat was addressed in the previous Cleveland Gaston Lincoln plan.
Hurricane and Coastal Hazards	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCEI Storm Events Database • Review of historical	• Hurricane and coastal hazard events are discussed in the State Plan. • NOAA historical records indicate roughly 63 hurricane or tropical storms/depressions have come within 75 miles of the Cleveland Gaston Lincoln Region since 1850. • Two out of ten 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

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		presidential disaster declarations • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	Cleveland Gaston Lincoln Region is between 55-65 mph. • Hurricane and coastal hazards were addressed in the previous Cleveland Gaston Lincoln plan.
Lightning	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • 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/Thunderstorms hazard. • NCEI reports 56 lightning events for the Cleveland Gaston Lincoln Region since 1996. These events have resulted in a recorded 16 injuries and nearly $3.9 million (2023 dollars) in property damage. • Lightning is addressed under Tornadoes/Thunderstorms in the previous Cleveland Gaston Lincoln plan. 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 under Severe Winter Weather. • 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 not discussed in the previous Cleveland Gaston Lincoln plan.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Tornadoes/Thunderstorm	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Tornado events are discussed in the State Plan. • NCEI reports 66 tornado events in the Cleveland Gaston Lincoln Region counties since 1950. These events have resulted in 5 recorded deaths and have caused 78 injuries and $154.3 million (2023 dollars) in property damage with the most severe being an F4. • Tornado events were addressed in the previous Cleveland Gaston Lincoln plan.
Severe Thunderstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • 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 State Plan. • NCEI reports 678 thunderstorm wind events in the Cleveland Gaston Lincoln Region counties since 1950. These events have resulted in 4 deaths and 13 injuries and over $3.2 million (2023 dollars) in property damage. • Severe thunderstorm events were addressed in the previous Cleveland Gaston Lincoln plan.
Severe Winter Weather	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of historical Presidential disaster declarations	• Severe winter weather, including snow storms and ice storms, are discussed in the State Plan. • NCEI reports that the Cleveland Gaston Lincoln counties have been affected by 254 winter weather events since 1993. These events resulted in over $61.5 million (2023 dollars) in damages but did not cause any deaths

Hazards Considered	Was this hazard identified as a significant hazard to be listed 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 the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	or injuries. • Three of the region's ten disaster declarations were directly related to severe winter weather events. • Severe winter weather events were addressed in the previous Cleveland Gaston Lincoln plan.
Earthquakes	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • USGS Earthquake Hazards Program website • Review of NOAA NCEI records • Review of FEMA's National Risk Index	• 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 of an earthquake event (no counties are high risk). • The previous Cleveland Gaston Lincoln plan addressed earthquakes. • 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 NCEI and USGS records. The greatest MMI reported was a 7. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Cleveland Gaston Lincoln Region is

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			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 USDA Soil Conservation Service's Soil Survey • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Expansive soils are not discussed in the State Plan. • 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. • The previous Cleveland Gaston Lincoln plan did not identify expansive soils as a potential hazard.
Geological (Landslides, Sinkholes, Erosion)	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • 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 Regional Hazard Mitigation Plan	• Landslide/rock fall events are discussed in the State Plan as a geological hazard. • 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 incidence with high susceptibility. • The previous Cleveland Gaston Lincoln plan addressed landslides.
Land Subsidence	**NO**	• Review of NC State Hazard Mitigation Plan	• The State Plan does not discuss land subsidence hazards.

Hazards Considered	Was this hazard identified as a significant hazard to be listed 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	• The previous Cleveland Gaston Lincoln plan does not address 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 National Risk Index • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses)	• Tsunamis are not discussed as a hazard in the State Plan. • The previous Cleveland Gaston Lincoln plan does not address tsunamis. • No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	**NO**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of USGS Volcano Hazards Program website	• 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 failure is discussed in the State Plan. • Per the NC Dam Inventory, there are 50 high hazard dams in the

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Dam Safety Program's NC Dam Inventory as of July 2024 • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	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 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 Regional Hazard Mitigation Plan	• Erosion is referenced as a geological subhazard in the previous Cleveland Gaston Lincoln 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 FEMA's National Risk Index • 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)	• The flood hazard is thoroughly discussed in the State Plan. • Five of ten 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 76 flood events since 1993. These events in total caused 1 reported death and no injuries, plus an estimated $12.2 million (2023 dollars) in property damages. • Nearly 7.4% of the Cleveland Gaston

Hazards Considered	Was this hazard identified as a significant hazard to be listed 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	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. • The previous Cleveland Gaston Lincoln plan addressed flood hazards.
Storm Surge	**NO**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Storm surge is discussed in the State Plan under the Hurricane hazard. • The previous Cleveland Gaston Lincoln plan does not 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.
Wildfires	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Forest Service website	• Wildfires are discussed in the State Plan as a hazard of concern. • The previous Cleveland Gaston Lincoln plan addressed wildfires. • A review of SWRA data indicates that there are areas of elevated concern in the Cleveland Gaston Lincoln Region. • According to the North Carolina Forest Service, 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.

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Infectious Disease	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Including infectious disease hazards to be consistent with the State Plan. • This hazard will assess foreign animal disease.
TECHNOLOGICAL HAZARDS			
Hazardous Substances	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• The previous Cleveland Gaston Lincoln plan addressed hazardous substances. • This update assesses hazardous materials, hazardous chemicals, and oil spills under this hazard.
Terrorism	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan • Review of local official knowledge	• Including terrorism hazards to be consistent with the State Plan. • There are several fixed nuclear facilities in the state. • This hazard will assess chemical, biological, radiological, nuclear, and explosive terrorism events.
Radiological Emergency – Fixed Nuclear Facilities	**YES**	• Review of NC State Hazard Mitigation Plan • 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	• 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. • Local officials expressed a desire to address radiological emergencies as a hazard in this plan. • Nuclear events can sometimes be caused by

Hazards Considered	Was this hazard identified as a significant hazard to be listed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		officials about location of nuclear power stations	natural hazards and deserve some attention in this plan due to some areas of the region being in the 10-mile evacuation zone for the McGuire and Catawba Nuclear Power Stations.
Cyber	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of a cyberattack with the increase in global technology.
Electromagnetic Pulse	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous Cleveland Gaston Lincoln Regional Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology.
Civil Disturbance	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions and social systems encourage the assessment of the possibility of a civil disruption incident.
Food Emergency	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions and food systems encourage the assessment of the possibility of a food emergency.

4.5 HAZARD IDENTIFICATION RESULTS

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

TABLE 4.5: HAZARD IDENTIFICATION AND EVALUATION RESULTS

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

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

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

*** = Hazard is assessed as a subhazard under the Geological 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 Civil Disturbance
- 5.20 Food Emergency
- 5.21 Conclusions on Hazard Risk
- 5.22 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 must include information on previous occurrences of hazard events and on the probability of future hazard events.

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the Cleveland Gaston Lincoln Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard, its location and extent, notable historical occurrences, a discussion about changing future conditions, and the probability of future occurrences. Each profile also includes specific items noted by members of the Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee 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 Hazard Mitigation Planning Committee agreed 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 be changed and additional hazards were included in the assessment.

The following hazards were identified in the left column below along with "compounding hazards" that may either act as a key driver or lead to secondary risks associated with the primary hazard:

HAZARD	COMPOUNDING - NATURAL											COMPOUNDING - 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	Civil Disturbance	Food Emergency
NATURAL HAZARDS																		
DROUGHT (6)		•			•		•		•	•								•
EXCESSIVE HEAT (7)	•			•			•		•	•	•							•
HURRICANE AND COASTAL HAZARDS (7)				•			•	•	•			•	•					•
TORNADOES/ THUNDERSTORMS (6)		•	•				•		•	•		•						
SEVERE WINTER WEATHER (6)	•			•			•		•		•							•
EARTHQUAKES (5)							•	•	•			•	•					
GEOLOGICAL (8)	•	•	•	•	•	•		•	•									
DAM FAILURE (5)			•			•	•		•					•				
FLOODING (11)	•	•	•	•	•	•	•	•			•	•						•
WILDFIRES (3)	•	•		•														
INFECTIOUS DISEASE (7)		•			•				•			•		•			•	•
TECHNOLOGICAL HAZARDS																		
HAZARDOUS SUBSTANCES (9)			•	•		•			•	•	•		•	•				•
RADIOLOGICAL EMERGENCY (7)			•			•						•		•	•	•		•
TERRORISM (7)								•			•	•	•		•	•	•	
CYBER (4)													•	•		•	•	
ELECTROMAGNETIC PULSE (4)													•	•	•		•	
CIVIL DISTURBANCE (4)											•			•	•	•		
FOOD EMERGENCY (8)	•	•	•		•				•		•	•	•					

This 2025 plan update cycle also explicitly recognizes the threat of climate change as a real concern for the Cleveland Gaston Lincoln Region as it relates to how it will impact the hazards that can affect the area. As the Earth's climate warms, changing global weather patterns, future development in both urban and rural areas, and changing local and global environmental conditions are anticipated based on

historical trends and future projections. Recent studies demonstrate that North Carolina will experience a wide variety of negative effects due to climate change[1]. Additionally, the United States Environmental Protection Agency reports as of August 2016 that most of North Carolina has warmed by one-half to one degree (F) in the last century, and the sea level is rising about one inch every decade. Some of the impacts of climate change over the next fifty (50) years are expected to include, but potentially not be limited to, more frequent and/or more intense hazard events, increased vulnerability of the built environment to hazards, increased number of extreme heat days, increased risks of heat stroke and other heat-related illnesses, reduced crop yields, and livestock harms.

In response to this growing body of information, each hazard profile now includes a subsection titled ***Changing Future Conditions*** that discusses how the hazard, and thus how it impacts the Cleveland Gaston Lincoln Region, may be expected to change in the future. Where applicable, climate change is specifically addressed in those subsections.

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.

[1] *2020 North Carolina Climate Science Report* (https://ncics.org/programs/nccsr/)

FIGURE 5.1: CLEVELAND GASTON LINCOLN REGION BASE MAP

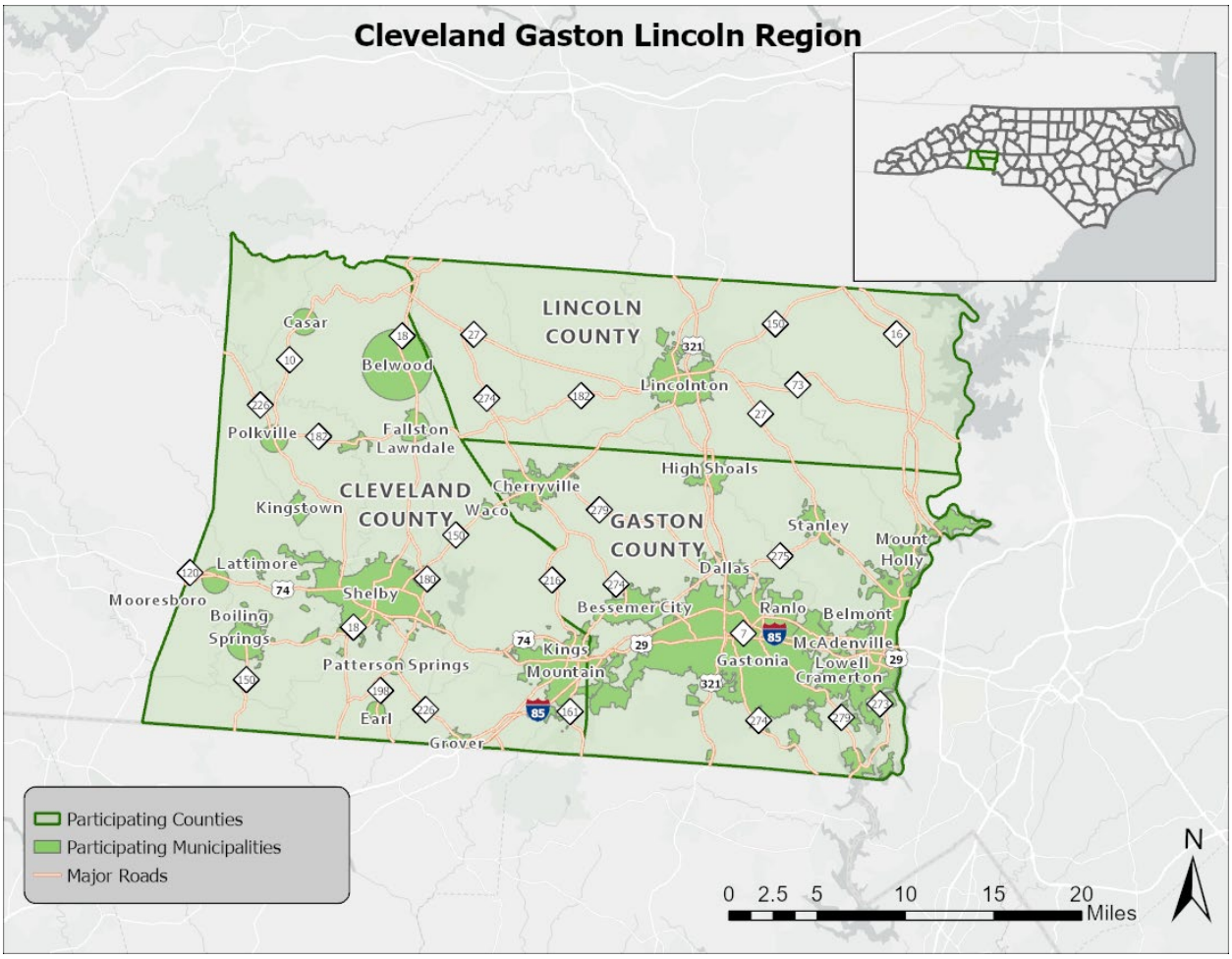


Table 5.2 lists each significant hazard for the Cleveland Gaston Lincoln Region and identifies whether or not it has been determined to be a specific hazard of concern for the 28 municipal jurisdictions and each of the countywide unincorporated areas. This is based on the best available data and information from the Cleveland Gaston Lincoln Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	NATURAL											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	Civil Disturbance	Food Emergency
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 droughts.

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

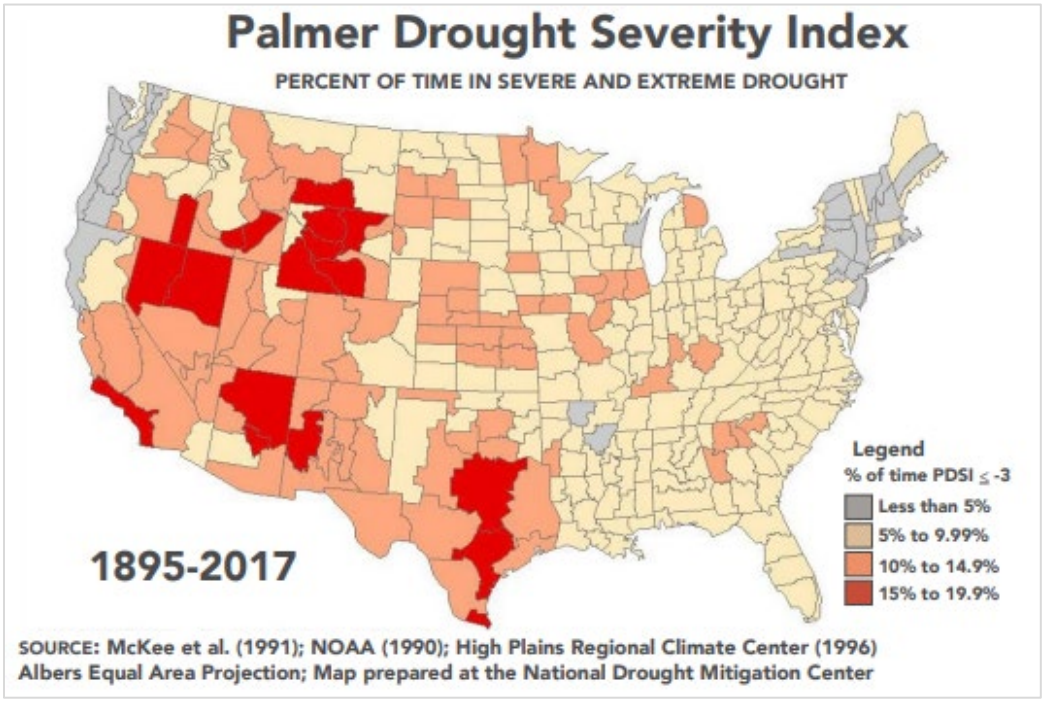
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural 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 effects on 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 ranges from -0.5 (incipient dry spell) to -4.0 (extreme drought). As evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United States, drought affects most areas of the United States, but is less severe in the Eastern United States.

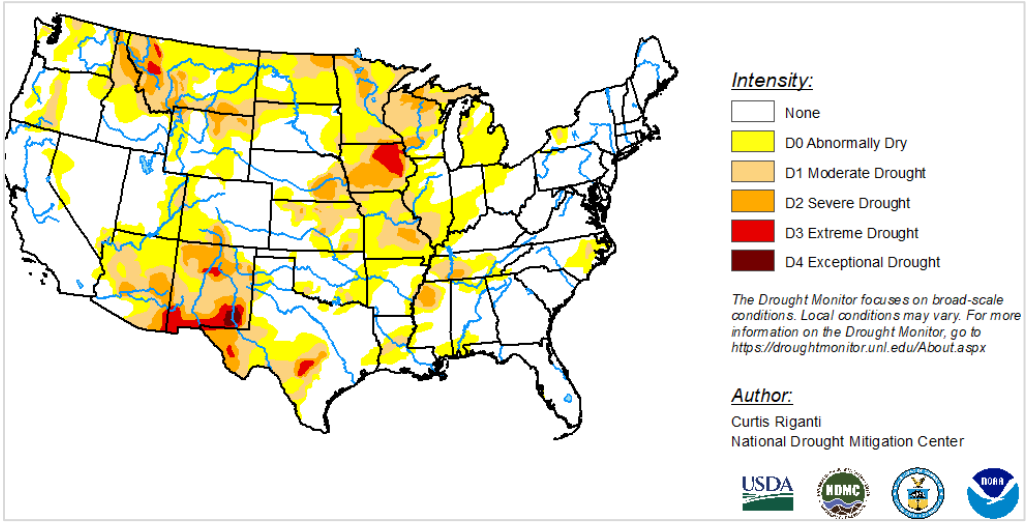
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



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 March 5, 2024, 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

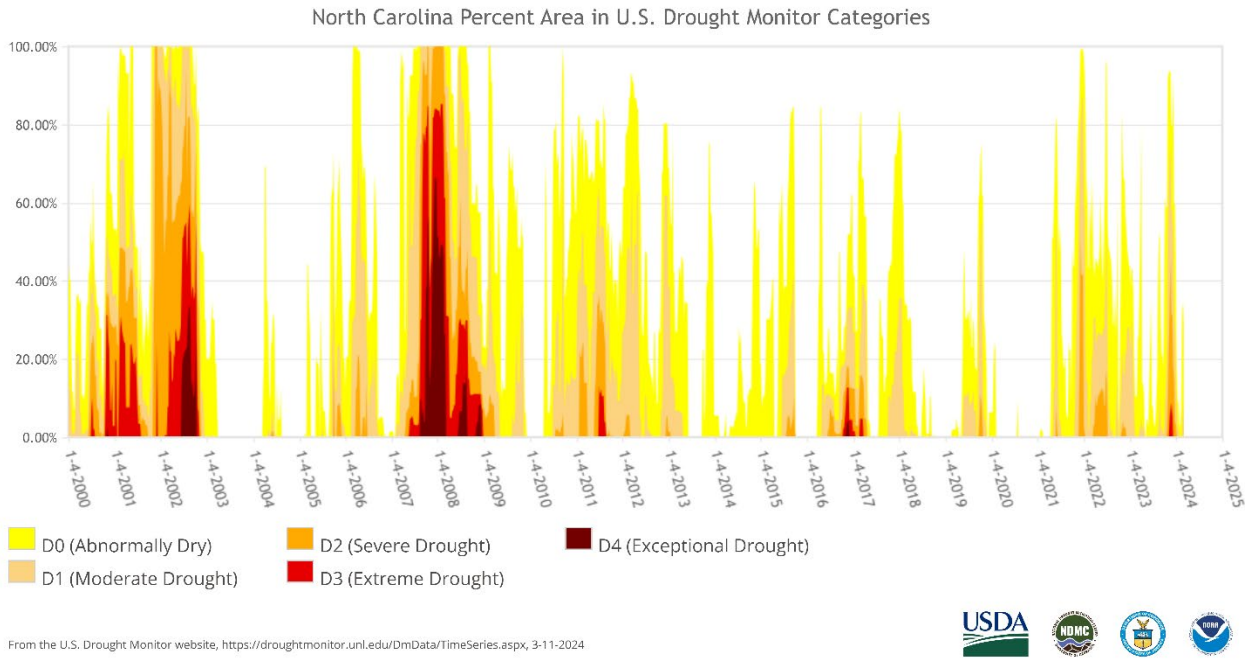
The North Carolina Drought Management Advisory Council also reports data on North Carolina drought conditions from 2000 to 2024 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor (USDM), which classifies conditions on a scale of 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 Oceanic and Atmospheric Administration (NOAA) 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 experienced drought conditions from 2000 to 2024.

FIGURE 5.4: NORTH CAROLINA DROUGHT CONDITIONS (2000-2024)



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 nearly all of the last 20 years (2005-2024) (**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
2019	Severe Drought	Severe Drought	Severe Drought
2020	None Reported	None Reported	None Reported
2021	Severe Drought	Severe Drought	Severe Drought
2022	Moderate Drought	Moderate Drought	Moderate Drought
2023	Extreme Drought	Severe Drought	Extreme Drought
2024	Abnormally Dry	Abnormally Dry	Abnormally Dry

Source: North Carolina Drought Monitor (through February 2024)

5.3.4 Changing Future Conditions

According to findings from the 2020 North Carolina Climate Science Report, it is very likely that average temperatures and the number of very warm nights will both continue to increase throughout North Carolina. Annual average temperatures have been consistently above normal in the state since the 1990s, with the most recent 10-year span (2009-2018) marking the warmest 10-year period on its record. Additionally, by 2050, climate models project that the annual average temperature in North Carolina (compared to the 1996-2015 average temperature) will increase by 2 to 4°F under a lower emissions scenario and by 2 to 5°F under a higher emissions scenario. The frequency, duration, and intensity of droughts are likely to continue to increase in tandem with higher average temperatures and a higher rate of evapotranspiration.

5.3.5 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the Cleveland Gaston Lincoln Region has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location, but each area has an equal probability of experiencing a drought. However, historical information also indicates that there is a much lower probability of extreme, long-lasting drought conditions. As of 2024, the FEMA National Risk Index[2] rates the drought hazard as “very low” in Cleveland County and Gaston County compared to “relatively low” in Lincoln County.

[2] FEMA National Risk Index (https://hazards.fema.gov/nri/)

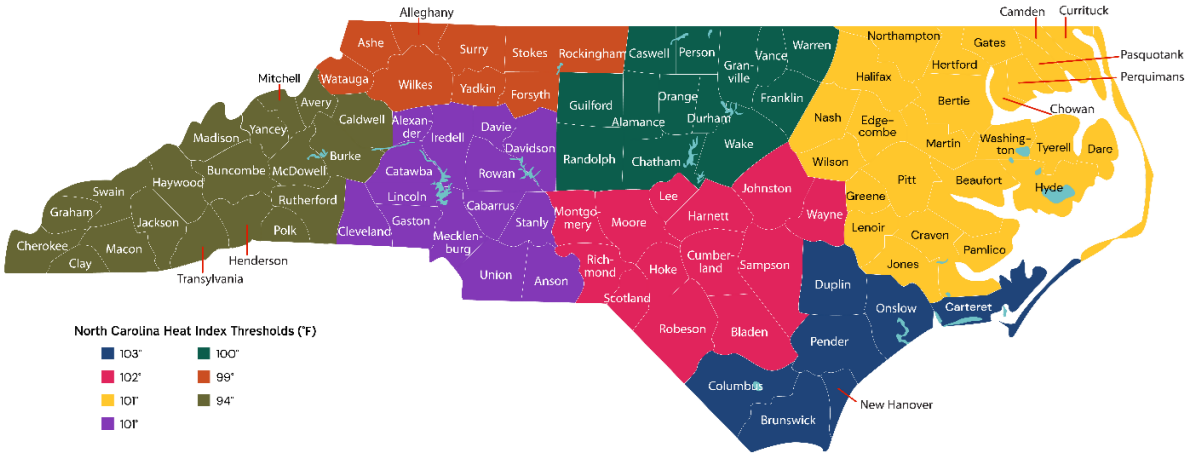
5.4 EXCESSIVE HEAT

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 is often referred to as "extreme heat" or a "heat wave." According to the National Oceanic and Atmospheric Administration, there is no universal definition for extreme heat because "the definition of "extreme" can vary depending on the location and typical climate[3]." In most areas of the country, the National Weather Service generally issues alerts "when the heat index is expected to exceed 105°F-110°F for at least two consecutive days," but they also work with local partners to determine the most appropriate conditions for a specific geography[4, 5]. Each National Weather Service forecast office considers their own community's vulnerabilities, local guidelines and thresholds, forecast confidence, heat intensity and duration, occurrences during summer holidays or outdoor events, and other factors. They use this information to decide when and whether to issue a heat watch, warning, or advisory.

The State of North Carolina defines extreme heat regionally using heat index thresholds, as shown in **Figure 5.5**. The regional thresholds recognize that an area's typical climate conditions and relevant local factors, such as the proportion of the population engaged in outdoor work, can impact how heat affects the local population. At heat indices higher than established thresholds, negative health impacts begin to occur. The North Carolina Department of Health and Human Services (NCDHHS) uses these regional temperature thresholds to activate its Heat Health Alert System. NCDHHS sends heat alerts to county health departments and Heat Health Alert System subscribers when the daily maximum heat index is forecasted to meet or exceed the heat index threshold for their region. In the Cleveland Gaston Lincoln Region, that threshold is 101°F.

FIGURE 5.5: NORTH CAROLINA REGIONAL HEAT INDEX THRESHOLDS



Source: North Carolina State Climate Office

[3] 2024-2030 National Heat Strategy (https://cpo.noaa.gov/wp-content/uploads/2024/07/National_Heat_Strategy-2024-2030.pdf)

[4] NWS Heat Forecast Tools (https://www.weather.gov/safety/heat-index)

[5] NWS Heat Safety (https://www.weather.gov/safety/heat-ww)

Extreme heat can lead to heat-related illness and death. The number of extreme heat days has been increasing on average each year, putting residents at a higher risk of health impacts. In 2023, more people in the United States died of heat-related illness than any other year on record[6]. **Table 5.6** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly the young, and people with pre-existing health conditions, are more susceptible to heat danger than other segments of the population. However, everyone is at risk of health impacts from exposure to extreme heat.

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 to the direct impact excessive heat has on health, heat waves can cause air pollution levels to spike. Stagnant atmospheric conditions trap pollutants. Heat accelerates the production of ground-level ozone. Excessive heat can lead to droughts, which subsequently increases wildfire risk. These compounding impacts can add unhealthy air to excessively hot temperatures. In addition, the urban heat island effect, which occurs anywhere with development – not just in large urban areas, 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 (NCEI) 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

[6] Associated Press Climate (https://apnews.com/article/record-heat-deadly-climate-change-humidity-south-11de21a526e1cbe7e306c47c2f12438d)

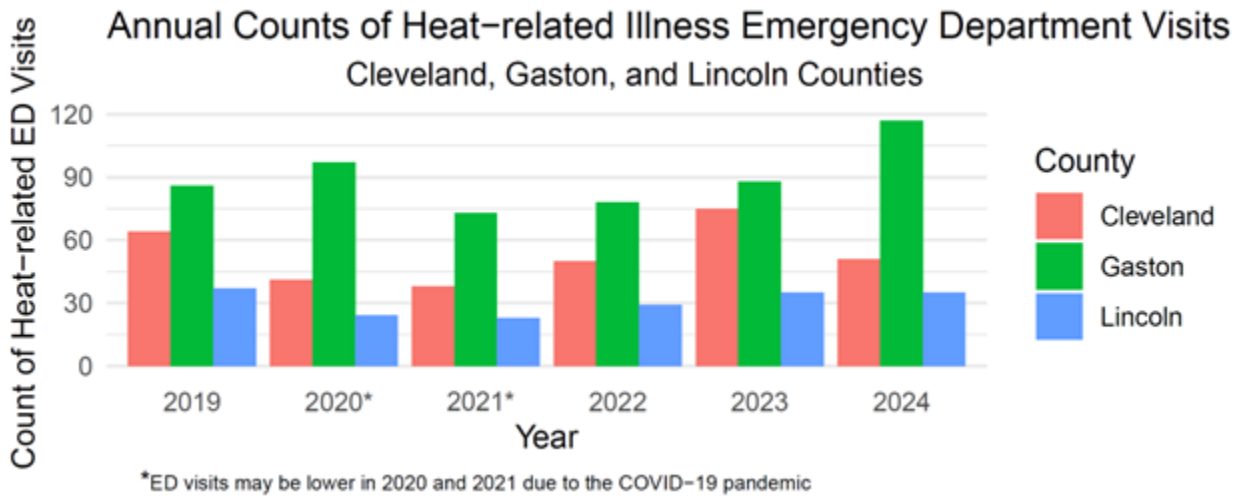
CLEVELAND GASTON LINCOLN REGION (1996-2023)

County	Number of Events	Deaths/ Injuries	Property Damage (2023 dollars)[7]
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: NOAA NCEI

Although there were no deaths or property damage reported in Table 5.7, residents experienced heat-related illnesses. **Figure 5.6** shows the annual count of emergency department visits for heat-related illness in the Cleveland Gaston Lincoln Region, using public health syndromic surveillance system data from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT). The annual count of emergency department visits for heat-related illness in Cleveland County ranged from 38 visits in 2021 to 75 visits in 2023. The annual count of emergency department visits for heat-related illness in Gaston County ranged from 73 in 2021 to 117 in 2024. The annual count of emergency department visits for heat related illness in Lincoln County ranged from 23 in 2021 to 37 in 2019.

FIGURE 5.6: HEAT-RELATED ILLNESS



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

[7] **Note for all NCEI property damage calculations**: these are adjusted for inflation using the Consumer Price Index (CPI) based on December 2023 dollar values to align with NCEI reporting and do not include estimates of crop damages.

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 1953 to 2023 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)	68.6	71.6	79.2	85.2	89.1	93.5	95.5	94.7	91.4	84.4	77.1	68.8

Source: State Climate Office of North Carolina

5.4.4 Changing Future Conditions

According to 2022 climate summary data from the NOAA National Centers for Environmental Information, temperatures recorded since the middle of the century have steadily increased and been marked above the average consistently beyond the late 1990s. Recent summer average temperatures were also logged as the warmest reported on record for the last 16 years (2005-2020). Furthermore, the last 11 years (2010-2020) indicated the greatest number of very warm nights recorded despite no significant increase in the frequency of very hot days[8].

The State Climate Office of North Carolina provides county-specific climate projections on the North Carolina Resilience Exchange. These projections, which are based on the Fifth National Climate Assessment, anticipate that the number of days above 90°F in all three counties will increase significantly by the 2060s, as shown in **Table 5.10**. The number of days above 95°F are anticipated to increase substantially by the 2060s – as much as five times the amount that Cleveland County, Gaston County, and Lincoln County currently experience. The same dataset shows that nighttime temperatures, which have historically surpassed 70°F 11 nights per year in Cleveland County, will surpass 70°F between 43 and 61 nights per year, on average. The data for nighttime temperatures projections is just as stark in Gaston and Lincoln Counties[9].

TABLE 5.10: EXTREME HEAT PROJECTIONS IN THE

[8] NOAA NCEI 2022 State Climate Summaries (https://statesummaries.ncics.org/chapter/nc/)

[9] NC Resilience Exchange (https://www.resilienceexchange.nc.gov/understand-your-vulnerabilities/climate-observations-and-projections)

CLEVELAND GASTON LINCOLN REGION

Location	Average Number of Days each Year with Daytime Temperatures Over 90°F	
	Historical Number of Days	Projected Number of Days by the 2060s
Cleveland County	37	76-91
Gaston County	42	79-93
Lincoln County	38	76-92
	Average Number of Days each Year with Daytime Temperatures Over 95°F	
	Historical Number of Days	Projected Number of Days by the 2060s
Cleveland County	8	28-40
Gaston County	9	30-43
Lincoln County	8	29-41
	Average Number of Days each Year with Nighttime Lows Over 70°F	
	Historical Number of Nights	Projected Number of Nights by the 2060s
Cleveland County	11	43-61
Gaston County	28	65-82
Lincoln County	22	60-78

Source: State Climate Office of North Carolina

Nights that do not go below 70°F make it hard for our bodies to recover from hot days. This continuous exposure to heat can make health problems worse, especially for residents that live in homes without adequate air conditioning and other vulnerable populations.

5.4.5 Probability of Future Occurrences

Based on historical occurrence information and echoing key findings from the 2020 North Carolina Climate Science Report, 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 5.11**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

TABLE 5.11: 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 (2024)

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 5.12** 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 5.12: 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 hurricanes and coastal hazards.

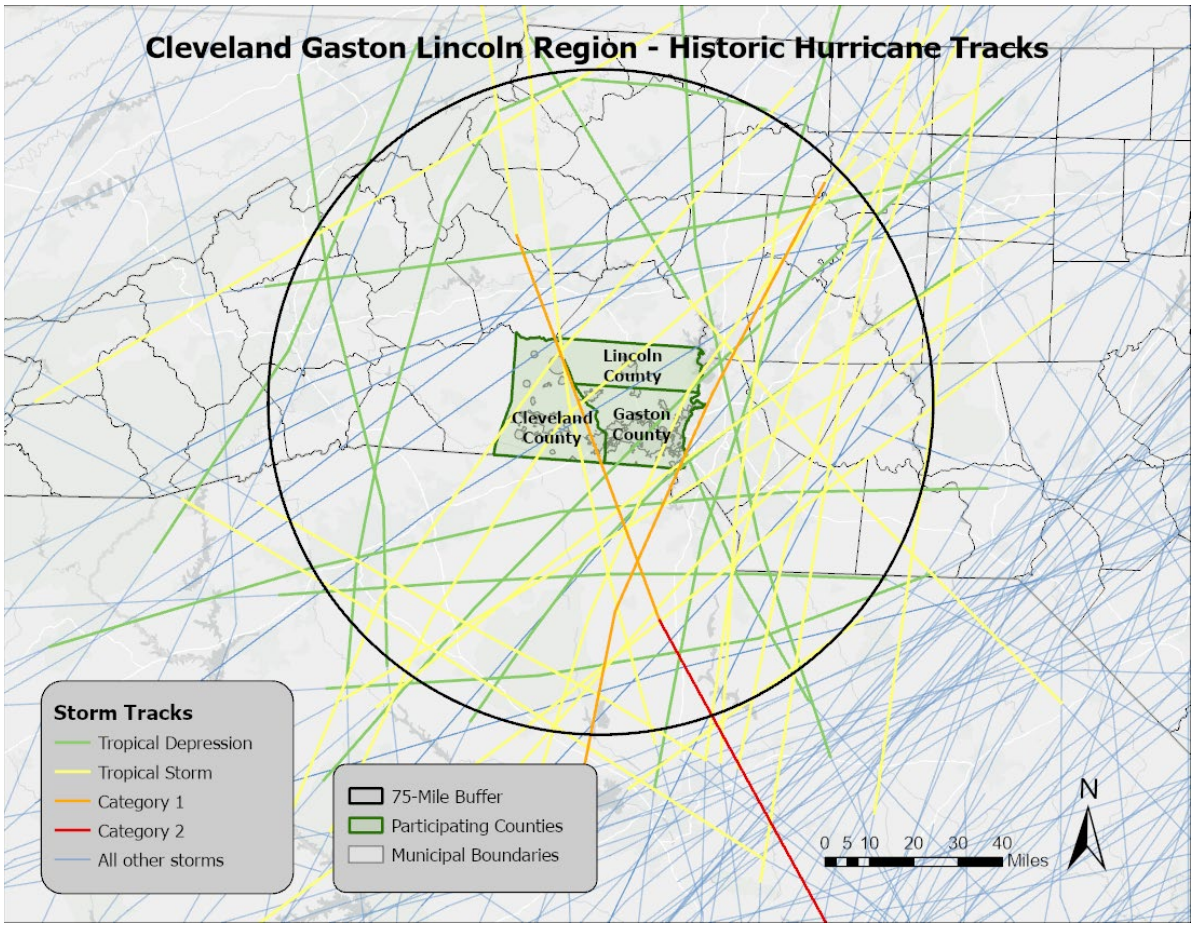
5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 50 hurricane or tropical storm tracks have passed within 75 miles of the Cleveland Gaston Lincoln Region since 1850[10].

Of the recorded storm events, eleven have traversed directly through the Cleveland Gaston Lincoln Region as shown in **Figure 5.7**. Furthermore, **Table 5.13** provides for each event the date of occurrence, name (if applicable), maximum wind speed, and maximum category of the storm based on the Saffir-Simpson Scale (e.g., Hurricane Category 1-5 = "H1" to "H5", Tropical Storm = "TS", Tropical Depression = "TD").

[10] 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 5.7: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE CLEVELAND GASTON LINCOLN REGION



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.13: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE CLEVELAND GASTON LINCOLN REGION (1850–2024)

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
ELSA 2021	6/30/2021	75	H1
CLAUDETTE 2021	6/17/2021	40	TS
ZETA 2020	10/24/2020	100	H3
BERTHA 2020	5/27/2020	45	TS
MICHAEL 2018	10/6/2018	140	H5
FLORENCE 2018	8/30/2018	130	H4
ALBERTO 2006	6/10/2006	60	TS
JEANNE 2004	9/13/2004	105	H3
IVAN 2004	9/2/2004	145	H5
BILL 2003	6/28/2003	50	TS
HELENE 2000	9/15/2000	60	TS
DENNIS 1999	8/24/1999	90	H2
DANNY 1997	7/16/1997	70	H1
BERYL 1994	8/14/1994	50	TS
UNNAMED 1994	7/20/1994	30	TD

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
HUGO 1989	9/10/1989	140	H5
CHRIS 1988	8/21/1988	45	TS
DANNY 1985	8/12/1985	80	H1
BOB 1985	7/21/1985	65	H1
DAVID 1979	8/25/1979	150	H5
BABE 1977	9/3/1977	65	H1
ALMA 1970	5/17/1970	65	H1
ABBY 1968	6/1/1968	65	H1
CLEO 1964	8/20/1964	130	H4
GRACIE 1959	9/20/1959	115	H4
ARLENE 1959	5/28/1959	55	TS
UNNAMED 1952	8/27/1952	45	TS
ABLE 1952	8/18/1952	85	H2
UNNAMED 1949	8/23/1949	115	H4
UNNAMED 1935	8/29/1935	160	H5
UNNAMED 1927	9/30/1927	50	TS
UNNAMED 1920	9/19/1920	75	H1
UNNAMED 1916	7/11/1916	100	H3
UNNAMED 1915	7/31/1915	65	H1
UNNAMED 1913	8/30/1913	75	H1
UNNAMED 1906	9/3/1906	80	H1
UNNAMED 1902	6/12/1902	50	TS
UNNAMED 1901	7/4/1901	70	H1
UNNAMED 1896	7/4/1896	85	H2
UNNAMED 1893	9/27/1893	115	H4
UNNAMED 1893	8/15/1893	105	H3
UNNAMED 1889	9/12/1889	95	H2
UNNAMED 1888	9/6/1888	50	TS
UNNAMED 1886	6/17/1886	85	H2
UNNAMED 1885	10/10/1885	60	TS
UNNAMED 1882	9/2/1882	110	H3
UNNAMED 1878	9/1/1878	90	H2
UNNAMED 1877	9/21/1877	100	H3
UNNAMED 1859	9/15/1859	70	H1
UNNAMED 1854	9/7/1854	110	H3

Source: National Hurricane Center (Historical Hurricane Tracks)

The National Centers for Environmental Information reported 6 events associated with a hurricane or tropical storm in the Cleveland Gaston Lincoln Region between 1950 and 2023. Federal records also indicate that three major disaster declarations were made in 1989 (Hurricane Hugo), 2004 (Tropical Storm Frances), and 2024 (Tropical Storm Helene) for the region[11].

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

[11] 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*.

information is available for the major storms that have impacted that area as found below:

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

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.

Tropical Storm Helene – September 26-29, 2024
Tropical Storm Helene originated in the Caribbean Sea and rapidly intensified to a major hurricane ahead of its landfall along the coast of Florida before moving farther north towards the Appalachian Mountains with an unprecedented amount of rainfall. Many areas across the Carolinas broke historic records for precipitation totals with anywhere from 10 to nearly 30 inches recorded and some estimates reported over 40 trillion cumulative gallons released throughout the course of Helene's lifetime in the Southeast. This led to multiple 1,000-year flood events in Western North Carolina where the worst impacts materialized. According to the National Centers for Environmental Information (NCEI), Helene led to roughly 219 deaths making it one of the deadliest hurricanes after Hurricane Maria (2,981) and Hurricane Katrina (1,833) in addition to approximately $78.7 billion in CPI-adjusted estimated costs[12].

5.5.4 Changing Future Conditions

North Carolina is vulnerable to the hazards of tropical storms and hurricanes due to its location along the Atlantic Coast. This inherently creates the greatest risk near low-lying coastal areas of the state, although inland areas found to the west may still face significant impacts over time. According to 2022 climate summary data from the NOAA National Centers for Environmental Information, a storm at hurricane-level intensity makes landfall in the state roughly once every 3 years. Several periods since the late 1990s were notably active in terms of hurricane formation and local damages, including Hurricanes Dennis, Floyd, Frances, Ivan, Matthew, and Florence. Climate change models project that hurricane-associated storm intensity and rainfall rates will both increase in the future despite some annual variability in the number of landfalling hurricanes in North Carolina[13].

5.5.5 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.

[12] NCEI Billion-Dollar Weather and Climate Disasters (https://www.ncei.noaa.gov/access/billions/events)
[13] NOAA NCEI 2022 State Climate Summaries (https://statesummaries.ncics.org/chapter/nc/)

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. As of 2024, the FEMA National Risk Index rates the hurricane hazard as “relatively low” across Cleveland County, Gaston County, and Lincoln County.

5.6 TORNADOES/THUNDERSTORMS

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

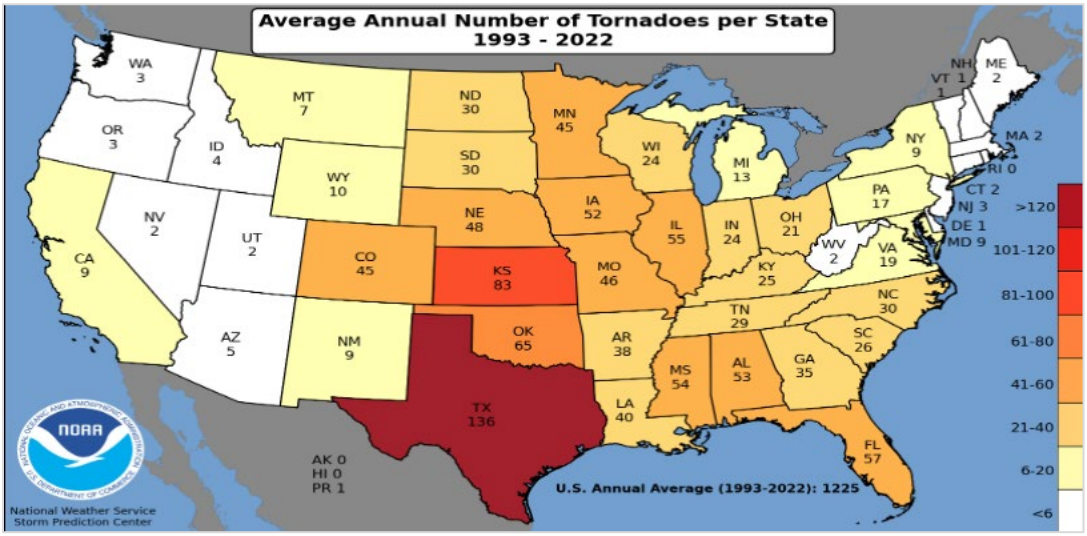
5.6.1 Background and Description

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 approximately 56 deaths and 1,500 injuries[14]. 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 5.8** shows tornado activity in the United States based on the number of recorded tornadoes per 10,000 square miles.

FIGURE 5.8: TORNADO ACTIVITY IN THE UNITED STATES



Source: NOAA Storm Prediction Center

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

[14] NOAA, 2013.

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

TABLE 5.14: 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 5.15: 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[15], 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

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

tornado, or 3) winds of at least 58 miles per hour.

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

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

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the 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 5.16** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.16: 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

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H5	Destructive	30-50	>800	1.2 – 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		1.6 – 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		2.0 – 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-90		1.6 – 3.5	(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

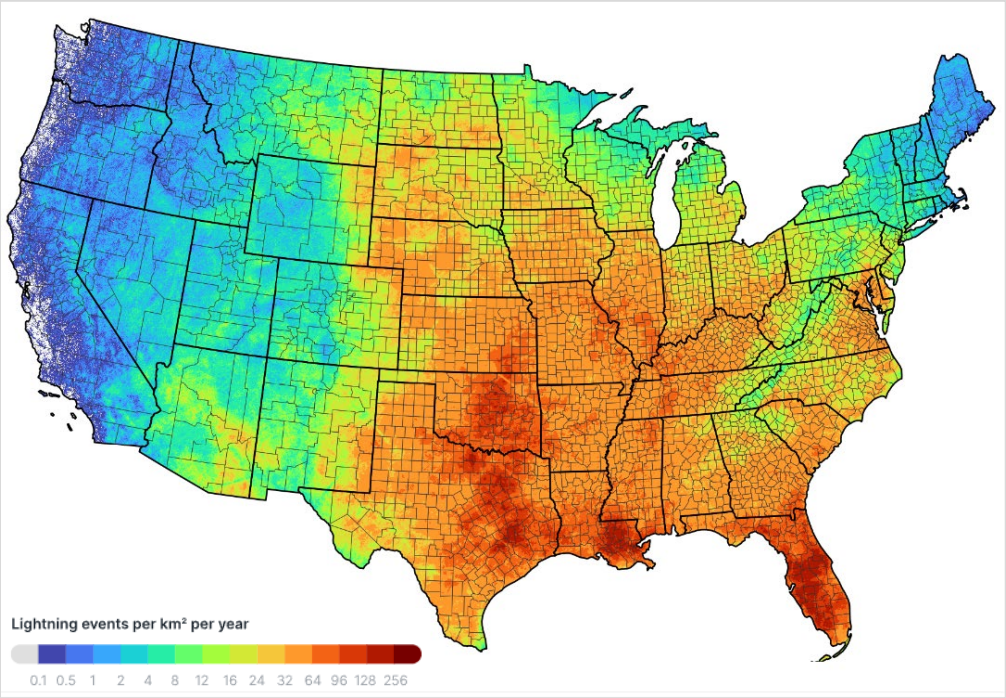
Source: Tornado and Storm Research Organisation (TORRO)

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 5.9 shows a lightning flash density map for the years 2016-2022 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN).

FIGURE 5.9: LIGHTNING FLASH DENSITY IN THE UNITED STATES (2016-2022)



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 three disaster declarations in the Cleveland Gaston Lincoln Region in 1974,1989, and 2020[16]. According to the National Centers for Environmental Information, there have been a total of 66 recorded tornado events in the Cleveland Gaston Lincoln Region since 1950 (**Table 5.17**), resulting in over $154 million (2023 dollars) in property damages[17]. Ten of the recorded tornado occurrences happened within the last five years of 2023 reporting. In addition, 5 deaths and 78 injuries were reported. The magnitude of these tornadoes ranges from F0 to F4 in intensity, although an F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported.

TABLE 5.17: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)[18]
Cleveland County	**27**	**0/36**	**$67,386,639**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$0
Casar	0	0/0	$0
Earl	1	0/0	$1,029,349
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	1	0/0	$28,558
Kingstown	0	0/0	$0
Lattimore	1	0/0	$0
Lawndale	2	0/0	$420,813
Mooresboro	1	0/0	$124,358
Patterson Springs	1	0/0	$80,765
Polkville	2	0/0	$41,552
Shelby	1	0/0	$1,944
Waco	2	0/0	$80,765
Unincorporated Area	14	0/36	$65,578,535

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

[17] 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.

[18] **Note for all NCEI property damage calculations**: these are adjusted for inflation based on December 2023 dollar values to align with NCEI reporting and do not include estimates of crop damages.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)[18]
Gaston County	**17**	**1/12**	**$20,540,344**
Belmont	1	0/0	$1,550,425
Bessemer City	0	0/0	$0
Cherryville	2	0/0	$3,343,583
Cramerton	1	0/0	$76,116
Dallas	0	0/0	$0
Gastonia	4	0/0	$10,485,143
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	1	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	8	1/12	$5,085,077
Lincoln County	**22**	**4/30**	**$66,441,883**
Lincolnton	3	0/0	$82,904
Unincorporated Area	19	4/30	$66,358,979
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**66**	**5/78**	**$154,368,866**

Source: National Centers for Environmental Information

Thunderstorms

Severe storms have resulted in two disaster declarations in the Cleveland Gaston Lincoln Region[19]. According to NCEI, there have been 707 reported thunderstorm wind and high wind events since 1955 in the Cleveland Gaston Lincoln Region[20]. These events caused over $6.4 million (2023 dollars) in damages. There were reports of 16 injuries and 4 fatalities. **Table 5.18** summarizes this information.

TABLE 5.18: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	**279**	**0/7**	**$2,293,282**
Belwood	6	0/0	$35,003
Boiling Springs	18	0/1	$283,241
Casar	15	0/0	$2,554
Earl	9	0/0	$9,991
Fallston	6	0/0	$33,360
Grover	8	0/0	$8,308
Kings Mountain	17	0/0	$8,095
Kingstown	0	0/0	$0
Lattimore	6	0/0	$14,722
Lawndale	9	0/0	$138,562
Mooresboro	9	0/0	$203,678
Patterson Springs	9	0/0	$91,519

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

[20] 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 (2023)
Polkville	10	0/0	$18,200
Shelby	52	0/6	$240,218
Waco	11	0/0	$88,357
Unincorporated Area	94	0/0	$1,117,474
Gaston County	**261**	**3/8**	**$2,277,126**
Belmont	17	0/0	$68,508
Bessemer City	14	0/0	$18,259
Cherryville	22	0/1	$264,796
Cramerton	7	0/0	$16,686
Dallas	16	0/0	$160,058
Gastonia	59	2/1	$274,576
High Shoals	2	0/0	$0
Lowell	3	0/0	$30,446
McAdenville	3	0/1	$0
Mount Holly	11	0/0	$172,830
Ranlo	1	0/0	$0
Spencer Mountain	1	0/0	$0
Stanley	8	0/0	$31,500
Unincorporated Area	97	1/5	$1,239,467
Lincoln County	**167**	**1/1**	**$1,847,982**
Lincolnton	49	0/1	$302,802
Unincorporated Area	101	1/0	$1,545,180
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**707**	**4/16**	**$6,418,390**

Source: National Centers for Environmental Information

Hailstorms

According to the National Centers for Environmental Information, 454 recorded hailstorm events have affected the Cleveland Gaston Lincoln Region since 1962[21]. **Table 5.19** is a summary of the hail events in the Cleveland Gaston Lincoln Region. In all, hail occurrences resulted in over $2.4 million (2023 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 5.19: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	**162**	**0/0**	**$0**
Belwood	1	0/0	$0

[21] 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. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Boiling Springs	8	0/0	$0
Casar	15	0/0	$0
Earl	4	0/0	$0
Fallston	6	0/0	$0
Grover	5	0/0	$0
Kings Mountain	19	0/0	$0
Kingstown	0	0/0	$0
Lattimore	3	0/0	$0
Lawndale	6	0/0	$0
Mooresboro	6	0/0	$0
Patterson Springs	4	0/0	$0
Polkville	10	0/0	$0
Shelby	24	0/0	$0
Waco	3	0/0	$0
Unincorporated Area	48	0/0	$0
Gaston County	**163**	**0/0**	**$501,492**
Belmont	10	0/0	$501,492
Bessemer City	10	0/0	$0
Cherryville	14	0/0	$0
Cramerton	3	0/0	$0
Dallas	10	0/0	$0
Gastonia	37	0/0	$0
High Shoals	1	0/0	$0
Lowell	3	0/0	$0
McAdenville	2	0/0	$0
Mount Holly	9	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	1	0/0	$0
Stanley	5	0/0	$0
Unincorporated Area	57	0/0	$0
Lincoln County	**129**	**0/0**	**$1,974,886**
Lincolnton	41	0/0	$8,525
Unincorporated Area	88	0/0	$1,966,361
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**454**	0/0	**$2,476,378**

Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been a total of 56 recorded lightning events in the Cleveland Gaston Lincoln Region since 1996[22]. These events resulted in

[22] 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. As additional local data becomes available, this hazard profile will be amended.

nearly $3.9 million (2023 dollars) in damages, as listed in summary **Table 5.20**. Furthermore, lightning caused 16 injuries throughout the Cleveland Gaston Lincoln Region.

It is certain that more than 56 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 5.20: SUMMARY OF LIGHTNING OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	**25**	**0/5**	**$1,451,849**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$13,578
Casar	1	0/0	$36,714
Earl	1	0/0	$47,095
Fallston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	4	0/1	$84,746
Kingstown	0	0/0	$0
Lattimore	1	0/0	$17,032
Lawndale	2	0/1	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	1	0/0	$151,181
Shelby	12	0/3	$718,709
Waco	1	0/0	$213,321
Unincorporated Area	1	0/0	$169,473
Gaston County	**19**	**0/7**	**$809,816**
Belmont	2	0/0	$16,196
Bessemer City	0	0/0	$0
Cherryville	2	0/1	$62,433
Cramerton	0	0/0	$0
Dallas	1	0/0	$1,622
Gastonia	10	0/6	$583,751
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	$67,874
Unincorporated Area	3	0/0	$77,940
Lincoln County	**12**	**0/4**	**$1,644,360**
Lincolnton	4	0/0	$492,375
Unincorporated Area	7	0/4	$1,151,985
Cleveland Gaston Lincoln Regional Total	**56**	**0/16**	**$3,906,025**

Source: National Centers for Environmental Information

5.6.4 Changing Future Conditions

Tornadoes are among the most difficult hazards to link definitively to changes in climate, partially because they are both relatively small and short-lived events when compared against wildfires, heat waves, and other climate disasters with a larger temporal and/or spatial distribution. However, the clustering of tornado systems has appeared to increase in recent years despite few changes in the total number of systems observed[23]. According to 2022 climate summary data from the NOAA National Centers for Environmental Information, tornadoes can be produced by hurricanes and severe thunderstorm systems, with the largest outbreak of 30 confirmed tornadoes and 24 deaths in North Carolina reported as of April 16, 2011.

Changing weather patterns related to climate change may also result in more frequent and more severe storms (thunderstorms, lightning, and hail) throughout the Cleveland Gaston Lincoln Region. According to the National Aeronautics and Space Administration (NASA), severe storm events are likely to become more frequent and intense throughout the Southeast due to radical changes in weather extremes[24].

5.6.5 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). As of 2024, the FEMA National Risk Index rates the tornado hazard as "relatively moderate" across Cleveland County, Gaston County, and Lincoln County.

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. As of 2024, the FEMA National Risk Index rates the strong wind hazard as "relatively moderate" in Cleveland County and Lincoln County compared to "relatively high" in Gaston County.

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. As of 2024, the FEMA National Risk Index rates the hail hazard as "relatively low" in Cleveland County and Gaston County compared to "relatively moderate" in Lincoln County.

[23] Brooks et al. (2014). Increased variability of tornado occurrence in the United States. *Science* **346**(6207). https://doi.org/10.1126/science.1257460

[24] NASA Climate Change Effects (https://science.nasa.gov/climate-change/effects/)

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) data from 2016 to 2023, Cleveland County experienced an average of 33.5 lightning events per square kilometer per year, Gaston County experienced an average of 30.1 lightning events per square kilometer per year, and Lincoln County experienced an average of 25.7 lightning events per square kilometer per year. 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. As of 2024, the FEMA National Risk Index rates the lightning hazard as "relatively moderate" across Cleveland County, Gaston County, and Lincoln County.

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 three disaster declarations in the Cleveland Gaston Lincoln Region. This includes the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002[25]. According

[25] A complete listing of historical disaster declarations, including the affected counties, can be found in *Section 4*: *Hazard Identification*.

to the National Centers for Environmental Information, there have been a total of 254 recorded winter storm events in the Cleveland Gaston Lincoln Region since 1993 (**Table 5.21**)[26]. These events resulted in more than $61.5 million (2023 dollars) in damages. Four event occurrences happened recently in 2022.

TABLE 5.21: SUMMARY OF SEVERE WINTER WEATHER EVENTS IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	89	0/0	$15,421,821
Gaston County	77	0/0	$30,760,227
Lincoln County	88	0/0	$15,341,908
CLEVELAND GASTON LINCOLN REGION TOTAL	**254**	**0/0**	**$61,523,956**

Source: National Centers for Environmental Information

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

5.7.4 Changing Future Conditions

According to recent climate findings from NOAA, average winter temperatures in urban hubs throughout North Carolina have been noted at 2 to 4 degrees Fahrenheit above the normal average, which is defined as the 30-year Climate Normals data published from 1991 to 2020[27]. The increased atmospheric moisture of warmer conditions year-round also helps to intensify the water cycle. Air holds about 4% more water vapor for each additional degree Fahrenheit increase in temperature – thereby increasing the likelihood of warmer and wetter conditions in future winter seasons[28].

5.7.5 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 likely (10 to 100 percent annual probability). As of 2024, the FEMA National Risk Index rates the winter weather hazard as “very low” in Cleveland County and Gaston County compared to “relatively low” in Lincoln County.

[26] These ice and winter storm events (including cold/wind chill, extreme cold/wind chill, freezing fog, frost/freeze, heavy snow, ice storm, sleet, winter storm, and winter weather) 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 events are reported by county, so many of these storms likely affected all of the counties.
[27] NOAA Winter 2022 Climate Report (https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202202)
[28] U.S. Climate Resilience Toolkit, Southeast (https://toolkit.climate.gov/regions/southeast)

5.8 EARTHQUAKES

5.8.1 Background and Description

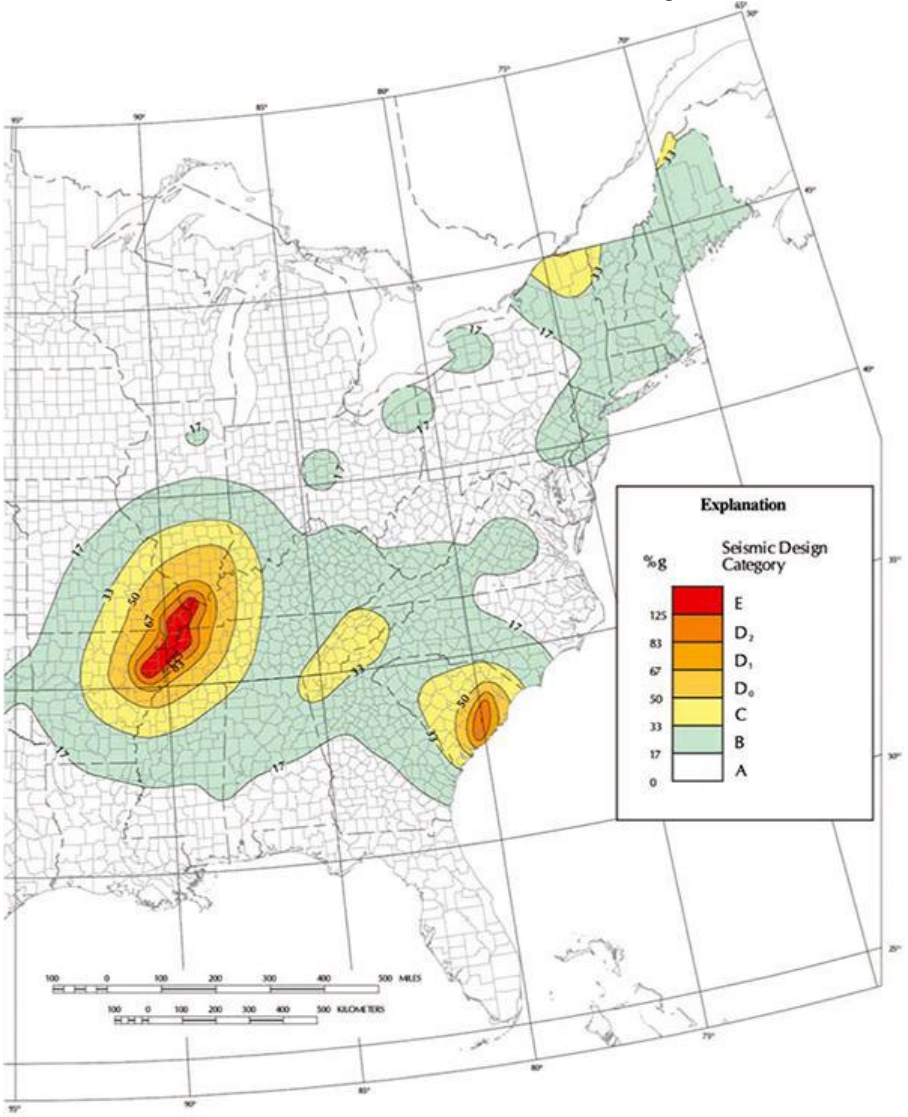
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured 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. Deformations at plate boundaries can lead to fractures as energy builds. The rock on both sides of the fracture is then 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 5.10** shows relative seismic risk for the United States.

FIGURE 5.10: 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 5.22**). 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 5.23**.

TABLE 5.22: 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 5.23: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

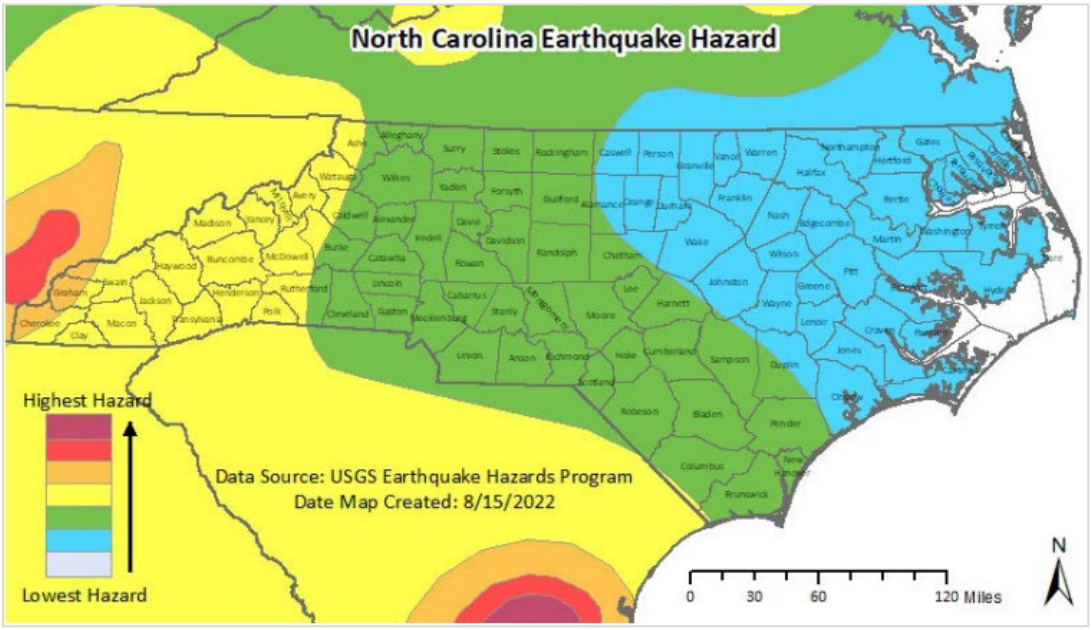
Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Not felt	Not felt except by a very few under especially favorable conditions.	
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.	< 4.2
III	Weak	Felt quite noticeably by persons indoors, especially 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 5.11** is a map showing geological and seismic information for North Carolina.

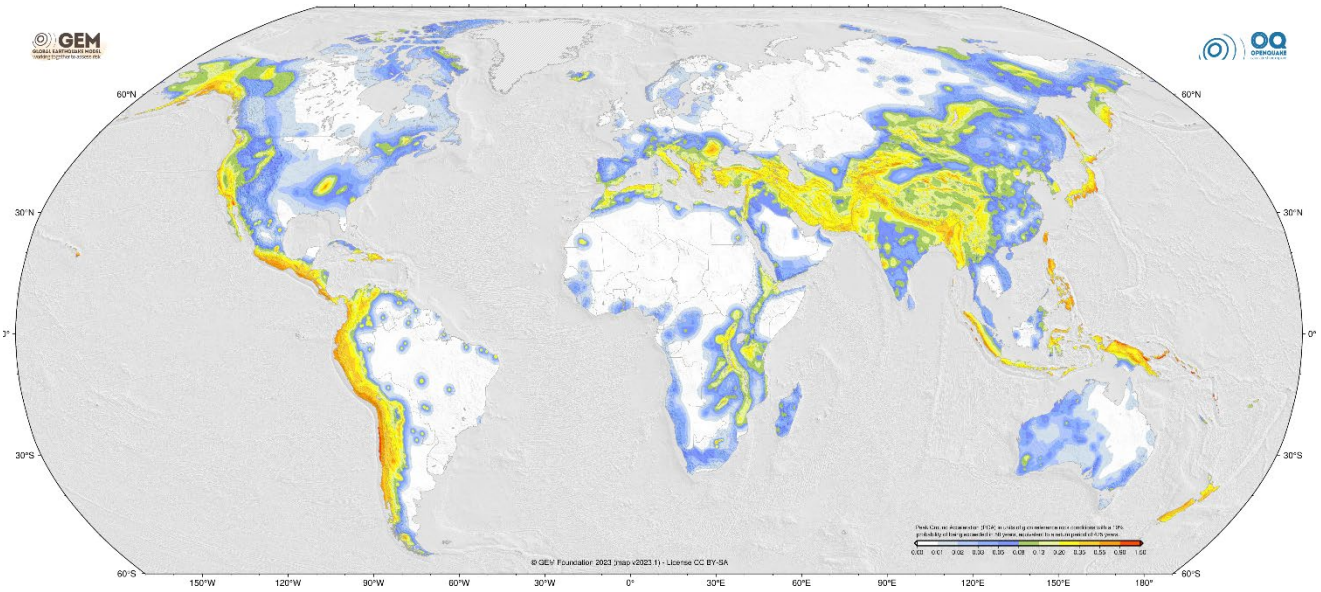
FIGURE 5.11: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.12 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 5.12: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: Global Earthquake Model, 2023

5.8.3 Historical Occurrences

At least 29 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 5.24** provides a summary of earthquake events reported by the USGS and NOAA between 1638 and2024.

TABLE 5.24: 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	--	--
Polkville	1	IV	< 4.8
Shelby	4	V	< 4.8
Waco	0	--	--

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Unincorporated Area	0	--	--
Gaston County	**7**	**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	2	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	**29**	**VII**	**< 6.1**

Source: NOAA, USGS

Note: Future updates of the plan will continue 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 5.25.**

TABLE 5.25: 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
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

Date	Origin Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
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 was 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 Changing Future Conditions

According to the North Carolina Department of Environmental Quality (NCDEQ), despite infrequent occurrences of severe seismic events and no active fault zones in the state, North Carolina is bordered by the Middleton Place-Summerville Seismic Zone (near Charleston, SC) to the south, East Tennessee Seismic Zone to the west, and Central Virginia Seismic Zone to the north[29]. Although strong earthquakes are rare in North Carolina, there have still been several notable events recorded across susceptible regions of the state within the last 100 years alone. A single event of magnitude 5 or greater can easily cut off critical infrastructure around the mountains and cause residual structural damage over a large area. Current building and development practices may account for this hazard in their designs, but significant portions of existing development, especially in more rural or older areas, will remain vulnerable to earthquakes without any new structural interventions. Earthquakes are primarily influenced by tectonic processes and although they could potentially be affected by climate factors such as droughts these connections remain unclear[30].

5.8.5 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 (equivalent to Modified Mercalli Intensity VI or greater) within the next 100 years based on the latest National Seismic Hazard Model, reporting a 5-25% chance for North Carolina as of 2023[31].As of 2024, the FEMA National Risk Index rates the earthquake hazard as “relatively low” across Cleveland County, Gaston County, and Lincoln County.

[29] NCDEQ Earthquakes (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/north-carolina-geological-survey/geologic-hazards/earthquakes-north-carolina)
[30] NASA Science (https://science.nasa.gov/earth/climate-change/can-climate-affect-earthquakes-or-are-the-connections-shaky/#h-getting-the-big-picture-of-the-earth-system-s-interconnectivity)
[31] USGS National News Release (https://www.usgs.gov/news/national-news-release/new-usgs-map-shows-where-damaging-earthquakes-are-most-likely-occur-us)

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.

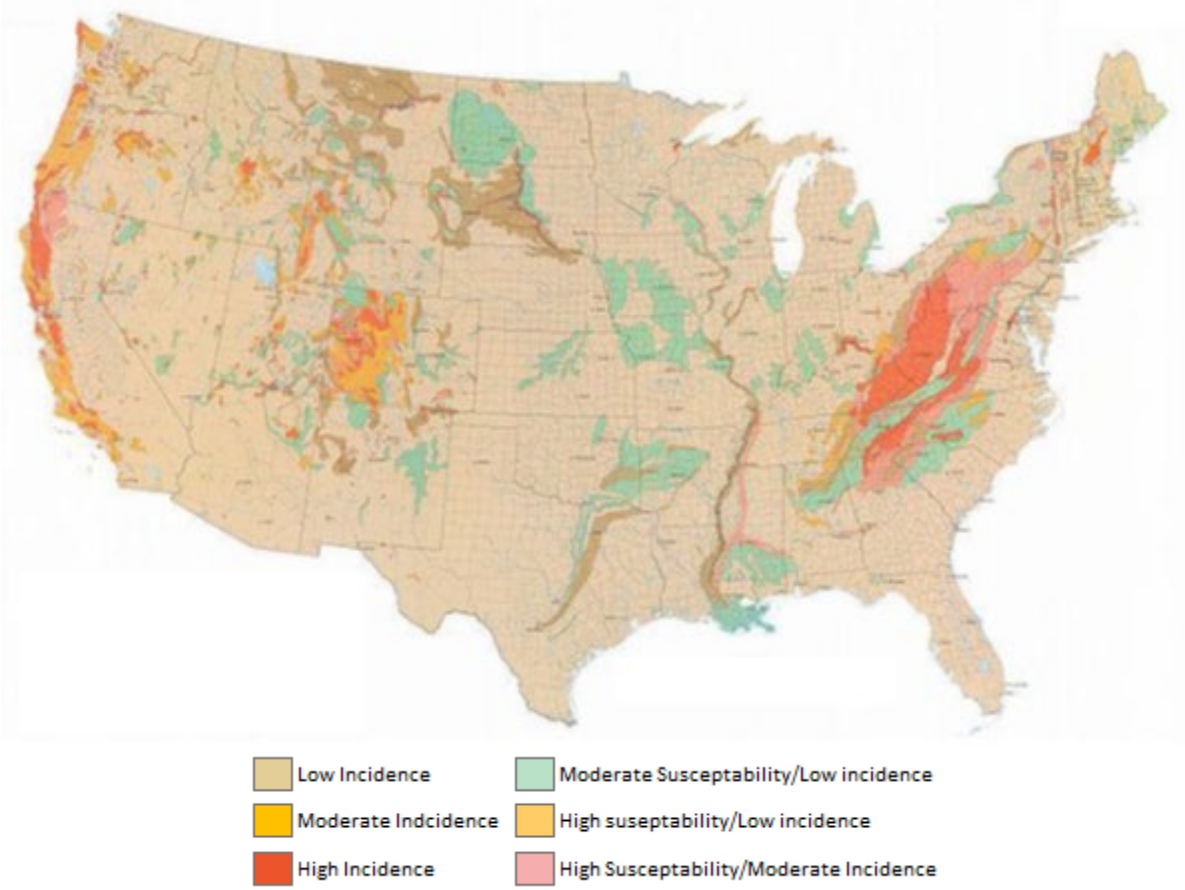
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved 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 $5.4 billion (2023 dollars) in damage and between 25 and 50 deaths in the United States[32]. **Figure 5.13** delineates areas where large numbers of landslides have occurred and areas that are susceptible to landsliding in the

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

conterminous United States[33].

FIGURE 5.13: LANDSLIDE OVERVIEW MAP OF THE UNITED STATES[34]



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

[33] 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: https://www.usgs.gov/programs/landslide-hazards.

[34] Susceptibility not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the area] 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 5.14** below shows, they can be huge and can occur where a house or road is on top[35].

FIGURE 5.14: 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,

[35] Sinkholes. United States Geological Survey. Retrieved from: https://www.usgs.gov/special-topics/water-science-school/science/sinkholes

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.

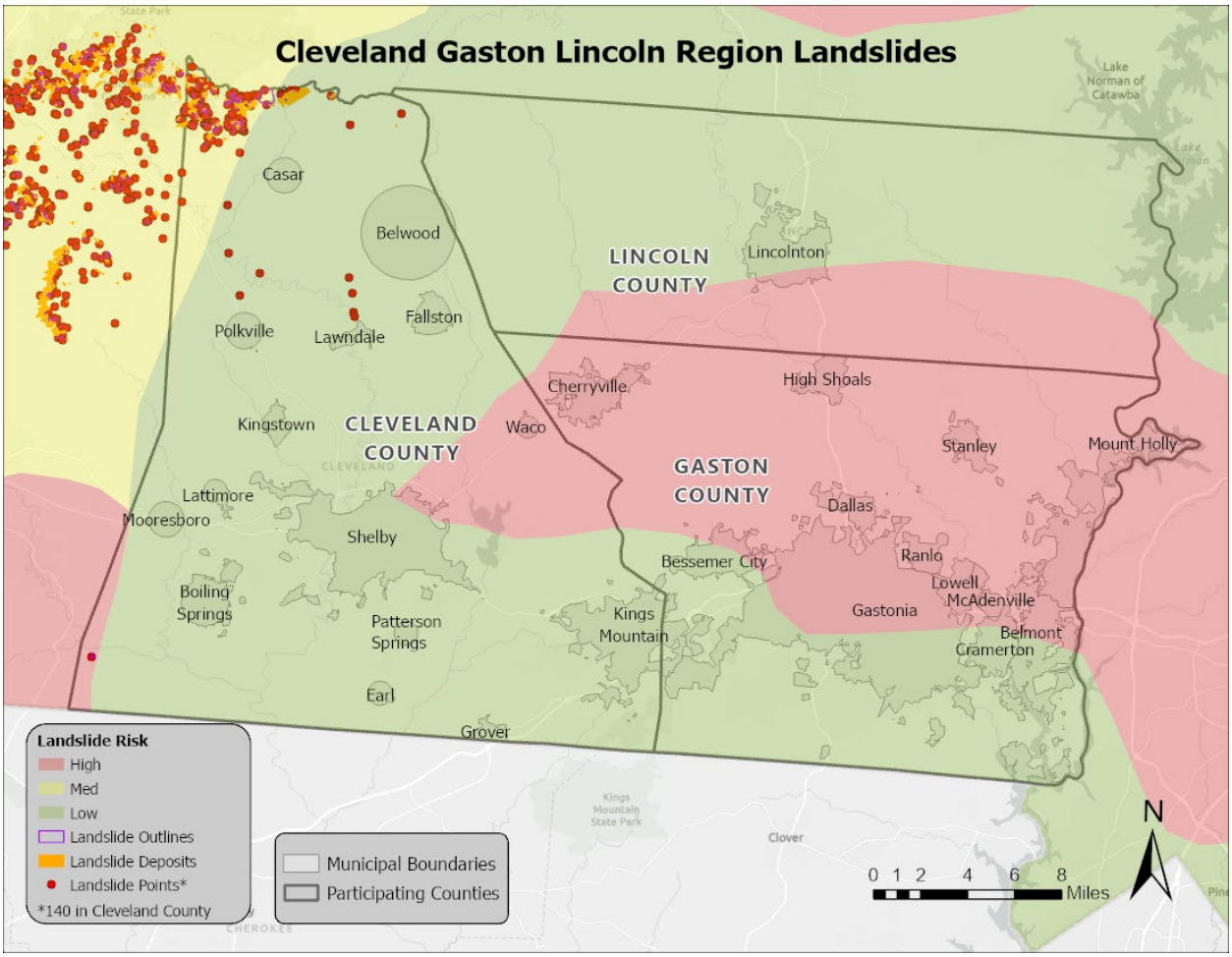
5.9.2 Location and Spatial Extent

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 5.15** below, portions of the region have experienced significant landslide activity based on existing North Carolina Geological Survey inventories. There is a sizable portion of the region that has a high susceptibility, covering much of northern Cleveland County. Previous risk mapping from the USGS has identified areas of high risk in eastern Cleveland County, central and northern Gaston County, and southern Lincoln County.

FIGURE 5.15: LANDSLIDE SUSCEPTIBILITY IN THE CLEVELAND GASTON LINCOLN REGION

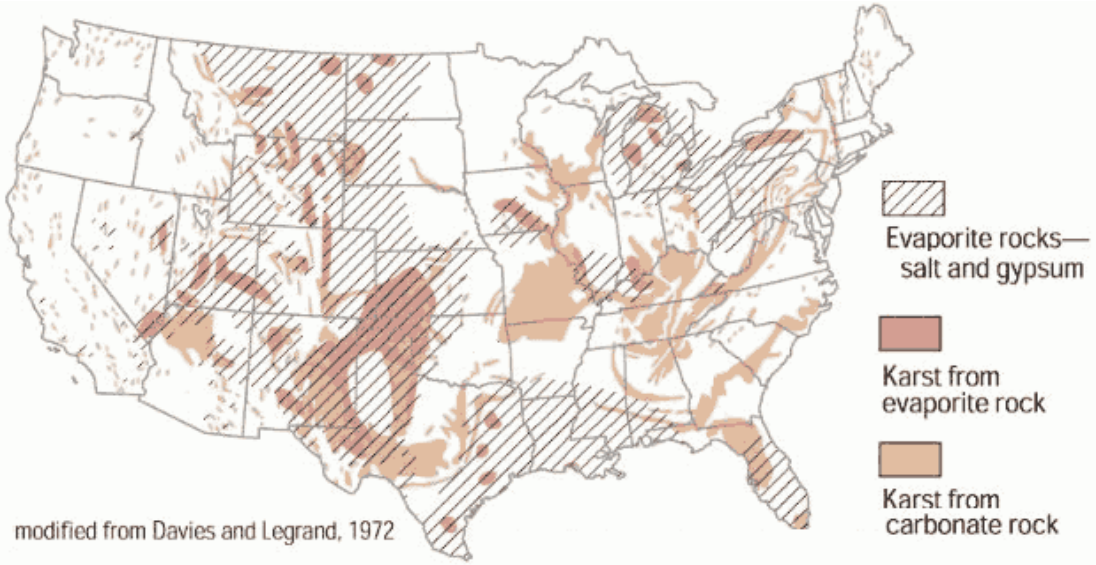


Source: United States Geological Survey, North Carolina Geological Survey

Sinkholes

Figure 5.16 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 5.16: 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 regional 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, demonstrate that most reports (roughly 140 in the region) in the Western North Carolina Landslide Hazard Database[36] have happened in the northern areas of Cleveland County. Some incidence mapping has also been completed throughout the western portion of North Carolina though it is not complete. Therefore, it should be noted that many more incidents than what is reported are likely to have occurred in Cleveland, Gaston, and Lincoln Counties.

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.

[36] NCDEQ Landslide Hazard Data (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/north-carolina-geological-survey/geologic-hazards/landslides)

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, consulting local officials at meetings, 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 a hazard of negligible potential impacts.

5.9.4 Changing Future Conditions

According to the North Carolina Climate Risk Assessment and Resilience Plan as of 2020, the number of landslides statewide is increasing due to more extreme rainfall events. As the global climate continues to change, both storm intensity and rainfall rates affecting North Carolina are projected to increase in tandem[37]. According to the USGS, pumping water and its associated drawdown of the water table is a primary risk factor associated with sinkholes. The potential impacts of climate change could accelerate this dynamic as well. For example, altered rainfall patterns and increasing rates of evaporation due to higher temperatures can lead to a decrease in subsurface groundwater flow, resulting in changing sinkhole formations. Decreased groundwater flow could lead to additional water pumping and related drawdowns near urban and industrial areas capable of reducing water tables and contributing to the formation of new sinkholes[38].

5.9.5 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 annual probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in the Cleveland Gaston Lincoln Region have greater risk than others given factors such as steepness on slope and modification of slopes. As of 2024, the FEMA National Risk Index rates the landslide hazard as “relatively moderate” in Gaston County and Lincoln County compared to “relatively low” in Cleveland County.

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 (less than 1 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 annual probability). 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*.

[37] 2020 NC Climate Risk Assessment and Resilience Plan (https://www.deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-plans-and-progress/nc-climate-risk-assessment-and-resilience-plan)
[38] USGS Sinkholes (https://www.usgs.gov/special-topics/water-science-school/science/sinkholes)

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 91,000 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 5.26** explains these classifications.

TABLE 5.26: 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

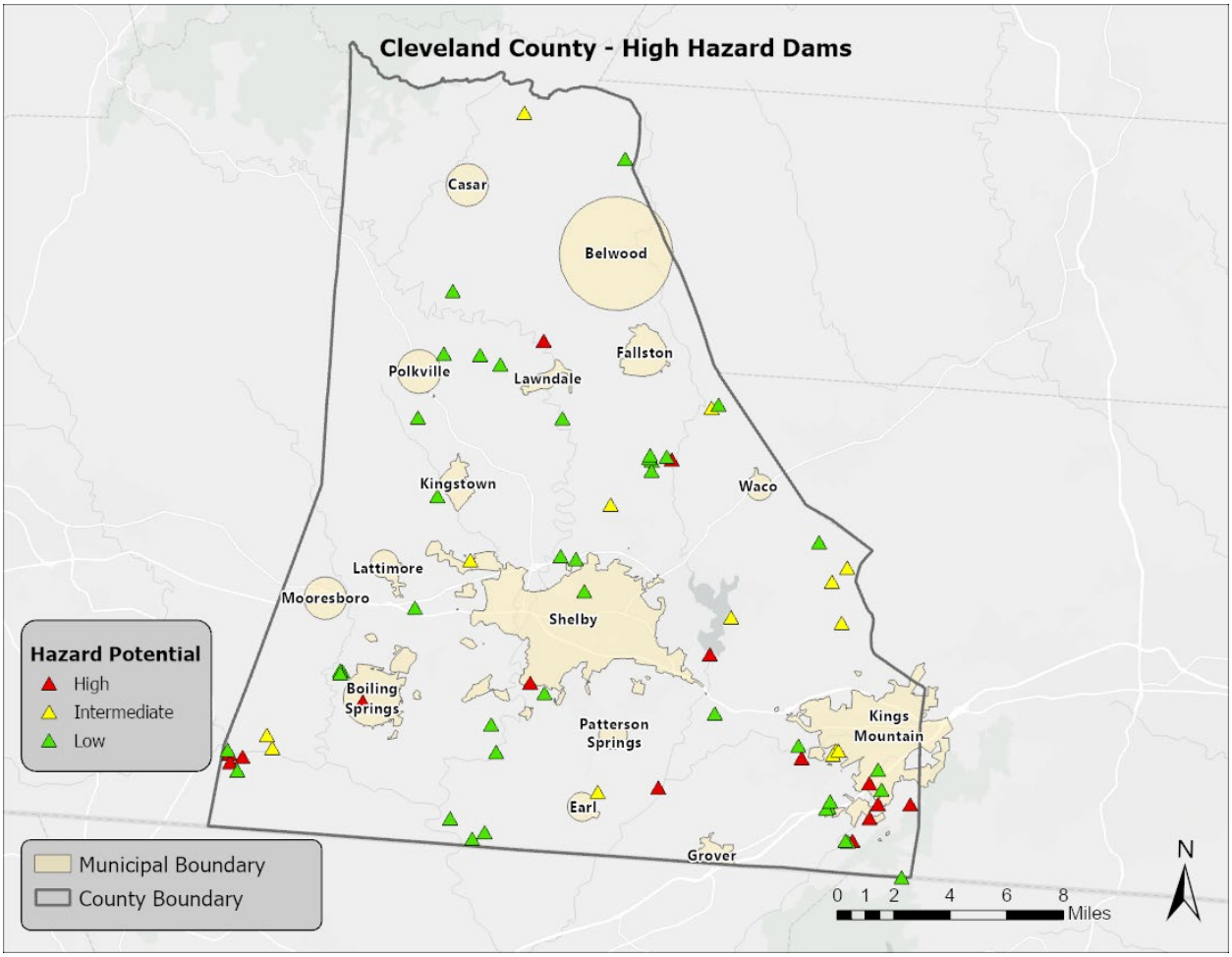
According to the North Carolina Division of Energy, Mineral, and Land Resources Dam Safety Program as of July 2024, there are 301 dams in the Cleveland Gaston Lincoln Region[39]. **Figures 5.17-19** show the dam location and the corresponding hazard ranking for each. Of these dams, 50 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.26.**

TABLE 5.27: SUMMARY OF HIGH-HAZARD DAM LOCATIONS

Location	Number of High Hazard Dams
Cleveland County	16
Gaston County	24
Lincoln County	10
CLEVELAND GASTON LINCOLN REGION TOTAL	**50**

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

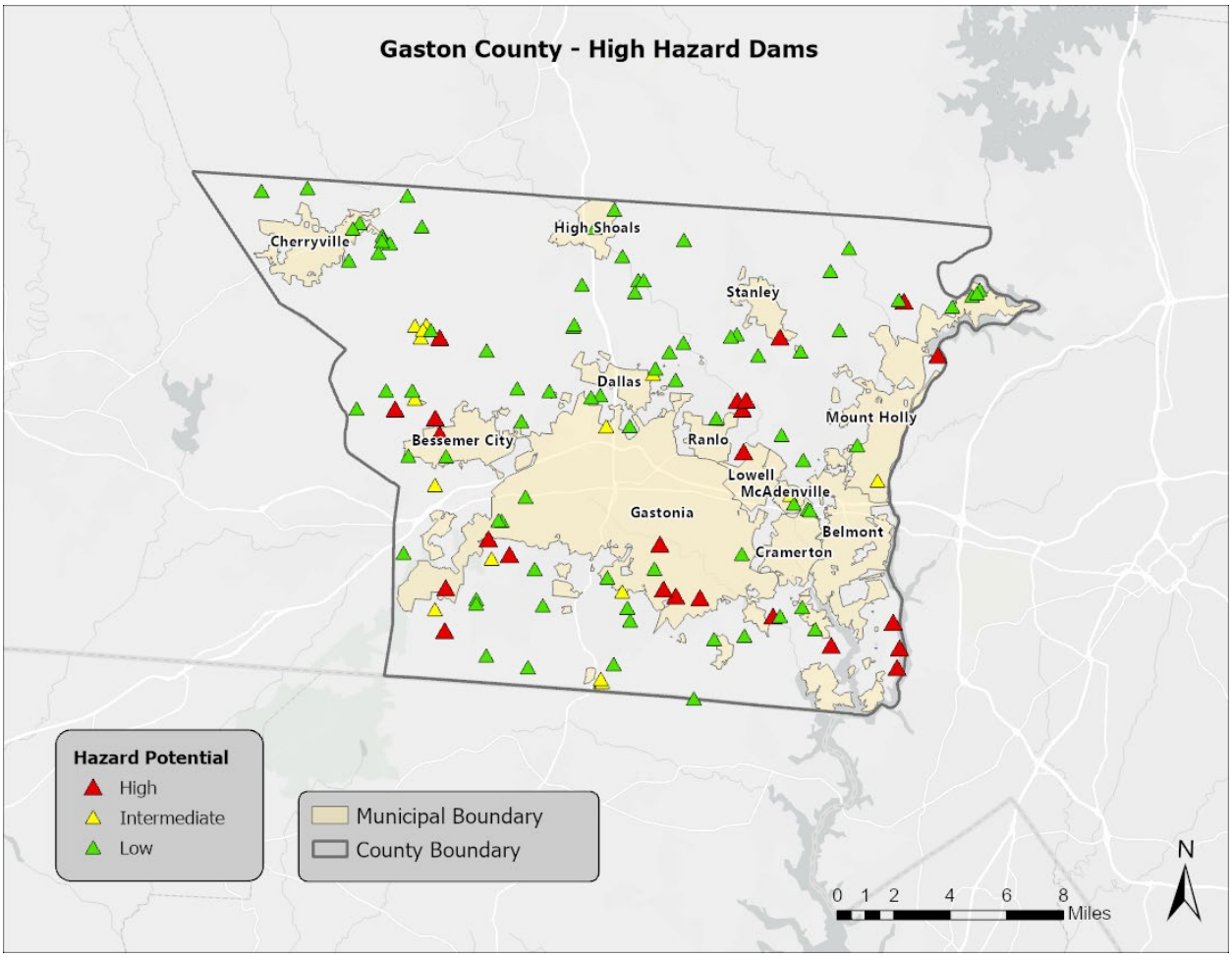
FIGURE 5.17: CLEVELAND COUNTY DAM LOCATIONS



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

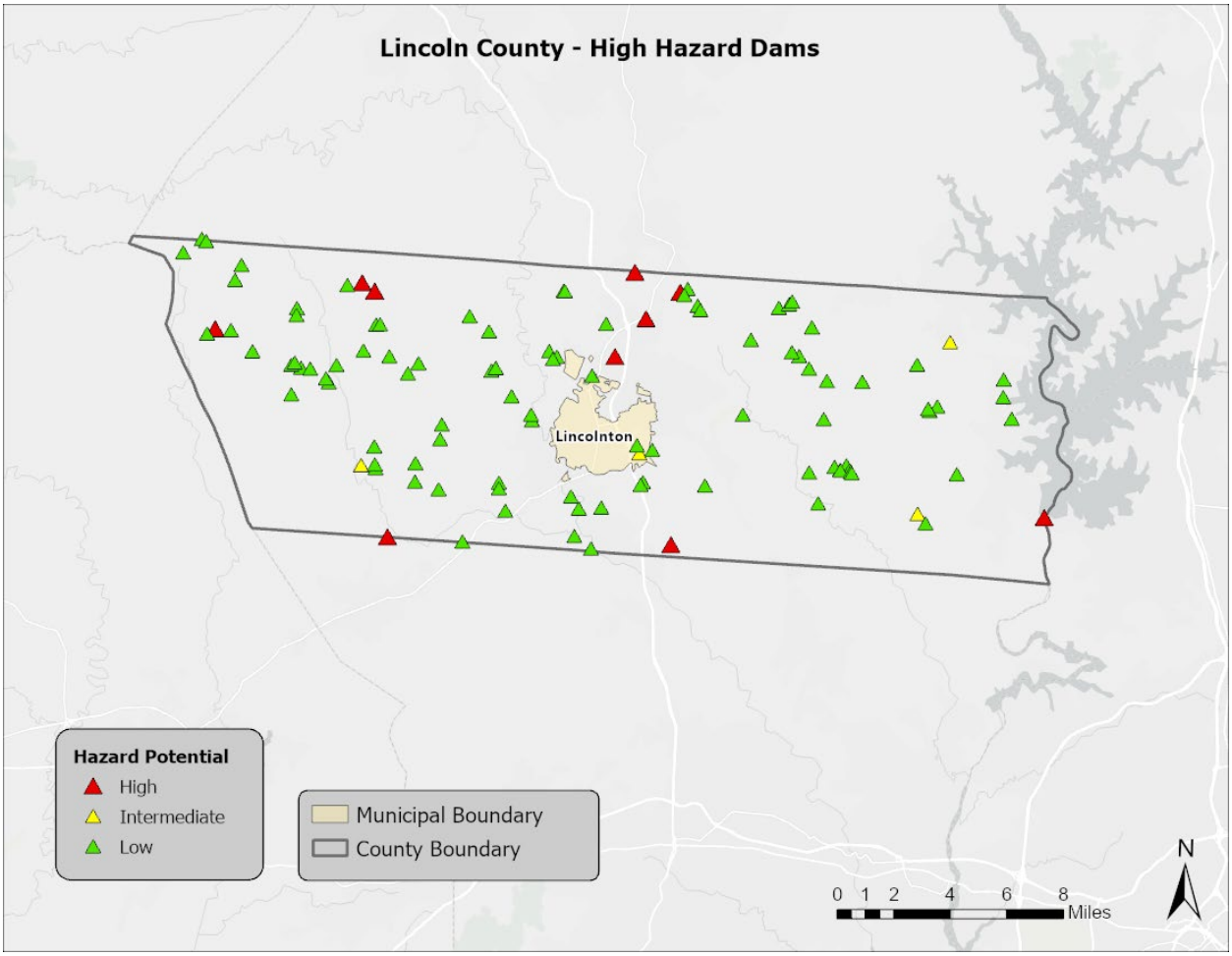
[39] The July 2024 list of high hazard dams was obtained from the North Carolina Division of Energy, Mineral, and Land Resources (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/dam-safety).

FIGURE 5.18: GASTON COUNTY DAM LOCATIONS



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

FIGURE 5.19: LINCOLN COUNTY DAM LOCATIONS



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

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 Energy, Mineral, and Land Resources as of July 2024, there have been a total of at least nine dams with a breach status reported in the Cleveland Gaston Lincoln Region, including four in Cleveland County, five in Gaston County, and none in Lincoln County. All breached dams are considered low risk. Additionally, several potential future 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 $3,832 (2023 dollars) of property damage.

5.10.4 Changing Future Conditions

Changing climate and weather patterns may not affect dams as directly when compared to other hazards. However, a significant projected rise in various extreme weather events could affect dams negatively in the form of higher floodwaters, changing streamflow, structural damages, and other key risk factors. Dam failures present recurring dangers of widespread flooding, which would greatly impact the Cleveland Gaston Lincoln Region in a breach scenario.

5.10.5 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. Inundation by failure of the Cowans Ford Dam would cause catastrophic damage, including loss of life and injuries, especially to those areas located along the Catawba River. In addition to local devastation, the region as whole would be impacted. No further analysis beyond the information included from the North Carolina Department of Environmental Quality Dam Safety Program will be completed in ***Section 6: Vulnerability Assessment*** as more sophisticated dam breach plans continue to be explored and developed for regional dams of concern.

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. Flooding is also a uniquely dangerous hazard due to the wide range of compounding hazards (e.g., hurricanes, thunderstorms, heat waves, earthquakes) that can exacerbate its frequency, intensity, and scale of impact.

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. Urban flooding and the stormwater management it requires poses significant challenges for critical facility operations, emergency response, transportation access, and utility services as developed areas continue to grow. In the event of road inundation, structural breaches, or mechanical failures due to floodwaters the response times to many hazard events may take much longer than originally anticipated. Increasing needs for flood mitigation measures are ongoing across every municipality included in this plan (especially in highly urbanized areas).

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. Floodplain maps for each jurisdiction in the region can be viewed in **Appendix F**. Special Flood Hazard Areas (SFHAs) in the Cleveland Gaston Lincoln Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM)[40]. 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 approximately 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 5.28**.

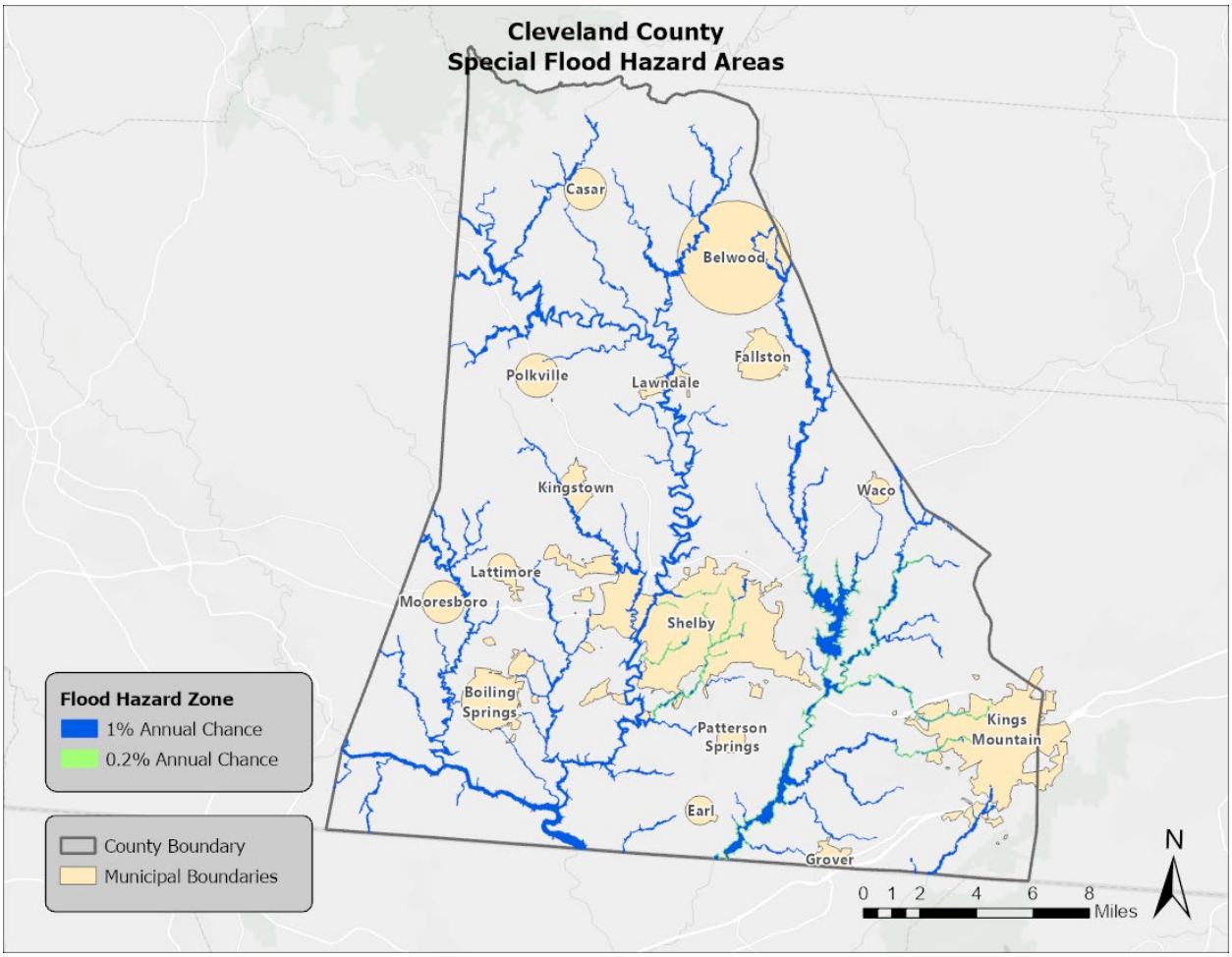
TABLE 5.28: SUMMARY OF FLOODPLAIN AREAS IN THE CLEVELAND GASTON LINCOLN REGION

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 nearly 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 5.20-5.22** 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 2024.

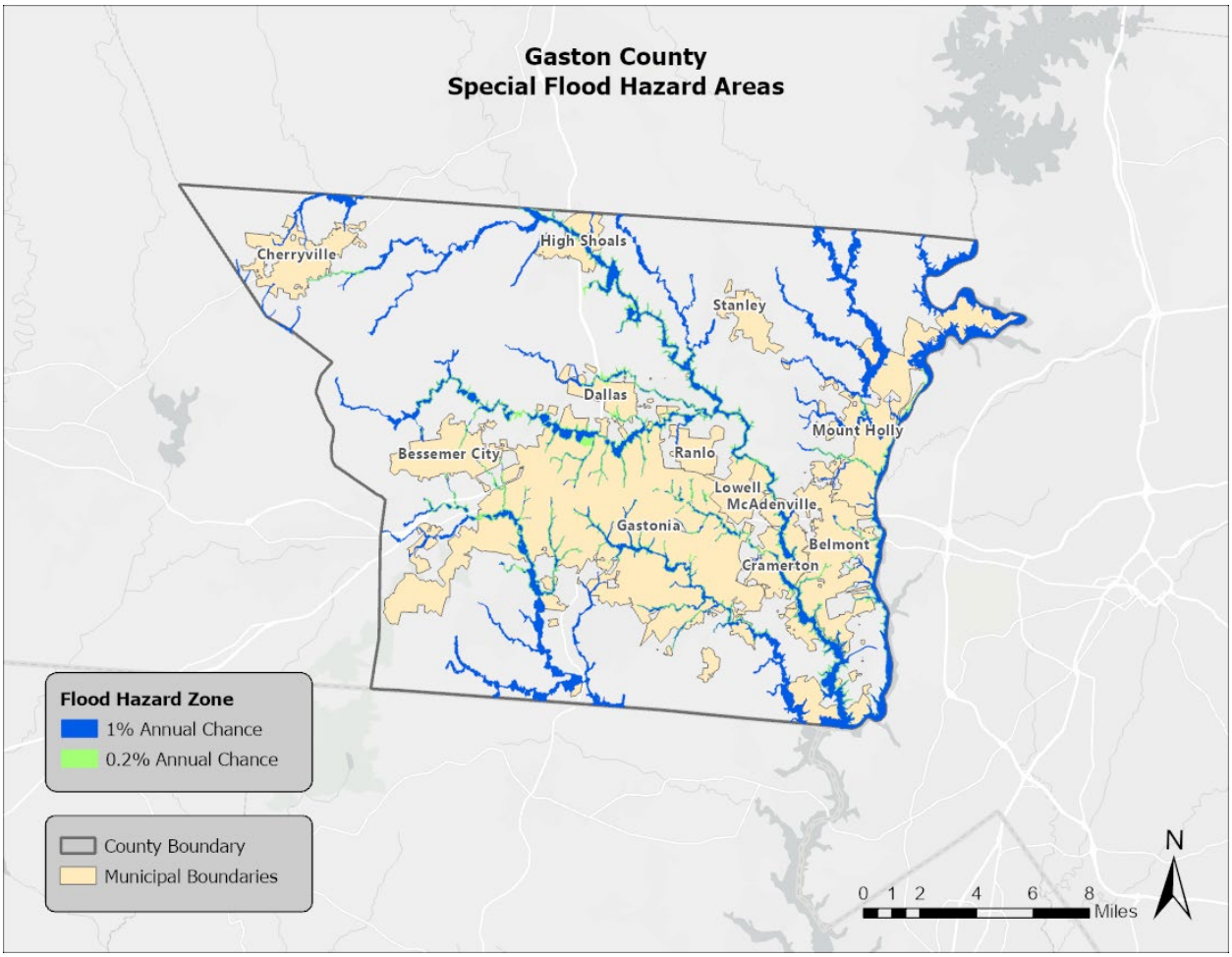
[40] The county-level DFIRM map data used for Cleveland County was updated in 2020, Gaston County in 2017, and Lincoln County in 2015.

FIGURE 5.20: SPECIAL FLOOD HAZARD AREAS IN CLEVELAND COUNTY



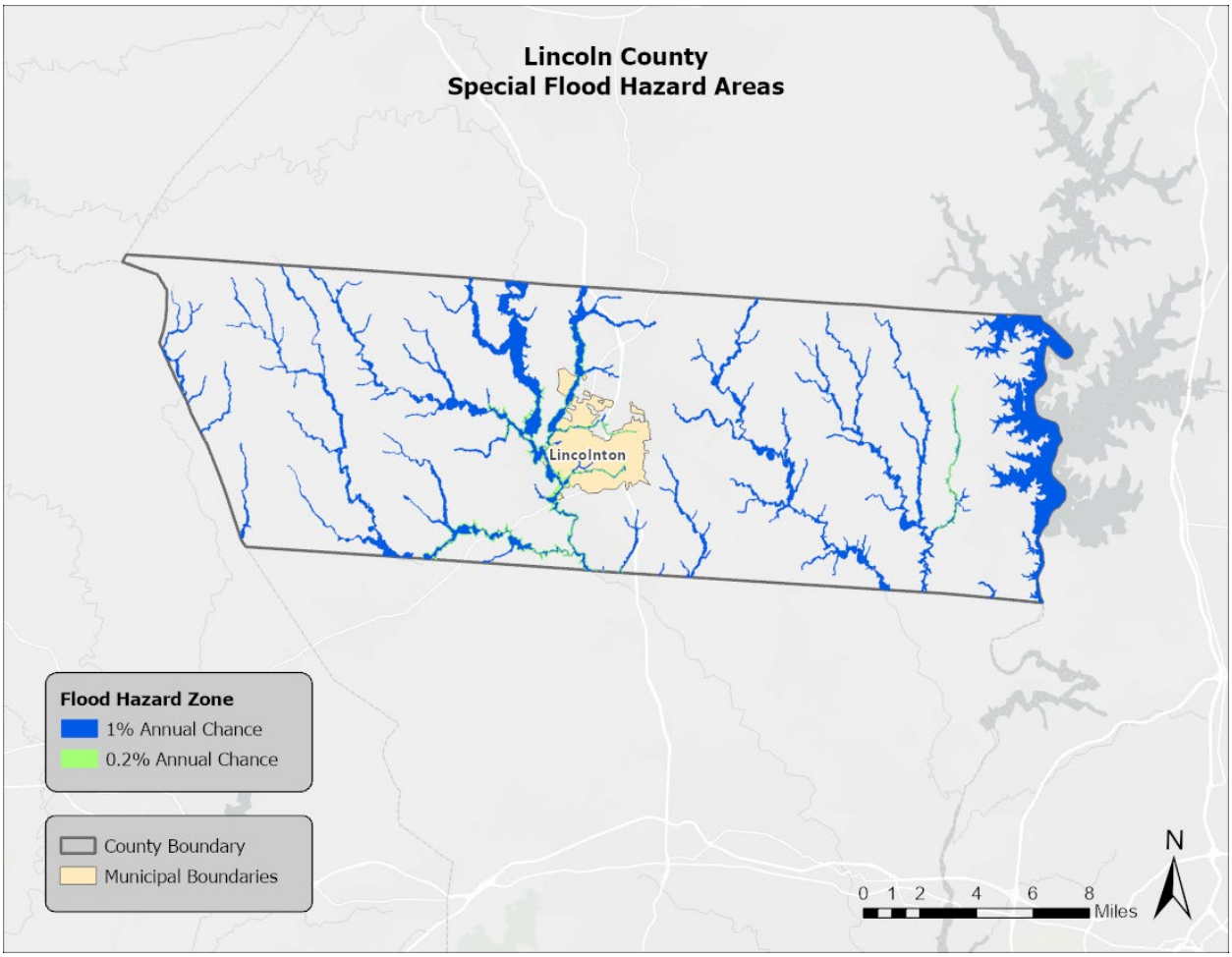
Source: Federal Emergency Management Agency

FIGURE 5.21: SPECIAL FLOOD HAZARD AREAS IN GASTON COUNTY



Source: Federal Emergency Management Agency

FIGURE 5.22: 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 76 events throughout the Cleveland Gaston Lincoln Region since 1993[41]. A summary of these events is presented in **Table 5.29**. These events accounted for over $12.2 million (2023 dollars) in property damage throughout the region.

TABLE 5.29: SUMMARY OF FLOOD OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
CLEVELAND COUNTY	**18**	**0/0**	**$2,059,821**
Belwood	0	0/0	$0
Boiling Springs	4	0/0	$1,955,218
Casar	0	0/0	$0

[41] These events (flooding and flash flooding) are only inclusive of those reported by NCEI. It is likely that additional occurrences have occurred and have gone unreported.

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Earl	0	0/0	$0
Falston	1	0/0	$0
Grover	1	0/0	$0
Kings Mountain	2	0/0	$12,969
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	1	0/0	$589
Polkville	0	0/0	$0
Shelby	3	0/0	$14,051
Waco	0	0/0	$0
Unincorporated Area	6	0/0	$76,994
GASTON COUNTY	**28**	**1/0**	**$6,905,280**
Belmont	0	0/0	$0
Bessemer City	3	0/0	$17,449
Cherryville	2	0/0	$0
Cramerton	0	0/0	$0
Dallas	1	0/0	$0
Gastonia	5	0/0	$4,851
High Shoals	1	0/0	$67,701
Lowell	1	0/0	$0
McAdenville	1	0/0	$2,593
Mount Holly	1	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	5	1/0	$0
Stanley	0	0/0	$0
Unincorporated Area	7	0/0	$6,812,686
LINCOLN COUNTY	**30**	**0/0**	**$3,304,932**
Lincolnton	12	0/0	$551,873
Unincorporated Area	18	0/0	$2,753,059
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**76**	**1/0**	**$12,270,033**

Source: National Centers for Environmental Information

5.11.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of February 2024, there have been at least 140 flood losses reported in the Cleveland Gaston Lincoln Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $1.3M in claims payments (2024 dollars). A summary of these figures for Cleveland Gaston Lincoln counties is provided in **Table 5.30**. 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 5.30: SUMMARY OF INSURED FLOOD LOSSES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Flood Losses	Claims Payments
CLEVELAND COUNTY	**50**	**$535,544.73**
Belwood	0	$0
Boiling Springs	0	$0
Casar	0	$0
Earl*	-	-
Falston*	-	-
Grover	0	$0
Kings Mountain	3	$11,804.30
Kingstown	0	$0
Lattimore*	-	-
Lawndale	0	$0
Mooresboro*	-	-
Patterson Springs*	-	-
Polkville	0	$0
Shelby	40	$494,446.85
Waco	0	$0
Unincorporated Area	7	$29,293.58
GASTON COUNTY	**77**	**$609,374.09**
Belmont	5	$8,066.59
Bessemer City	0	$0
Cherryville	2	$91,964.86
Cramerton	9	$98,868.02
Dallas	2	$12,878.96
Gastonia	34	$75,285.54
High Shoals	0	$0
Lowell	0	$0
McAdenville	0	$0
Mount Holly	12	$233,063.20
Ranlo	0	$0
Spencer Mountain	0	$0
Stanley	0	$0
Unincorporated Area	13	$89,246.92
LINCOLN COUNTY	**13**	**$229,648.32**
Lincolnton	1	$3,933.91
Unincorporated Area	12	$225,714.41
CLEVELAND GASTON LINCOLN REGION TOTAL	**140**	**$1,374,567.14**

*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 150,000 repetitive

loss properties nationwide. A severe repetitive loss property is any insurable building for which four or more claims of more than $5,000 were paid by the NFIP, where at least two of the claims are made within 10 years of each other.

Currently (as of February 2024 records), there are 12 non-mitigated repetitive loss properties located in the Cleveland Gaston Lincoln Region, which accounted for 32 losses (with over $34,000 in claims payments last recorded across 2 properties in 2018). Additionally, 2 of the properties (both in Cleveland County) are considered severe repetitive loss properties. All of the properties are single-family residential buildings. Without mitigation these properties will likely continue to experience flood losses. **Table 5.31** presents a summary of these figures for the Cleveland Gaston Lincoln Region.

TABLE 5.31: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Properties	Number of Losses
Cleveland County	**5**	**18**
Belwood	0	0
Boiling Springs	0	0
Casar	0	0
Earl*	--	--
Fallston*	--	--
Grover	0	0
Kings Mountain	0	0
Kingstown	0	0
Lattimore*	--	--
Lawndale	0	0
Mooresboro*	--	--
Patterson Springs*	--	--
Polkville	0	0
Shelby	5	18
Waco	0	0
Unincorporated Area	0	0
Gaston County	**6**	**12**
Belmont	0	0
Bessemer City	0	0
Cherryville	1	2
Cramerton	2	4
Dallas	0	0
Gastonia	2	4
High Shoals	0	0
Lowell	0	0
McAdenville	0	0
Mount Holly	0	0
Ranlo	0	0
Spencer Mountain	0	0
Stanley	0	0
Unincorporated Area	1	0
Lincoln County	**1**	**2**

Location	Number of Properties	Number of Losses
Lincolnton	0	0
Unincorporated Area	1	2
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**12**	**32**

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

5.11.6 Changing Future Conditions

A changing climatic environment translates to new weather patterns, stronger storms, and significant shifts in rainfall which can all exacerbate flood risks across different regions. The North Carolina Climate Science Report notes that there is an upward trend in the number of heavy rainfall events (3 inches or more per day), with the last four years (2015-2018) demonstrating the greatest number of events since 1900. A warmer atmosphere also contributes to increased evaporation and greater water availability when it rains. Current projections in the report indicate it is likely that annual total precipitation in North Carolina will increase and very likely for extreme precipitation frequency and intensity due to related increases in atmospheric water vapor content. Additionally, greater intensity and frequency of flooding could also present a variety of extreme public health and emergency management challenges.

5.11.7 Probability of Future Occurrences

Flood events will remain a threat in the Cleveland Gaston Lincoln Region, especially among recognized floodplains or Special Flood Hazard Areas (SFHAs), 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). As of 2024, the FEMA National Risk Index rates the riverine flooding hazard as “relatively low” in Gaston County and Lincoln County compared to “very low” in Cleveland County.

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[42]. 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.

5.12.2 Location and Spatial Extent

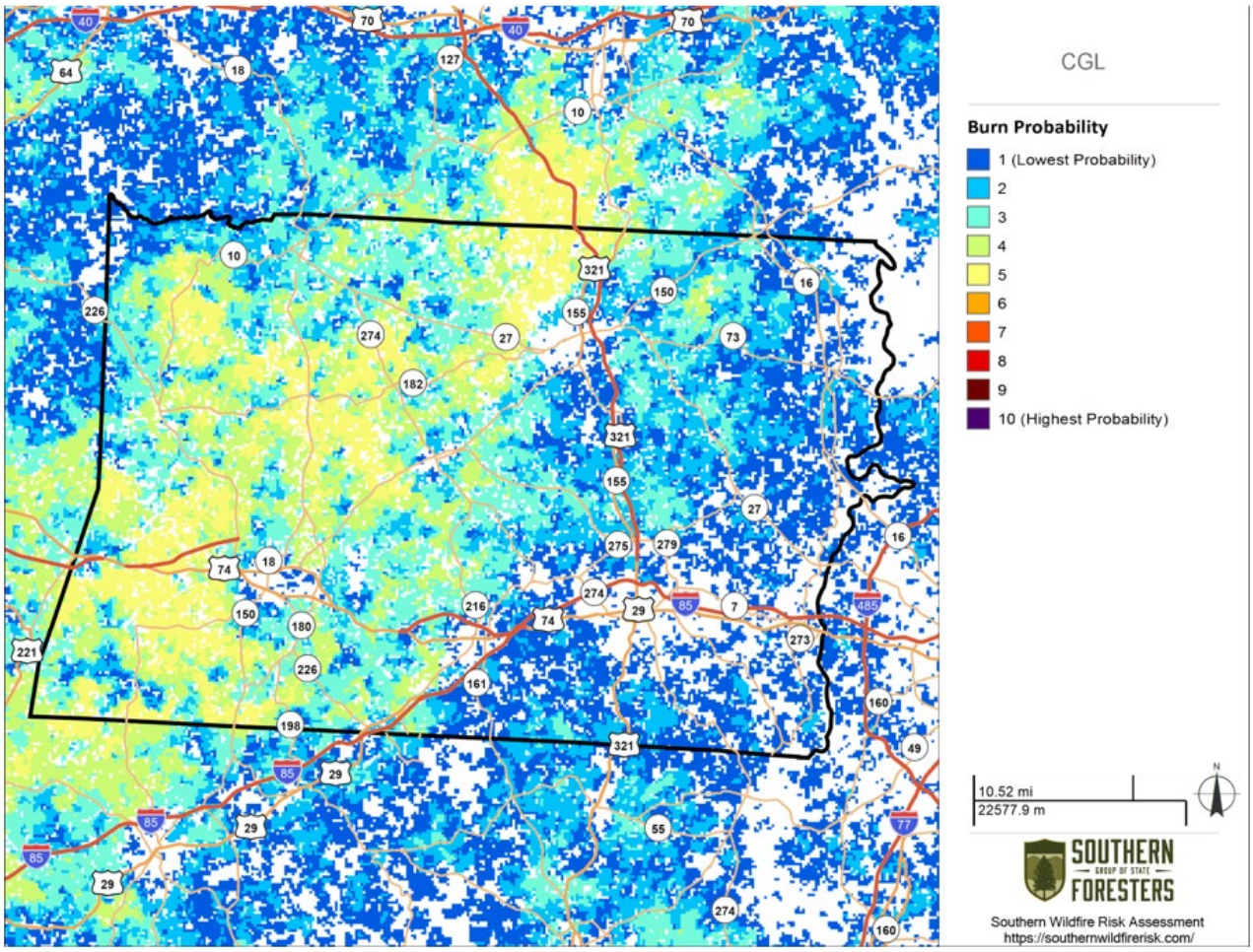
The entire region is at risk of a wildfire occurrence. Wildfire risk maps for each jurisdiction in the region can be viewed in **Appendix G**. However, several factors such as drought conditions

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

or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the wildland urban interface (WUI) are particularly susceptible to fire hazard as populations border formerly undeveloped areas.

Figure 5.23 shows the burn probability for each county in the Cleveland Gaston Lincoln Region based on data from the Southern Wildfire Risk Assessment. This data represents the likelihood of an area burning based on landscape conditions, percentile weather, historical ignition patterns, and historical fire suppression efforts.

FIGURE 5.23: BURN PROBABILITY IN THE CLEVELAND GASTON LINCOLN REGION

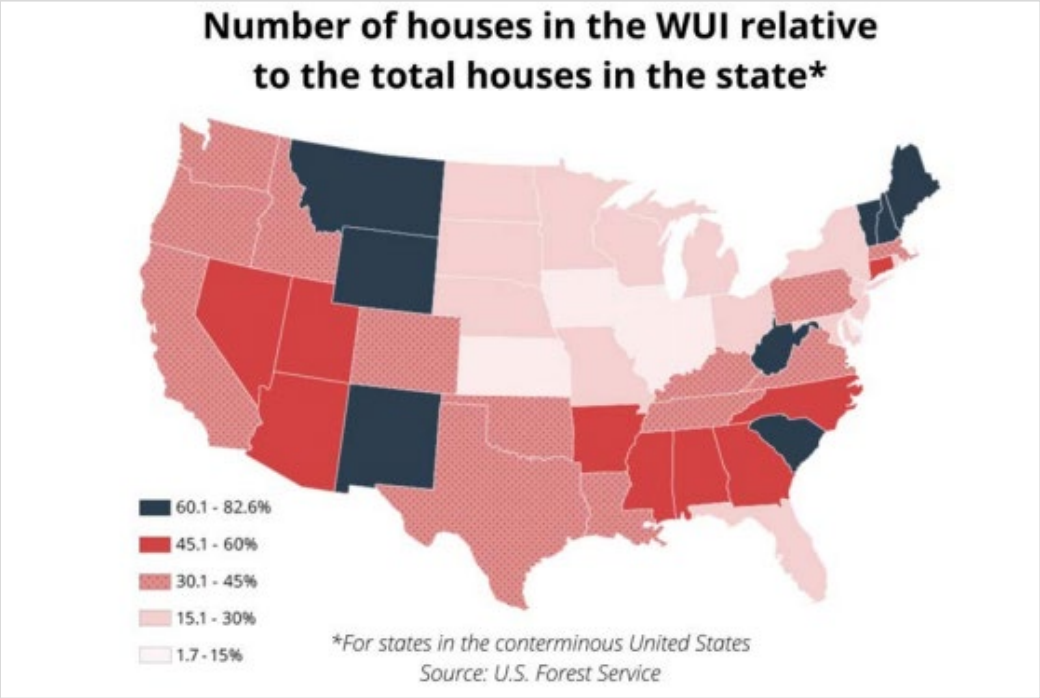


Source: Southern Wildfire Risk Assessment

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 share of houses in the WUI as of 2022. According to the U.S. Fire Administration, the states with the greatest number of houses in the WUI include California, Texas, Florida, North Carolina, and Pennsylvania[43]. Based on past data from the US Department of Agriculture, approximately 52% of homes in North Carolina lie within the WUI.

[43] U.S. Fire Administration (https://www.usfa.fema.gov/downloads/pdf/publications/wui-issues-resolutions-report.pdf)

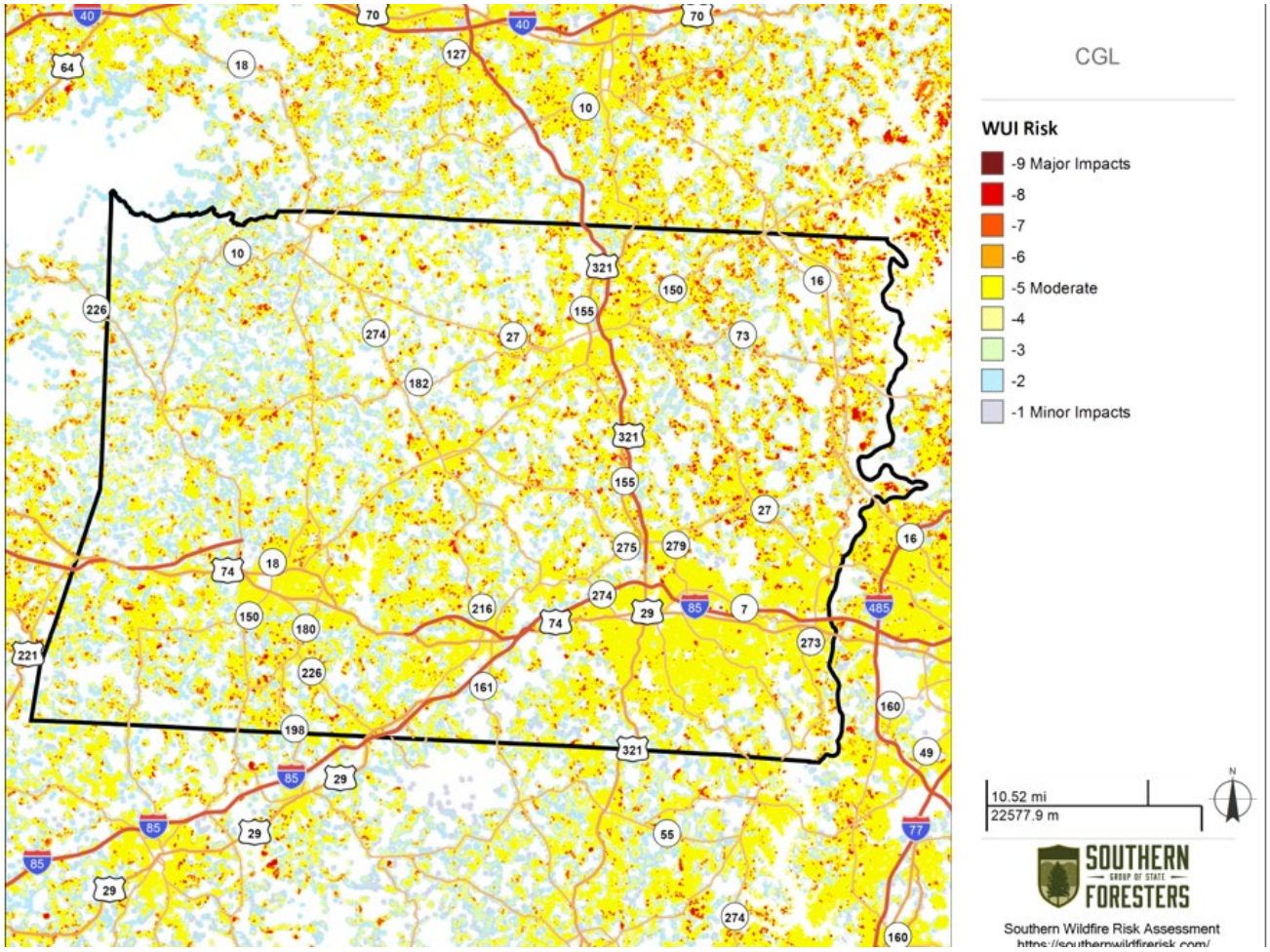
FIGURE 5.24: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: US Fire Administration

Below, **Figure 5.25** displays the WUI Risk Index for the counties in the Cleveland Gaston Lincoln Region.

FIGURE 5.25: CLEVELAND GASTON LINCOLN REGION WILDLAND URBAN INTERFACE (WUI) RISK INDEX



Source: Southern Wildfire Risk Assessment

5.12.3 Historical Occurrences

Information from the National Association of State Foresters through 2018 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[44]. A summary of these events is presented in **Table 5.32**. The largest of these events was the Pinnacle Road Fire which occurred in Gastonia in 2005 and impacted 116 acres. Additionally, the 2020 North Carolina Forest Action Plan notes that each county in the region experiences between 40 to 80 wildfires each year based on average rates of occurrence from 2010 to 2020.

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

TABLE 5.32: 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
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**

Source: National Association of State Foresters

There is lacking 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 Changing Future Conditions

According to the 2020 North Carolina Forest Action Plan, the state has experienced 41,551 wildfires burning a combined total of over 399,125 acres since 2010. The cost of wildfire response, WUI acreage, fuel loading related to fire exclusion and plant mortality, and climate change stressors are also all increasing in the context of growing wildfire risks[45].

Although wildfires occur naturally and play a long-term role in the health of ecosystems, changing wildfire and climate patterns threaten to upset the status quo conditions of future seasons. The wildfire season has lengthened in many areas due to factors including warmer springs, longer summer dry seasons, and drier soils and vegetation. For instance, according to the USDA Forest Service during the 2016 fire season, 320 (100+ acre) large fires burned more than 325,000 acres of forestland across the Southeast from October to December. Of increasing concern is the threat wildfires pose to homes and lives throughout North Carolina.

5.12.5 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 to 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). As of 2024, the FEMA National Risk Index rates the wildfire hazard as “very low” across Cleveland County, Gaston County, and Lincoln County.

[45] North Carolina Forest Action Plan (https://www.stateforesters.org/districts/north-carolina/)

5.13 INFECTIOUS DISEASE

5.13.1 Background and Description

For the purposes of this plan, this section will assess infectious diseases, vector-borne diseases, and foreign animal 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 the region. Some of the infectious diseases of greatest concern include coronavirus, influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant superbugs. 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.

Additionally, the recent and ongoing global pandemic caused by the SARS-related coronavirus, COVID-19 (Severe Acute Respiratory Syndrome Coronavirus 2 or SARS-CoV-2), has persisted for multiple years resulting in over 774 million reported cases and over 7 million deaths worldwide as of 2024 according to the World Health Organization. The disease spread rapidly following its initial discovery in 2019, eventually leading to the broader COVID-19 pandemic on a global scale. The contagious virus spreads between people through contaminated respiratory droplets and other airborne particles. Its evolving nature and high transmission rates continue to pose a significant threat.

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.

Foreign Animal Diseases

As defined in the 2023 State Hazard Mitigation Plan, Foreign Animal Disease (FAD) is recognized as an animal disease or pest not known to exist in a country of interest (e.g., United States) or any of its associated territories. A FAD in the United States, and specifically North Carolina, could prove to be extremely detrimental to agricultural producers and general public health if it manages to spread over a large area. The North Carolina Department of Agriculture and Consumer Services (NCDA&CS) is designated to lead a statewide response in the event of a potential FAD outbreak. There are several diseases of future clinical significance in North Carolina: African swine fever, Dourine, contagious bovine pleuropneumonia (CBPP), foot and mouth disease (FMD), highly pathogenic avian influenza (HPAI), and Glanders among other emerging pathogens.

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.

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
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, substantial cases of influenza and influenza-like illnesses have been reported in hospitals. According to the North Carolina Department of Health and Human Services (NCDHHS), there were over 30,000 positive tests and 196 influenza-associated deaths during the 2022-2023 influenza season[46]. The Cleveland Gaston Lincoln Region is part of Flu Surveillance Region 7 (see regional map in NCDHHS annual surveillance summaries) in the state, with 2-6% of influenza-like illnesses reported among total emergency department visits during the season. The primary respiratory viruses treated during the 2022-2023 season included influenza and SARS-CoV-2 (COVID-19).

A COVID-19 Pandemic disaster declaration was declared for North Carolina on March 25, 2020, with an incident period of over 3 years. Between March 7, 2020, and May 10, 2023, NCDHHS reported 3,501,404 total cases and 29,059 total deaths due to COVID-19 statewide. This included over 37,001 total cases and 457 total deaths in Cleveland County, 82,513 total cases and 983 total deaths in Gaston County, and 30,642 total cases and 211 total deaths in Lincoln County.

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. Over $477,500 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[47]. More recently, state officials have encouraged citizens to "Fight the Bite" against both mosquito and tick bites to avoid serious vector-borne diseases after nearly 700 cases were reported in 2022[48].

Foreign Animal Diseases
No significant cases have been reported in the region.

[46] NCDHHS Respiratory Disease Surveillance Summaries (https://flu.ncdhhs.gov/data.htm)
[47] NCDHHS Press Release, August 2016 (https://www.ncdhhs.gov/news/press-releases/nc-prepared-zika-virus-risk-local-virus-carrying-mosquitoes-low)
[48] NCDHHS Press Release, March 2023 (https://www.ncdhhs.gov/news/press-releases/2023/03/30/ncdhhs-urges-north-carolinians-fight-bite-insect-repellant-and-other-prevention-tools-avoid-tick-and)

5.13.4 Changing Future Conditions

According to the Centers for Disease Control and Prevention (CDC), ongoing climate change trends of milder winters, warmer summers, and fewer days of frost make it easier for infectious diseases and vector diseases to expand to new geographic areas and infect more people. Between 2004 and 2018, the number of reported illnesses from mosquito, tick, and flea bites more than doubled, with more than 760,000 cases reported in the United States. Additionally, nine new germs spread by mosquitoes and ticks were discovered or introduced into the United States during this time. In 2012, a mild winter, early spring, and a hot summer also set the stage for an outbreak of West Nile Virus disease in the United States, resulting in more than 5,600 illnesses and 286 deaths[49].

5.13.5 Probability of Future Occurrence

It is difficult to predict the future probability of infectious diseases due to the difficulty of obtaining information on this type of hazard. Regardless of this difficulty, current events surrounding the recent COVID-19 pandemic and other emerging infectious diseases have highlighted an important need for local, state, and federal agencies to closely monitor these hazards in the future. The most common and probable disease in the state has shown to be influenza; however, based on historical data, it is likely (between 10 and 100 percent annual probability) that the Cleveland Gaston Lincoln Region will experience an outbreak of any number of infectious diseases in the future.

[49] CDC National Center for Emerging and Zoonotic Infectious Disease (NCEZID) (https://www.cdc.gov/ncezid/priorities/climate-infectious-disease.html)

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[50]. 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 toxicological 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.

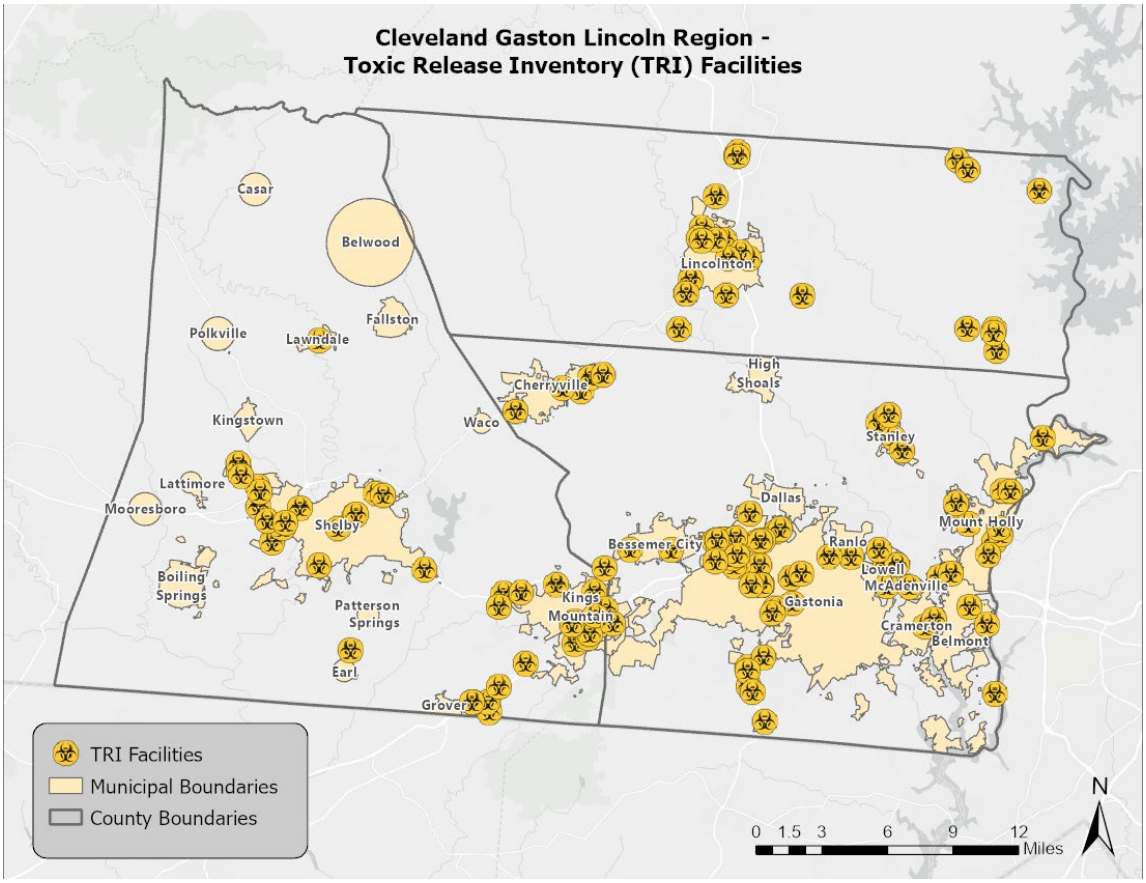
5.14.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency (EPA) provides public information on hazardous materials. One facet of this program is to collect information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate

[50] FEMA, 1997.

where such activity is occurring. As of 2023, the Cleveland Gaston Lincoln Region has 139 reported TRI facilities. These sites are shown in **Figure 5.26.**

FIGURE 5.26: TOXIC RELEASE INVENTORY (TRI) FACILITIESIN 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 of 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 5.33 summarizes the serious HAZMAT incidents reported in the Cleveland Gaston Lincoln Region.

TABLE 5.33: SUMMARY OF HAZMAT INCIDENTS IN THE CLEVELAND GASTON LINCOLN REGION

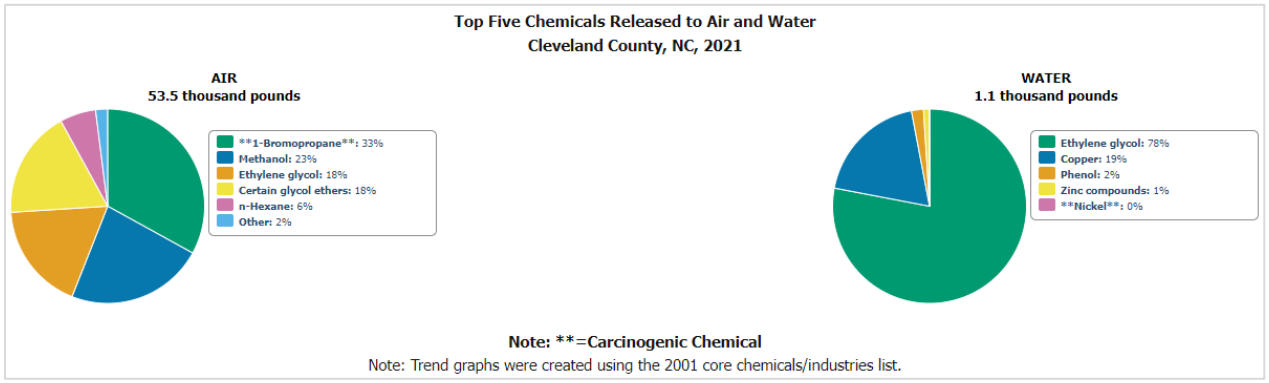
Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
CLEVELAND COUNTY	**5**	**0/0**	**$13,965**
Belwood	0	0/0	$0
Boiling Springs	1	0/0	$0
Casar	0	0/0	$0
Earl	0	0/0	$0
Falston	0	0/0	$0
Grover	0	0/0	$0
Kings Mountain	0	0/0	$0
Kingstown	0	0/0	$0
Lattimore	2	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	0	0/0	$0
Polkville	0	0/0	$0
Shelby	1	0/0	$593
Waco	0	0/0	$0
Unincorporated Area	1	0/0	$13,372
GASTON COUNTY	**11**	**0/1**	**$67,514**
Belmont	0	0/0	$0
Bessemer City	1	0/0	$0
Cherryville	0	0/0	$0
Cramerton	0	0/0	$0
Dallas	1	0/0	$1,352
Gastonia	6	0/1	$66,162
High Shoals	0	0/0	$0
Lowell	0	0/0	$0
McAdenville	0	0/0	$0
Mount Holly	3	0/0	$0
Ranlo	0	0/0	$0
Spencer Mountain	0	0/0	$0
Stanley	0	0/0	$0
Unincorporated Area	0	0/0	$0
LINCOLN COUNTY	**5**	**0/1**	**$117,949**
Lincolnton	2	0/0	$27,685

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Unincorporated Area	3	0/1	$90,264
CLEVELAND GASTON LINCOLN REGION TOTAL	**21**	**0/2**	**$199,428**

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

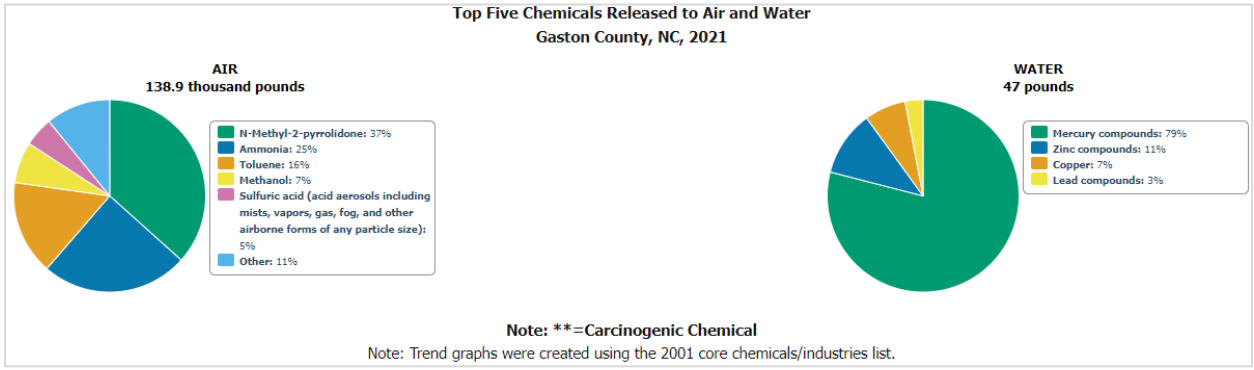
Updated information regarding county-specific chemical releases have been provided through 2021 and TRI facilities through 2023 by the EPA[51]. In Cleveland County, there are 41 reported TRI facilities. Releases have mostly been conducted through off-site disposal with a smaller share of air releases. Gaston County has 73 reported TRI facilities. Releases have mostly been conducted by air with a smaller share of off-site disposals. Lincoln County has 25 reported TRI facilities. Nearly all releases have been conducted through off-site disposal. In the following three figures, the top five chemicals released through air and water are shown for each of the counties in the region.

FIGURE 5.27: CHEMICALS RELEASED IN CLEVELAND COUNTY



Source: Environmental Protection Agency

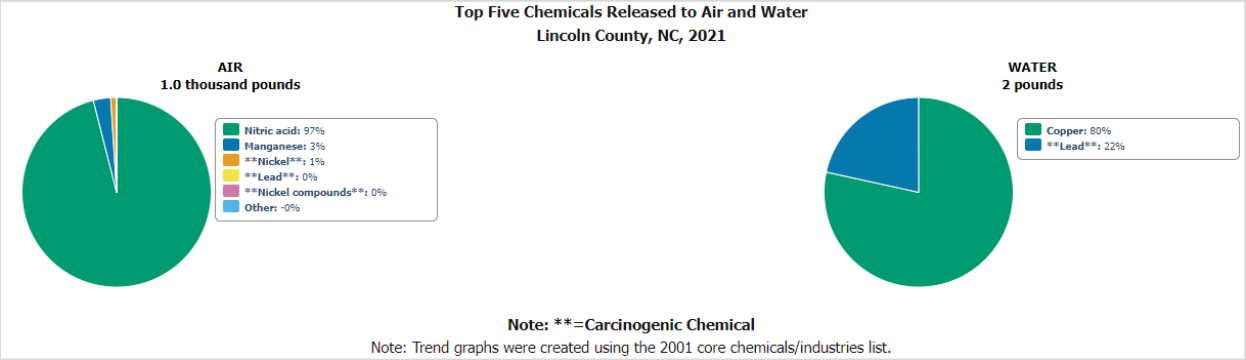
FIGURE 5.28: CHEMICALS RELEASED IN GASTON COUNTY



Source: Environmental Protection Agency

[51] EPA TRI National Analysis Where You Live Tool (https://www.epa.gov/trinationalanalysis/where-you-live) and EPA TRI Envirofacts (https://www.epa.gov/enviro/tri-search?)

FIGURE 5.29: CHEMICALS RELEASED IN LINCOLN COUNTY



Source: Environmental Protection Agency

5.14.4 Changing Future Conditions

As the population of the Cleveland Gaston Lincoln Region continues to grow, more people could become increasingly vulnerable to incidents involving hazardous substances. Therefore, it is important to monitor all transportation routes and continue to attempt to prevent future incidents from occurring through ongoing preparedness, monitoring, and training. Unlike other hazards discussed in this plan, climate change is unlikely to affect the occurrence or frequency of future hazardous substance events.

5.14.5 Probability of Future Occurrence

Given the location of 139 TRI facilities in the Cleveland Gaston Lincoln Region and prior rail and roadway incidents, it is likely that a hazardous material incident may occur in the region (between 10 and 100 percent annual probability). County and municipal officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

5.15 RADIOLOGICAL EMERGENCY – FIXED NUCLEAR FACILITIES

5.15.1 Background and Description

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 plant 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.

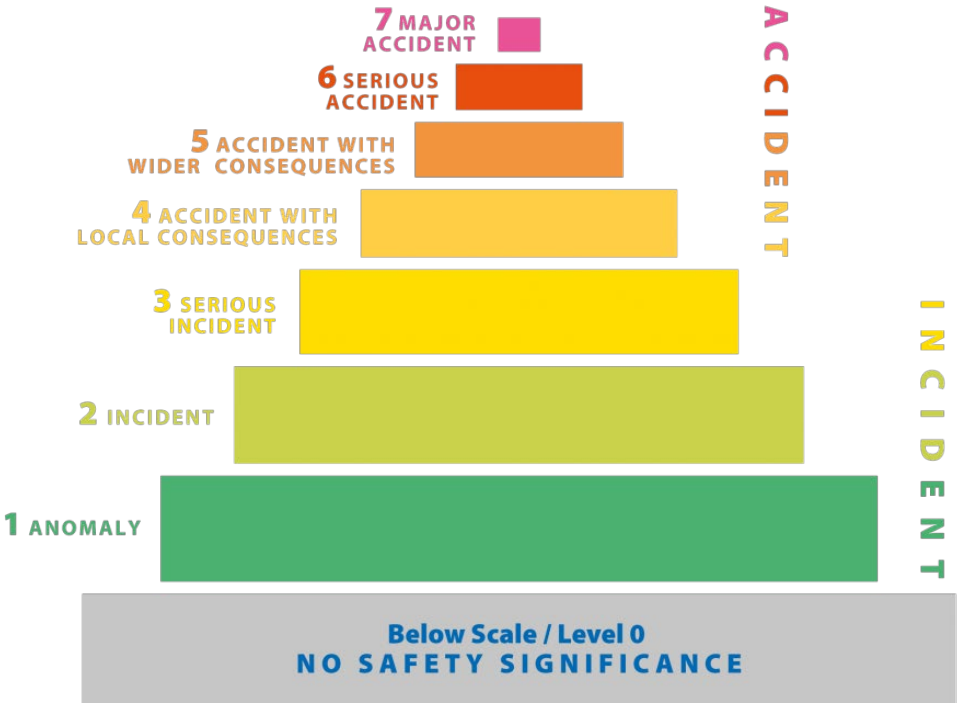
The region is also located within a close proximity to the Catawba Nuclear Station in South Carolina which houses two 1,129-megawatt pressurized water reactors. The plant was commissioned in 1985 and the second unit was added in 1986. It also operates with a very high level of security. Its first unit began operating in 1985, followed by the next unit in 1986, and is only 11 miles southwest of Charlotte, NC[52].

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**).

[52] Duke Energy Power Plants Map (https://www.duke-energy.com/our-company/about-us/power-plants)

FIGURE 5.30: INTERNATIONAL NUCLEAR EVENT SCALE

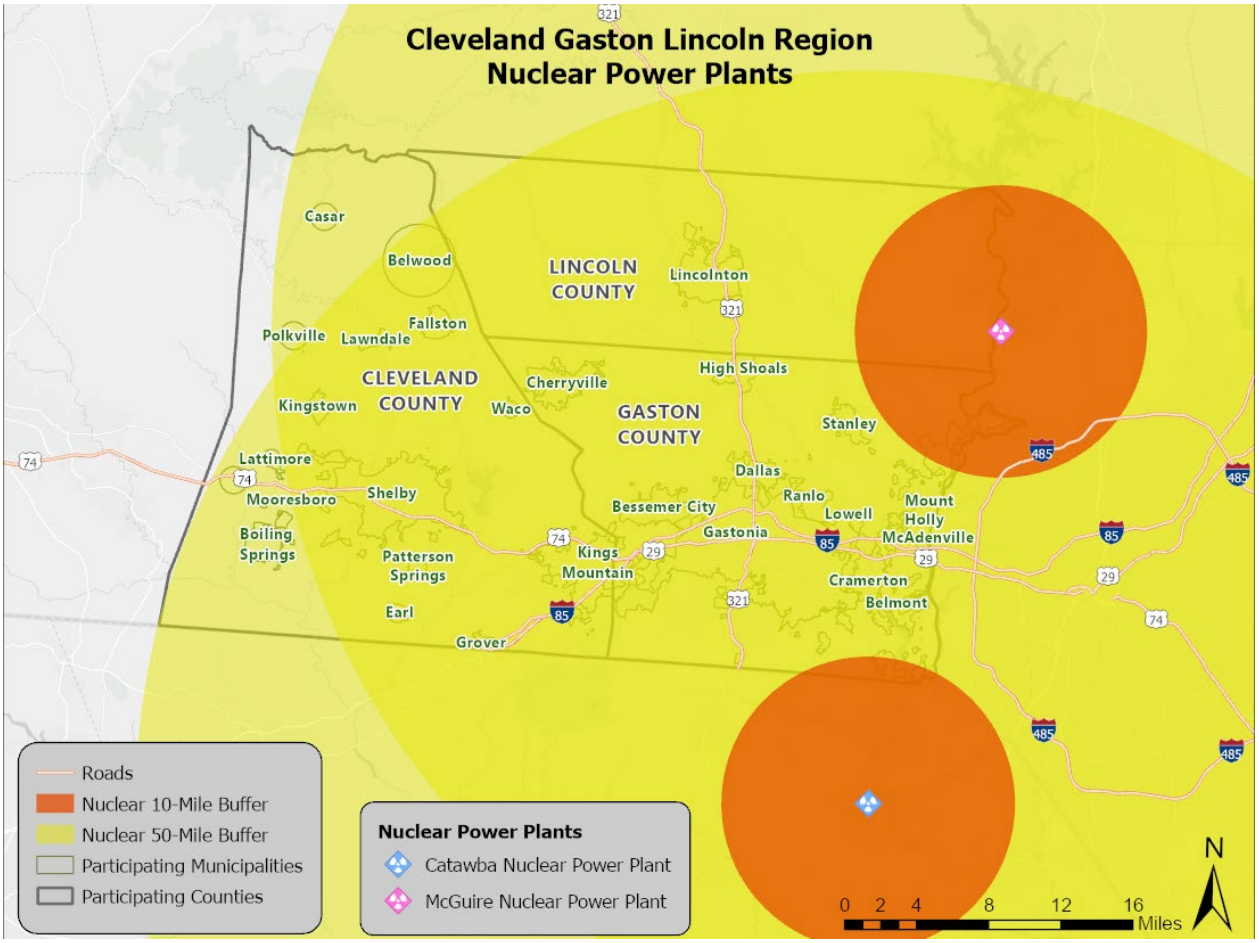


Source: International Atomic Energy Agency

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 **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 Changing Future Conditions

Unlike other hazards discussed in this plan, climate change is unlikely to affect the occurrence or frequency of future radiological emergency events. However, severe weather could still potentially affect nuclear facilities in the form of physical damage which necessitates close monitoring.

5.15.5 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

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, cyberattacks (computer-based), and the use of chemical, biological, nuclear, and radiological weapons. For the purposes of this plan, cyberattacks 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 high impact 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 had significant impacts in the past.

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.

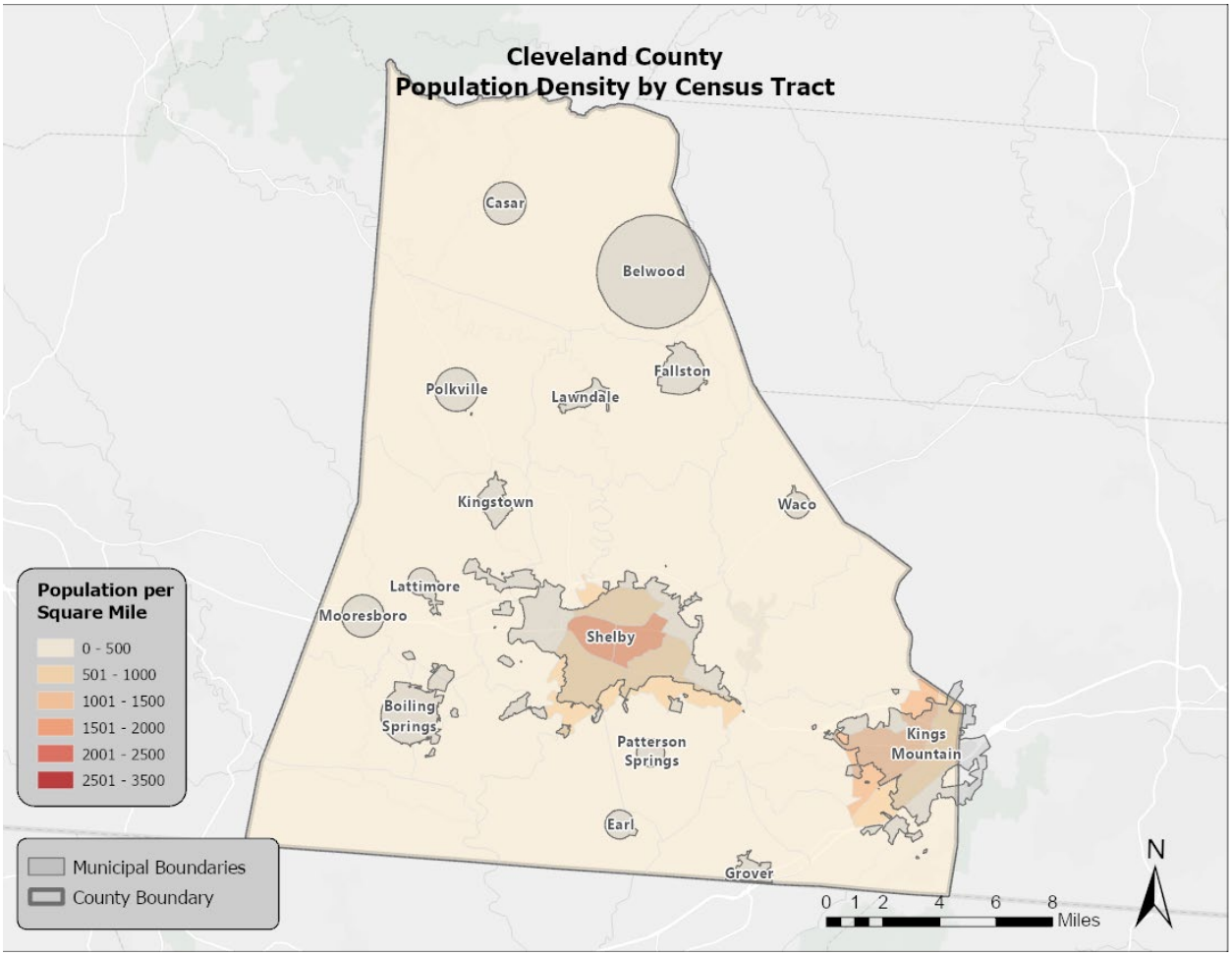
OTHER

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

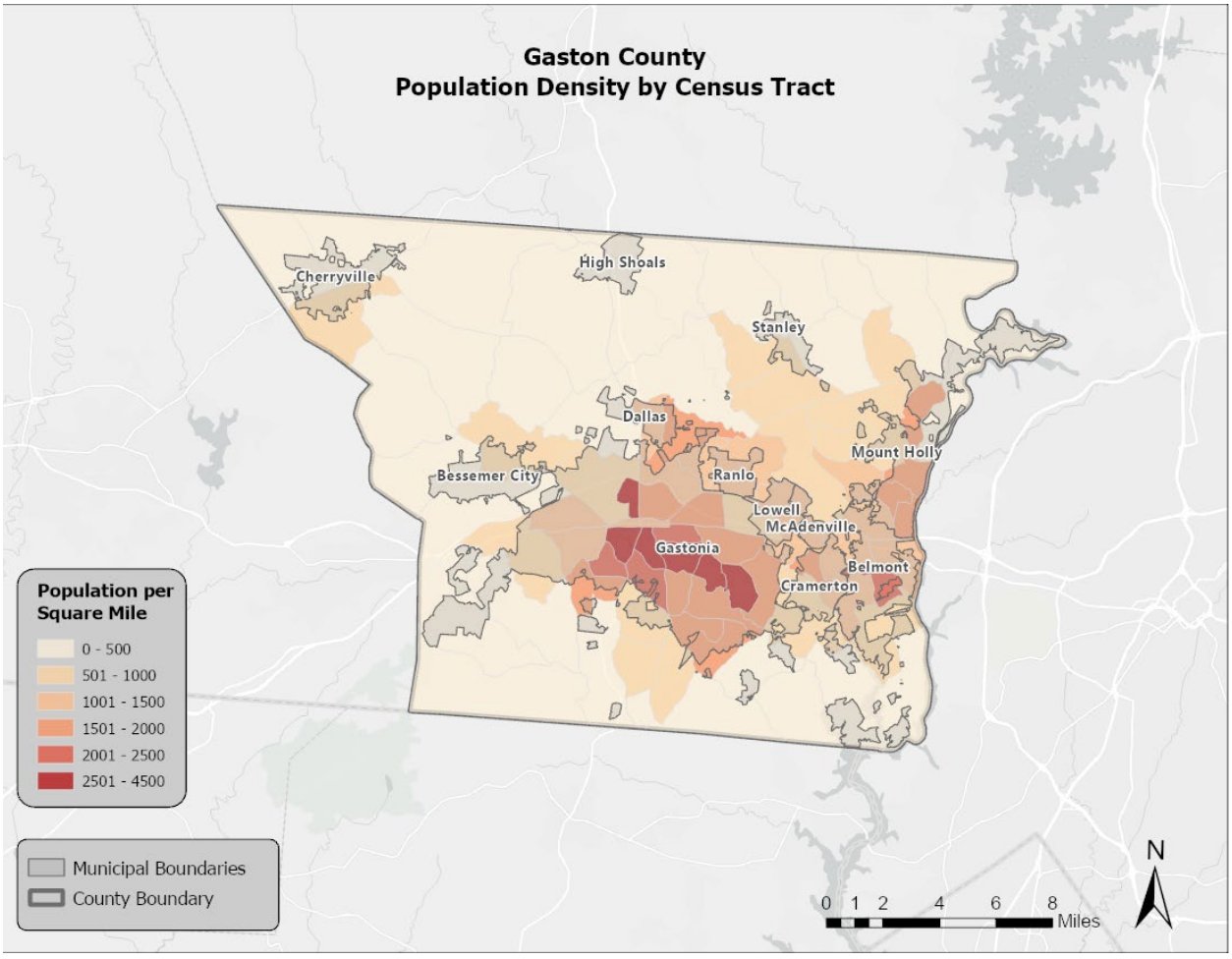
All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The maps below in **Figure 5.32, Figure 5.33,** and **Figure 5.34** display the population density in each county in the Cleveland Gaston Lincoln Region using census tract levels.

FIGURE 5.32: POPULATION DENSITY IN CLEVELAND COUNTY



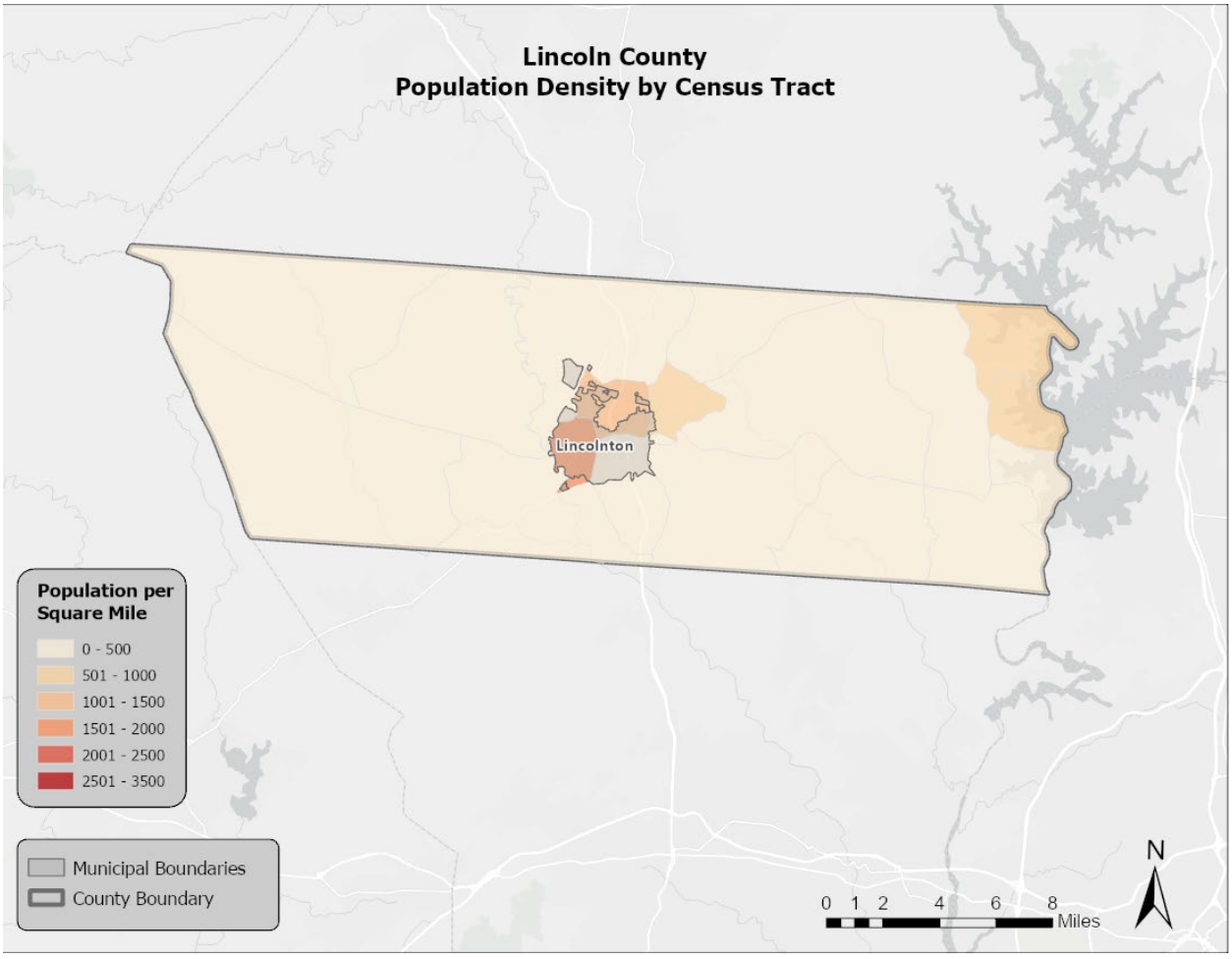
Source: US Census Bureau

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 jurisdiction based on American Community Survey (ACS) 5-year estimates can be seen in **Table 5.34** below.

TABLE 5.34: 2022 POPULATION ESTIMATES FOR THE CLEVELAND GASTON LINCOLN REGION

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Cleveland County	**99,527**	**214.4**
Belwood	1,103	69.7
Boiling Springs	4,622	1,029.9
Casar	391	174.3
Earl	358	230.0
Fallston	670	289.6
Grover	598	838.9
Kingstown	533	372.7
Kings Mountain	11,246	809.5
Lattimore	557	396.1
Lawndale	599	706.3

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Mooresboro	204	165.8
Patterson Springs	854	556.5
Polkville	500	277.0
Shelby	21,712	980.5
Waco	278	369.9
Unincorporated Area	55,302	--
Gaston County	**228,972**	**640.7**
Belmont	14,842	1,230.8
Bessemer City	5,472	1,038.9
Cherryville	6,113	1,101.1
Cramerton	5,294	1,140.6
Dallas	5,889	1,935.7
Gastonia	80,615	1,546.7
High Shoals	675	228.7
Lowell	3,692	994.3
McAdenville	1,125	656.3
Mount Holly	17,644	1,578.5
Ranlo	4,487	2,189.8
Spencer Mountain	0	0.0
Stanley	3,967	1,470.0
Unincorporated Area	79,157	--
Lincoln County	**87,933**	**293.4**
Lincolnton	11,225	1,278.5
Unincorporated Area	76,708	--
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**416,432**	**382.8**

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 Changing Future Conditions

The concept of "climate security," or the impacts of climate change on general peace and security of nations, has received increasing global attention in recent years and will likely continue to do so. According to the U.S. Government Accountability Office as of 2023, the overall threat of terrorism is also reportedly rising as incidents of domestic terrorism increased by 357% nationally between 2013 and 2021. The U.S. Department of Homeland Security notes in the 2024 Homeland Threat Assessment that national terrorism threats remain high as extremists react to future sociopolitical events.

With North Carolina ranked as the ninth most populous state in the U.S. (222.8 people/mi^2) as of 2024, its population growth may inherently raise the odds of terrorism incidents within the state.

5.16.5 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 is entirely possible (between 1 to 10 percent annual probability) and preparedness must be ensured across all populated areas of the region.

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.

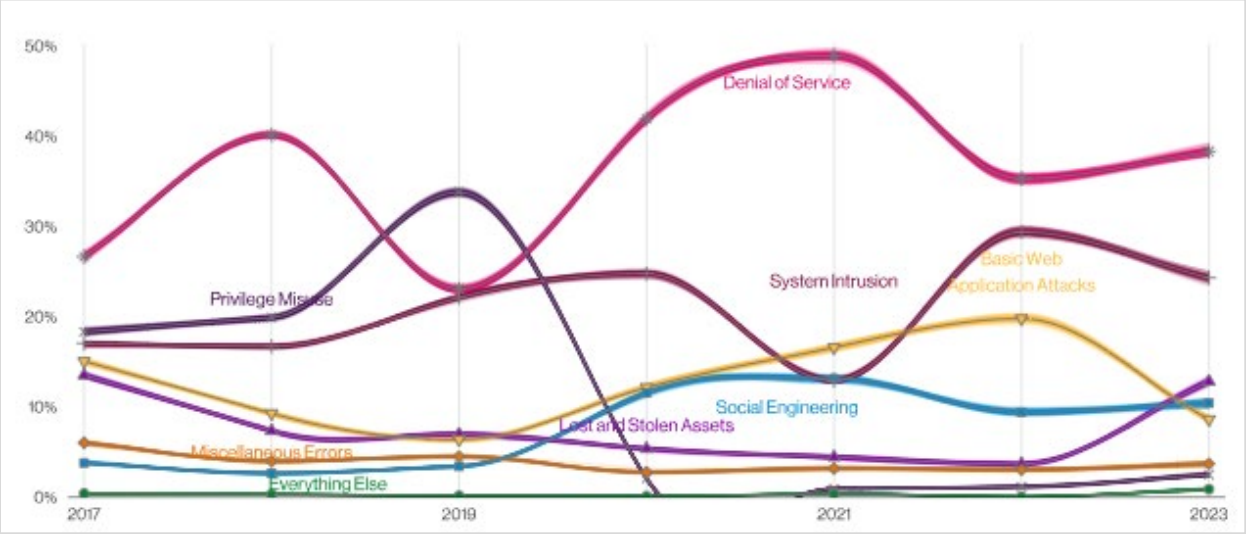
Cyberattacks can happen in both the public and private sector. They may be carried out by a specific individual, or by groups from afar. Many attacks attempt to steal money or to disturb normal operations. According to the 2023 Verizon Report of Data Breaching, 83% of breaches involved external actors, with the majority of them being financially motivated.

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 over time (2017 to 2023) from the 2023 Verizon Data Breach Investigations Report (DBIR).

FIGURE 5.35: PERCENTAGES AND PATTERNS OF INCIDENTS OVER TIME



Source: 2023 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 cyberattack threats within the State to raise cybersecurity preparedness.

In 2023, North Carolina reported the highest number of cybercrimes in the "personal data breach" sector, which can be seen in **Table 5.35** below.

TABLE 5.35: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2023

Crime Type by Victim Count			
Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
Advanced Fee	211	Lottery/Sweepstakes/Inheritance	119
BEC	596	Malware	20
Botnet	13	No Lead Value	1,122
Confidence/Romance	453	Non-payment/Non-Delivery	1,295
Credit Card/Check Fraud	337	Other	186
Crimes Against Children	46	Overpayment	115
Data Breach	93	Personal Data Breach	1,571
Employment	402	Phishing/Spoofing	150
Extortion	1,269	Ransomware	59
Government Impersonation	410	Real Estate	242
Harassment/Stalking	284	SIM Swap	18
IPR/Copyright and Counterfeit	33	Tech Support	1,032
Identity Theft	454	Threats of Violence	44
Investment	692		
Descriptors*			
Cryptocurrency	996	Cryptocurrency Wallet	480

Source: FBI Internet Crime Complaint Center, 2023

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 Changing Future Conditions

Unlike other hazards discussed in this plan, climate change is unlikely to affect the occurrence or frequency of future cyberattack incidents. Ongoing preparedness and training efforts will remain especially important as global data usage trends and cyberattack threats evolve in future years.

5.17.5 Probability of Future Occurrences

As the world's dependency on technology grows, the possibility of experiencing cyberattacks rises as well. Although there have not been severe past occurrences in the region, the growing risks of cyberattack capabilities suggest they are possible (1 to 10 percent annual probability) 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
- 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 Changing Future Conditions

Unlike other hazards discussed in this plan, climate change is unlikely to affect the occurrence or frequency of potential EMP incidents. One of the most problematic threats of EMPs is a widespread lack of general understanding regarding potential consequences among local, state, and federal entities. As technological innovation grows, updated information on this unique hazard can then be distributed.

5.18.5 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 CIVIL DISTURBANCE

5.19.1 Background and Description

Civil disturbances often refer to incidents in which multiple people knowingly act against established laws or regulations, with a common goal of bringing attention to a specific cause or larger sociopolitical movement. Modern laws have evolved in response to the changing understanding and real-world applications by which to peacefully resolve civil conflict. In the United States, "freedom of assembly" is a constitutional protection for peaceful and lawful purposes among the public. However, assemblies that are not peaceful or lawful (e.g., angry mobs) do not receive these same legal protections. The laws covering disruptive and disorderly conduct are generally grouped into various offenses that disturb the public peace ranging from general misdemeanors up to severe felonies.

When a riot or similar public disturbance occurs, local law enforcement agencies are initially mobilized and responsible for addressing the event. If local law enforcement agencies lack sufficient capacity or become overwhelmed by the response effort, state law enforcement agencies may be deployed. According to the North Carolina Emergency Operations Plan (NCEOP), the State Emergency Response Team (SERT) Emergency Services Branch will coordinate state law enforcement activities during public disturbances, riots and/or emergency situations. In extreme cases, the Governor of North Carolina has the authority to mobilize the National Guard to protect persons and property and restore order.

The extent of any civil disturbance incident will often depend on the scale and crowd size of that event in conjunction with its location. The more widespread a civil incident is, the greater the likelihood of significant injuries, loss of life, and extensive property damage. Rapid containment of the event by law enforcement is especially critical in minimizing the number of injuries and damages.

A book published by the University of Minnesota, *Sociology: Understanding and Changing the Social World*, discusses the typology of crowds based on the differences observed between the gathering purpose and existing dynamics between the participants. A crowd is generally recognized to be a temporary gathering of people without any real social relationships present between them. Building off the work of sociologist Herbert Blumer, the book explicitly distinguishes five crowd categories:

- **Casual Crowd –** A random collection of people gathered somewhere at the same time. The crowd has no shared identity or purpose. This type of crowd can include shoppers and tourists among many others. The likelihood of any violence is basically nonexistent.
- **Conventional Crowd –** A collection of people who gather for a shared purpose or activity, like a big dance, a sporting event, or a festival/concert. Crowd behavior is relatively structured and would require substantial provocation to arouse any kind of violence.
- **Expressive Crowd –** A collection of people who gather for some kind of excitement and to express at least one emotion. Examples of this crowd can include a political rally or loosely structured protests.
- **Protest Crowd –** A collection of people who gather to directly protest a targeted political, social, cultural, or economic issue. People in these types of crowds may engage in various activities together through sit-ins, demonstrations, or marches/rallies.
- **Acting Crowd –** A collection of people specifically assembled for a guiding purpose. Acting crowds tend to be more impulsive, more emotional, and require only minimal stimulation to be spurred into violence. Acting crowds can quickly spiral into large and uncontrollable riots depending on the circumstances.

5.19.2 Location and Spatial Extent

Civil disturbances can materialize from a variety of different circumstances and societal factors. The driving forces may be spontaneous or a direct result of escalating tensions. The most likely locations for this specific hazard are areas with large numbers of people clustered together. Sites preparing for political or other interest-based events/rallies should often be assessed as hotspot potential locations for a civil disturbance incident. Arenas and stadiums capable of hosting thousands of people at a time are other areas of concern as well. A civil disturbance incident may also spill over into surrounding areas beyond where an initial "trigger event" occurred.

5.19.3 Historical Occurrences

There is at least one major example of a community-wide civil disturbance in the Cleveland Gaston Lincoln Region. In July 2020, a customer at an ice cream shop in Gastonia was arrested after a verbal confrontation and was met with a significant response by law enforcement. Subsequent reactions to this incident led to several days of intense protests and demonstrations from various groups in the local community, with multiple arrests following around the site of the incident and a nearby courthouse. Police also had to shut down parts of Franklin Boulevard to manage the large size of gathering crowds.

5.19.4 Changing Future Conditions

While climate change would not necessarily have a direct impact on civil disturbances, the ongoing climate crisis could present a cause for civil disorder in the Cleveland Gaston Lincoln Region related to "climate security" risks. Climate change projections, previously discussed across the natural hazards included in this plan, could eventually lead to extreme weather events that exacerbate issues of drought, flooding, severe storms, and other pressing hazards with the potential to damage socio-ecological systems and greatly reduce access to critical resources (e.g., water, food, energy) thereby upsetting general order in society.

5.19.5 Probability of Future Occurrences

Civil disturbances are bound to be recurrent on a local, regional, and national scale as they are unpredictable features of social life. The Cleveland Gaston Lincoln Region will continue to experience protests, demonstrations, and other energized gatherings across its various cities and communities that could ultimately lead to some form of disruptive behavior. Based on the unpredictable nature and few past occurrences of civil disturbance in the Cleveland Gaston Lincoln Region, the future probability of civil disturbance incidents is possible (between 1 to 10 percent annual probability).

5.20 FOOD EMERGENCY

5.20.1 Background and Description

According to the 2019 National Food and Agriculture Incident Annex (FAIA) to Federal Interagency Operational Plans (FIOPs) published by FEMA, a food emergency refers to the "adulteration and/or contamination, threatened or actual, of food that impacts or may impact human health or the safety or availability of the state's food supply". As noted in the 2023 State of North Carolina Hazard Mitigation Plan, food emergencies may stem from multiple distinct causes including inclement weather events (e.g., hurricanes, floods, droughts) or technological failures like power outages and storage system leaks that ultimately result in losses of edible foods. A food emergency may also alternatively stem from human activities, including either unintentional or intentional contamination leading to public health impacts. Food emergencies often have many compounding effects with infectious disease hazards.

Additionally, the 2023 Food Emergency Response Plan in Annex B of the North Carolina Emergency Operations Plan (NCEOP) indicates that North Carolina's impact related to the food and agricultural production, processing, and retail systems industry is:

- Valued at over **$68 billion**
- Employs approximately **20%** of the total workforce
- Makes it the **third most agriculturally diverse state** in the U.S.

A food emergency incident could have severe consequences across the larger industry including anywhere affected by regional food markets and may ultimately jeopardize the public health of any locally affected populations. It is important to note that food systems are inherently complex and refer to many different interrelated activities and groups that all affect how food is produced and eventually consumed by individuals. Generally speaking, a food system can be simplified into key broader components of (1) production, (2) processing, (3) distribution, and (4) consumption.

5.20.2 Location and Spatial Extent

No rating system exists for a relative assessment of food emergency scale and overall extent since many factors depend on a case-by-case basis. However, unsafe and/or unavailable food supplies have the potential to affect isolated communities and may affect the entire planning area in extreme instances.

5.20.3 Historical Occurrences

In October 2012, the Cleveland County Fair was impacted by an outbreak of E. coli that sickened over 100 attendees, with multiple hospitalizations and 1 death reported.

Additionally, in October 2014, nearly 70 people were sickened and 3 hospitalized after eating pork prepared by a member of a church conference in Bessemer City.

5.20.4 Changing Future Conditions

As weather patterns and the global climate continue to change in the future, the overall risk of food emergencies could begin to increase as well. According to the North Carolina Climate Science Report, it is likely that major droughts will increase in frequency and intensity due to higher temperatures and evaporation rates which may in turn create many new agricultural challenges. It should be noted that these factors can also affect the ability of pathogens to spread among both crops and livestock. Heavy precipitation from hurricanes and thunderstorms is also very likely to increase and create greater flooding risks throughout North Carolina. This may lead to emerging threats of a food emergency based

on historical trends observed regarding crop losses and subsequent contamination of edible crops from intense storm flooding.

5.20.5 Probability of Future Occurrences

Several past occurrences of this hazard in the form of foodborne illness or contamination have been documented in the Cleveland Gaston Lincoln Region. Historical data is noticeably limited for food emergencies resulting from any deliberate contamination of food, but the possibility of this risk still exists. Based on the unpredictable nature and occurrences of food emergencies in the Cleveland Gaston Lincoln Region, the future probability of food emergency incidents is possible (1 to 10 percent annual probability).

5.21 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, including the potential dynamics of changing future conditions (e.g., climate change) in the planning area.

5.21.1 Hazard Extent

Table 5.36 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 5.36 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 (Table 5.3). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. Each of the participating counties has received this ranking several times over the reporting period of 20+ years.
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 (Tables 5.10 and 5.11). 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 5.8) as well as the Fujita/Enhanced Fujita Scale (Tables 5.13 and 5.14). 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 73+ 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: 75 knots • Gaston County: 75 knots

	• Lincoln County: 90 knots Lightning: According to the Vaisala flash density map (Figure 5.9), the majority of the Cleveland Gaston Lincoln Region is located in an area that experiences roughly 16 to 32 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 5.21) and the Modified Mercalli Intensity (MMI) scale (Table 5.22) and the distance of the epicenter from the Cleveland Gaston Lincoln Region. According to data provided by the USGS and NOAA NCEI records, the greatest MMI to impact the region was reported on September 1, 1886, with an 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 Energy, Mineral, and Land Resources criteria (Table 5.25). Of the 299 dams in Cleveland Gaston Lincoln Region, 50 are classified as high hazard. • Cleveland County: 16 high hazard dams • Gaston County: 24 high hazard dams • Lincoln County: 10 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 the United States Geological Survey (USGS) 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	21.33
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.

Wildfires

Wildfire data was provided by the North Carolina Forest Service and is reported annually by county from 2003-2018. 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 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 severe hazardous materials incident reported in the region was 9,197 LGA released on the highway near Lincolnton on August 30, 2006. It should be noted that larger events are possible. • Cleveland County: 650LGA • Gaston County: 8,450LGA • Lincoln County: 9,197LGA
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 cyberattacks have been historically reported in the Cleveland Gaston Lincoln Region. Technology usage, however, is increasing. A cyberattack 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.
Civil Disturbance	Few major instances of civil disturbances have been identified in the Cleveland Gaston Lincoln Region. However, established social systems of the area are still changing every year in response to new social, political, and/or cultural events.
Food Emergency	Some instances of food emergencies, especially in the form of mass foodborne illness (e.g., *E. coli* and *Salmonella*) or contamination, have been historically reported in the Cleveland Gaston Lincoln Region. Additionally, established food systems of the area are still changing every year in response to new hazard events, changing climatic conditions, and evolving contamination threats.

5.21.2 Priority Risk Index

Results of the Hazard Identification and Risk Assessment (HIRA) process described in detail above were determined using a "Priority Risk Index" (PRI) methodology to help develop meaningful planning conclusions for the region. The guiding purpose of the PRI is to rate, categorize, and indicate priority among all potential hazards in the planning area. These ratings include high, moderate, or low risk hazards based on the scale described below. When combined with the quantitative data from the asset inventory and vulnerability assessment in the following section, the summary classifications developed using the PRI contribute to targeted prioritization and mitigation planning efforts related to hazards of higher risk. More specifically, it facilitates the identification of hazard mitigation opportunities for all of the jurisdictions in the region to consider as part of their proposed strategies.

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 Planning Committee 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[53], as summarized in **Table 5.37**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the Cleveland Gaston Lincoln Region, the highest PRI value out of 4.0 will indicate the hazard with the greatest potential priority. Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Hazard Mitigation Planning Committee who made recommendations to make changes to the final hazard rankings.

TABLE 5.37: 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	4	

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

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
		shutdown of critical facilities for 30 days or more.		
Spatial Extent	Negligible	Less than 1% of area affected	1	**20%**
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	**10%**
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	**10%**
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

5.21.3 Priority Risk Index Results

Table 5.38 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the Regional Hazard Mitigation Planning Committee. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.38: 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	Agricultural, Hydrological	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Excessive Heat		Likely	Critical	Large	More than 24 hours	More than 1 week	**3.1**
Hurricane and Coastal Hazards	Storm Surge, Severe Weather	Possible	Critical	Large	More than 24 hours	Less than 1 week	**2.7**
Tornadoes/ Thunderstorms	High Wind, Hail, Lightning	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	**3.1**
Severe Winter Weather	Snow, Blizzards,	Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.0**

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
	Wind Chill, Extreme Cold, Ice Storms, Freezing Rain						
Earthquakes		Possible	Limited	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
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 1 week	**2.5**
Flooding		Likely	Critical	Moderate	6 to 12 hours	Less than 1 week	**3.1**
Wildfires		Likely	Critical	Moderate	12 to 24 hours	More than 1 week	**3.0**
Infectious Disease	Vector-Borne Disease, Foreign Animal Disease	Likely	Critical	Large	More than 24 hours	More than 1 week	**3.1**
Technological Hazards							
Hazardous Substances	Hazardous Materials, Hazardous Chemicals, Oil Spill, Road/Rail Incidents	Likely	Limited	Small	Less than 6 hours	Less than 24 hours	**2.5**
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**
Terrorism	Explosive, Chemical, Radiological, Biological, Nuclear	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	**2.5**
Cyber	Mass power/utility disruption	Likely	Critical	Moderate	Less than 6 hours	More than 1 week	**3.2**
Electromagnetic Pulse		Unlikely	Critical	Moderate	12 to 24 hours	More than 1 week	**2.4**
Civil Disturbance		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Food Emergency		Possible	Critical	Moderate	More than 24 hours	More than 1 week	**2.6**

5.22 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 Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk. For the 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 5.39 ranks the hazards that were assessed in the update that were renamed to be consistent with the 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 5.39: 2025 CONCLUSIONS ON HAZARD RISK FOR THE CLEVELAND GASTON LINCOLN REGION

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

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. This description must include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP insured structures that have been repetitively damaged by floods. 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 dollar 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, previous Cleveland Gaston Lincoln Region 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 6.28**.

6.2.2 GIS-Based Analysis

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

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

[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 beyond what is reported by NCDEQ. Further, USACE and NCDEQ also complete separate dam failure plans to identify risk and response measures.

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[2]. 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 Pro™ 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 in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2020 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 data 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 North Carolina Emergency Management (NCEM)-Risk Management (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 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 2020 Decennial 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.

[2] **Note that geospatial attributes, coordinates, and/or addresses of some jurisdictional facilities may be outdated** and recent changes in location or operations may not be corrected in the latest data release from various sources. This note applies to all georeferenced/GIS planning datasets used within this plan update.

With all information combined in 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 documentation, 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 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 the 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 from the Southern Wildfire Risk Assessment (SWRA). 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[3]. 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, estimated number of buildings, and the total assessed value of improvements for participating areas of the Cleveland Gaston Lincoln Region (study

[3] 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.

area of vulnerability assessment)[4]. For reference, the total area of the Cleveland Gaston Lincoln Region is approximately 729,073 acres, or 1,139 square miles. The U.S. Census Bureau also notes the following information for each county as of vintage year 2023:

- **Cleveland County**
  - Land area in square miles (2020): 464.25
  - Population per square mile (2020): 214.4
  - Building permits (2023): 641
  - Total employer establishments (2022): 2,022

- **Gaston County**
  - Land area in square miles (2020): 355.75
  - Population per square mile (2020): 640.7
  - Building permits (2023): 1,578
  - Total employer establishments (2022): 4,580

- **Lincoln County**
  - Land area in square miles (2020): 295.85
  - Population per square mile (2020): 293.4
  - Building permits (2023): 677
  - Total employer establishments (2022): 2,014

TABLE 6.1: IMPROVED PROPERTY IN THE CLEVELAND GASTON LINCOLN REGION

Location[5]	Estimated Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Cleveland County	**60,202**	**$8,571,365,224**	**52,131**	**$6,050,709,300**
Belwood	809	$79,046,553	707	$42,417,605
Boiling Springs	1,871	$392,752,093	1,497	$324,967,081
Casar	278	$23,005,409	291	$15,075,457
Earl	186	$13,275,934	168	$9,735,994
Fallston	516	$54,854,845	394	$41,555,871
Grover	487	$43,656,602	388	$35,844,646
Kings Mountain	5,684	$1,313,430,398	5,011	$1,097,513,340
Kingstown	406	$22,623,982	299	$16,792,157
Lattimore	254	$29,126,882	206	$21,458,749
Lawndale	509	$23,652,431	355	$17,480,992
Mooresboro	257	$23,912,130	220	$15,358,032
Patterson Springs	272	$20,635,705	294	$15,045,388
Polkville	436	$42,204,761	351	$31,088,056
Shelby	11,478	$2,218,277,363	9,799	$1,745,371,272
Waco	202	$17,415,265	180	$13,289,170
Unincorporated Area	36,557	$4,253,494,871	31,971	$2,607,715,490
Gaston County	**112,272**	**$29,016,433,820**	**170,964**	**$26,504,985,850**

[4] 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.

[5] Number of buildings for each jurisdiction is based on the approximate number of building footprints.

Location[5]	Estimated Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Belmont	7,669	$3,170,415,690	6,989	$2,976,688,100
Bessemer City	3,143	$537,474,640	4,700	$512,902,950
Cherryville	3,294	$591,971,060	5,210	$565,991,060
Cramerton	2,840	$1,079,399,610	2,726	$1,009,082,560
Dallas	2,513	$504,755,060	3,109	$465,591,430
Gastonia	33,901	$9,980,792,570	42,282	$9,338,811,110
High Shoals	408	$61,614,750	611	$52,807,210
Lowell	1,961	$693,325,860	2,990	$612,137,520
McAdenville	531	$164,380,880	671	$148,512,900
Mount Holly	8,479	$2,781,769,590	9,358	$2,540,194,780
Ranlo	1,862	$431,915,880	2,658	$400,199,120
Stanley	1,969	$467,780,350	2,622	$458,834,960
Unincorporated Area	43,702	$8,550,837,880	87,038	$7,423,232,150
Lincoln County	**55,389**	**$17,803,321,858**	**57,682**	**$13,443,048,934**
Lincolnton	5,256	$1,817,072,109	5,925	$1,512,552,113
Unincorporated Area	50,133	$15,986,249,749	51,757	$11,930,496,821
CLEVELAND GASTON LINCOLN REGION TOTAL	**227,863**	**$55,391,120,902**	**280,692**	**$45,998,744,084**

Source: Local governments

The following table lists the fire stations, police stations, emergency operations centers (EOCs), licensed medical care facilities, schools, and other critical facilities located in the Cleveland Gaston Lincoln Region as listed on NC OneMap[6]. 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 6.28**, 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 using georeferenced data and updated municipal boundaries.

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

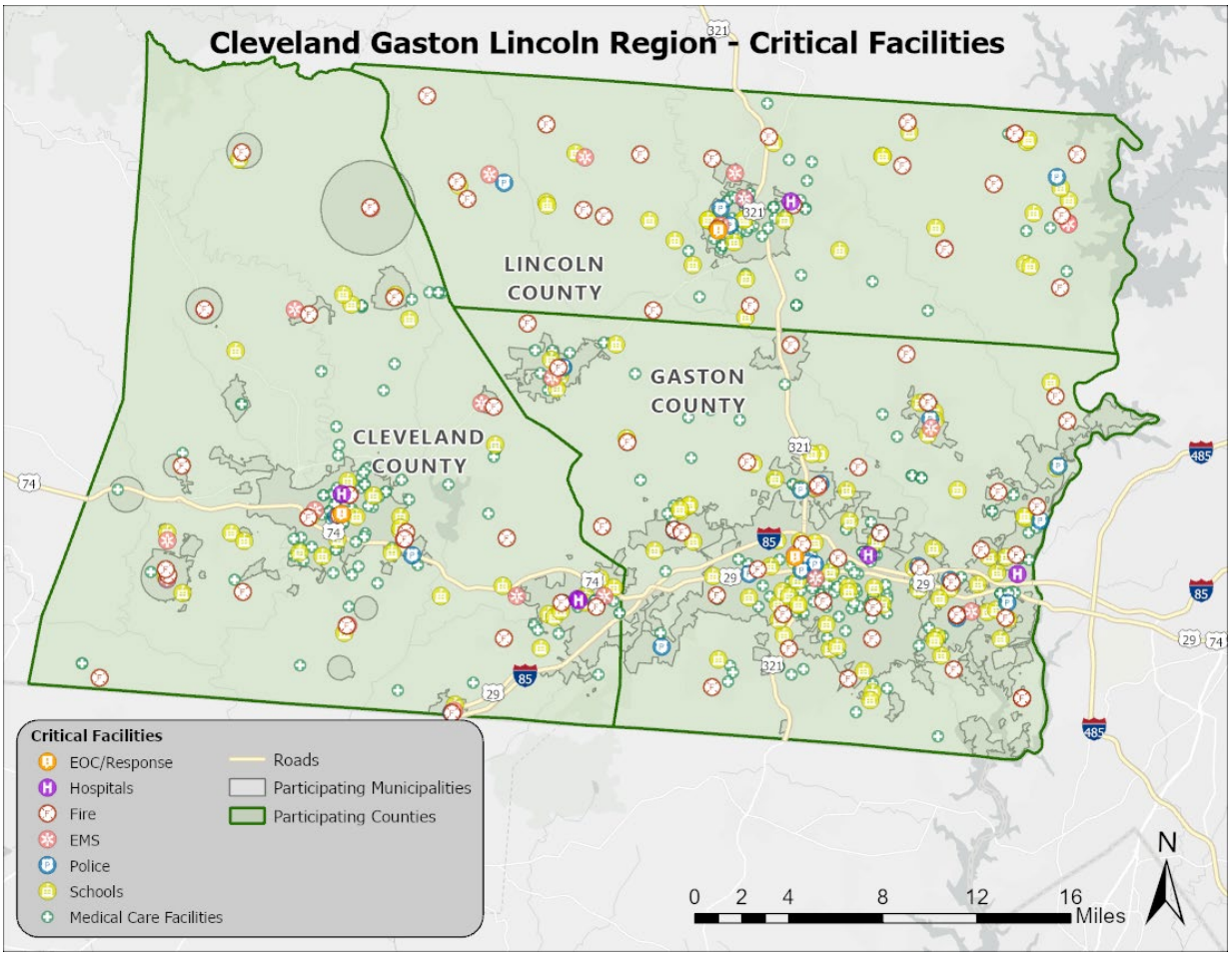
Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Cleveland County	**38**	**6**	**108**	**1**	**35**	**0**
Belwood	0	0	0	0	0	0
Boiling Springs	2	1	1	0	1	0
Casar	1	0	0	0	1	0
Earl	0	0	0	0	0	0
Fallston	1	0	3	0	1	0
Grover	4	1	2	0	1	0
Kings Mountain	6	1	15	0	8	0
Kingstown	0	0	2	0	0	0
Lattimore	1	0	0	0	0	0

[6] NC OneMap: https://www.nconemap.gov/

Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Lawndale	4	0	17	0	0	0
Mooresboro	1	0	3	0	0	0
Patterson Springs	0	0	0	0	0	0
Polkville	1	0	0	0	0	0
Shelby	15	3	64	1	10	0
Waco	2	0	0	0	0	0
Unincorporated Area	0	0	1	0	13	0
Gaston County	**44**	**17**	**151**	**1**	**73**	**75**
Belmont	6	1	13	0	6	4
Bessemer City	4	1	11	0	6	5
Cherryville	3	1	9	0	4	7
Cramerton	2	1	2	0	2	3
Dallas	3	2	6	0	1	9
Gastonia	13	4	97	1	25	26
High Shoals	1	0	0	0	0	1
Lowell	1	1	0	0	1	3
McAdenville	1	1	1	0	2	2
Mount Holly	5	2	6	0	4	6
Ranlo	1	1	0	0	1	1
Stanley	2	1	5	0	4	4
Unincorporated Area	2	1	1	0	17	4
Lincoln County	**30**	**5**	**52**	**1**	**31**	**4**
Lincolnton	12	3	45	1	8	4
Unincorporated Area	18	2	7	0	23	0
CLEVELAND GASTON LINCOLN REGION TOTAL	**112**	**28**	**311**	**3**	**139**	**79**

Source: Local governments, NC OneMap

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



Source: Local Governments, NC OneMap

6.4.2 Social Vulnerability

Social vulnerability is defined by FEMA through the National Risk Index methodology as "the susceptibility of social groups to the adverse impacts of hazards, including disproportionate death, injury, loss, or disruption of livelihood." In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess members of the resident population in the Cleveland Gaston Lincoln Region that are potentially at higher risk to these hazards.

Table 6.3 lists the population by county according to U.S. Census Bureau population estimates. The population estimates are updated using the most recent vintage tables as per 2018-2022 American Community Survey (ACS) 5-Year Estimates findings. The total population in the Cleveland Gaston Lincoln Region according to Census data is reported as 416,432. Key factors that may provide additional insights regarding socially vulnerable populations of the region include spoken language, disability status, and poverty status listed in the table below.

According to the Social Vulnerability Index (SVI)[7] published by the Centers for Disease Control and Prevention (CDC), 2022 findings are highly variable between the counties in the Cleveland Gaston Lincoln Region. The overall SVI score for Cleveland County is 0.8524 (high level of vulnerability) compared to 0.65 (medium to high level of vulnerability) for Gaston County and 0.2517 (low to medium level of vulnerability) for Lincoln County. Additionally, the Environmental Justice Index (EJI)[8] published by the CDC ranks census tracts by level of environmental burden using quartiles from low to high. Cleveland County contains roughly 15 tracts ranked as high and 5 ranked as moderate to high, whereas Gaston County contains 26 high and 14 moderate to high tracts, and Lincoln County contains 4 high and 2 moderate to high tracts.

Additionally, the FEMA National Risk Index (NRI)[9] provides base ratings of risk index, social vulnerability, and community resilience by county using established and vetted assessment methodologies. Community resilience is defined by FEMA through the NRI methodology as "the ability of a community to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions." This information is updated as of 2024 and associated tables and reports can be viewed using the NRI tool.

For Cleveland County, the risk index rating is relatively low (70.57 out of 100) and social vulnerability is rated as very high (87.6 out of 100) compared to relatively low community resilience (35.0 out of 100). For Gaston County, the risk index rating is relatively low (81.55) and social vulnerability is rated as relatively high (71.7) compared to relatively moderate community resilience (52.8). For Lincoln County, the risk index rating is relatively low (64.94) and social vulnerability is rated as relatively low (33.7) compared to relatively moderate community resilience (52.6).

[7] CDC/ATSDR Social Vulnerability Index: https://www.atsdr.cdc.gov/placeandhealth/svi/index.html
[8] CDC/ATSDR Environmental Justice Index: https://www.atsdr.cdc.gov/placeandhealth/eji/index.html
[9] FEMA National Risk Index: https://hazards.fema.gov/nri/

TABLE 6.3: TOTAL POPULATION IN THE CLEVELAND GASTON LINCOLN REGION

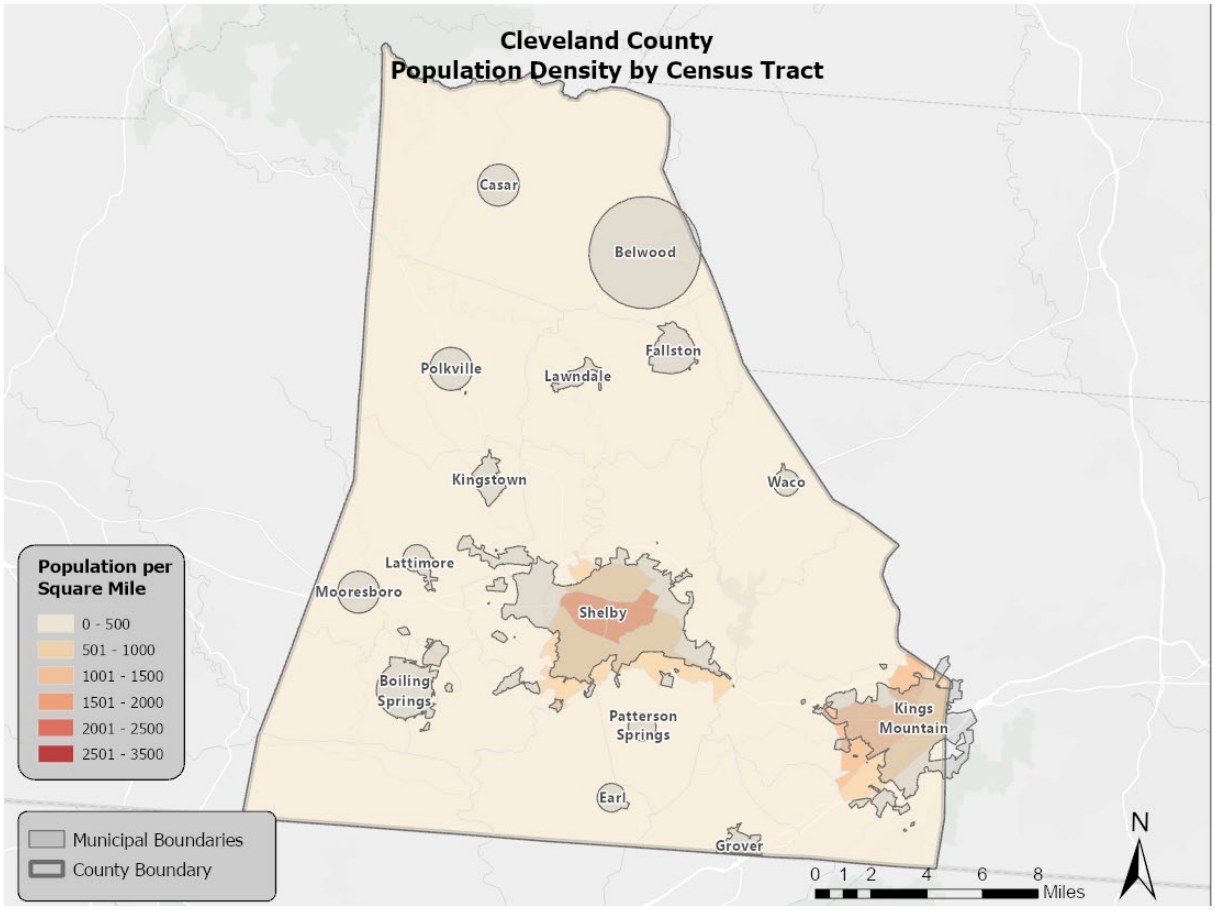
Location	2022 Population Estimates	% population speaking a language other than English	% population with a disability	% population below the poverty level
Cleveland County	99,527	4.5%	16.2%	18.4%
Gaston County	228,972	8.5%	14.7%	12.4%
Lincoln County	87,933	7.8%	14.4%	9.3%
REGION TOTAL	**416,432**	--	--	--

Source: US Census Bureau, 2022 ACS 5-Year Estimates

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

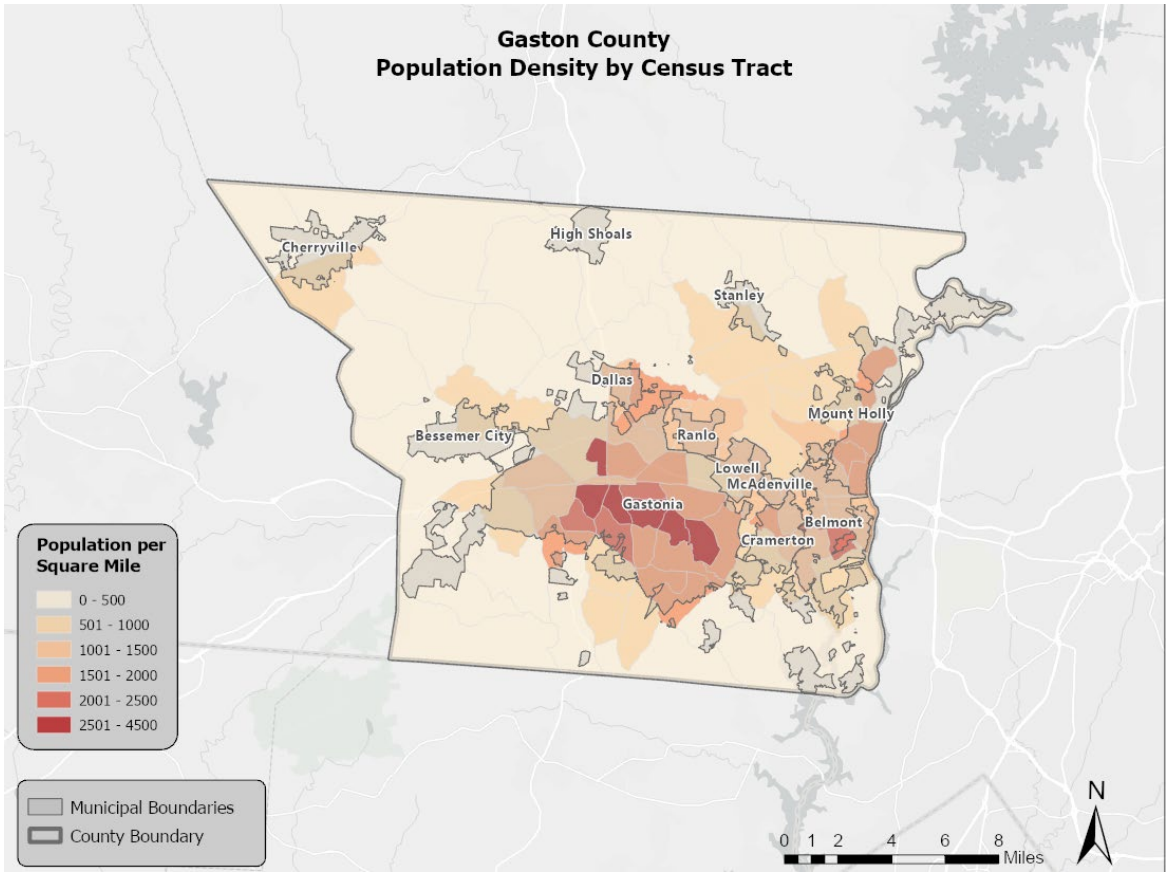
In addition, **Figures 6.2, 6.3, and 6.4** illustrate the population density by census tract for each county as it was reported by the US Census Bureau in the 2020 Decennial Census.

FIGURE 6.2: POPULATION DENSITY IN CLEVELAND COUNTY



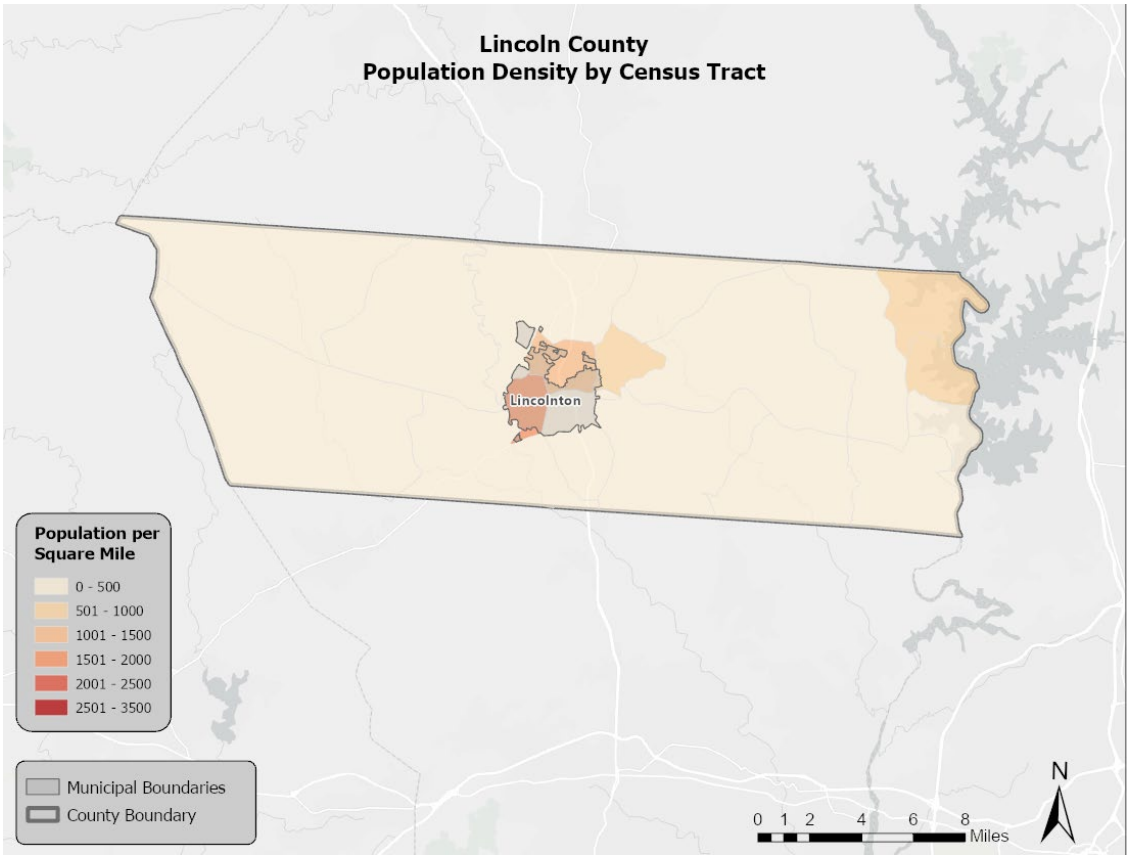
Source: US Census Bureau

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 2020), the Cleveland Gaston Lincoln Region has experienced limited growth and development. **Table 6.4** shows the number of building units constructed since 2010 and 1970 compared to recently updated totals by jurisdiction according to the US Census Bureau.

TABLE 6.4: BUILDING COUNTS FOR THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Total Housing Units (2022)	Units Built 2010 Or Later	% Building Stock Built Post-2010	Units Built 1970 Or Later	% Building Stock Built Post-1970
Cleveland County	**43,782**	**2,034**	**4.7%**	**29,823**	**68.1%**
Belwood	433	21	4.9%	325	75.1%
Boiling Springs	1,216	39	3.2%	1,034	85.0%
Casar	178	4	2.2%	128	71.9%
Earl	223	2	0.9%	153	68.6%
Fallston	347	17	4.9%	184	53.0%
Grover	304	0	0.0%	147	48.4%
Kingstown	308	0	0.0%	239	77.6%
Kings Mountain	4,598	287	6.2%	2,652	57.7%
Lattimore	122	3	2.5%	61	50.0%

Jurisdiction	Total Housing Units (2022)	Units Built 2010 Or Later	% Building Stock Built Post-2010	Units Built 1970 Or Later	% Building Stock Built Post-1970
Lawndale	311	2	0.6%	83	26.7%
Mooresboro	144	12	8.3%	71	49.3%
Patterson Springs	328	11	3.4%	161	49.1%
Polkville	257	0	0.0%	140	54.5%
Shelby	11,005	298	2.7%	5,685	51.7%
Waco	153	5	3.3%	79	51.6%
Unincorporated Area	23,855	1,333	5.6%	18,681	78.3%
Gaston County	**98,616**	**9,701**	**9.8%**	**63,972**	**64.9%**
Belmont	6,332	1,732	27.3%	4,506	71.2%
Bessemer City	2,451	47	1.9%	1,445	59.0%
Cherryville	2,708	103	3.8%	1,310	48.4%
Cramerton	2,382	561	23.6%	1,689	70.9%
Dallas	2,349	382	16.3%	1,563	66.5%
Gastonia	34,467	3,313	9.6%	21,231	61.6%
High Shoals	287	22	7.7%	168	58.5%
Lowell	1,525	47	3.1%	734	48.1%
McAdenville	498	258	51.8%	383	76.9%
Mount Holly	7,334	1,301	17.8%	5,175	70.6%
Ranlo	1,679	221	13.2%	1,084	64.6%
Spencer Mountain	0	0	0.0%	0	0.0%
Stanley	1,539	131	8.5%	749	48.7%
Unincorporated Area	35,065	1,583	4.5%	23,935	68.3%
Lincoln County	**37,715**	**4,694**	**12.4%**	**29,689**	**78.7%**
Lincolnton	5,164	344	6.7%	2,665	51.6%
Unincorporated Area	32,551	4,350	13.4%	27,024	83.0%
Cleveland Gaston Lincoln Region Total	**180,113**	**16,429**	**9.1%**	**123,484**	**68.6%**

Source: US Census Bureau, 2022 ACS 5-Year Estimates

Table 6.5 shows population growth estimates for the region from 2020 to 2022, with 2010 totals for reference, based on the US Census Decennial data and 2022 ACS 5-Year population estimates.

TABLE 6.5: POPULATION GROWTH IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Population Estimates				% Change 2010-2020
	2010	2020	2021	2022	
Cleveland County	**98,030**	**99,519**	**98,898**	**99,527**	**1.5%**
Belwood	949	857	1,143	1,103	-9.7%
Boiling Springs	4,641	4,615	4,511	4,622	-0.6%
Casar	297	305	380	391	2.7%
Earl	260	198	321	358	-23.8%
Fallston	606	627	718	670	3.5%

Jurisdiction	Population Estimates				% Change 2010-2020
	2010	2020	2021	2022	
Grover	707	802	577	598	13.4%
Kingstown	823	656	491	533	-20.3%
Kings Mountain	10,631	11,142	10,775	11,246	4.8%
Lattimore	426	406	618	557	-4.7%
Lawndale	696	570	621	599	-18.1%
Mooresboro	354	293	200	204	-17.2%
Patterson Springs	554	571	852	854	3.1%
Polkville	672	516	516	500	-23.2%
Shelby	20,417	21,918	21,564	21,712	7.4%
Waco	257	310	300	278	20.6%
Gaston County	**206,150**	**227,943**	**226,097**	**228,972**	**10.6%**
Belmont	10,252	15,010	14,442	14,842	46.4%
Bessemer City	5,342	5,428	5,452	5,472	1.6%
Cherryville	5,761	6,078	6,044	6,113	5.5%
Cramerton	4,168	5,296	5,190	5,294	27.1%
Dallas	4,492	5,927	5,777	5,889	31.9%
Gastonia	71,757	80,411	79,483	80,615	12.1%
High Shoals	695	595	659	675	-14.4%
Lowell	3,527	3,654	3,620	3,692	3.6%
McAdenville	650	890	1,019	1,125	36.9%
Mount Holly	13,662	17,703	17,315	17,644	29.6%
Ranlo	3,436	4,511	4,395	4,487	31.3%
Spencer Mountain	37	0	0	0	-100.0%
Stanley	3,558	3,963	3,911	3,967	11.4%
Lincoln County	**78,400**	**86,810**	**85,670**	**87,933**	**10.7%**
Lincolnton	10,503	11,091	10,926	11,225	5.6%
Cleveland Gaston Lincoln Region Total	**382,580**	**414,272**	**410,665**	**416,432**	**8.3%**

Source: US Census Bureau

Based on the above data, the rate of residential development and population growth in the region since 2020 has increased very slightly. Changes in development may have not significantly 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, those populations and associated infrastructure will be increasingly 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 authoritative data, analysis would not lead to credible results (sinkholes, erosion, dam failure, infectious disease, terrorism, cyber, EMP, civil disturbance, and food emergency). The total regional exposure of critical facilities, and thus risk, is presented in **Table 6.28**.

The annualized loss estimate for all hazards, where available, is presented at the end of this section in **Table 6.26.** For additional information related to vulnerability and expected annual losses for a wide

range of hazards, the FEMA NRI[10] is a publicly available online tool that allows users to create reports and download data for both county and census tract geographies.

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 and tropical storms in the region (Hurricane Hugo, Tropical Storm Frances, and Tropical Storm Helene). 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 (RMT) 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 from hurricanes 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	**41,548**	**48,873**	**$17,580,462**	**3,311**	**$8,477,392**	**745**	**$1,559,534**	**52,929**	**$27,617,386**
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	6,037	7,300	$2,678,176	568	$2,882,739	136	$362,739	8,004	$5,923,654
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
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

[10] FEMA National Risk Index: https://hazards.fema.gov/nri/

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	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	21,719	26,005	$8,958,393	1,152	$2,349,370	223	$689,195	27,380	$11,996,958
Gaston County	**73,916**	**106,751**	**$20,869,643**	**9,147**	**$4,078,786**	**2,032**	**$1,972,389**	**117,930**	**$26,920,818**
Belmont	3,931	5,791	$1,436,414	402	$265,325	162	$110,542	6,355	$1,812,281
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	1,432	2,833	$695,181	177	$70,816	51	$50,164	3,061	$816,160
Dallas	1,853	2,168	$410,562	190	$39,456	106	$32,292	2,464	$482,310
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	688	1,152	$149,036	81	$18,440	31	$5,667	1,264	$173,143
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	423	488	$120,628	52	$34,108	18	$5,733	558	$160,468
Mount Holly	3,411	5,770	$1,378,306	541	$367,472	106	$58,187	6,417	$1,803,965
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	38	1	$124	35	$13,258	2	$324	38	$13,707
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,058	42,028	$6,039,809	2,678	$844,860	497	$414,612	45,203	$7,299,282
Lincoln County	**18,963**	**43,906**	**$13,688,289**	**3,794**	**$6,354,139**	**510**	**$2,832,093**	**48,210**	**$22,874,520**
Lincolnton	6,028	6,770	$2,072,276	786	$1,064,622	156	$222,782	7,712	$3,359,679
Unincorporated Area	12,935	37,136	$11,616,013	3,008	$5,289,517	354	$2,609,311	40,498	$19,514,841
Cleveland Gaston Lincoln Region Total	**134,427**	**199,530**	**$52,138,394**	**16,252**	**$18,910,317**	**3,287**	**$6,364,016**	**219,069**	**$77,412,724**

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	**9,554**	**3,229**	**54,693**
Belwood	106	33	799
Boiling Springs	405	287	3,104
Casar	14	5	109
Earl	23	12	164
Fallston	61	16	282
Grover	40	13	233
Kingstown	33	12	189
Kings Mountain	3,211	877	17,254
Lattimore	29	10	166
Lawndale	24	6	111

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Mooresboro	46	17	267
Patterson Springs	43	9	242
Polkville	30	7	122
Shelby	5,246	1,217	23,893
Waco	27	10	155
Unincorporated Area	216	698	7,603
Gaston County	**12,104**	**4,242**	**76,497**
Belmont	2,489	1,071	15,911
Bessemer City	737	368	5,673
Cherryville	1,185	337	6,352
Cramerton	1,217	381	7,689
Dallas	698	193	3,804
Gastonia	14,301	5,441	85,293
High Shoals	219	80	1,467
Lowell	618	142	3,911
McAdenville	383	81	2,317
Mount Holly	1,572	577	11,993
Ranlo	516	284	3,678
Spencer Mountain	61	35	458
Stanley	1,545	420	6,146
Unincorporated Area	0	0	0
Lincoln County	**15,478**	**3,826**	**82,805**
Lincolnton	2,079	1,007	13,274
Unincorporated Area	13,399	2,819	69,531
Cleveland Gaston Lincoln Region Total	**37,136**	**11,297**	**213,995**

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 from hurricanes and coastal hazards. Timely sheltering/evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe hurricane.

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 6.28** 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 numerous fatalities, road closures, water contamination, gas leaks, 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	**41,571**	**48,902**	**$5,843,276,509**	**3,312**	**$4,068,564,677**	**745**	**$764,184,548**	**52,959**	**$10,676,025,738**
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	6,037	7,300	$893,510,474	568	$1,074,126,130	136	$140,668,031	8,004	$2,108,304,636
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	21,742	26,034	$2,923,581,781	1,153	$1,240,731,370	223	$243,093,034	27,410	$4,407,406,186
Gaston County	**73,961**	**106,825**	**$8,712,225,188**	**9,163**	**$4,445,219,510**	**2,033**	**$1,188,593,568**	**118,021**	**$14,346,038,269**
Belmont	3,931	5,791	$596,177,471	402	$345,416,767	162	$99,405,677	6,355	$1,040,999,915
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	1,432	2,833	$317,083,866	177	$90,431,076	51	$28,319,034	3,061	$435,833,976
Dallas	1,853	2,168	$175,895,252	190	$62,542,655	106	$50,117,719	2,464	$288,555,626
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	687	1,152	$79,005,564	81	$21,558,599	31	$7,512,226	1,264	$108,076,388
Lowell	1,667	1,987	$154,086,322	235	$111,503,549	57	$33,244,719	2,279	$298,834,590
McAdenville	423	488	$48,777,906	52	$69,409,298	18	$8,647,104	558	$126,834,308
Mount Holly	3,411	5,770	$626,175,373	541	$303,474,271	106	$58,815,279	6,417	$988,464,923
Ranlo	1,370	1,709	$143,743,108	92	$111,723,083	26	$16,027,705	1,827	$271,493,897

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
Spencer Mountain	38	1	$53,819	35	$10,918,848	2	$805,478	38	$11,778,145
Stanley	4,863	4,875	$374,941,792	272	$169,826,968	69	$51,676,715	5,216	$596,445,475
Uninc. Area	23,104	42,102	$2,631,352,759	2,694	$727,084,726	498	$245,681,486	45,294	$3,604,118,972
Lincoln County	**18,963**	**43,906**	**$4,623,084,518**	**3,794**	**$3,596,171,135**	**510**	**$668,104,774**	**48,210**	**$8,887,360,427**
Lincolnton	6,028	6,770	$758,994,378	786	$932,220,331	156	$135,845,813	7,712	$1,827,060,522
Uninc. Area	12,935	37,136	$3,864,090,140	3,008	$2,663,950,804	354	$532,258,961	40,498	$7,060,299,905
Cleveland Gaston Lincoln Region Total	**134,495**	**199,633**	**$19,178,586,215**	**16,269**	**$12,109,955,322**	**3,288**	**$2,620,882,890**	**219,190**	**$33,909,424,434**

Source: NCEM Risk Management Tool

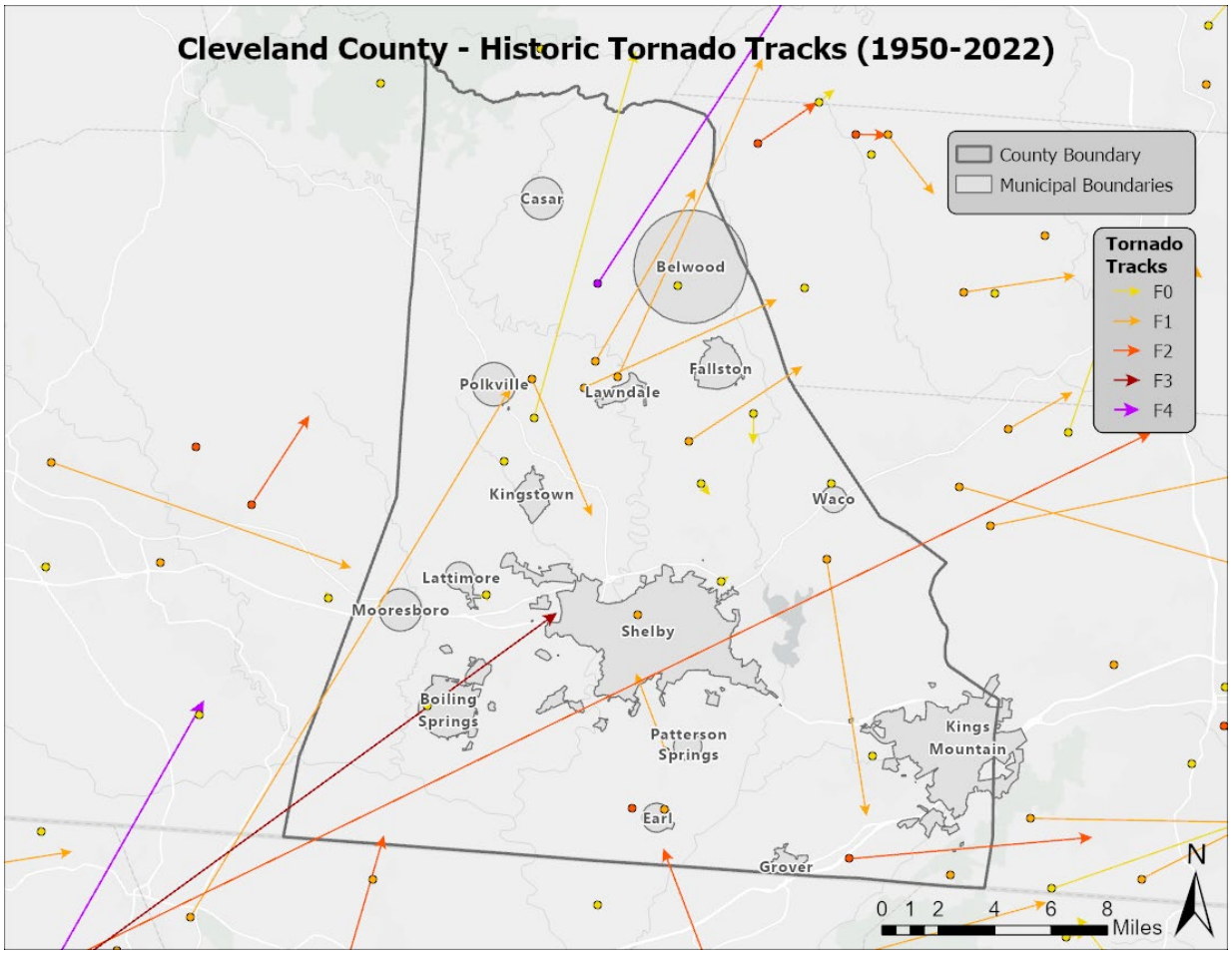
TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD IN THE CLEVELAND GASTON LINCOLN REGION

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cleveland County	**18,903**	**5,764**	**101,844**
Belwood	106	33	799
Boiling Springs	405	287	3,104
Casar	14	5	109
Earl	23	12	164
Fallston	61	16	282
Grover	40	13	233
Kingstown	33	12	189
Kings Mountain	3,211	877	17,254
Lattimore	29	10	166
Lawndale	24	6	111
Mooresboro	46	17	267
Patterson Springs	43	9	242
Polkville	30	7	122
Shelby	5,246	1,217	23,893
Waco	27	10	155
Unincorporated Area	9,565	3,233	54,754
Gaston County	**37,666**	**13,659**	**231,324**
Belmont	2,489	1,071	15,911
Bessemer City	737	368	5,673
Cherryville	1,185	337	6,352
Cramerton	1,217	381	7,689
Dallas	698	193	3,804
Gastonia	14,301	5,441	85,293
High Shoals	219	80	1,467
Lowell	618	142	3,911
McAdenville	383	81	2,317
Mount Holly	1,572	577	11,993
Ranlo	516	284	3,678
Spencer Mountain	61	35	458
Stanley	1,545	420	6,146
Unincorporated Area	12,125	4,249	76,632
Lincoln County	**17,557**	**4,833**	**96,079**
Lincolnton	2,079	1,007	13,274
Unincorporated Area	15,478	3,826	82,805
Cleveland Gaston Lincoln Region Total	**74,126**	**24,256**	**429,247**

Source: NCEM Risk Management Tool

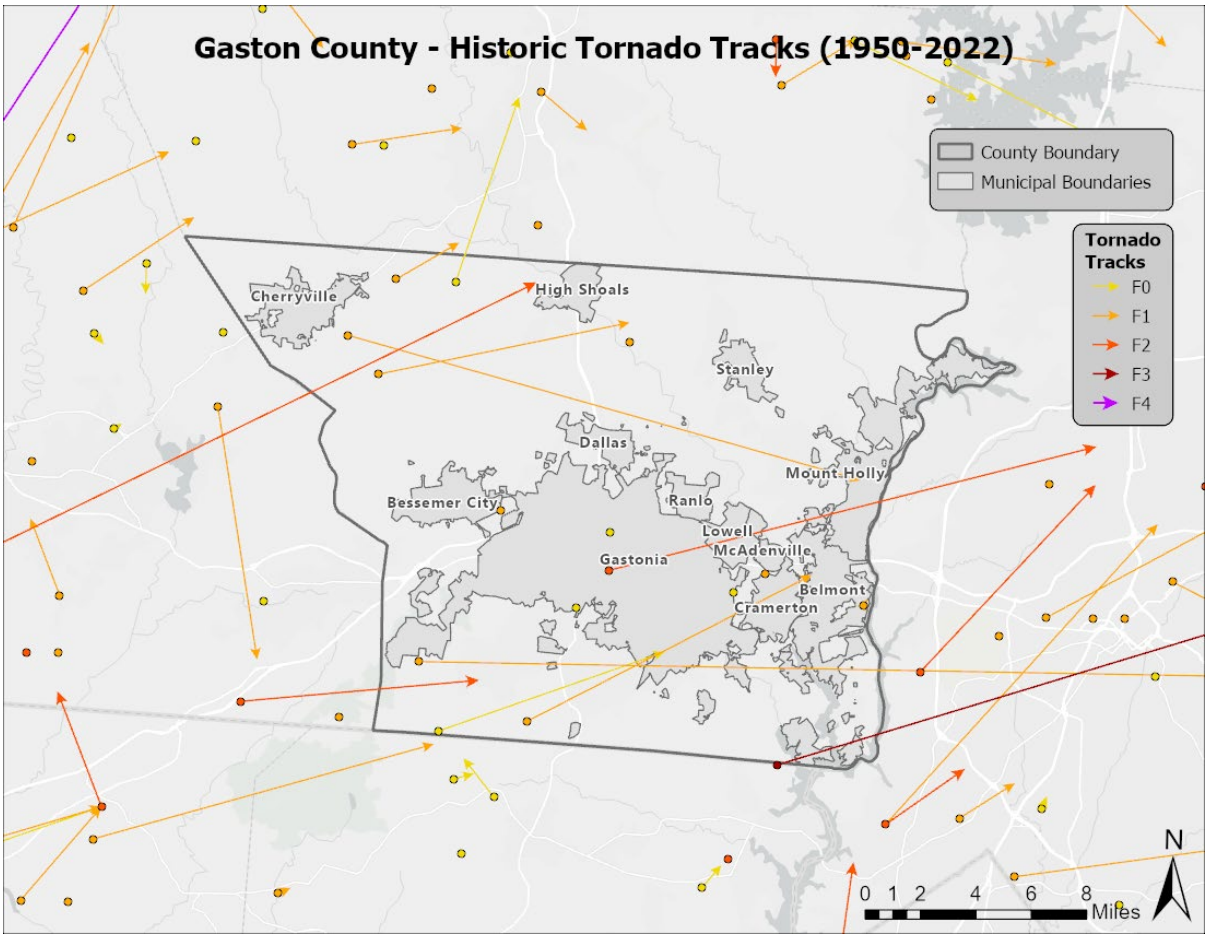
A map of historical tornado points of origin and paths can be seen below in **Figures 6.5, 6.6, and 6.7**.

FIGURE 6.5: HISTORIC TORNADO TRACKS IN CLEVELAND COUNTY



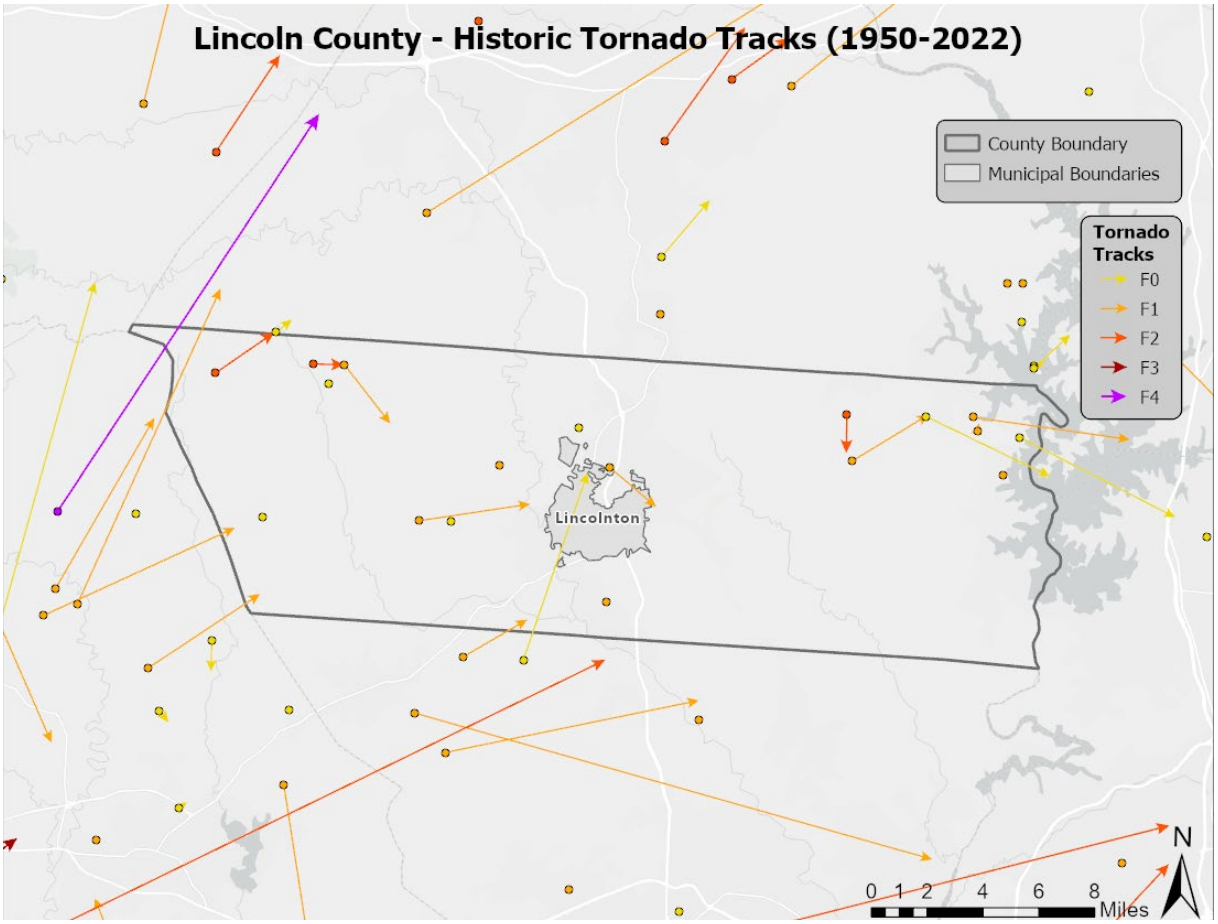
Source: NOAA

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 potential damages caused by other remnants of thunderstorms, such as lightning or hail. The RMT 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	**41,548**	**48,873**	**$17,580,462**	**3,311**	**$8,477,392**	**745**	**$1,559,534**	**52,929**	**$27,617,386**
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

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
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	6,037	7,300	$2,678,176	568	$2,882,739	136	$362,739	8,004	$5,923,654
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
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	21,719	26,005	$8,958,393	1,152	$2,349,370	223	$689,195	27,380	$11,996,958
Gaston County	**73,916**	**106,751**	**$20,869,643**	**9,147**	**$4,078,786**	**2,032**	**$1,972,389**	**117,930**	**$26,920,818**
Belmont	3,931	5,791	$1,436,414	402	$265,325	162	$110,542	6,355	$1,812,281
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	1,432	2,833	$695,181	177	$70,816	51	$50,164	3,061	$816,160
Dallas	1,853	2,168	$410,562	190	$39,456	106	$32,292	2,464	$482,310
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	688	1,152	$149,036	81	$18,440	31	$5,667	1,264	$173,143
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	423	488	$120,628	52	$34,108	18	$5,733	558	$160,468
Mount Holly	3,411	5,770	$1,378,306	541	$367,472	106	$58,187	6,417	$1,803,965
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	38	1	$124	35	$13,258	2	$324	38	$13,707
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,058	42,028	$6,039,809	2,678	$844,860	497	$414,612	45,203	$7,299,282
Lincoln County	**18,963**	**43,906**	**$13,688,289**	**3,794**	**$6,354,139**	**510**	**$2,832,093**	**48,210**	**$22,874,520**
Lincolnton	6,028	6,770	$2,072,276	786	$1,064,622	156	$222,782	7,712	$3,359,679
Unincorporated Area	12,935	37,136	$11,616,013	3,008	$5,289,517	354	$2,609,311	40,498	$19,514,841
Cleveland Gaston Lincoln Region Total	**134,427**	**199,530**	**$52,138,394**	**16,252**	**$18,910,317**	**3,287**	**$6,364,016**	**219,069**	**$77,412,724**

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	**18,892**	**5,760**	**101,783**
Belwood	106	33	799
Boiling Springs	405	287	3,104
Casar	14	5	109
Earl	23	12	164
Fallston	61	16	282
Grover	40	13	233
Kingstown	33	12	189
Kings Mountain	3,211	877	17,254
Lattimore	29	10	166
Lawndale	24	6	111
Mooresboro	46	17	267
Patterson Springs	43	9	242
Polkville	30	7	122
Shelby	5,246	1,217	23,893
Waco	27	10	155
Unincorporated Area	9,554	3,229	54,693
Gaston County	**37,645**	**13,652**	**228,872**
Belmont	2,489	1,071	15,911
Bessemer City	737	368	5,673
Cherryville	1,185	337	6,352
Cramerton	1,217	381	7,689
Dallas	698	193	3,804
Gastonia	14,301	5,441	85,293
High Shoals	219	80	1,467
Lowell	618	142	3,911
McAdenville	383	81	2,31
Mount Holly	1,572	577	11,993
Ranlo	516	284	3,678
Spencer Mountain	61	35	458
Stanley	1,545	420	6,146
Unincorporated Area	12,104	4,242	76,497
Lincoln County	**17,557**	**4,833**	**96,079**
Lincolnton	2,079	1,007	13,274
Unincorporated Area	15,478	3,826	82,805
Cleveland Gaston Lincoln Region Total	**74,094**	**24,245**	**426,734**

Source: NCEM RMT

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk of the tornadoes/thunderstorms hazard. Timely sheltering/evacuations of elderly and young individuals,

disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe tornado or thunderstorm event.

CRITICAL FACILITIES

All critical facilities should still be considered at-risk of damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.28**.

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 RMT 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	**41,571**	**48,902**	**$12,150,506**	**3,312**	**$16,876,625**	**745**	**$3,610,256**	**52,959**	**$32,637,390**
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	6,037	7,300	$1,938,346	568	$4,261,252	136	$650,612	8,004	$6,850,210
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	21,742	26,034	$5,798,598	1,153	$4,859,027	223	$1,161,515	27,410	$11,819,139
Gaston County	**73,961**	**106,825**	**$14,083,265**	**9,163**	**$19,062,645**	**2,033**	**$5,285,663**	**118,021**	**$38,431,573**
Belmont	3,931	5,791	$958,346	402	$1,532,320	162	$459,268	6,355	$2,949,934
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	1,432	2,833	$494,928	177	$394,008	51	$114,981	3,061	$1,003,917
Dallas	1,853	2,168	$299,242	190	$282,217	106	$200,727	2,464	$782,186

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
Gastonia	23,256	30,019	$4,800,727	3,466	$8,886,589	710	$2,291,328	34,195	$15,978,644
High Shoals	687	1,152	$118,462	81	$81,671	31	$31,007	1,264	$231,141
Lowell	1,667	1,987	$238,032	235	$492,669	57	$146,561	2,279	$877,262
McAdenville	423	488	$75,540	52	$286,600	18	$34,828	558	$396,968
Mount Holly	3,411	5,770	$902,573	541	$1,206,321	106	$262,843	6,417	$2,371,737
Ranlo	1,370	1,709	$214,887	92	$433,239	26	$76,675	1,827	$724,801
Spencer Mountain	38	1	$69	35	$40,344	2	$2,220	38	$42,633
Stanley	4,863	4,875	$555,629	272	$630,105	69	$216,069	5,216	$1,401,803
Unincorporated Area	23,104	42,102	$4,475,958	2,694	$3,007,429	498	$1,070,173	45,294	$8,553,559
Lincoln County	**18,963**	**43,906**	**$7,323,337**	**3,794**	**$12,510,202**	**510**	**$2,256,306**	**48,210**	**$22,089,845**
Lincolnton	6,028	6,770	$1,483,499	786	$3,703,519	156	$558,863	7,712	$5,745,881
Unincorporated Area	12,935	37,136	$5,839,838	3,008	$8,806,683	354	$1,697,443	40,498	$16,343,964
Cleveland Gaston Lincoln Region Total	**134,495**	**199,633**	**$33,557,108**	**16,269**	**$48,449,472**	**3,288**	**$11,152,225**	**219,190**	**$93,158,808**

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	**9,565**	**3,233**	**54,754**
Belwood	106	33	799
Boiling Springs	405	287	3,104
Casar	14	5	109
Earl	23	12	164
Fallston	61	16	282
Grover	40	13	233
Kingstown	33	12	189
Kings Mountain	3,211	877	17,254
Lattimore	29	10	166
Lawndale	24	6	111
Mooresboro	46	17	267
Patterson Springs	43	9	242
Polkville	30	7	122
Shelby	5,246	1,217	23,893
Waco	27	10	155
Unincorporated Area	0	0	0
Gaston County	**12,125**	**4,249**	**76,632**
Belmont	2,489	1,071	15,911
Bessemer City	737	368	5,673

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Cherryville	1,185	337	6,352
Cramerton	1,217	381	7,689
Dallas	698	193	3,804
Gastonia	14,301	5,441	85,293
High Shoals	219	80	1,467
Lowell	618	142	3,911
McAdenville	383	81	2,317
Mount Holly	1,572	577	11,993
Ranlo	516	284	3,678
Spencer Mountain	61	35	458
Stanley	1,545	420	6,146
Unincorporated Area	0	0	0
Lincoln County	**15,478**	**3,826**	**82,805**
Lincolnton	2,079	1,007	13,274
Unincorporated Area	13,399	2,819	69,531
Cleveland Gaston Lincoln Region Total	**37,168**	**11,308**	**214,191**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk of the earthquake hazard. Timely sheltering/evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe earthquake event.

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 6.28**.

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 the 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	**53,524**	**6,678**	**46,893**	**5,238**	**$5,457,190,859**	**$593,518,441**
Belwood	809	0	707	0	$42,417,605	$0
Boiling Springs	1,871	0	1,497	0	$324,967,081	$0
Casar	278	0	291	0	$15,075,457	$0
Earl	186	0	168	0	$9,735,994	$0
Fallston	516	0	394	0	$41,555,871	$0
Grover	487	0	388	0	$35,844,646	$0
Kingstown	406	0	299	0	$16,792,157	$0
Kings Mountain	5,684	0	5,011	0	$1,097,513,340	$0
Lattimore	254	0	206	0	$21,458,749	$0
Lawndale	509	0	355	0	$17,480,992	$0
Mooresboro	257	0	220	0	$15,358,032	$0
Patterson Springs	272	0	294	0	$15,045,388	$0
Polkville	436	0	351	0	$31,088,056	$0
Shelby	10,927	551	9,467	332	$1,678,258,241	$67,113,031
Waco	0	202	0	180	$0	$13,289,170
Unincorporated Area	30,632	5,925	27,245	4,726	$2,094,599,250	$513,116,240
Gaston County	**39,169**	**73,103**	**52,843**	**118,121**	**$10,023,459,120**	**$16,481,526,730**
Belmont	4,775	2,894	2,806	4,183	$1,683,494,140	$1,293,193,960
Bessemer City	2,343	800	3,458	1,242	$304,979,410	$207,923,540
Cherryville	0	3,294	0	5,210	$0	$565,991,060
Cramerton	2,357	483	2,330	396	$755,300,750	$253,781,810
Dallas	0	2,513	0	3,109	$0	$465,591,430
Gastonia	13,001	20,900	13,850	28,432	$4,028,990,510	$5,309,820,600
High Shoals	0	408	0	611	$0	$52,807,210
Lowell	0	1,961	0	2,990	$0	$612,137,520
McAdenville	0	531	0	671	$0	$148,512,900
Mount Holly	0	8,479	0	9,358	$0	$2,540,194,780
Ranlo	0	1,862	0	2,658	$0	$400,199,120
Spencer Mountain	0	0	0	0	$0	$0
Stanley	0	1,969	0	2,622	$0	$458,834,960
Unincorporated Area	16,693	27,009	30,399	56,639	$3,250,694,310	$4,172,537,840
Lincoln County	**40,104**	**15,285**	**41,815**	**15,867**	**$10,076,697,478**	**$3,366,351,456**
Lincolnton	4,511	745	5,121	804	$1,350,121,534	$162,430,579
Unincorporated Area	35,593	14,540	36,694	15,063	$8,726,575,944	$3,203,920,877
Cleveland Gaston Lincoln Region Total	**132,797**	**95,066**	**141,551**	**139,226**	**$25,557,347,457**	**$20,441,396,627**

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 intersect as much with landslide hazards 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 (approximately 200) 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 approximately 11 and 16 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 6.28** 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 regional 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 76 flood events have been reported by the National Centers for Environmental Information since 1993, resulting in over $12 million dollars in damages (2023 dollars), but no injuries and 1 fatality.

In order to assess flood risk, a GIS-based analysis was used to estimate parcel exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the counties in the region. 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 intersecting an identified floodplain. **Table 6.15** presents the potential at-risk property. Both the number of parcels and the approximate value of improvements are presented. Building-specific risk and mitigation information can be obtained through the North Carolina Flood Risk Information System (FRIS) and North Carolina Floodplain Mapping Program (NCFMP).

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

Location	1.0 Percent (100-year) ACF			0.2 Percent (500-year) 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	**4,298**	**2,280**	**$635,638,812**	**1,578**	**1,001**	**$256,821,146**
Belwood	94	47	$3,385,595	0	0	$0
Boiling Springs	34	22	$7,773,775	0	0	$0
Casar	15	5	$658,967	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	14	10	$1,003,937	0	0	$0
Kings Mountain	148	87	$57,674,460	135	79	$39,349,797
Lattimore	0	0	$0	0	0	$0
Lawndale	33	16	$1,648,187	0	0	$0
Mooresboro	5	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	11	5	$349,121	0	0	$0
Shelby	646	414	$286,022,471	613	403	$94,157,881
Waco	15	9	$751,703	0	0	$0
Unincorporated Area	3,296	1,674	$277,122,299	830	519	$123,313,468
Gaston County	**7,898**	**5,218**	**$3,299,054,100**	**5,573**	**3,882**	**$2,646,891,400**
Belmont	559	330	$440,483,780	458	284	$364,291,630
Bessemer City	56	31	$61,497,660	49	27	$29,946,110
Cherryville	78	52	$22,553,910	14	12	$8,936,900
Cramerton	309	223	$167,214,530	306	238	$168,114,940
Dallas	169	121	$42,807,390	219	165	$47,217,240
Gastonia	2,424	1,675	$1,324,807,390	2,463	1,748	$1,361,593,100
High Shoals	51	35	$6,272,510	35	23	$3,214,860
Lowell	28	19	$148,551,780	54	42	$148,551,780
McAdenville	68	32	$15,113,700	81	46	$15,113,700
Mount Holly	792	595	$371,640,440	251	193	$171,238,710
Ranlo	59	40	$9,785,540	1	1	$608,080
Spencer Mountain	0	0	$0	0	0	$0
Stanley	5	4	$1,364,130	0	0	$0
Unincorporated Area	3,300	2,061	$686,961,340	1,642	1,103	$328,064,350
Lincoln County	**5,566**	**3,885**	**$2,076,921,263**	**958**	**596**	**$277,820,320**
Lincolnton	335	238	$156,652,064	289	204	$156,652,064
Unincorporated Area	5,231	3,647	$1,920,269,199	669	392	$121,168,256
Cleveland Gaston Lincoln Region Total	**17,762**	**11,383**	**$6,011,614,175**	**8,109**	**5,479**	**$3,181,532,866**

Source: FEMA DFIRM, Local tax data

To assess flood risk, the NCEM RMT analyzed buildings located in the 1-percent annual chance area, or 100-year return period, of floodplains. The buildings are assessed by the type of building (commercial, residential, or public) and also assessed by status as 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

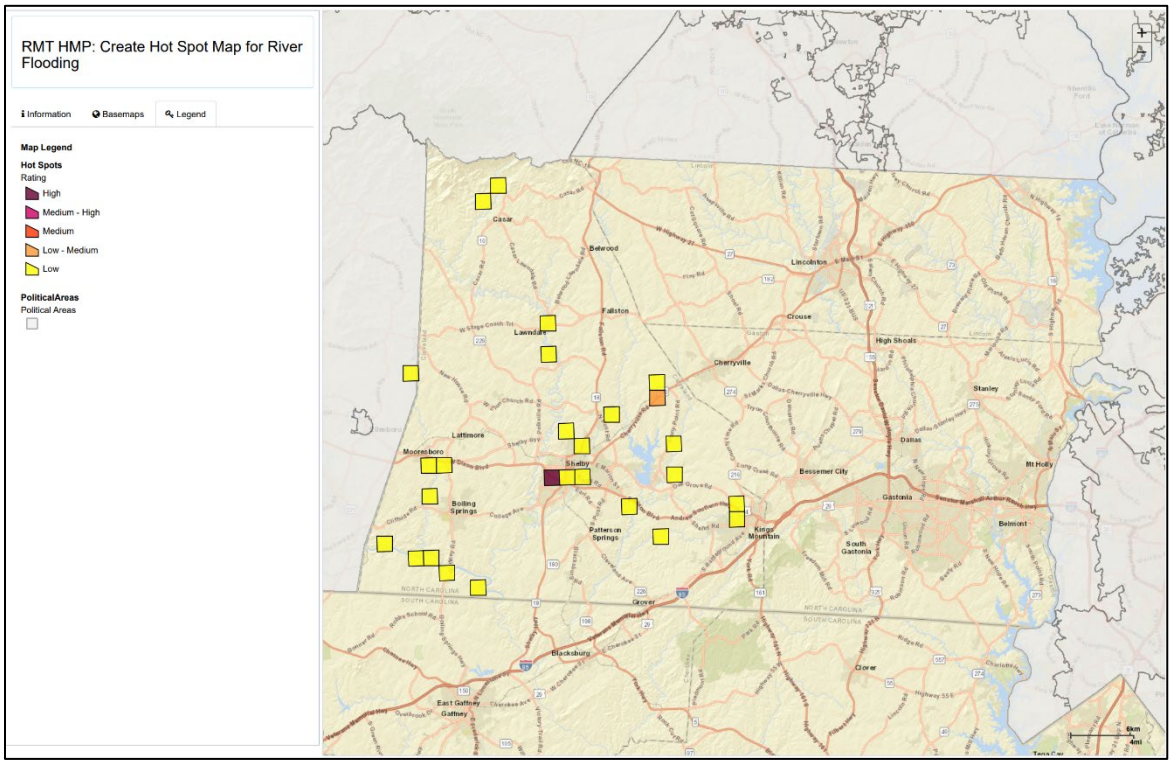
Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Cleveland County	**82**	**107**	**$1,084,608**	**4**	**$1,091,131**	**0**	**0**	**111**	**$2,175,739**
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	7	7	$22,729	0	$0	0	$0	7	$22,729
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
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	**374**	**605**	**$3,086,490**	**46**	**$1,999,413**	**2**	**$114,745**	**653**	**$5,200,647**
Belmont	14	18	$159,163	2	$18,448	0	$0	20	$177,610
Bessemer City	5	5	$39,630	0	$0	0	$0	5	$39,630
Cherryville	4	6	$15,263	0	$0	0	$0	6	$15,263
Cramerton	47	51	$370,186	7	$125,327	1	$81,712	59	$577,225
Dallas	23	23	$63,227	0	$0	0	$0	23	$63,227
Gastonia	149	177	$790,719	11	$1,489,764	0	$0	188	$2,280,483
High Shoals	6	3	$447	3	$55,220	0	$0	6	$55,667
Lowell	0	8	$30,639	0	$0	0	$0	8	$30,639
McAdenville	4	2	$33,312	2	$1,029	1	$33,033	5	$67,375
Mount Holly	16	43	$206,648	2	$32,592	0	$0	45	$239,240
Ranlo	2	3	$3,246	0	$0	0	$0	3	$3,246
Spencer Mountain	2	1	$22,770	1	$3,285	0	$0	2	$26,055
Stanley	1	1	$573	0	$0	0	$0	1	$573
Unincorporated Area	101	264	$1,350,667	18	$273,748	0	$0	282	$1,624,414
Lincoln County	**95**	**142**	**$273,308**	**20**	**$208,577**	**1**	**$4,502**	**163**	**$486,387**
Lincolnton	54	51	$149,138	12	$167,445	0	$0	63	$316,583
Unincorporated Area	41	91	$124,170	8	$41,132	1	$4,502	100	$169,804

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 Gaston Lincoln Region Total	551	854	$4,444,406	70	$3,299,121	3	$119,247	927	$7,862,773

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 of the flooding hazard in the 1-percent annual chance floodplain area.

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	**42**	**12**	**225**
Belwood	0	0	0
Boiling Springs	0	0	2
Casar	0	0	0

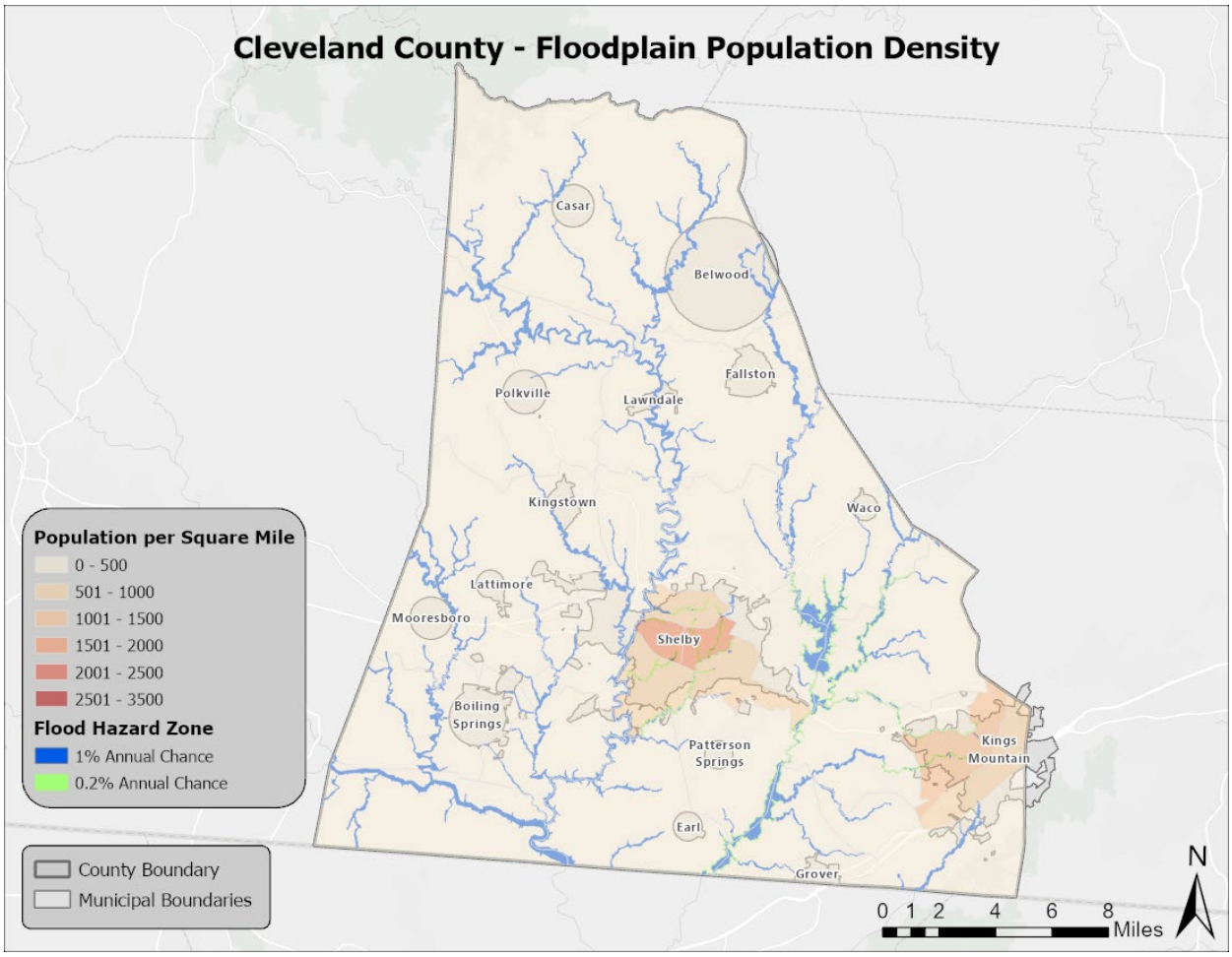
Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Earl	0	0	0
Fallston	0	0	0
Grover	0	0	0
Kingstown	0	0	0
Kings Mountain	3	1	17
Lattimore	0	0	0
Lawndale	0	0	0
Mooresboro	0	0	0
Patterson Springs	0	0	0
Polkville	0	0	0
Shelby	16	4	75
Waco	1	0	7
Unincorporated Area	22	7	124
Gaston County	**279**	**112**	**1,808**
Belmont	8	3	49
Bessemer City	1	1	9
Cherryville	2	0	8
Cramerton	22	7	138
Dallas	7	2	40
Gastonia	84	32	501
High Shoals	1	0	4
Lowell	2	1	16
McAdenville	2	0	9
Mount Holly	12	4	89
Ranlo	1	0	6
Spencer Mountain	61	35	458
Stanley	0	0	1
Unincorporated Area	76	27	480
Lincoln County	**54**	**17**	**302**
Lincolnton	16	8	99
Unincorporated Area	38	9	203
Cleveland Gaston Lincoln Region Total	**375**	**141**	**2,335**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

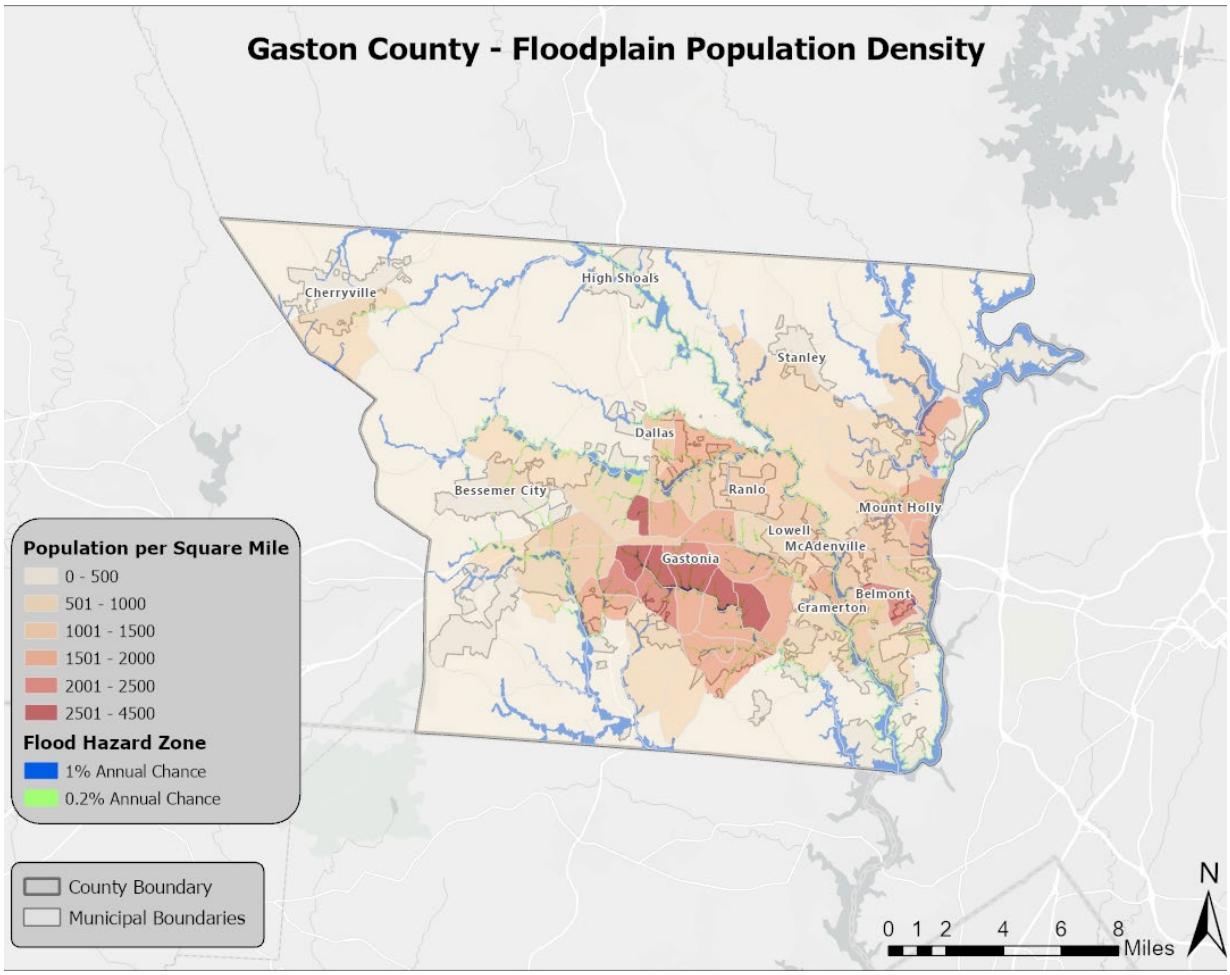
A national Census was last conducted in 2020 and may offer more accurate insights compared to the current availability of population estimates. This data was analyzed to further understand at-risk populations to the flooding hazard in the Cleveland Gaston Lincoln Region and specific floodplain areas of concern can be seen below in **Figures 6.9, 6.10, and 6.11**.

FIGURE 6.9: CLEVELAND COUNTY FLOODPLAINS



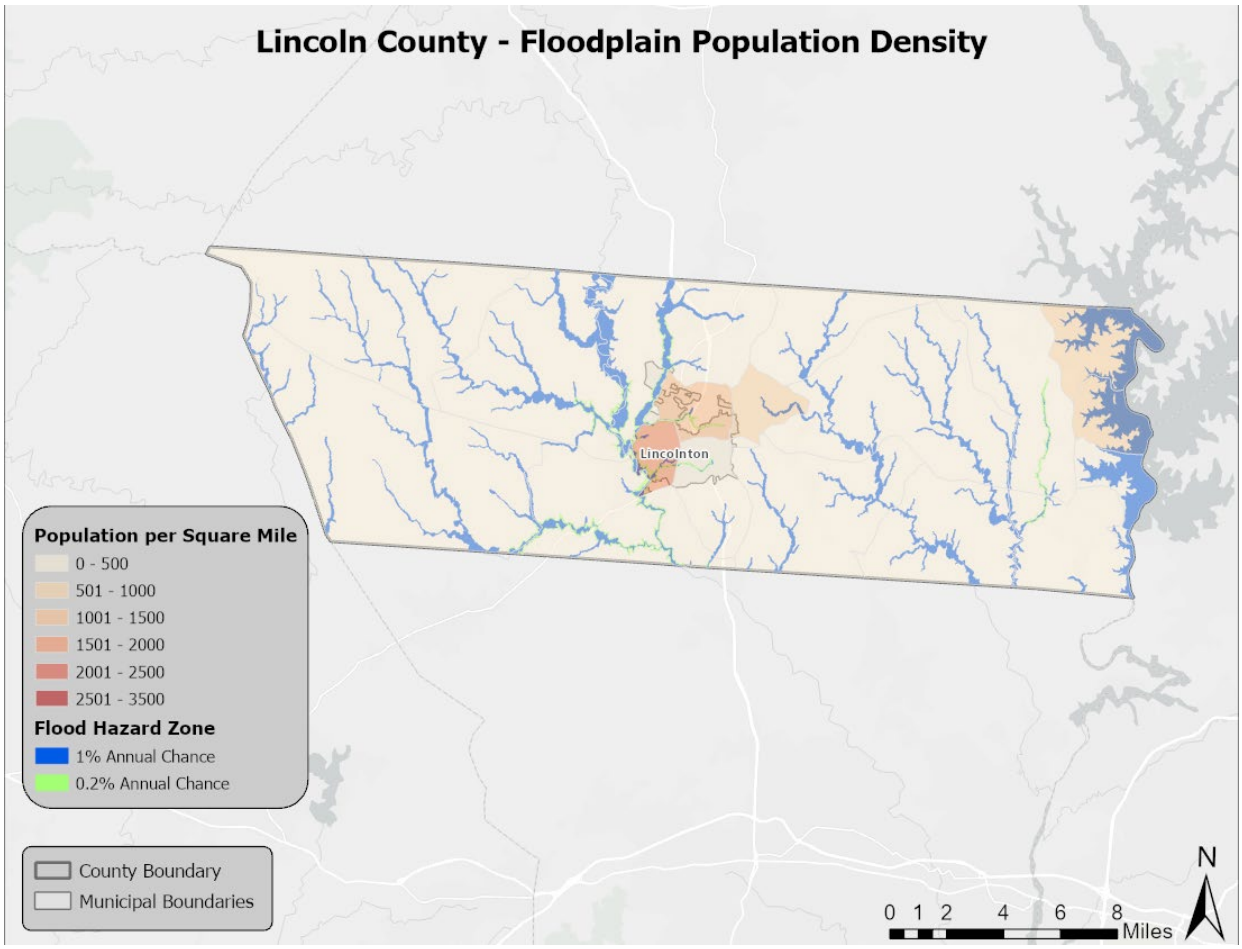
Source: FEMA DFIRM, US Census Bureau

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 approximately eight critical facilities located in the Cleveland Gaston Lincoln Region 1.0-percent or 0.2-percent annual chance floodplains based on FEMA DFIRM boundaries and GIS analysis. (As previously noted, this analysis does not consider building elevation, which may negate risk.) A list of specific critical facilities and their associated risk can be found in **Table 6.28** 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 number of losses for each county.

TABLE 6.18: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE CLEVELAND GASTON LINCOLN REGION

Location	Number of Properties	Number of Losses
Cleveland County	**5**	**18**
Belwood	0	0
Boiling Springs	0	0
Casar	0	0
Earl*	--	--
Fallston*	--	--
Grover	0	0
Kings Mountain	0	0
Kingstown	0	0
Lattimore*	--	--
Lawndale	0	0
Mooresboro	0	0
Patterson Springs*	--	--
Polkville	0	0
Shelby	5	18
Waco	0	0
Unincorporated Area	0	0
Gaston County	**6**	**12**
Belmont	0	0
Bessemer City	0	0
Cherryville	1	2
Cramerton	2	4
Dallas	0	0
Gastonia	2	4
High Shoals	0	0
Lowell	0	0
McAdenville	0	0
Mount Holly	0	0
Ranlo	0	0
Spencer Mountain	0	0
Stanley	0	0
Unincorporated Area	1	0
Lincoln County	**1**	**2**
Lincolnton	0	0
Unincorporated Area	1	2
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**12**	**32**

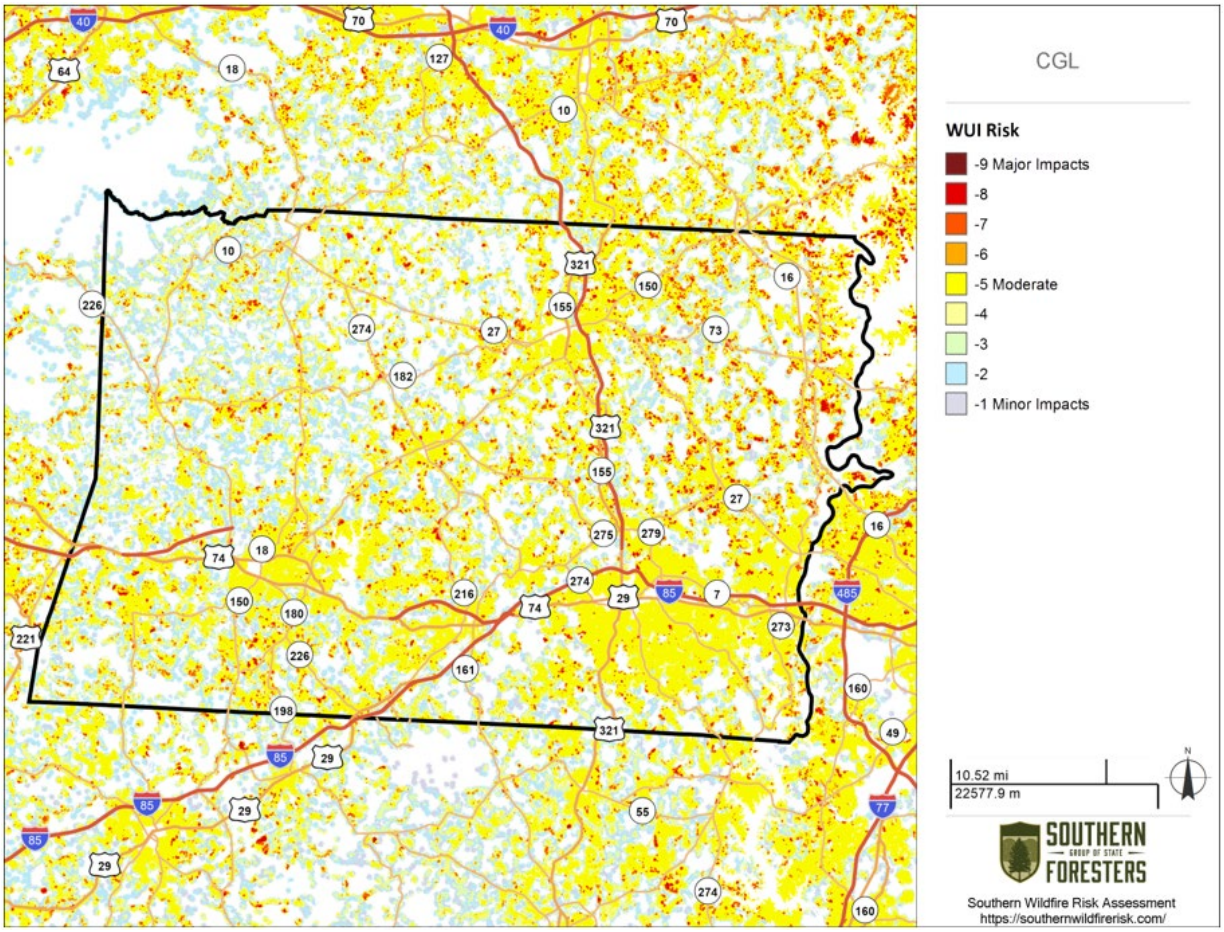
* These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
Source: National Flood Insurance Program

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. **Figure 6.12** shows the WUI Risk Index for each county in the region below.

FIGURE 6.12: WILDLAND URBAN INTERFACE RISK INDEX IN THE CLEVELAND GASTON LINCOLN REGION



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. As of 2024 findings from the Southern Wildfire Risk Assessment, burn probabilities of the region range from 1 (lowest probability) to 4 on a scale rated up to 10 (highest probability). Specifically, out of 1,320,969 total assessed acres, 61.4% of the region is rated a probability of 1, 32.1% a 2, 6.3% a 3, and 0.2% a 4.

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. Timely sheltering/evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk during a severe wildfire event.

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 8 facilities. These facilities were two schools, three fire stations, and three medical facilities. 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	**8**
Lincoln County	**1**
Cleveland Gaston Lincoln Regional Total	**11**

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 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	1,287	1,809	$266,157,541	137	$348,604,942	17	$60,910,491	1,963	$675,672,973
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
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

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
Unincorporated Area	6,573	7,494	$896,037,258	128	$0	0	$0	7,610	$442,414,804
GASTON COUNTY	**8,694**	**14,418**	**$1,095,394,325**	**1,204**	**$410,446,700**	**227**	**$229,909,034**	**15,849**	**$1,735,750,059**
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	475	694	$79,754,141	48	$43,799,072	22	$24,962,258	764	$148,515,470
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	1,391	4,676	$15,328,932	388	$0	0	$0	5,009	$0
LINCOLN COUNTY	**7,065**	**16,456**	**$2,031,961,986**	**1,213**	**$1,476,611,189**	**165**	**$405,721,327**	**17,834**	**$3,914,294,502**
Lincolnton	1,399	2,099	$323,376,902	168	$271,195,694	34	$75,658,870	2,301	$670,231,467
Unincorporated Area	5,666	14,357	$1,708,585,084	1,045	$1,205,415,495	131	$330,062,457	15,533	$3,244,063,035
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**27,754**	**44,879**	**$5,081,253,178**	**3,109**	**$2,720,649,774**	**523**	**$916,489,404**	**48,511**	**$8,718,392,357**

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	**5,147**	**1,740**	**29,465**
Belwood	75	23	567
Boiling Springs	74	52	564
Casar	11	4	82
Earl	18	10	132
Falston	51	13	236
Grover	3	1	17
Kings Mountain	794	217	4,268
Kingstown	8	3	43
Lattimore	13	5	75
Lawndale	13	3	61
Mooresboro	25	9	145
Patterson Springs	30	6	168
Polkville	13	3	53
Shelby	1,219	283	5,553
Waco	23	9	134
Unincorporated Area	2,777	1,099	17,367
GASTON COUNTY	**4,151**	**1,455**	**26,238**

Jurisdiction	Elderly at Risk	Children at Risk	Total at Risk
Belmont	409	176	2,613
Bessemer City	189	94	1,452
Cherryville	209	59	1,118
Cramerton	298	93	1,880
Dallas	142	39	772
Gastonia	1,701	647	10,145
High Shoals	60	22	401
Lowell	99	23	626
McAdenville	86	18	522
Mount Holly	119	44	906
Ranlo	62	34	439
Spencer Mountain	0	0	0
Stanley	327	89	1,302
Unincorporated Area	450	117	4,062
LINCOLN COUNTY	**6,860**	**1,696**	**36,700**
Lincolnton	644	312	4,115
Unincorporated Area	6,216	1,384	32,585
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**16,158**	**4,891**	**92,403**

Source: NCEM Risk Management Tool

6.5.7. Hazardous Substances

Although historical evidence and existing Toxic Release Inventory (TRI) 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.

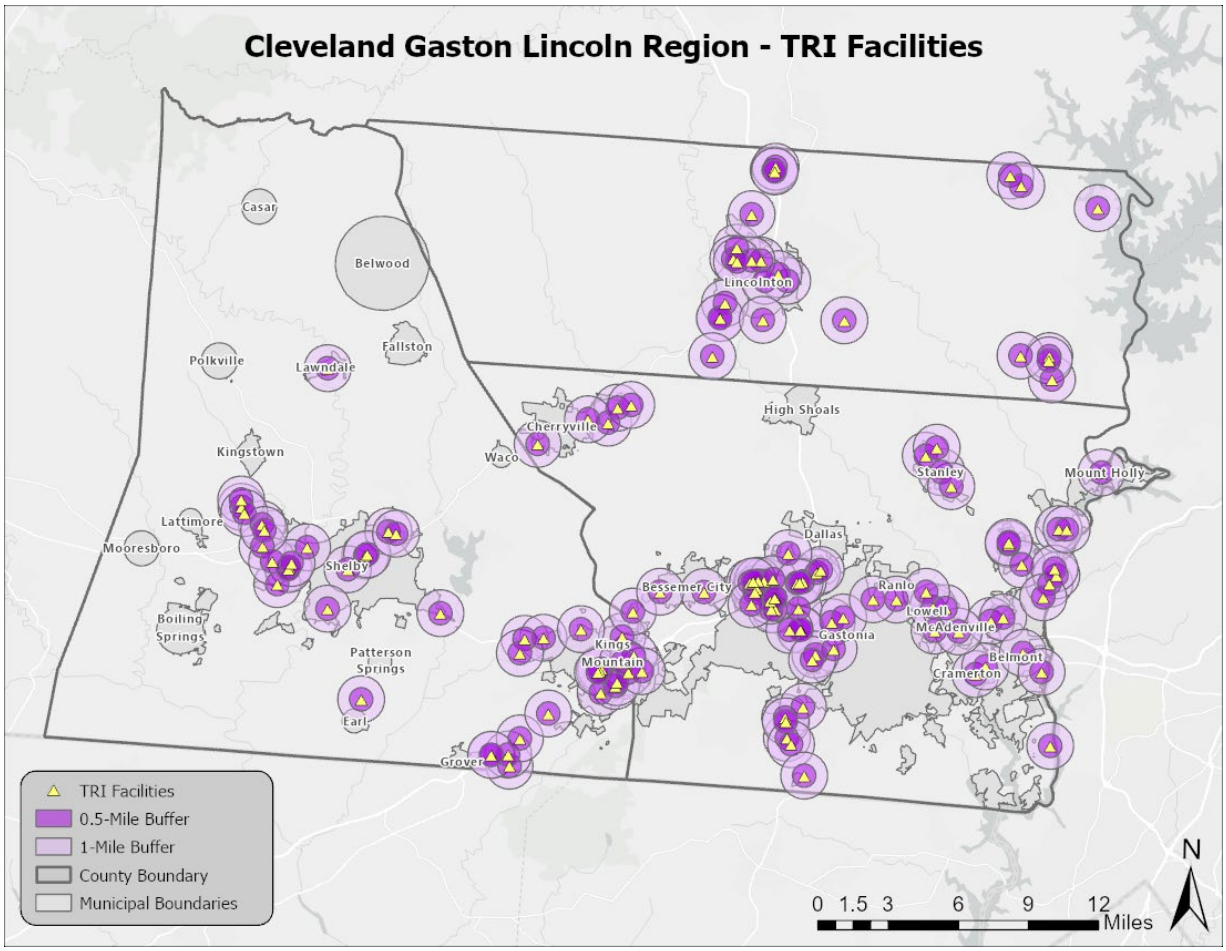
In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels[11]. In both scenarios, two sizes of buffers—0.5 mile and 1 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426,

[11] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an 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 6.13.** 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 6.14** 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)[12].

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

FIGURE 6.13: TOXIC RELEASE INVENTORY (TRI) FACILITIES IN THE CLEVELAND GASTON LINCOLN REGION



Source: EPA

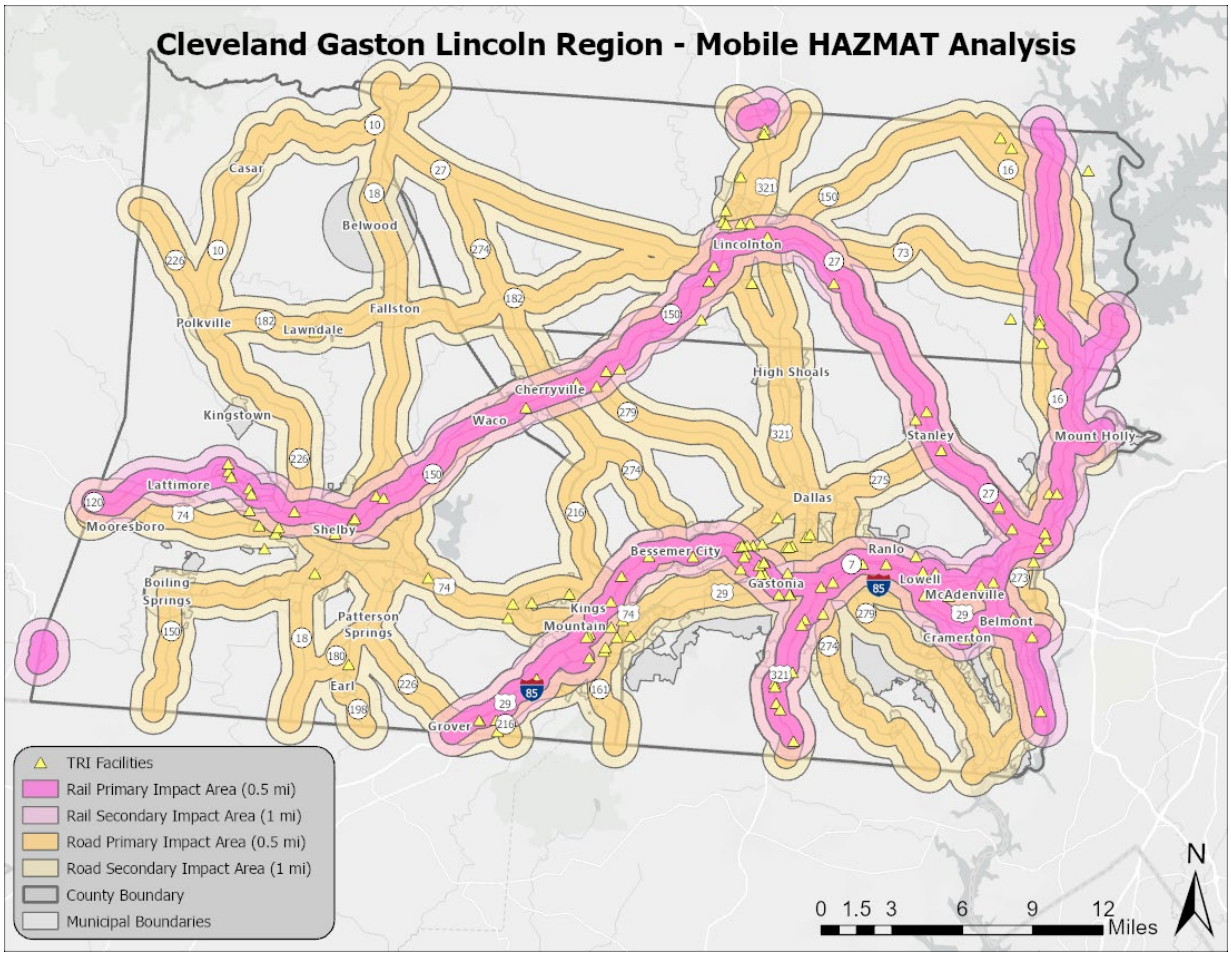
TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES) IN THE CLEVELAND GASTON LINCOLN REGION

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	**7,287**	**5,415**	**$1,371,200,509**	**18,042**	**13,464**	**$2,449,426,445**
Belwood	0	0	$0	0	0	$0
Boiling Springs	0	0	$0	0	0	$0
Casar	0	0	$0	0	0	$0
Earl	6	2	$214,886	104	52	$4,532,054
Fallston	0	0	$0	0	0	$0
Grover	3	3	$306,349	169	125	$17,233,684
Kingstown	0	0	$0	0	0	$0
Kings Mountain	2,028	1,642	$406,991,907	4,375	3,534	$702,760,910
Lattimore	0	0	$0	0	0	$0

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Lawndale	264	198	$8,805,493	502	328	$17,404,833
Mooresboro	0	0	$0	0	0	$0
Patterson Springs	0	0	$0	0	0	$0
Polkville	0	0	$0	0	0	$0
Shelby	3,550	2,627	$744,936,361	8,356	6,485	$1,243,808,664
Waco	0	0	$0	0	0	$0
Unincorporated Area	1,436	943	$209,945,513	4,536	2,940	$463,686,300
Gaston County	**22,098**	**18,058**	**$5,429,101,170**	**53,445**	**44,276**	**$12,849,362,120**
Belmont	1,632	1,391	$881,498,370	4,362	3,733	$1,793,778,510
Bessemer City	1,056	778	$134,188,850	2,702	2,079	$427,211,460
Cherryville	710	585	$131,335,750	1,965	1,637	$352,146,830
Cramerton	521	450	$179,611,650	1,963	1,736	$704,843,060
Dallas	0	0	$0	504	423	$96,190,570
Gastonia	9,071	7,630	$2,068,556,940	17,869	15,145	$4,355,072,510
High Shoals	0	0	$0	0	0	$0
Lowell	1,399	1,176	$292,837,290	1,961	1,644	$612,130,770
McAdenville	353	269	$113,867,100	531	408	$148,511,070
Mount Holly	2,198	1,811	$678,973,210	6,512	5,679	$1,833,595,220
Ranlo	424	393	$87,172,820	1,562	1,441	$345,473,900
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,398	1,180	$297,189,840	1,836	1,590	$417,555,690
Unincorporated Area	3,336	2,395	563,869,350	11,678	8,761	1,762,852,530
Lincoln County	**4,231**	**3,306**	**$1,656,778,223**	**14,806**	**11,680**	**$4,365,904,733**
Lincolnton	1,816	1,500	$656,746,582	5,055	4,147	$1,379,617,175
Unincorporated Area	2,415	1,806	$1,000,031,641	9,751	7,533	$2,986,287,558
Cleveland Gaston Lincoln Region Total	**33,616**	**26,779**	**$8,457,079,902**	**86,293**	**69,420**	**$19,664,693,298**

Source: EPA, Local governments

FIGURE 6.14: 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	**32,376**	**23,097**	**$3,465,291,184**	**43,719**	**30,708**	**$4,516,716,341**
Belwood	325	198	$19,747,095	530	307	$31,156,279
Boiling Springs	921	700	$175,636,447	1,467	1,143	$257,034,045
Casar	255	158	$13,839,183	278	171	$15,069,907
Earl	185	110	$9,733,424	186	110	$9,733,424
Fallston	502	335	$40,312,786	516	348	$41,550,064
Grover	481	347	$35,484,423	487	351	$35,838,251
Kingstown	6	4	$272,269	105	54	$2,850,815
Kings Mountain	4,638	3,753	$751,053,030	5,147	4,215	$839,200,321
Lattimore	27	14	$1,464,794	104	71	$7,236,376
Lawndale	482	316	$16,308,138	509	332	$17,474,300

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
Mooresboro	227	147	$13,649,945	257	166	$15,353,955
Patterson Springs	272	208	$15,043,434	272	208	$15,043,434
Polkville	428	272	$28,927,544	436	277	$31,083,617
Shelby	9,993	7,765	$1,285,844,935	11,371	8,854	$1,490,909,138
Waco	200	146	$13,087,146	202	147	$13,286,381
Unincorporated Area	13,434	8,624	$1,044,886,591	21,852	13,954	$1,693,896,034
Gaston County	**65,552**	**53,571**	**$15,994,222,610**	**92,735**	**76,452**	**$22,369,330,000**
Belmont	5,125	4,301	$2,109,342,420	7,089	5,974	$2,817,729,600
Bessemer City	2,785	2,141	$439,636,640	3,143	2,426	$512,893,510
Cherryville	2,830	2,333	$460,704,910	3,286	2,744	$564,316,400
Cramerton	1,506	1,347	$565,680,240	2,475	2,177	$888,279,620
Dallas	2,210	1,794	$421,651,750	2,513	2,032	$465,585,950
Gastonia	22,273	19,107	$6,166,106,760	30,715	26,656	$8,384,747,530
High Shoals	358	289	$44,446,100	405	323	$52,807,090
Lowell	1,254	1,012	$453,262,700	1,725	1,425	$545,286,910
McAdenville	504	384	$133,775,160	514	392	$144,501,900
Mount Holly	5,460	4,706	$1,410,107,130	7,265	6,385	$2,042,105,390
Ranlo	724	667	$157,598,500	1,778	1,646	$384,173,350
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,736	1,504	$402,139,880	1,955	1,706	$455,797,820
Unincorporated Area	18,787	13,986	$3,229,770,420	29,872	22,566	$5,111,104,930
Lincoln County	**27,819**	**20,894**	**$6,913,900,273**	**40,224**	**30,262**	**$9,714,058,522**
Lincolnton	4,737	3,878	$1,374,635,887	5,214	4,286	$1,503,103,761
Unincorporated Area	23,082	17,016	$5,539,264,386	35,010	25,976	$8,210,954,761
Cleveland Gaston Lincoln Region Total	**125,747**	**97,562**	**$26,373,414,067**	**176,678**	**137,422**	**$36,600,104,863**

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	**8,825**	**6,420**	**$1,178,849,465**	**15,803**	**11,725**	**$1,990,407,469**
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	346	265	$29,528,584	486	351	$35,838,251
Kingstown	0	0	$0	0	0	$0
Kings Mountain	2,882	2,414	$292,385,513	4,116	3,411	$541,256,810
Lattimore	201	139	$17,021,064	245	172	$21,159,778

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
Lawndale	0	0	$0	0	0	$0
Mooresboro	123	82	$6,543,110	227	149	$13,777,003
Patterson Springs	0	0	$0	0	0	$0
Polkville	0	0	$0	0	0	$0
Shelby	2,807	1,987	$640,604,746	5,858	4,514	$986,112,269
Waco	197	144	$12,873,234	202	147	$13,286,381
Unincorporated Area	2,269	1,389	$179,893,214	4,669	2,981	$378,976,977
Gaston County	**35,108**	**28,831**	**$8,344,367,370**	**57,532**	**47,476**	**$13,479,405,710**
Belmont	3,792	3,248	$1,614,521,280	7,089	5,974	$2,817,729,600
Bessemer City	2,451	1,867	$370,661,120	3,055	2,351	$495,386,730
Cherryville	2,195	1,830	$367,144,080	3,078	2,566	$515,291,390
Cramerton	1,409	1,271	$423,389,610	2,327	2,069	$832,456,110
Dallas	0	0	$0	0	0	$0
Gastonia	9,958	8,327	$2,386,733,380	16,987	14,342	$4,055,717,280
High Shoals	0	0	$0	0	0	$0
Lowell	1,603	1,349	$505,065,710	1,961	1,644	$612,130,770
McAdenville	254	186	$61,207,440	531	408	$148,511,070
Mount Holly	3,650	3,150	$1,042,217,330	6,388	5,568	$1,797,822,280
Ranlo	731	676	$159,273,210	1,655	1,528	$359,966,780
Spencer Mountain	0	0	$0	0	0	$0
Stanley	1,643	1,417	$384,607,650	1,954	1,706	$455,859,310
Unincorporated Area	7,422	5,510	$1,029,546,560	12,507	9,320	$1,388,534,390
Lincoln County	**9,638**	**7,542**	**$2,506,577,407**	**18,720**	**14,518**	**$5,418,358,098**
Lincolnton	3,428	2,694	$849,266,688	4,400	3,619	$1,267,474,455
Unincorporated Area	6,210	4,848	$1,657,310,719	14,320	10,899	$4,150,883,643
Cleveland Gaston Lincoln Region Total	**53,571**	**42,793**	**$12,029,794,242**	**92,055**	**73,719**	**$20,888,171,277**

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 of hazardous materials incidents. It should be noted that areas of high population density may be at an elevated risk due to a greater burden to quickly evacuate more people.

CRITICAL FACILITIES

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 318 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 144 facilities throughout the region. Gaston County has the most facilities in the primary impact zone with 80 facilities, while Lincoln County has 30 facilities. Cleveland County has 34 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 6.28** at the end of this section.

Mobile Analysis:
The critical facility analysis for road and railroad transportation corridors revealed that there are 450 critical facilities located in the primary (0.5-mile) mobile HAZMAT buffer areas for roads and 197 for 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 543 critical facilities located in the secondary (1-mile) buffer area of roads and 327 in the secondary buffer area of 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 6.28** at the end of this section.

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

6.5.8. Dam Failure

Vulnerability to dam failure in the region is essentially limited to the people, property, infrastructure, critical facilities, and the environment of areas immediately downstream of dams, especially high hazard dams. At the time of the 2025 update of this plan, there is limited modeling data available (or available data is protected) to conduct a detailed vulnerability assessment for this hazard. However, the North Carolina Department of Environmental Quality oversees the statewide Dam Safety Program to reduce the overall risk of this hazard and implement Emergency Action Plans (EAP) for future reference. The U.S. Army Corps of Engineers also maintains the National Inventory of Dams (NID) at the federal level. Additional information related to high hazard dams of the region can be found in **Table 6.25**.

TABLE 6.25: SUMMARY OF HIGH-HAZARD DAM VULNERABILITY

Dam Name	NID ID	EAP	Condition (as of July 2024)	Owner Type	Max Capacity (acre-feet)	Max Discharge (ft3/s)	River/Stream
CLEVELAND COUNTY							
Kings Mountain City Lake Dam #2	NC00111	Y	Fair	Local Gov	714	66	Kings Creek
Albemarle Dam	NC00127	Y	Fair	Private	150	26	UT to Kings Creek
C.E. Harry Lake Dam	NC00248	N	Fair	Private	120	50	Buffalo Creek
Kings Mountain Lake Dam #1	NC00112	Y	Fair	Utility	450	0	Kings Creek
Maples Fishing Pond Dam	NC02113	Y	Fair	Unknown	52	N/A	Beason Creek
Lake Montonia Dam	NC00114	Y	Fair	Private	314	N/A	Kings Creek
Moss Lake Dam	NC00204	Y	Fair	Local Gov	51032	77418	Buffalo Creek
Poplar Circle Dam	NC05588	Y	Fair	Private	22	0	First Broad River
Hughes Lake Dam	NC05636	N	Satisfactory	Private	130	716	Kings Creek
Lake Hollifield Dam	NC05664	N	Fair	Private	35	0	UT to Sandy Run Branch
Cliffside Retention Basin Dam	NC05714	Y	Satisfactory	Utility	69	4	Broad River
Cliffside Active Ash Basin Downstream Dam	NC05874	Y	Satisfactory	Utility	1843	N/A	Suck Creek
Cliffside Active Ash Basin Upstream Dam	NC05875	Y	Satisfactory	Utility	1843	0	N/A
Cleveland Co. Sanitary District Water Storage Reservoir Dam	NC06035	Y	Satisfactory	Local Gov	150	235	UT to First Broad River
Fluff's Carp & Catfish Lake Dam	NC06103	N	Satisfactory	Private	13	N/A	UT to Buffalo Creek
Brooks Pond Dam	NC07456	N	N/A	Private	N/A	N/A	N/A
GASTON COUNTY							
Mountain Island Lake Dam	NC00787	Y	N/A	Utility	139752	292300	Catawba River
Shorts Lake Dam	NC01204	Y	Fair	State	151	660	South Crowders Creek
Arrowood Lake Dam	NC01205	Y	Fair	Local Gov	440	297	Long Creek
Robinwood Lake Dam	NC01211	Y	Fair	Unknown	514	1540	Anthony Creek
Allen Retired Ash Basin Dam	NC01668	Y	Satisfactory	Utility	30	1061	Catawba River
Paradise Point Dam	NC01674	N	Poor	Private	50	N/A	South Fork River
Gaston Country Club Lake Dam	NC01676	N	Fair	Private	70	N/A	Catawba Creek
Leigh Lake Dam	NC02610	Y	Fair	Private	21	38	Catawba Creek

Johnny Long Pond Dam	NC02617	N	Poor	Private	149	N/A	UT to Crowders Creek
Sparrow Springs Lake Dam	NC01681	N	Fair	Private	60	N/A	UT to South Crowders Creek
Allen Active Ash Basin Dam	NC01669	Y	Satisfactory	Utility	1230	275	Catawba River
Cox Dam	NC02626	N	Fair	Private	37	N/A	Dutchmans Creek
Pharr Yarns Dam	NC02627	N	Satisfactory	Private	12	N/A	S. Fork Catawba River
Ben Webber Lake Dam	NC02629	Y	Fair	Local Gov	150	N/A	Long Creek
Warren Dam	NC02631	N	Poor	Private	44	0	UT to South Stanly Creek
Bessemer City Water Treatment Reservoir Dam	NC02634	Y	Fair	Local Gov	14	N/A	Long Creek
Girl Scouts of USA Dam	NC02637	Y	Fair	Private	18	N/A	Crowders Creek
Lithco Mine Tailings Dam F	NC02641	Y	Fair	Private	56	0	Long Creek
Messick Mobile Home Park Dam	NC05731	N	Satisfactory	Private	0	0	Catawba Creek
Poston Park Dam	NC06046	Y	Fair	Local Gov	325	4091	Houser Branch
Allen Retention Basin Dam	NC06200	Y	Satisfactory	Utility	89	48	Catawba River
Kenneth Raymond Stowe II Dam	NC06486	N	Not Rated	Private	8	4	UT to the Catawba Creek
Spencer Mountain Dam	NC06531	N	Fair	Utility	N/A	N/A	S. Fork Catawba River
Spencer Mountain Canal Embankment Dam	NC06532	N	Fair	Private	N/A	N/A	S. Fork Catawba River
LINCOLN COUNTY							
Carpenter Lake Dam	NC00131	N	Unsatisfactory	Private	134	13	N/A
Gladden Pond Dam	NC03287	N	Fair	Private	87	0	Lackard Creek
National Fruit Products Dam	NC03293	N	Fair	Private	24	0	Howard Creek
Leatherman Pond Dam	NC03297	Y	Fair	Private	26	0	UT to Howards Creek
Horseshoe Pond Dam	NC03316	N	Fair	Private	40	0	Carpenter Creek
Cowans Ford Dam	NC05064	Y	N/A	Utility	N/A	N/A	Catawba River
Glen Oaks Golf Course Dam B	NC05666	N	Fair	Private	9	N/A	Hog Branch
Kaylor Pond Dam	NC05673	N	Fair	Private	4	N/A	Lackard Creek
City of Cherryville Water Supply Reservoir Dam	NC06125	N	Fair	Local Gov	67	0	N/A
Bennett Houser Pond Dam	NC07332	N	Fair	Private	8	N/A	N/A

Source: NCDEQ, July 2024

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 tornadoes/thunderstorms hazard and commercial, residential, and government-owned facilities are at risk of repetitive flooding).

Table 6.26 presents a summary of estimated annual losses (EAL) for each hazard and on a composite scale in the Cleveland Gaston Lincoln Region as reported in 2024 by the FEMA National Risk Index[13]. 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.

[13] FEMA National Risk Index: https://hazards.fema.gov/nri/. Note that the Tornadoes/Thunderstorms (hail, lightning, strong wind, tornado) and Severe Winter Weather (cold wave, ice storm, winter weather) hazards are calculated using an average of available subhazard EAL data.

TABLE 6.26: POTENTIAL ANNUALIZED LOSSES FOR THE CLEVELAND GASTON LINCOLN REGION

Hazard	Cleveland County	Gaston County	Lincoln County	Total
Composite EAL	$9,071,107	$18,939,996	$9,662,174	$37,673,277
Building EAL	$6,007,988	$11,205,127	$6,813,632	$24,026,747
Population Equivalence EAL	$2,771,706	$7,698,481	$2,615,580	$13,085,767
Agriculture EAL	$291,413	$36,388	$232,962	$560,763
Drought	$7,095	$2,389	$147,937	$157,421
Excessive Heat	$209,515	$479,519	$48,274	$737,308
Hurricane & Coastal Hazards	$1,684,332	$2,614,678	$1,323,156	$5,622,166
Tornadoes/Thunderstorms	$1,180,184	$2,692,072	$1,302,928	$5,175,184
Severe Winter Weather	$858,586	$1,595,103	$1,031,360	$3,485,048
Earthquakes	$609,027	$1,302,228	$498,442	$2,409,697
Geological	$21,900	$122,400	$122,400	$266,700
Dam Failure	Negligible	Negligible	Negligible	Negligible
Flooding	$44,151	$392,933	$197,432	$634,516
Wildfires	$57,179	$67,361	$50,099	$174,639
Infectious Disease	Negligible	Negligible	Negligible	Negligible
Hazardous Substances	Negligible	Negligible	Negligible	Negligible
Radiological Emergency	Negligible	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible	Negligible
Cyber	Negligible	Negligible	Negligible	Negligible
Electromagnetic Pulse	Negligible	Negligible	Negligible	Negligible
Civil Disturbance	Negligible	Negligible	Negligible	Negligible
Food Emergency	Negligible	Negligible	Negligible	Negligible

Source: FEMA NRI

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to various 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 6.27** shows an expanded count of regional critical facilities retrieved from NCEM RMT data grouped by updated FEMA community lifelines. These critical facility counts are planning estimates subject to future changes. Additionally, **Table 6.28** 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 6.27: CRITICAL FACILITIES BY FEMA COMMUNITY LIFELINE

FEMA Lifeline	Food	Comms	Hazmat	Shelter	Comms	Supply	Safety	Safety	Medical	Comms	Safety	Hazmat	Safety	Transport	Energy	Safety	Water	N/A
Location	Food & Farm	Banking & Finance	Chemical	Commercial	Comms	Manufacturing	Defense	Government	Healthcare	IT	National Monument	Nuclear	Postal & Shipping	Transport	Energy	Emergency Services	Water	Total
Cleveland County	**11**	**56**	**0**	**2,081**	**0**	**832**	**0**	**339**	**148**	**0**	**0**	**0**	**0**	**532**	**2**	**0**	**0**	**4,001**
Belwood	0	0	0	28	0	10	0	0	2	0	0	0	0	11	0	0	0	51
Boiling Springs	0	0	0	69	0	26	0	49	5	0	0	0	0	17	0	0	0	166
Casar	0	0	0	11	0	1	0	6	0	0	0	0	0	0	0	0	0	18
Earl	0	0	0	12	0	0	0	0	0	0	0	0	0	7	0	0	0	19
Fallston	0	1	0	16	0	5	0	2	2	0	0	0	0	2	0	0	0	28
Grover	0	0	0	29	0	12	0	14	2	0	0	0	0	13	0	0	0	70
Kings Mountain	5	11	0	322	0	200	0	62	18	0	0	0	0	77	0	0	0	695
Kingstown	0	0	0	7	0	5	0	0	1	0	0	0	0	1	0	0	0	14
Lattimore	0	0	0	14	0	2	0	12	0	0	0	0	0	3	0	0	0	31
Lawndale	0	2	0	21	0	2	0	3	0	0	0	0	0	2	0	0	0	30
Mooresboro	0	0	0	24	0	1	0	0	0	0	0	0	0	0	0	0	0	25
Patterson Springs	0	0	0	23	0	2	0	1	0	0	0	0	0	2	0	0	0	28
Polkville	0	0	0	18	0	2	0	2	0	0	0	0	0	1	0	0	0	23
Shelby	0	30	0	775	0	197	0	114	84	0	0	0	0	214	1	0	0	1,415
Waco	0	1	0	13	0	4	0	4	1	0	0	0	0	3	0	0	0	26
Unincorporated Area	6	11	0	699	0	363	0	70	33	0	0	0	0	179	1	0	0	1,362
Gaston County	**715**	**84**	**0**	**7,276**	**2**	**1,830**	**1**	**761**	**279**	**0**	**0**	**0**	**1**	**158**	**92**	**44**	**9**	**11,252**
Belmont	0	9	0	346	0	91	0	89	20	0	0	0	0	7	0	2	0	564
Bessemer City	41	3	0	256	0	140	0	34	8	0	0	0	0	6	2	2	0	492
Cherryville	46	6	0	416	0	80	0	48	25	0	0	0	0	7	3	2	0	633
Cramerton	0	3	0	170	0	33	0	10	8	0	0	0	0	3	5	1	0	233
Dallas	2	5	0	185	0	38	0	57	4	0	0	0	0	2	1	2	1	297

Gastonia	26	48	0	3,047	2	569	1	263	167	0	0	0	1	40	21	12	2	4,199
High Shoals	21	0	0	59	0	21	0	4	0	0	0	0	0	6	2	1	1	115
Lowell	0	1	0	207	0	54	0	25	1	0	0	0	0	2	3	2	0	295
McAdenville	0	0	0	41	0	22	0	4	2	0	0	0	0	0	0	1	0	70
Mount Holly	4	4	0	448	0	140	0	26	17	0	0	0	0	4	1	3	5	652
Ranlo	2	1	0	63	0	41	0	5	0	0	0	0	0	4	0	2	0	118
Stanley	32	4	0	197	0	66	0	20	12	0	0	0	0	9	1	2	0	343
Unincorporated Area	541	0	0	1,841	0	535	0	176	15	0	0	0	0	68	53	12	0	3,241
Lincoln County	**260**	**39**	**1**	**1,846**	**0**	**1,106**	**2**	**186**	**149**	**0**	**0**	**0**	**0**	**654**	**96**	**15**	**0**	**4,354**
Lincolnton	9	16	0	423	0	179	0	61	62	0	0	0	0	156	33	6	0	945
Unincorporated Area	251	23	1	1,423	0	927	2	125	87	0	0	0	0	498	63	9	0	3,409
CLEVELAND GASTON LINCOLN REGION TOTAL	**986**	**179**	**1**	**11,203**	**2**	**3,768**	**3**	**1,286**	**576**	**0**	**0**	**0**	**1**	**1,344**	**190**	**59**	**9**	**19,607**

Source: NCEM Risk Management Tool

TABLE 6.28: 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																		
CLEVELAND COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X		X	X	X	X		X
Bethlehem Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Boiling Springs City Fire Department	Fire/EMS	X	X	X	X	X	X				X				X	X		
Boiling Springs Fire and Rescue	Fire/EMS	X	X	X	X	X	X				X				X	X		
Boiling Springs Fire and Rescue 2	Fire/EMS	X	X	X	X	X	X				X							
Casar Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Cleveland County Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		X
Cleveland County Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Fallston Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Fallston Community Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Grover Rural Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
Kings Mountain Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Kings Mountain Fire Department 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Lawndale Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
Number Seven Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X						X	X
Number Three Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
Oak Grove Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X							
Polkville Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Shanghai Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X					X		
Shelby Fire Department	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Shelby Fire Department 2	Fire/EMS	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)
Shelby Fire Department 3	Fire/EMS	X	X	X	X	X	X				X				X	X		
Waco Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 8	Fire/EMS	X	X	X	X	X	X			X	X				X	X	X	X
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 3	Fire/EMS	X	X	X	X	X	X				X				X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 4	Fire/EMS	X	X	X	X	X	X				X				X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 22	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 13	Fire/EMS	X	X	X	X	X	X				X				X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 6	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 12	Fire/EMS	X	X	X	X	X	X				X				X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 1	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES STATION 7	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
CLEVELAND COMMUNITY COLLEGE EMERGENCY SERVICES REGIONAL TRAINING CENTER	Fire/EMS	X	X	X	X	X	X				X				X	X		
GROVER RESCUE SQUAD INCORPORATED	Fire/EMS	X	X	X	X	X	X				X				X	X	X	X
BOILING SPRINGS LIFESAVING AND RESCUE	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)
SHELBY RESCUE SQUAD INCORPORATED	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
UPPER CLEVELAND RESCUE INCORPORATED	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
CLEVELAND COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
CLEVELAND COUNTY LIFE SAVING AND RESCUE	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP H DISTRICT IV	Police	X	X	X	X	X	X				X			X	X	X		
TOWN OF BOILING SPRINGS POLICE DEPARTMENT	Police	X	X	X	X	X	X				X				X	X		
SHELBY POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X		X
CITY OF GROVER POLICE DEPARTMENT	Police	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
CLEVELAND COUNTY SHERIFFS' DEPARTMENT	Police	X	X	X	X	X	X				X		X	X	X	X		X
Casar Elementary	School	X	X	X	X	X	X				X	X			X	X		
Washington Elementary	School	X	X	X	X	X	X			X								
Crest Middle	School	X	X	X	X	X	X				X							
Fallston Elementary	School	X	X	X	X	X	X				X				X	X		
Boiling Springs Elementary	School	X	X	X	X	X	X				X					X		
Burns High	School	X	X	X	X	X	X				X				X	X		
Burns Middle	School	X	X	X	X	X	X				X					X		
Crest High	School	X	X	X	X	X	X				X			X				
Shelby Intermediate	School	X	X	X	X	X	X				X				X	X		
Township Three Elementary	School	X	X	X	X	X	X				X			X	X	X		
Union Elementary	School	X	X	X	X	X	X				X				X	X		
Springmore Elementary	School	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)
Turning Point Academy	School	X	X	X	X	X	X				X			X	X	X	X	X
East Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Grover Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Jefferson Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Marion Elementary	School	X	X	X	X	X	X				X			X	X	X		X
North Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
North Shelby	School	X	X	X	X	X	X				X			X		X		X
Shelby Middle	School	X	X	X	X	X	X				X		X	X	X	X		
West Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Kings Mountain Intermediate	School	X	X	X	X	X	X				X					X		X
Shelby High	School	X	X	X	X	X	X				X				X	X		
Kings Mountain Middle	School	X	X	X	X	X	X				X					X		X
Bethware Elementary	School	X	X	X	X	X	X				X		X	X	X	X		
Kings Mountain High	School	X	X	X	X	X	X				X				X	X		X
Graham Elementary	School	X	X	X	X	X	X				X			X	X	X		X
James Love Elementary	School	X	X	X	X	X	X				X			X	X	X		
Cleveland ECHS	School	X	X	X	X	X	X				X				X	X		
Cleveland Ambulatory Services	Medical	X	X	X	X	X	X				X							
Eye Surgery Center of Shelby	Medical	X	X	X	X	X	X				X			X	X	X		
Cleveland Regional Medical Ctr. Cardiac Rehab. Prog	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Kings Mountain Hospital Cardiac Rehabilitation Prog	Medical	X	X	X	X	X	X				X			X	X	X		
B. J.'s Family Care Home #1	Medical	X	X	X	X	X	X				X							
B. J.'s Family Care Home #2	Medical	X	X	X	X	X	X				X							

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
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Brandon-Sha Family Life Center	Medical	X	X	X	X	X	X				X							
Brooks Family Care Home	Medical	X	X	X	X	X	X				X							
Brooks Family Care Home #2	Medical	X	X	X	X	X	X				X							
Champion Family Care Home	Medical	X	X	X	X	X	X				X				X	X	X	X
Ethel's Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Fallston Rest Home	Medical	X	X	X	X	X	X				X				X	X		
Gordon's Family Care Home	Medical	X	X	X	X	X	X				X							
Greene Haven Family Care Home	Medical	X	X	X	X	X	X			X								
Heavenly Touch Care Home	Medical	X	X	X	X	X	X				X					X		
Howard's Hill Home	Medical	X	X	X	X	X	X				X				X	X		
Nellie's Family Care Home II, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Nellie's Family Care Home, Inc.	Medical	X	X	X	X	X	X			X				X	X	X		
Paula's Family Care Home	Medical	X	X	X	X	X	X				X				X	X		
Towery's Family Care Home	Medical	X	X	X	X	X	X	X			X	X			X	X		
All-Care Providers	Medical	X	X	X	X	X	X				X			X	X	X	X	X
At Home Total Care	Medical	X	X	X	X	X	X				X		X	X	X	X		
Claddaugh Home Care, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X		
Cleveland County Department of Social Services	Medical	X	X	X	X	X	X				X				X	X		
Cleveland Home Health Agency, Inc.	Medical	X	X	X	X	X	X				X			X	X	X		
CNC/Access, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Complete Care, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X		
Interim HealthCare of the Triad, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X		
Total Care, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X

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Alterra Sterling House of Shelby	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Autumn Years Health Care	Medical	X	X	X	X	X	X			X			X	X	X	X		
Carillon Assisted Living of Shelby	Medical	X	X	X	X	X	X				X			X		X		
Cleveland Health Care Center	Medical	X	X	X	X	X	X				X				X	X		
Golden Years Rest Home	Medical	X	X	X	X	X	X				X				X	X		
Kings Mountain Care Center, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Openview Retirement Home	Medical	X	X	X	X	X	X				X				X	X		
Shelby Manor Group Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Somerset Court of Shelby	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Summit Place of Kings Mountain	Medical	X	X	X	X	X	X				X					X		
Yelton's Health Care	Medical	X	X	X	X	X	X				X				X	X		
Hospice of Cleveland County, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Wendover	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Cleveland Regional Medical Center	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Crawley Memorial Hospital, Inc.	Medical	X	X	X	X	X	X				X					X		
Kings Mountain Hospital	Medical	X	X	X	X	X	X				X			X	X	X		
923 Lake Drive	Medical	X	X	X	X	X	X				X			X	X	X		
Above and Beyond Enterprises	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Adventure House	Medical	X	X	X	X	X	X				X							
All My Children Home at Crawford	Medical	X	X	X	X	X	X				X		X	X	X	X		
Behavioral Wellness Center of Shelby	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Belvedere Group Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Blanton Home	Medical	X	X	X	X	X	X				X				X	X		

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Blanton Home II	Medical	X	X	X	X	X	X				X				X	X		
Cabaniss	Medical	X	X	X	X	X	X				X				X	X		
Carpenter Therapeutic Home	Medical	X	X	X	X	X	X				X					X		
Chesterfield Group Home	Medical	X	X	X	X	X	X				X				X	X	X	X
Clearview	Medical	X	X	X	X	X	X				X				X	X		
Cleveland Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Cleveland County Day Reporting Center	Medical	X	X	X	X	X	X	X			X		X	X	X	X		
Cleveland Vocational Industries, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Community Providers Home #1	Medical	X	X	X	X	X	X				X		X	X	X	X		
Day Treatment Center	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Dianna's Place	Medical	X	X	X	X	X	X			X								
Essentially Living	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Floyd Street Care B	Medical	X	X	X	X	X	X				X		X	X	X	X		
Floyd Street Care Home	Medical	X	X	X	X	X	X				X		X	X	X	X		
Fox New Beginnings	Medical	X	X	X	X	X	X				X			X		X	X	X
Fox New Beginnings 2	Medical	X	X	X	X	X	X				X		X	X	X	X		
Fox New Beginnings III	Medical	X	X	X	X	X	X				X			X		X	X	X
Hall Respite Service, Inc.	Medical	X	X	X	X	X	X				X							
Joyful Living DDA Home, Inc. #2	Medical	X	X	X	X	X	X				X			X	X	X		
Joyful Living Residential Care Home for Children	Medical	X	X	X	X	X	X				X			X	X	X		
Kingspointe Residential Academy	Medical	X	X	X	X	X	X			X								
Knox Home	Medical	X	X	X	X	X	X				X			X		X		
Ladell Lane Group Home	Medical	X	X	X	X	X	X				X							

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Landing Street Group Home	Medical	X	X	X	X	X	X				X			X	X	X		
Ledford Home	Medical	X	X	X	X	X	X				X			X		X		
Oriental Group Home	Medical	X	X	X	X	X	X				X		X	X	X	X		
Pathways-Solution Station	Medical	X	X	X	X	X	X				X				X	X		
Pritchett Home	Medical	X	X	X	X	X	X				X		X	X	X	X		
Quality Works Residential A	Medical	X	X	X	X	X	X				X			X	X	X		
Quality works Residential B	Medical	X	X	X	X	X	X				X			X	X	X		
Shadowgate	Medical	X	X	X	X	X	X				X		X	X	X	X		
South Post Road	Medical	X	X	X	X	X	X				X				X	X		
Stamey Home	Medical	X	X	X	X	X	X				X					X		
Stoney Point Group Home	Medical	X	X	X	X	X	X			X								
The New Lamb DDA Group Home II	Medical	X	X	X	X	X	X				X					X		
The New Lambs DDA Group Home I	Medical	X	X	X	X	X	X				X					X		
VOCA-Cherryville Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
VOCA-Fallston	Medical	X	X	X	X	X	X				X				X	X		
VOCA-Roxford	Medical	X	X	X	X	X	X				X				X	X		
VOCA-Young Group Home	Medical	X	X	X	X	X	X				X			X	X	X		
Wellness Training Associates, Inc.	Medical	X	X	X	X	X	X				X		X	X	X	X		
Yelton's Supported Living Unit #1	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #10	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #11	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #2	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #3	Medical	X	X	X	X	X	X				X				X	X		

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Yelton's Supported Living Unit #5	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #6	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit #7	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living Unit# 12	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living, Unit #8	Medical	X	X	X	X	X	X				X				X	X		
Yelton's Supported Living, Unit #9	Medical	X	X	X	X	X	X				X				X	X		
Century Care of Shelby	Medical	X	X	X	X	X	X				X			X	X	X		
Cleveland Pines Nursing Center	Medical	X	X	X	X	X	X				X							
White Oak Manor - Kings Mountain	Medical	X	X	X	X	X	X				X			X	X	X		
White Oak Manor - Shelby	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
GASTON COUNTY																		
GASTON COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X			X			X	X	X	X	X	X
Agriculture Center Volunteer Fire Department Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Alexis Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Belmont Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Belmont Fire Department 2	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
Bessemer City Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Cherryville Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Community Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X				X		X	X	X
Cramerton Fire Department	Fire/EMS	X	X	X	X	X	X	X			X		X	X		X	X	X
Cramerton Fire Department 2	Fire/EMS	X	X	X	X	X	X		X	X			X	X	X	X		X
Cramerton Volunteer Fire Department Inc.	Fire/EMS	X	X	X	X	X	X	X			X		X	X		X	X	X
Crowders Mountain Volunteer Fire & Rescue, Inc.	Fire/EMS	X	X	X	X	X	X				X							

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Crowders Mountain Volunteer Fire & Rescue, Inc. 2	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X	X	X
Crowders Mountain Volunteer Fire & Rescue, Inc. 3	Fire/EMS	X	X	X	X	X	X				X	X	X	X	X	X	X	X
Dallas Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
East Gaston Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Gastonia Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Gastonia Fire Department 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Gastonia Fire Department 3	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Gastonia Fire Department 4	Fire/EMS	X	X	X	X	X	X				X				X	X		
Gastonia Fire Department 5	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Gastonia Fire Department 6	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Gastonia Fire Department 7	Fire/EMS	X	X	X	X	X	X				X							
Gastonia Fire Department 8	Fire/EMS	X	X	X	X	X	X				X					X		
Hugh's Pond Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Lowell Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Lucia-Riverbend Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Mount Holly Fire & Rescue Services Department	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Mount Holly Fire & Rescue Services Department 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Mount Holly Fire & Rescue Services Department 3	Fire/EMS	X	X	X	X	X	X			X		X			X	X	X	X
New Hope Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
North Gaston Volunteer Fire & Rescue Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Ranlo Volunteer Fire and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X				X			X	X
Southpoint Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X			X	X	X		X
Spencer Mountain Road Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		

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Stanley Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Tryonota Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Tryonota Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X	X						
Union Road Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
STANLEY CIVIL DEFENSE RESCUE	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
GASTON COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
SOUTH POINT LIFE SAVING CREW	Fire/EMS	X	X	X	X	X	X				X		X	X		X	X	X
DALLAS TOWNSHIP RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X			X					X	X		
CHERRYVILLE RESCUE	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
GASTON LIFE SAVING CREW INCORPORATED	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
NORTH CAROLINA DIVISION OF PARKS - CROWDERS MOUNTAIN STATE PARK	Police	X	X	X	X	X	X				X							
GASTON COLLEGE POLICE	Police	X	X	X	X	X	X			X					X	X		
NORTH CAROLINA DIVISION OF FOREST RESOURCES - DISTRICT TWELVE	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
CRAMERTON POLICE DEPARTMENT	Police	X	X	X	X	X	X				X		X	X		X	X	X
MCADENVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X		
RANLO POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X		X	X	X
GASTON COUNTY SHERIFFS DEPARTMENT / GASTON COUNTY JAIL	Police	X	X	X	X	X	X			X				X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP H DISTRICT I	Police	X	X	X	X	X	X			X				X	X	X		X
DALLAS POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X		
CITY OF LOWELL POLICE DEPARTMENT	Police	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)
CITY OF GASTONIA POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
BELMONT POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
MOUNT HOLLY POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
STANLEY POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
GASTON COUNTY POLICE DEPARTMENT - BESSEMER CITY SUBSTATION	Police	X	X	X	X	X	X				X			X	X	X	X	X
GASTON COUNTY POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X	X	X
CITY OF CHERRYVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X	X	X
Bessemer City Primary	School	X	X	X	X	X	X			X						X		
Bessemer City High	School	X	X	X	X	X	X			X					X	X		X
Bessemer City Central Elem	School	X	X	X	X	X	X			X						X		
Bessemer City Middle	School	X	X	X	X	X	X				X			X	X	X	X	X
Tryon Elementary	School	X	X	X	X	X	X			X					X	X		
Bess Elementary	School	X	X	X	X	X	X				X				X	X		
McAdenville Elementary	School	X	X	X	X	X	X			X			X	X	X	X	X	X
South Point High	School	X	X	X	X	X	X				X				X	X		
Webb St	School	X	X	X	X	X	X			X				X	X	X	X	X
Springfield Primary	School	X	X	X	X	X	X			X				X	X	X	X	X
Rankin Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Ashbrook High	School	X	X	X	X	X	X			X					X	X		
Belmont Central Elementary	School	X	X	X	X	X	X				X			X		X	X	X
Belmont Middle	School	X	X	X	X	X	X			X				X	X	X	X	X
Brookside Elementary	School	X	X	X	X	X	X			X					X	X		X
Carr Elementary	School	X	X	X	X	X	X			X					X	X		

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		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)
Catawba Heights Elementary	School	X	X	X	X	X	X			X				X		X	X	X
Cherryville High	School	X	X	X	X	X	X			X					X	X		X
Cherryville Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Costner Elementary	School	X	X	X	X	X	X			X					X	X		
Cramerton Middle	School	X	X	X	X	X	X				X				X	X		
East Gaston High	School	X	X	X	X	X	X			X								
Forestview High	School	X	X	X	X	X	X				X				X	X		
Gardner Park Elementary	School	X	X	X	X	X	X			X						X		
Grier Middle	School	X	X	X	X	X	X			X					X	X		
Holbrook Middle	School	X	X	X	X	X	X			X				X	X	X	X	X
Hunter Huss High	School	X	X	X	X	X	X			X				X		X		X
Page Primary	School	X	X	X	X	X	X				X			X	X	X	X	X
Chavis Middle	School	X	X	X	X	X	X			X					X	X		X
Kiser Elementary	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Lingerfeldt Elementary	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Lowell Elementary	School	X	X	X	X	X	X			X			X	X		X	X	X
Mount Holly Middle	School	X	X	X	X	X	X			X				X	X	X	X	X
Forest Heights Elementary	School	X	X	X	X	X	X				X					X		
New Hope Elementary	School	X	X	X	X	X	X				X				X	X		
North Belmont Elementary	School	X	X	X	X	X	X			X			X	X		X	X	X
North Gaston High	School	X	X	X	X	X	X			X						X		
Pinewood Elementary	School	X	X	X	X	X	X			X		X	X	X	X	X	X	X
Pleasant Ridge Elementary	School	X	X	X	X	X	X			X				X		X		X

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Rhyne Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Robinson Elementary	School	X	X	X	X	X	X				X				X	X		
Sherwood Elementary	School	X	X	X	X	X	X			X					X	X		
H H Beam Elementary	School	X	X	X	X	X	X				X			X	X	X	X	X
Southwest Middle	School	X	X	X	X	X	X				X				X	X		X
Stanley Middle	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Friday Middle	School	X	X	X	X	X	X			X					X	X		
Woodhill Elementary	School	X	X	X	X	X	X			X					X	X		X
York Chester Middle	School	X	X	X	X	X	X			X			X	X	X	X		X
Highland Sch of Technology	School	X	X	X	X	X	X			X				X	X	X		
Highland Charter Public School	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Piedmont Community Charter School, CFA	School	X	X	X	X	X	X				X				X	X		
Chapel Grove Elementary	School	X	X	X	X	X	X				X							
Warlick Academy	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Blaine Beam Intermediate	School	X	X	X	X	X	X			X				X	X	X	X	X
Sadler Elementary	School	X	X	X	X	X	X				X				X	X		
Bessemer City Early College High School	School	X	X	X	X	X	X			X					X	X		X
Gaston Regional Detention Ctr	School	X	X	X	X	X	X			X				X	X	X		
Hawks Nest Intermediate	School	X	X	X	X	X	X				X				X	X		
Mountain Island Charter	School	X	X	X	X	X	X			X		X			X	X		X
CaroMont Speciality Surgery	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
East First Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
House Of Mercy	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X

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Rock Garden Family Care Home	Medical	X	X	X	X	X	X				X					X		
St. Marks Road Care Home	Medical	X	X	X	X	X	X			X						X		
Walden Pond Care Home	Medical	X	X	X	X	X	X			X		X	X	X	X	X	X	X
At Home Total Care	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Bayada Nurses	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Compleat Rehab Services	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Complete Care, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Emerald Care Partners	Medical	X	X	X	X	X	X			X					X	X		
Emerald Care, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Gaston Memorial Home Health	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Health & Home Services	Medical	X	X	X	X	X	X	X		X				X	X	X		
Home Health Professionals	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Hospice of Gaston County, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Interim HealthCare of the Triad, Inc.	Medical	X	X	X	X	X	X			X				X		X		X
Primary Health Concepts	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Total Care, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Touched by Angels Home Healthcare, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Abingdon Place of Gastonia	Medical	X	X	X	X	X	X			X					X	X		
Carillon Assisted Living of Cramer Mountain	Medical	X	X	X	X	X	X				X				X	X		X
Countrytime Inn	Medical	X	X	X	X	X	X				X							
Gaston Manor	Medical	X	X	X	X	X	X			X				X	X	X		X
Gaston Place	Medical	X	X	X	X	X	X				X					X		
Gastonia Village	Medical	X	X	X	X	X	X			X						X		

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Morningside of Gastonia	Medical	X	X	X	X	X	X				X				X	X		
Moses Manor, Inc.	Medical	X	X	X	X	X	X				X				X	X		
Rosewood Assisted Living	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Somerset Court of Cherryville	Medical	X	X	X	X	X	X			X					X	X	X	X
South Haven Long Term Care	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Woodlawn Haven	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Gaston Memorial Hospital	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
112 Linville Court	Medical	X	X	X	X	X	X			X					X	X		
14th Street I	Medical	X	X	X	X	X	X				X			X	X	X	X	X
14th Street II	Medical	X	X	X	X	X	X				X			X	X	X	X	X
401-A	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
401-B	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
403-C	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
403-D Kickapoo Avenue	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
A. Ledbetter Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
A.C.P.P., Inc./Restorative Justice Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Adams Home	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Alexander Children's Center-Gaston Home 1	Medical	X	X	X	X	X	X			X				X	X	X		
Alexander Children's Center-Gaston Home II	Medical	X	X	X	X	X	X			X				X	X	X		
Amaefuna Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Americas Addiction Trtmnt-430B W. Franklin Blvd.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Autumn Lane	Medical	X	X	X	X	X	X			X					X	X		X
Beacon Hall	Medical	X	X	X	X	X	X			X				X	X	X		

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Beasley Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Boone Home	Medical	X	X	X	X	X	X			X					X	X		
Broadway Home	Medical	X	X	X	X	X	X			X		X				X		
Brookview Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Carolinas Counseling & Consulting, LLC	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Carter Home	Medical	X	X	X	X	X	X				X					X		
Cbay/Hickory Creek	Medical	X	X	X	X	X	X				X							
Chapel Grove House	Medical	X	X	X	X	X	X				X	X						
Chateau Home	Medical	X	X	X	X	X	X				X				X	X		
Cherryville ICF/MR Group Home	Medical	X	X	X	X	X	X			X						X		X
Counterpoint	Medical	X	X	X	X	X	X			X				X	X	X		X
Creative Opportunities	Medical	X	X	X	X	X	X			X				X	X	X		
Crocker Home	Medical	X	X	X	X	X	X			X				X	X	X		
Day Break	Medical	X	X	X	X	X	X			X								
Devon's Place	Medical	X	X	X	X	X	X			X			X	X		X	X	X
Elizabeth Drive ICF/MR Group Home	Medical	X	X	X	X	X	X			X					X	X		
Ellis Home	Medical	X	X	X	X	X	X				X				X	X		
Fairfield Drive Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Forestbrook Group Home	Medical	X	X	X	X	X	X				X				X	X		
Foxhunt	Medical	X	X	X	X	X	X			X					X	X		
Franklin Group Home	Medical	X	X	X	X	X	X	X		X			X	X	X	X	X	X
Gardner Park Group Home	Medical	X	X	X	X	X	X			X					X	X		
Garland House	Medical	X	X	X	X	X	X				X							

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Garland Knox Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Gaston-Lincoln Area MH/MR Respite Care Home	Medical	X	X	X	X	X	X			X					X	X		
Gentry Home	Medical	X	X	X	X	X	X			X								
Georgetowne Woods	Medical	X	X	X	X	X	X				X					X		
Hall's Learning Center	Medical	X	X	X	X	X	X			X				X		X		X
Holy Angels Services Inc.-Main Center	Medical	X	X	X	X	X	X	X		X			X	X	X	X		X
Holy Angels Services, Inc. - Lakewood	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Holy Angels Services, Inc.-Belhaven	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Holy Angels Services, Inc.-Gary Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Holy Angels Services, Inc.-Pinehaven Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Holy Angels Services, Inc.-The Carrabaun Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Hope Run Group Home	Medical	X	X	X	X	X	X			X					X	X		
HSS-Gastonia	Medical	X	X	X	X	X	X			X					X	X		
Insights In Recovery	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Kid's Depot	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Kid's Place	Medical	X	X	X	X	X	X			X								
Kid's Station (True's Kids, Inc.)	Medical	X	X	X	X	X	X				X					X		
Lackey Home	Medical	X	X	X	X	X	X			X					X	X		X
Laurel Lane Group Home	Medical	X	X	X	X	X	X			X				X		X		X
Ledbetter Home	Medical	X	X	X	X	X	X			X				X	X	X		
Lightner Home	Medical	X	X	X	X	X	X			X					X	X		X
Linford House	Medical	X	X	X	X	X	X				X			X		X		X
MacGregor II	Medical	X	X	X	X	X	X				X				X	X		

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Marvin Gardens	Medical	X	X	X	X	X	X				X			X				
McCormick Group Home	Medical	X	X	X	X	X	X			X				X	X	X		X
McLeod Addictive Disease Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Meadow Ridge Home	Medical	X	X	X	X	X	X			X					X	X		
Meek Road ICF/MR Group Home	Medical	X	X	X	X	X	X				X					X		
Merrywood	Medical	X	X	X	X	X	X				X							
Monument Home	Medical	X	X	X	X	X	X			X				X		X		
Mt. Ridge Group Home	Medical	X	X	X	X	X	X				X					X		
Mumbulo Home	Medical	X	X	X	X	X	X			X								
Murphey's House	Medical	X	X	X	X	X	X			X				X		X		X
New Beginnings of Gaston County	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Oakcrest	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Partial Hospitalization Program-Gaston Counseling C	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Patriot	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Patriot Lane	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Paula's Kids	Medical	X	X	X	X	X	X			X				X	X	X		X
Paula's Kids Inc. #2	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Peach Tree Place	Medical	X	X	X	X	X	X			X					X	X		
Piedmont Adolescent Services	Medical	X	X	X	X	X	X			X						X		X
Piedmont Pioneer House	Medical	X	X	X	X	X	X			X					X	X		
Pleasant Home	Medical	X	X	X	X	X	X			X					X	X		
Price Home	Medical	X	X	X	X	X	X			X						X		
Reep Home	Medical	X	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)
Robinwood Home	Medical	X	X	X	X	X	X				X					X		
Second Avenue	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Self Concepts Consulting	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Smith Therapeutic Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Smith's Hope House	Medical	X	X	X	X	X	X			X					X	X		
Springdale Lane Group Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Stevens Street Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Tara Cottage	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Teen Scene Act 1	Medical	X	X	X	X	X	X			X								
Teen Scene Act 2	Medical	X	X	X	X	X	X			X								
Teen Scene Act 3	Medical	X	X	X	X	X	X			X								
The Flynn Fellowship Home of Gastonia, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
The House of David	Medical	X	X	X	X	X	X			X				X	X	X		X
The Recovery Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Turning Point Behavioral Health Group	Medical	X	X	X	X	X	X			X			X	X	X	X		X
UMAR-Baytree	Medical	X	X	X	X	X	X			X					X	X		
UMAR-WNC, Inc.-Laurel Woods	Medical	X	X	X	X	X	X				X					X		
UMAR-WNC, Inc.-Powell	Medical	X	X	X	X	X	X			X				X	X	X		X
Victory Group Homes, Inc. Derrydown Home	Medical	X	X	X	X	X	X				X					X		
VOCA-Dellinger	Medical	X	X	X	X	X	X			X				X	X	X		X
York-Chester Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Alexandria Place	Medical	X	X	X	X	X	X			X				X	X	X		X
Belaire Health Care Center	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)
Brian Center Health and Rehabilitation/Gastonia	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Carolina Care Center	Medical	X	X	X	X	X	X			X					X	X		
Century Care of Cherryville	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Century Care of Gastonia	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Courtland Terrace	Medical	X	X	X	X	X	X			X					X	X		X
Covenant Village, Inc.	Medical	X	X	X	X	X	X			X						X		
MeadowWood Nursing Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Rehabilitation and Health Center of Gastonia	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
GLC Staffing Company	Medical	X	X	X	X	X	X			X				X	X	X		
Mega Force Staffing	Medical	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

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 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		
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
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		

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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
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

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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
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
LINCOLN COUNTY																		
LINCOLN COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X				X			X	X	X	X	X
Alexis Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Crouse Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Denver Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
Denver Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
Denver Volunteer Fire Department, Inc. 3	Fire/EMS	X	X	X	X	X	X				X		X	X		X		
East Lincoln Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		X

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East Lincoln Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		X
Howard's Creek Volunteer Fire Dept., Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
Howard's Creek Volunteer Fire Dept., Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
Lincolnton Fire Department	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
Lincolnton Fire Department 2	Fire/EMS	X	X	X	X	X	X				X				X	X		X
North 321 Volunteer Fire Dept., Inc.	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
North 321 Volunteer Fire Dept., Inc. 2	Fire/EMS	X	X	X	X	X	X				X							
North Brook Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X				X				X	X		
North Brook Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
North Brook Volunteer Fire Department, Inc. 3	Fire/EMS	X	X	X	X	X	X				X					X		
Ore Bank Pumpkin Center Volunteer Fire Dept., Inc.	Fire/EMS	X	X	X	X	X	X				X	X						
Ore Bank Pumpkin Center Volunteer Fire Dept., Inc. 2	Fire/EMS	X	X	X	X	X	X				X				X	X		
The South Fork Volunteer Fire Department of Lincoln County, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Union Volunteer Fire Department, Inc. of Vale, N. C.	Fire/EMS	X	X	X	X	X	X				X							
Union Volunteer Fire Department, Inc. of Vale, N. C. 2	Fire/EMS	X	X	X	X	X	X				X							
LINCOLN COUNTY EMERGENCY MEDICAL SERVICES QUICK RESPONSE VEHICLE 10	Fire/EMS	X	X	X	X	X	X				X							
LINCOLN COUNTY EMERGENCY MEDICAL SERVICES MEDIC 5	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
LINCOLN COUNTY EMERGENCY MEDICAL SERVICES MEDIC 4	Fire/EMS	X	X	X	X	X	X			X					X	X		
LINCOLN COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X				X		X	X	X	X		
WEST LINCOLN RESCUE INCORPORATED	Fire/EMS	X	X	X	X	X	X				X				X	X		

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EAST LINCOLN RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X				X				X	X		X
LINCOLN COUNTY LIFE SAVING CREW	Fire/EMS	X	X	X	X	X	X				X			X	X	X	X	X
SPECIALIZED TRANSPORT	Fire/EMS	X	X	X	X	X	X				X			X	X	X		
LINCOLN EMERGENCY MEDICAL SERVICES STATION 4	Fire/EMS	X	X	X	X	X	X				X				X	X		X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP F DISTRICT V - SUBSTATION	Police	X	X	X	X	X	X				X		X	X		X		X
LINCOLN COUNTY SHERIFFS DEPARTMENT - CHARLIE OFFICE	Police	X	X	X	X	X	X				X				X	X	X	X
LINCOLNTON POLICE DEPARTMENT	Police	X	X	X	X	X	X				X			X	X	X	X	X
LINCOLN COUNTY SHERIFFS DEPARTMENT / LINCOLN COUNTY JAIL	Police	X	X	X	X	X	X				X		X	X	X	X		X
LINCOLN COUNTY SHERIFFS DEPARTMENT - ADAM OFFICE	Police	X	X	X	X	X	X				X				X	X		
East Lincoln Middle	School	X	X	X	X	X	X				X				X	X		
Rock Springs Elementary	School	X	X	X	X	X	X				X			X	X	X		X
North Brook Elementary	School	X	X	X	X	X	X				X				X	X		
East Lincoln High	School	X	X	X	X	X	X			X					X	X		X
Iron Station Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
LCST	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Love Memorial Elementary	School	X	X	X	X	X	X			X				X		X	X	X
Battleground Elementary	School	X	X	X	X	X	X				X			X		X		X
Catawba Springs Elementary	School	X	X	X	X	X	X			X					X	X		X
GE Massey Elementary	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Lincolnton High	School	X	X	X	X	X	X				X			X		X	X	X

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Lincolnton Middle	School	X	X	X	X	X	X				X			X		X		X
S Ray Lowder Elementary	School	X	X	X	X	X	X				X			X	X	X		X
West Lincoln High	School	X	X	X	X	X	X				X				X	X		
West Lincoln Middle	School	X	X	X	X	X	X				X				X	X		
Pumpkin Center Primary	School	X	X	X	X	X	X				X				X	X		
North Lincoln Middle	School	X	X	X	X	X	X				X				X	X		
Asbury School	School	X	X	X	X	X	X				X		X	X	X	X	X	X
Lincoln Charter School	School	X	X	X	X	X	X				X				X	X		
Union Elementary	School	X	X	X	X	X	X				X							
North Lincoln High	School	X	X	X	X	X	X				X				X	X		
St James Elementary	School	X	X	X	X	X	X				X				X	X		X
Kiser Intermediate	School	X	X	X	X	X	X				X			X		X		X
Childers Elementary	School	X	X	X	X	X	X				X				X	X		
Pumpkin Center Intermediate	School	X	X	X	X	X	X				X				X	X		
Combine Academy	School	X	X	X	X	X	X				X				X	X		
Lincoln Christian Academy	School	X	X	X	X	X	X			X				X	X	X		
Long Shoals Wesleyan Academy	School	X	X	X	X	X	X			X						X		
Pursuit Prep	School	X	X	X	X	X	X				X			X	X	X		X
Starboard Christian Academy	School	X	X	X	X	X	X				X				X	X		X
Denver Christian Academy	School	X	X	X	X	X	X				X	X			X	X		X
Schenck Family Care Home	Medical	X	X	X	X	X	X			X								
American Health Services	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Lincoln County DSS	Medical	X	X	X	X	X	X				X		X	X	X	X		

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Lincoln County Home Health Agency	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Lincoln Medical Center Home Health	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Heath House	Medical	X	X	X	X	X	X				X		X	X	X	X		
Lakewood Care Center, Inc.	Medical	X	X	X	X	X	X				X				X	X	X	X
Wexford House	Medical	X	X	X	X	X	X				X		X	X	X	X		
Hospice of Lincoln County, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Lincoln Medical Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
A.C.T.S. In Recovery	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Abby's House	Medical	X	X	X	X	X	X				X				X	X		X
Alternatives of Lincoln County	Medical	X	X	X	X	X	X			X					X	X		X
Bessemer Heights	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Bettie Woods	Medical	X	X	X	X	X	X				X					X		
Boger City House	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Brookwood Home	Medical	X	X	X	X	X	X				X				X	X		
Care Group/Stanly Drive	Medical	X	X	X	X	X	X				X					X		
Creekside Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Crescent Court Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Crescent Court II	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Crestview	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Dallas Quarters	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Deer Creek	Medical	X	X	X	X	X	X			X						X		
Deer Creek III	Medical	X	X	X	X	X	X			X						X		
Deercreek I	Medical	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)
East Pine Street Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Elmore/Schrum Therapeutic Foster Home	Medical	X	X	X	X	X	X				X			X	X	X		X
Fox Home	Medical	X	X	X	X	X	X			X						X		X
Lakewood Apartment	Medical	X	X	X	X	X	X			X			X	X	X	X		
Laurel Lane	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Lincoln County Group Home for the Handicapped, Inc.	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Lincoln Recovery Center	Medical	X	X	X	X	X	X				X		X	X	X	X		
Linoak Group Home	Medical	X	X	X	X	X	X				X		X	X		X	X	X
Lithia Inn Group Home	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Promised Hope Counseling Services	Medical	X	X	X	X	X	X				X					X		X
Rhyne	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X
Riverview Home	Medical	X	X	X	X	X	X			X			X	X		X		X
Ross Center	Medical	X	X	X	X	X	X				X		X	X	X	X		
Salem Industries / Division of Gaston Skills, Inc.	Medical	X	X	X	X	X	X			X						X		
State Street	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Sunny Hill II	Medical	X	X	X	X	X	X				X				X	X		X
Sunny Hills Group Home #1	Medical	X	X	X	X	X	X				X				X	X		X
Sycamore Home	Medical	X	X	X	X	X	X				X			X	X	X	X	X
Turner 3	Medical	X	X	X	X	X	X				X			X	X	X		X
Turner 4	Medical	X	X	X	X	X	X				X			X	X	X		X
Turner I	Medical	X	X	X	X	X	X				X			X	X	X		X
Turner II	Medical	X	X	X	X	X	X				X			X	X	X		X
UMAR - WNC, Inc.	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)
Brian Center Health and Retirement/Lincolnton	Medical	X	X	X	X	X	X				X		X	X	X	X		
Cardinal Healthcare and Rehabilitation Center	Medical	X	X	X	X	X	X				X		X	X		X		X
Lincoln Nursing Center	Medical	X	X	X	X	X	X				X		X	X	X	X	X	X

Source: NC OneMap

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 the 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 feasible goals, objectives, and/or actions are feasible based on an understanding of the organization's capacity (agencies and/or departments) to implement the proposed strategies. The capability assessment helps determine practical mitigation actions that are likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, number 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 implement mitigation measures. Careful examination of local capabilities helps identify existing gaps, shortfalls, or weaknesses with ongoing government activities that potentially hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment acknowledges the existing mitigation measures (completed or underway) at the local government level, which should be leveraged 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. This helps establish the goals and objectives for the region to pursue under this Plan and ensures such goals and objectives are feasible 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

To facilitate the inventory and analysis of local government capabilities for the jurisdictions within Cleveland Gaston and Lincoln counties, a detailed capability assessment was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The assessment compiled information on various "capability indicators" including relevant planning practices (plans, programs, and ordinances), fiscal resources, administrative and technical capacity, and current political climate. These capability indicators provide insight into existing conditions that support and/or hinder the region's ability to implement hazard mitigation actions.

The standardized indicators used to assess capability promote extensive inventory of existing local plans, ordinances, programs, and resources that are in place or underway in addition to their overall effect on hazard loss reduction. Additionally, this information can help 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 for the capability assessment 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. The scoring methodology is included in Appendix B: Planning Tools.

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 a general assessment of local government capability. The results of this capability assessment help inform the development of an effective and practical 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 participating 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 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 successful enforcement and implementation of plans, ordinances, and programs that are intended to guide and manage growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that

regulate land development and building requirements; 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 in place or underway for the participating jurisdictions in the Cleveland Gaston Lincoln Region

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

and highlight the potential effect on loss reduction. This information helps 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 Plan/Ordinance	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	-	✓	-
Natural Resource Protection Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flood Response Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emergency Operations Plan	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Continuity of Operations Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Evacuation Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disaster Recovery Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital Improvements Plan	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	-	✓	-
Economic Development Plan	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	-	✓	-
Historic Preservation Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Planning / Regulatory Tool	CLEVELAND COUNTY	Belwood	Boiling Springs	Casar	Earl	Fallston	Grover	Kings Mountain	Kingstown	Lattimore	Lawndale	Mooresboro	Patterson Springs	Polkville	Shelby	Waco
Flood Damage Prevention Ordinance	✓	✓	✓	-	-	-	-	✓	✓	-	-	-	-	✓	✓	-
Zoning Ordinance	✓	✓	✓	-	-	-	✓	✓	-	-	-	✓	-	-	✓	-
Subdivision Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	✓	-	-	✓	-
Unified Development Ordinance	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	-	✓	-
Post-Disaster Redevelopment Ordinance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Building Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fire Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
National Flood Insurance Program (NFIP)	✓	✓	✓	✓	-	-	-	✓	✓	-	✓	-	-	✓	✓	✓
NFIP Community Rating System	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Planning / Regulatory Tool	GASTON COUNTY	Belmont	Bessemer City	Cherryville	Cramerton	Dallas	Gastonia	High Shoals	Lowell	McAdenville	Mount Holly	Ranlo	Spencer Mountain	Stanley	LINCOLN COUNTY	Lincolnton
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	✓	-	✓	✓	✓
Floodplain Management Plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Open Space Management Plan (Parks	✓	✓	✓	✓	✓	✓	✓	-	✓	✓	✓	-	-	-	✓	✓
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 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. 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, which have their own local comprehensive plans in place.
- 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 and Spencer Mountain. McAdenville and Ranlo have adopted local comprehensive plans.
- 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, McAdenville, Ranlo, 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 the 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.

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

[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.

officials, and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP information and 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	7	$2,171,000	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	0	$0	0	$0
Earl*	--	--	--	--	--	--
Fallston*	--	--	--	--	--	--
Grover	09/16/19	07/02/08	0	$0	0	$0
Kings Mountain	04/30/86	07/02/08(M)	10	$2,441,000	3	$11,804
Kingstown	10/03/12	07/02/08	0	$0	0	$0
Lattimore*	--	--	--	--	--	--
Lawndale	01/16/18	07/02/08	0	$0	0	$0
Mooresboro*	--	--	--	--	--	--
Patterson Springs*	--	--	--	--	--	--
Polkville	03/22/12	02/20/08	0	$0	0	$0
Shelby	04/03/78	07/02/08	24	$6,480,000	29	$412,886
Waco	03/15/18	07/02/08	0	$0	0	$0
GASTON COUNTY†	05/01/80	09/02/15	57	$16,717,000	8	$84,718
Belmont	11/01/79	09/02/15	23	$7,167,000	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	0	$0	0	$0
Cherryville	05/15/07	11/04/09	1	$350,000	2	$82,141
Cramerton	05/21/92	11/04/09	19	$5,080,000	6	$78,764
Dallas	05/01/94	11/04/09	9	$1,893,000	2	$12,879
Gastonia	02/01/78	11/04/09	159	$45,558,000	16	$71,046
High Shoals	05/20/10	11/04/09	0	$0	0	$0
Lowell	03/05/90	11/04/09	8	$4,019,000	0	$0
McAdenville	06/01/87	11/04/09	5	$2,856,000	0	$0
Mount Holly	09/28/79	09/02/15	41	$12,153,000	8	$223,326
Ranlo	03/03/03	11/04/09	5	$999,000	0	$0
Spencer Mountain	05/10/10	11/04/09	0	$0	0	$0
Stanley	08/27/10	11/04/09	5	$1,501,000	0	$0
LINCOLN COUNTY†	12/01/81	09/02/15	92	$28,532,000	9	$214,611
Lincolnton	12/01/81	03/02/09	12	$2,472,000	1	$3,934

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
Source: NFIP Community Status information as of October 2024; NFIP claims and policy information as of February 2024

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 and the City of Gastonia both participate in the CRS. Both are Class 9 communities. 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 Lincoln County, and the City of Mount Holly, which have 92 and 41 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, Lattimore, Mooresboro, and Patterson Springs, also participate in the NFIP and they all have adopted flood damage prevention regulations.
- In Cleveland County, the County provides floodplain management services for Belwood, Boiling Springs, Casar, Grover, Kingstown, Lawndale, Polkville, and Waco. The County Planner is named as the Floodplain Administrator in the Flood Ordinance. Shelby and Kings Mountain provide their own Floodplain Management services and the Planning Directors in each community serve as their Floodplain Manager.
- In Gaston County, the County provides floodplain management services for Belmont, Cherryville, Dallas, High Shoals, Lowell, and McAdenville. The County is currently working with Bessemer City to develop an agreement to provide floodplain management services for them as well. The County's Floodplain Administrator works in the Natural Resources Department. Cramerton, Gastonia, Mount Holly, Ranlo and Stanley provide their own Floodplain Management Services and have each appointed a Floodplain Manager.
- In Lincoln County, the Planning Director serves as the Floodplain Administrator. Lincolnton provides their own Floodplain Management services and the City's Planning Director serves as the Floodplain Manager.

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.

Substantial Damage Estimation Procedures: Properties in communities that participate in the NFIP that are determined to be "substantially damaged" following a flood event must be brought into compliance with the local flood damage prevention ordinance. Substantial damage estimating procedures for participating jurisdictions are detailed below.

- ***Cleveland County*** – The County provides floodplain management services for Belwood, Boiling Springs, Casar, Grover, Kingstown, Lawndale, Polkville, and Waco so these procedures also apply for those jurisdictions. The County, Shelby, and Kings Mountain are all currently working to develop their own specific procedures to document how substantial damage estimations are condutec. That language will be incorporated into future updates of this plan.

  Earl, Fallston, Mooresboro, and Patterson Springs do not participate in the NFIP.

- ***Gaston County*** – The County provides floodplain management services for Belmont, Cherryville, Dallas, High Shoals, Lowell, and McAdenville so these procedures also apply for those jurisdictions The County is currently working with Bessemer City to develop an agreement to provide floodplain management services for them as well. The County, Cramerton, Gastonia, Mount Holly, Ranlo and Stanley are all currently working to develop their own specific procedures for how to conduct substantial damage estimations. That language will be incorporated into future updates of this plan.

- ***Lincoln County*** – The County provided the following information regarding how they conduct substantial damage estimations following a flood.

  Immediately after a flood event, or other event resulting in substantial damage to homes and businesses, Lincoln County Emergency Management Coordinates Substantial Damage Estimates. This process begins by assembling employees from the following departments: Emergency Management, Planning, Inspections, Tax Appraisal, & Public Utilities. This assembly process begins with a situation briefing at the Emergency Operations Center and then assembled employees are broken into teams and deployed into areas. The number of assigned areas is determined by the severity and impacted area of the event.

  The deployed teams utilize Lincoln County D4H emergency management software and the Damage Assessment Tool on the ESRI Survey 123 platform. Based on the current edition of the FEMA Preliminary Damage Assessment Guide, damages are estimated, documented, and shared with appropriate authorities. In the event of a lack of internet connectivity the assessment would be conducted on paper forms utilizing the same FEMA Preliminary Damage Assessment Guide. All data collected is shared across departments and agencies. Once homeowners come in for permits for repair work, this data is referenced and if substantial damage is triggered then the building must come into compliance with all Lincoln County and City of Lincolnton ordinances, including the floodplain ordinance.

If a homeowner or applicant comes in to improve the property voluntarily without damage, then substantial improvement protocols are activated. This entails a lengthy review during plan review of the project scope, evaluating the building's depreciated value either by tax assessor value or through an appraisal, and the work is adjusted accordingly depending on the determination. All work is also field verified by inspectors to make sure construction is up to code and in compliance with local ordinances. Additional resources such as surveyors and engineers are utilized as necessary to determine compliance with local ordinances.

Lincolnton is currently working to develop their own specific procedures for how to conduct substantial damage estimations. That language will be incorporated into future updates of this plan.

***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, Cramerton, Lowell, Mount Holly, Ranlo, 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 34.36, 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	32	Moderate
Boiling Springs	36	Moderate
Casar	27	Moderate
Earl	23	Moderate
Fallston	22	Moderate
Grover	23	Moderate
Kings Mountain	35	Moderate
Kingstown	28	Moderate
Lattimore	22	Moderate
Lawndale	27	Moderate
Mooresboro	24	Moderate
Patterson Springs	22	Moderate
Polkville	29	Moderate
Shelby	36	Moderate
Waco	27	Moderate
GASTON COUNTY	**45**	**High**
Belmont	36	Moderate
Bessemer City	37	Moderate
Cherryville	35	Moderate
Cramerton	36	Moderate
Dallas	36	Moderate
Gastonia	42	High
High Shoals	26	Moderate
Lowell	37	Moderate
McAdenville	32	Moderate
Mount Holly	37	Moderate
Ranlo	35	Moderate
Spencer Mountain	23	Moderate
Stanley	29	Moderate
LINCOLN COUNTY	**42**	**High**
Lincolnton	38	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 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 2025 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.

As part of the development of the 2025 update of this plan, the goals found in **Table 8.1** were reviewed and discussed at the 8/9/2024 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. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. Consistent implementation of actions over time will ensure that community goals are achieved.

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 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

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 2025 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 2025 planning process. Actions identified as completed in previous versions 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 should be completed. More information is provided when possible.
- Implementation Status (2025)—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 31 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	3
Earl	9:13	5
Fallston	9:15	4
Grover	9:17	7
Kings Mountain	9:20	20
Kingstown	9:27	3
Lattimore	9:29	3
Lawndale	9:30	4
Mooresboro	9:32	7
Patterson Springs	9:35	2
Polkville	9:36	3
Shelby	9:38	10
Waco	9:42	2
Gaston County	9:43	**37**
Belmont	9:57	13
Bessemer City	9:61	13
Cherryville	9:65	10
Cramerton	9:68	12
Dallas	9:71	12
Gastonia	9:75	16
High Shoals	9:79	4
Lowell	9:82	10
McAdenville	9:86	13
Mount Holly	9:91	13
Ranlo	9:97	14
Stanley	9:100	14
Lincoln County	9:101	**24**
Lincolnton	9:114	24

Cleveland County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	County Planning	Local	2030	As of 2024, 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.	Flooding	Medium	Emergency Management	Local	2030	No policy has been developed as of 2024. This is to be completed in 2030 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	2030	This Article has not been updated as of 2024. This action to be completed in the future pending funding, staff resources and political will.
P-6	Revise and update the regulatory floodplain maps.	Flooding	High	County Planning	Federal State	2030	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 (2025)
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.	Flooding	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 (2025)
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.	The County continues to monitor available grant funding opportunities and will submit as interest or need arises.
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PP-1	Create and maintain a list of repetitive flood loss properties.	Flooding	Medium	County Planning	Local	2030	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	2030	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 2030.
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 (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2030	As of 2024, 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	2030	This Article has not been updated as of 2024. This action to be completed in the future pending funding, staff resources and political will.
P-4	Revise and update the regulatory floodplain maps.	Flooding	High	Town	Federal State	2030	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							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
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 (2025)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flooding	High	Town	Federal State	2030	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	2030	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 2030.
Public Education and Awareness							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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 (2025)
Prevention							
P-1	Adopt Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2030	These regulations have not been updated as of 2024. This action to be completed in the future pending funding, staff resources and political will.
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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 Earl Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	Update the UDO-Article IV (Subdivisions) to incorporate hazard mitigation objectives.	All	Medium	Town	Local	2030	This Article has not been updated as of 2024. This action to be completed in the future pending funding, staff resources and political will.
P-2	Revise and update the regulatory floodplain maps.	Flooding	High	County Planning	Federal State	2030	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.
P-3	Join the National Flood Insurance Program	Flooding	High	Emergency Management	Local	2030	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 (2025)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
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 (2025)
Prevention							
P-1	Adopt Subdivision regulations and incorporate hazard mitigation objectives.	All	Medium	Town	Local	2030	As of 2024, 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	Flooding	High	Emergency Management	Local	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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 Grover Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2030	As of 2024, 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	County Planning	Local	2030	This Article has not been updated as of 2024. 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 (2025)
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2030	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	Flooding	High	Emergency Management	Local	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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.

City of Kings Mountain Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2030	As of 2024, 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.	Flooding	Medium	City Planning	Local	2030	No policy has been developed as of 2024. This is to be completed by 2030 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	2030	This Article has not been updated as of 2024. 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.	Flooding	Medium	City Planning	Local	2030	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 (2025)
P-6	Revise and update the regulatory floodplain maps.	Flooding	High	City Planning	Federal State	2030	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.	Flooding	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 (2025)
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	2030	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/ Excessive Heat	Medium	COKM-Water Resources Dept. & COKM Planning Dept	Local Funding and/or Grants, Relief Funds, etc. as available.	2030	No work has been done on this through 2024. 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 (2025)
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.	Severe Winter Weather	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.	Wildfires	High	COKM-Codes Administration and Fire Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2030	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.	Flooding	Medium	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Flooding	High	COKM-Codes Administration Department	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Geological (Sinkhole)	High	COKM-Public Works Department	Local Funding and/or Grants, Relief Funds, etc. as available.	2030	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 (2025)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
ES-5	Maintain and/or purchase emergency generators for Critical Service Departments.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	COKM-Public Work, Fire and Police Departments	Local Funding and/or Grants, Relief Funds, etc. as available.	2030	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Structural Projects							
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/ Excessive Wave	High	COKM-Water Resources Dept	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Low	COKM-Electric and Codes Administration Departments	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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 (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.
PEA-2	Encourage fire suppression systems.	Wildfires	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 (2025)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flooding	High	Town	Federal State	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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 Lattimore Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-2	Join to participate in the National Flood Insurance Program	Flooding	High	Emergency Management	Local	2030	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	2030	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 2030.
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 (2025)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flooding	High	Town	Federal State	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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 Mooresboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	Town	Local	2030	As of 2024, 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	2030	This Article has not been updated as of 2024. 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 (2025)
P-6	Create a zoning map (digital) that can be easily reproduced/updated for staff and public use.	All	High	County Planning	Local	2030	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	Flooding	High	Emergency Management	Local	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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 Patterson Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
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 (2025)
Prevention							
P-1	Revise and update the regulatory floodplain maps.	Flooding	High	Town	Federal State	2030	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	2030	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 2030.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (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.

City of Shelby Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-1	At next Land Use Plan Update, review and include hazard mitigation objectives.	All	Medium	City Planning	Local	2030	As of 2024, 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.	Flooding	Medium	City Planning	Local	2030	No policy has been developed as of 2024. 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	2030	This Article has not been updated as of 2024. This action to be completed in the future pending funding, staff resources and political will.
P-6	Revise and update the regulatory floodplain maps.	Flooding	High	City Planning	Federal State	2030	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 (2025)
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.	Flooding	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 (2025)
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	2030	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.	Flooding	Medium	City Planning	Local	2030	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 (2025)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
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 (2025)
Emergency Services							
ES-2	Improve shelter capacities with alternate power/heat sources.	All	High	Emergency Management	Local	2030	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 2030.
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 (2025)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failures	High	Emergency Management, Code Enforcement	Local Funding	2030, Annual assessments	Coordination with NC-DENR and Duke Energy is ongoing with GCOEMFS. NC DENR maintains issues involving DAMS in the County and continue to advise Local Emergency Management of issues that arise.
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	2030	Joint meetings will be held with public works directors from each municipality, Gaston County public works officials, and utility operators to address this and other utility concerns.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Planning, Emergency Management Fire Marshall, Building Inspections	Local Funding, Grants, as available	2030, annually reviewed	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance through Code Enforcement and Planning. Joint meetings will be held with public works directors from each municipality, Gaston County public works officials, and utility operators to address this and other utility concerns.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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. The new facility for ACE since last update will assist with this initiative.
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/ Excessive Heat	Low	Public Works	Local Funding, Grants, as available	2030	Joint meetings will be held with public works directors from each municipality, Gaston County public works officials, and utility operators to address this and other utility concerns.
P-9	Identify programs to provide financial and physical assistance to citizens who experience dry wells for both residential and animal locations.	Drought/ Excessive Heat	Low	Grants	Local Funding, Grants, as available	2030	Gaston County participates in the Agricultural Water Resources Assistance Program, which identifies opportunities to increase water use efficiency, increase water storage and availability for agricultural purposes. Gaston County also participates in the Farmland Protection Plan that sets goals for the County and outlines actions steps to support the agricultural community.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-10	Update countywide land use plan.	Drought/ Excessive Heat	Medium	Planning, County Commission	Local Funding	2030	Gaston County is in the process of accepting RFPs for the update of the Comprehensive Land Use Plan. The goal is to have a new plan adopted before January 2026. Our main focus updates are: land use, transportation, affordable housing, areas in need of infrastructure, and overall continuity.
P-14	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	High	Fire Marshall, Municipalities	Local Funding, as available	2030	Gaston County will continue to plan 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.	Flooding	Medium	Emergency Management, DOT	Local Funding, State, Grants as available	2030	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
P-18	Identify areas of closed or abandon mines or other sites where sinkholes are possible.	Earthquakes, Geological (Landslide, Sinkhole)	Medium	Planning/Land Records	Local Funding	2030	Ongoing efforts within Gaston County GIS Services to identify these areas.
P-19	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquakes, Geological (Landslide, Sinkhole)	Medium	Planning/Land Records	Local Funding	2030	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 (2025)
P-20	Strengthen building codes so structures are "survivable". 'Safe Rooms may be included.	Tornadoes/ Thunderstorms	Low	Emergency Management, Codes, Inspections	Local Funding	2030	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Planning, Codes, Building Inspections	Local Funding	2030	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance.
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	2030	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. Establishing a relationship with all municipal Public works group to assist with this in future
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	High	Planning	Local Funding	2030	Gaston County continues to participate in the Community Rating System (CRS). A Flood Plain Administrator has been designated as the CRS Resource Specialist within the Gaston County Natural Resources Department to oversee this project.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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 moving forward.
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 Hazards	Medium	Gaston County Emergency Management	Federal Grants	As funding becomes available.	Ongoing part of daily operations. This item will remain on the list to ensure constant vigilance. This item will include actions taken moving forward in the 2025 plan.
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.	Severe Winter Weather Hurricane and Coastal Hazards and Coastal Hazard, Tornadoes/ Thunderstorms	Medium	EM	Private	2030	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 (2025)
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane and Coastal Hazards, Severe Winter Weather, Tornadoes/ Thunderstorms	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-4	Provide greater support to high profile security events impacting municipalities. (Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.)	Civil Disturbance, Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2030	Developing Incident action Plans will improve relationships, ensure availability and scheduling of resources, and improve emergency service coordination efforts. This involves County outreach efforts to municipalities. This was a new item for 2020 review and is moving forward as events arise.
Structural Projects							
S-1	Assist in construct of additional interconnects and extensions to facilitate water interchange between municipal systems as needed.	Drought/ Excessive Heat	Medium	Public Works, Municipalities	Local Funding, Grants, as available	2030	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 (2025)
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, Hurricane and Coastal Hazardss, 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	The First 72 campaign is no longer in existence, but a more interactive means to educate and increase public awareness through PSA that go out through social media on different topics each month has been established. In addition, an Educator has been hired to take education opportunities to local schools, senior centers, festivals, or any public gathering where there is an opportunity. The Educator also has an All-Hazards education trailer to assist with these events.
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	This item was completed with the exception of four weather station installations. One has been installed thus far. Future efforts are to add the other four around the county and complete any maintenance on current operating equipment.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Severe Winter Weather, Hurricane and Coastal Hazards	High	Emergency Management	Local Funding as available	Annual review and update	The First 72 campaign is no longer in existence, but a more interactive means to educate and increase public awareness through PSA that go out through social media on different topics each month has been established. In addition, an Educator has been hired to take education opportunities to local schools, senior centers, festivals, or any public gathering where there is an opportunity. The Educator also has an All-Hazards education trailer to assist with these events.
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.	Severe Winter Weather	High	Emergency Management	Local Funding as available	Annual review and update	GCOEMFS is providing Public Information Campaigns in conjunction with the National Weather Service. Campaigns include, Severe Weather Preparedness Week, Hurricane and Coastal Hazards Preparedness Week, and Winter Storm Preparedness Week. GCEOMFS will continue to maximize these events

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	Gaston County Environmental Health is required to provide each new well permit applicant a copy of a map indicating the known sources of contamination within 1,000 feet. This document is generated from a state website called Well Permitting Decision Tool. Funding from CDC allowed Environmental Health to offer free water testing to residents from 2017 to 2021 for the Healthy Wells Project. Environmental Health will be offering free water samples to residents in area of known elevated arsenic levels before the end of this year. The arsenic is naturally occurring.
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.	Flooding, Dam Failures	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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/ Excessive Heat	High	Emergency Management	Local Funding as Available	Annual review and update	A more interactive means to educate and increase public awareness through PSAs has been established that go out through social media on different topics each month. In addition, an Educator has been hired to take education opportunities to local schools, senior centers, festivals, or any public gathering where there is an opportunity. The Educator also has an All-Hazards education trailer to assist with these events.
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.	Flooding	Low	Planning	Local Funding or grants as available	Annual review and update	GCOEMFS 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.	Earthquakes	High	Emergency Management	Local Funding as available	Annual review and update	The County will continue to utilize state provided education materials for their current program involving earthquakes. 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 (2025)
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/ Excessive Heat	High	Emergency Management	Local Funding as available, partnership with Electric Companies possible	Annual review and update	A more interactive means to educate and increase public awareness through PSAs has been established that go out through social media on different topics each month. In addition, an Educator has been hired to take education opportunities to local schools, senior centers, festivals, or any public gathering where there is an opportunity. Also, GCOEMFS is establishing stronger working relationship with all municipal public works groups.
PEA-11	Encourage Best Land Use Practices. Education can take form of Public Service Messages on Government Access TV Channel, Posters and Fliers.	Geological	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Severe Winter Weather, Tornadoes/Thunderstorms	High	Emergency Management, Fire Marshall, Development Services	Local Funding as available	Annual review and update	Ongoing efforts to upgrade Damage Assessment Plans throughout the county to automate requirements and make them both user friendly and timely. Ongoing efforts to work with municipalities to share resources in the future to facilitate processes. Currently establishing a relationship with all municipal public works group to assist with these efforts.
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 Failures	Medium	Emergency Management	Local Funding as available	Annual review and update	Coordination with NC-DENR and Duke Energy is ongoing with GCOEMFS. NC DENR maintains issues involving DAMS in the County and continue to advise Local Emergency Management of issues that arise.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Infectious Disease	High	Public Information Officer, Health Dept.	Local Funding as available	Annual review and update	Gaston County Public Health, along with EM and GEMS, held numerous drive-thru vaccination clinics for COVID-19. Numerous press releases and communications have been sent out. There are Facebook posts about flu every year. Gaston County Environmental Health, through state funding, collects mosquitoes from several locations to identify the species present and conduct disease testing. Facebook posts about Fight the Bite for mosquitoes. We have given out magnets, coloring books, toy airplanes Gaston County Public Health has held annual free rabies drive thru clinics in the fall. In 2020, we did not have the clinic due to COVID. Media is notified if there is a positive animal with rabies.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PEA-15	Notifications about Flood Hazards, Flood Insurance and flood protection to residents in Special Flood Hazard Areas.	Flooding	Low to Medium	Planning	Local Funding, Grants as available	Annual review and update	The First 72 campaign is no longer in existence, but a more interactive means to educate and increase public awareness through PSA that go out through social media on different topics each month has been established. In addition, an Educator has been hired to take education opportunities to local schools, senior centers, festivals, or any public gathering where there is an opportunity. The Educator also has an All-Hazards education trailer to assist with these events.
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 Hazards	Low to Medium	Emergency Management	Local Funding, Grants if available	Annual review and update	County has established an everbridge notification system to notify citizens of any emergency information that needs to be disseminated through out and geographical area around the county.

City of Belmont Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
				Prevention			
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	2030	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-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	Medium	Gaston County Emergency Management, Fire Marshal, Belmont	Local Funding, as available	Review and update annually	The Belmont Fire Department currently has multiple automatic aid agreements with neighboring fds for assistance with fire suppression.
P-7	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquakes, Geological (Landslide, Sinkhole)	Low	Gaston County Codes	Local Funding	2030	Gaston County Bldg. Inspections is responsible for this action. It will be removed from future plan updates.
P-8	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornadoes/ Thunderstorms	Low	Gaston County Emergency Management, Belmont	Local Funding	2030	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-9	Require underground utilities for new construction.	Severe Winter Weather Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Gaston County Planning, Codes and Building Inspections, Belmont	Local Funding, Grants, as available	2030	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, 2030	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 (2025)
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	2030	Currently all hazards that can possibly be mediated are tackled in the planning process through a TRC (Technical Review Committee) with representation from all City of Belmont departments.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Planning, Belmont	Local Funding, Grants, as available	Required by code. Annually review	Belmont Planning and Public Works have contact with Duke Energy for such situations and are successful with implementation.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Gaston County Emergency Management	Belmont City Council	2030	Belmont: All city services have back-up power capabilities.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane and Coastal Hazards, Severe Winter Weather, Tornadoes/ Thunderstorms	High	Gaston County Emergency Management, Belmont	Local Funding as available	Implement directly after an event	Belmont Fire and Street Departments work seamlessly to accomplish road clearing during severe weather.
Structural Projects							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Flooding	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.
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	Belmont Fire Department has a designated educator along with supplemental educators. A reverse alert program called Code Red has been initiated. This allows for emergency messages to be forced to users within a geofence.
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	Designated educator sends out all severe weather prep education.

City of Bessemer City Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	2030	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Low	Bessemer City	Local Funding as available	2030	City will provide inventory of water and sewer facilities power/connection capacities.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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.	Earthquakes, Geological (Landslide, Sinkhole)	Low	Gaston County Codes	Local Funding	2030	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.	Tornadoes/ Thunderstorms	Low	Gaston County Emergency Management, Bessemer City	Local Funding	2030	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, 2030	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. Bessemer City is exploring an interlocal agreement with Gaston County for floodplain management.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	2030	Work with Gaston County to administer floodplain ordinance administration; regulate development within these areas.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Gaston County Emergency Management	Bessemer City	2030	Bessemer City will consider recommended ordinance implementation for zoning that will help with this strategy. Bessemer City will need guidance from GCOEMFS.
ES-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Hurricane and Coastal Hazards, Severe Winter Weather, Tornadoes/ Thunderstorms	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Included in all afterstorm operations. Will remain for 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.	Flooding	Medium	Bessemer City	Local Funding, Grants, as available	Annual evaluation	Manhole structures are raised in most areas in floodplains. We will continue to evaluate improvements as needed.
Public Education and Awareness							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	Bessemer City will utilize Nixle Mass Communication System (text and phone), iPaws (through Nixle), social media, and website for public awareness and emergency alerts as needed.
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	Bessemer City would like to partner with GCOEMFS for weather radio distribution program, especially for those without other means of communication (i.e. senior population, lower income, etc.)

City of Cherryville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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. Future engagements will be coordinated with municipalities on this issue driven by the county.
P-2	Maintain water system interconnects to increase reliability of fire protection water supply.	Wildfires	High	Public Works, City of Cherryville	Local Funding and/ or Grants, as available	2030	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.	Wildfires	High	Emergency Management, Fire Chief, City of Cherryville	Local Funding, as available	Review and update annually	On-going review and update of participation in State and County Mutual Aid agreements. These agreements are re-evaluated regularly.
P-11	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornadoes/ Thunderstorms	Low	Emergency Management, Cherryville	Local Funding	2030	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							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	2030	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 and Coastal Hazards, Severe Winter Weather, Tornadoes/ Thunderstorms	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.)	Civil Disturbance/ Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2030	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	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.	Flooding	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	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 (2025)
Prevention							
P-1	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	High	Gaston County Emergency Management, Cramerton	Local Funding as available	Annual review and update	Continuing to progress with help of Two River Utilities.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	2030	Continuing to progress with help of Two River Utilities and Town of Cramerton departments.
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/ Excessive Heat	Low	Gaston County Public Works, Cramerton	Local Funding, Grants, as available	2030	Continuing to progress with help of Two River Utilities.
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	High	Gaston County Emergency Management, Fire Marshal, Cramerton	Local Funding, as available	Review and update annually	Continuing to progress through Cramerton Fire Department, Cramerton Police Department, and other relationship building around the county.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-7	Require underground utilities for new construction.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	Medium	Gaston County Planning, Cramerton	Local Funding, Grants, as available	Gaston County will implement this action moving forward.	Continuing to progress with help of Gaston County Building and Inspections, Gaston County Planning and Zoning, Two Rivers Utilities, and Town of Cramerton departments.
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.	Flooding	Medium	Gaston County Planning Dept.	N/A	2030	Continuing to progress with mutual help from surrounding municipalities, the Catawba Riverkeeper, the South Fork Collective, and Town of Cramerton departments.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	High	Gaston County Emergency Management, Municipalities	Local Funding as available	Implement directly after an event	Continuing to progress with help of Town of Cramerton Departments.
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	2030	Continuing to progress by looking for funding.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
ES-4	Provide greater support to high profile security events impacting municipalities. (Cotton Ginning Days, Cherry Blossom Festival, Graduations, etc.)	Civil Disturbance/ Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2030	Continuing to assess and progress with assistance from various Gaston County Agencies.
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.	Flooding	Medium	Cramerton	Local Funding, Grants, as available	2030, Annual evaluation	Continuing to research and progress with Two Rivers Utilities.
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	Continuing to progress through various educational applications including a town app that can utilize push notifications.
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	Continuing to progress through researching and future purchasing of weather stations, flood predicting equipment, the creation of flood mapping, and Stormwater management education. that can assist in public notification.

Town of Dallas Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-2	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	High	Dallas	Local Funding as available	2030	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	Medium	Gaston County Planning, Dallas	Local Funding, Grants, as available	2030	All electric right-of-ways are maintained and we inspect for dead and danger trees constantly.
P-6	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	High	Gaston County Emergency Management, Fire Marshal, Dallas	Local Funding, as available	Review and update annually	We have standing mutual aid and automatic aid agreements in place.
P-8	Enforce Building Code and educate inspectors as to mass earth movements.	Earthquakes, Geological (Landslide, Sinkhole)	Low	Gaston County Codes	Local Funding	Gaston County will implement this action moving forward.	Gaston County handles all inspections within the town limits. This action will be removed for future updates.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-9	Strengthen building codes so structures are "survivable". 'Safe Rooms' may be included.	Tornadoes/ Thunderstorms	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.	Flooding	Medium	Gaston County Planning	N/A	2025	Process will be reviewed by Emergency Management Directorate to identify any required changes NLT 2030. Continue to review flood prone areas during the Preliminary 100 yr./ 500yr/ flood plan mapping
P-12	Participate in Community Rating System (CRS).	Flooding	Medium	Gaston County Planning	N/A	2030, 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 (2025)
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorm	Medium	Gaston County Emergency Management	Dallas, EM	2030	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ 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.	Flooding	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	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.
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	The Gaston County Firefighters Association has partnered with the County Emergency Manager to pursue this purchase.

City of Gastonia Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-3	Member of the Catawba-Wateree Drought Management Group which coordinates drought response among municipalities.	Drought/ Excessive Heat	Medium	COG – Public Utilities Dept.	Local Funding	2030	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.	Severe Winter Weather	Medium	COG – Code Enforcement & Electric Division	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Flooding	High	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Flooding	Medium	COG – Public Works and Utilities Zoning, Planning, Engineering,& Inspections	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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 (2025)
P-10	Pursue funding to implement mitigation strategies in identified vulnerable areas.	Flooding	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.
Property Protection							
PP-2	Encourage fire suppression systems.	Wildfires	High	COG – Inspections & Fire Dept.	Local Funding and/or Grants, Relief Funds, etc. as available	2030	Ongoing continued evaluation of the city's threat to fire and the response equipment required for such events. The Fire Department continues to meet the fire inspection schedule and conducts plan reviews set forth by the NC Fire Code.
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	Updating the City's EOP is currently ongoing along with training and exercises in the near future.
ES-2	Install SCADA System in City Electric Department for power outage response coordination.	Severe Winter Weather, Tornadoes/ Thunderstorms, Earthquakes, Geological (Landslide, Sinkhole)	High	COG - Electric Division	Local Funding and/or Grants, Relief Funds, etc. as available	2030	Electric has a fully functional SCADA System.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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	2030	A generator has been added to the main fuel island at 700 N. Broad St (City Garage). Pursuing grant opportunities to secure funding to install other generators to maintain service delivery during power outages.
ES-4	Maintain permanent Emergency Operations Center to coordinate services during natural disasters.	All Hazards	High	Police Department	Local Funding and/or Grants, Relief Funds, etc. as available	2030	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.	Civil Disturbance/ Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2030	Planning for high security events occur with the support of local, county, state, and federal resources. A unified command approach is required for all agencies involved.
Structural Projects							
S-2	Encourage additional active and/or emergency interconnects with other regional water purveyors.	Drought/ Excessive Heat	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
S-4	Encourage buried utilities where technologically and economically feasible.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	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.	Flooding	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.
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	City of Gastonia is utilizing Code Red and social media for public information. The Gaston County Shelter Task Force and the American Red Cross are focused on implementing shelter locations and 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 was awarded and weather radios have been installed at each city fire station.

City of High Shoals Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Flooding	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.	Flooding	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 (2025)
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 (2025)
Prevention							
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
P-8	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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.	Tornadoes/ Thunderstorms	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-11	Participate in Community Rating System (CRS).	Flooding	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 (2025)
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	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.	Wildfires	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							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Flooding	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.
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 (2025)
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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
P-5	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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.	Geological (Landslide, Sinkhole) Earthquakes	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.	Tornadoes/ Thunderstorms	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-10	Participate in Community Rating System (CRS).	Flooding	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 (2025)
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	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.)	Civil Disturbance, Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2025	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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	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 (2025)
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.	Flooding	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.
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 (2025)
Prevention							
P-2	Initiate road clearing efforts early in storms. Especially for Critical Facilities access.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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-10	Strengthen building codes so structures are “survivable”. ‘Safe Rooms’ may be included.	Tornadoes/ Thunderstorms	Low	Gaston County Emergency Management, Mount Holly	Local Funding	2030	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-12	Participate in Community Rating System (CRS).	Flooding	Medium	Gaston County Planning	Local Funding, Grants, as available	Pending possible increase in number of insurance policies, 2030	We have not joined this voluntary program; only 1500 communities participate in it nationally. However, we have an employee that l is obtaining his Certified Floodplain Manager certificate after taking the course in October. This would be a first step towards the CRS if the City chooses to go this route.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-13	Strengthen Floodplain regulations to include unstudied stream, CLOMRs, and other requirement to mitigate flood damages.	Flooding	High	Mount Holly Planning Dept.	Local Funding	Annually review	The City continues to work with the State Department of Emergency Management to update flood insurance rate maps based on new data, as we have long adopted the FEMA model floodplain management ordinance. At this time, the City is participating in the development of new Flood Insurance Rate Maps through FEMA and the State Dept of Emergency Management. Staff attended a community informational workshop in February of this year 2024. Additionally, we continue to coordinate with our State officials on the development of the new and more accurate flood maps. About every 5-8 years, the State conducts an audit of the City's Floodplain Administration to ensure that everything is in good standing.
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Gaston County EM	Mount Holly, EM	2030	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 (2025)
ES-3	Inventory water pumping facilities and sewer facilities, including their demand for electrical power and connection capabilities.	Severe Winter Weather, Tornadoes/ Thunderstorms Hurricane and Coastal Hazards	High	Gaston County Emergency Management, Mount Holly	Local Funding as available	2030	Establish a deliberate inventory date on long range calendar to work with municipalities public works to conduct inventories.
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.	Severe Winter Weather, Tornadoes/ Thunderstorms Hurricane and Coastal Hazards	High	Gaston County Public Works, Mount Holly	Local Funding, Duke Energy and/ or Grants, as available	2030	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.)	Civil Disturbance / Terrorism	High	Emergency Management, Municipalities	Local Funding as available with Emergency Management Support	2030	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							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
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.	Severe Winter Weather, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	Medium	Gaston County Planning, Mount Holly	Local Funding, Grants, as available	Annual review and update	Since 2001, the City has required that all new subdivisions in Mount Holly, power their respective power lines and install decorative light poles along the street. This has certainly helped reduce power outages during storm events and ice storms. The City also is in the process of implementing a dangerous tree ordinance to ensure that trees posing a danger of falling on private property can be required by the City to be removed.
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.	Flooding	Medium	Mount Holly	Local Funding, Grants, as available	Annual review and update	Coating and sealing manholes is a part of our yearly I&I program. Locking manhole lids are installed on all flood prone areas.
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 (2025)
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 (2025)
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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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.	Geological (Landslide, Sinkhole), Earthquakes	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.	Tornadoes/ Thunderstorms	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
P-12	Participate in Community Rating System (CRS).	Flooding	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.	Flooding	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.	Flooding	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.
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 (2025)
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 (2025)
Prevention							
P-1	Cooperate with state regulators in assessing vulnerability of dams and assure corrective actions are taken when suggested.	Dam Failures	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
P-7	Actively participate in mutual aid programs to strengthen suppression capabilities.	Wildfires	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.	Geological (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.	Tornadoes/ Thunderstorms	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-12	Participate in Community Rating System (CRS).	Flooding	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 (2025)
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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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 (2025)
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.	Flooding	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.
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 (2025)
Prevention							
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Severe Winter Weather	High	Industry, County Management, Emergency Management, Public Health, LEPC	Local	2030	Industry & Lincoln County Management continue to examine policies as technology advances to ease implementation. This action will be reviewed on an annual basis.
P-7	Designate sites for the disposal of debris.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Solid Waste	Local	2030	Completed: Solid waste will continue to evaluate needs for debris management ongoing. New debris management sites established at Owls Den and Optimist Club convenience sites.
P-8	Annual meetings with critical services, agencies and utilities.	All	High	Emergency Management	Local	2030 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	2030	Over the past 5 years, some alternative water sources were identified. The County has interconnections w/ City of Lincolnton & Catawba County with Hwy 16/150 interconnection in design phase.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Geological (Landslide)	Low	P&ID	Local	2030	Pending funding and staff time. There are no high-risk slopes identified in Lincoln County. Slope development is very localized presenting few challenges.
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All	High	Emergency Management, GIS, DH4 (software provider), Damage Assessment Teams	Local, Grants	2030	Requires continual data input. Over the past 5 years implementation of EM software has allowed archived and geolocated response and recovery documentation. Action to remain ongoing to remain current.
P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flooding	Medium	P&ID	Local	2030	Pending funding and staff time. This is a goal of the department. Minimal development in floodplains has occurred due to zoning requirements. Implement through Regional Planning Process. Over the past 5 years, this was not achieved.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-15	Organize regular meetings with local fire officials and the North Carolina Division of Forest Resources.	Wildfires	High	Emergency Management, County Forester	Local	2030, Monthly/Bi-monthly	Pending funding and staff time. Monthly meetings with local fire officials and NC Div of Forest Resources staff are conducted. County EM attends bi-monthly meetings with fire staff. Lincoln County Fire Rescue Association is the primary information sharing group.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans	All	High	County Planning, All Departments	Local	2030	Implementing this action is a goal of the LEPC. Land Use Plan updated in 2023 includes mitigation strategies. References have been made to mitigation in additional public policy documents and is ongoing as growth and new processes are continual.
P-17	Increase the number of USGS streamflow gauges in the county.	Flooding	Medium	USGS, NCGS, NCEM	Grants, Federal	2030	USGS, NCGS, and NCEM continue to install additional streamflow gauges across the state. No new gauges in Lincoln County over the past 5 years. Requests for additional gauges has been made for eastern part of county.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Utilities, Catawba Wateree Management Group	Local, Grants	2030	Catawba Wateree Water Management Group allows for coordinated water use management. Precipitation and surface water monitoring is minimally 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	Low	County	Local	2030	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	All Hazards	Medium	Cleveland County Emergency Management	Federal Grants	As funding becomes available.	The County continues to monitor available grant funding opportunities and will submit as interest or need arises.
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PP-1	Purchase property located in repetitively flooded areas.	Flooding	Low	County	BRIC, HMGP Grants	2030	Continue to evaluate need for funding to purchase property in the floodplain. Funding in low risk area has generally not been available.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially near critical facilities.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	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	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Emergency Management	Local	2030	Implemented through an existing Generator Agreement w/ State and Local vendors. No additional updates to agreement over past 5 years. A “Just in Time" Fuel plan has been implemented with vendors and is being used on a daily basis. Challenges occur when availability region wide is encountered.
Structural Projects							
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flooding	Medium	NCDOT	State	2030, 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 (2025)
S-3	Maintain interconnected water systems with other local municipalities for transfer of water resources.	Drought	High	Public Works	Local	2030	As of 2025, currently active w/ City of Lincolnton, and connection agreement with Catawba County at Hwy 16 &150 in design phase. 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.	Flooding	Medium	P&ID	Local, Grants	2030, Re-educate as new maps are produced	2023 Flood Hazard Map updates completed, but this activity will be continued periodically as necessary. Educational outreach opportunities provided as new information is available.
PEA-2	Notify all property owners with structures located in the 100-year flood plain of the importance of flood insurance.	Flooding	Low	P&ID	Local, Grants	2030, Re-educate as new maps are produced	Completed, this activity will be continued periodically as necessary. Educational outreach opportunities provided as new information is available.
PEA-3	Encourage purchase of Weather Alert Radios and use of other available warning technologies.	All Hazards	Medium	Emergency Management	Local, Grants	2030 with Annual review and update	Pending funding. Weather Alert radios were distributed key facilities. Providing more radios is pending funding. Encourage use of cellular alert capabilities such as WEA and weather apps to accomplish warning real time in mobile environment.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PEA-6	Encourage the removal or trees and branches that could down power lines.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Emergency Management	Local	2030, Annual review and update of outreach strategies	Pending funding Local Power Companies conduct survey of all power lines annually. County outreach to citizens continually performed through a number of mediums utilizing county PIO officer.
PEA-7	Publicize the location of emergency shelters.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards Radiological Emergencies	Medium	Emergency Management	Local	2030, Annual review and update of outreach strategies	All shelter locations are the responsibility of Lincoln County in partnership with Lincoln County DSS, Public Health, Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, and social media coordinated by county PIO, but new mediums will be evaluated.
PEA-8	Educate public of road clearing priorities through use of a map.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	Medium	NCDOT	State	2030	Maps of current road conditions are available through NCDOT TIMS system and 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.

City of Lincolnton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
Prevention							
P-4	Promote a policy that encourages business create inclement weather policies that allow telecommuting.	Severe Winter Weather	High	Industry, City Management, Emergency Management,	Local	2030	Industry & Lincolnton City Management, continue to examine policies as technology advances to ease implementation. It will be reviewed on an annual
P-7	Designate sites for the disposal of debris.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Public Services	Local	2030	Completed: Public Services Department will evaluate needs for debris management ongoing. Working with Lincoln County on establishment of new debris management sites established at Owls Den and Optimist Club convenience sites. No new debris sites identified within Lincolnton.
P-8	Annual meetings with critical services, agencies and utilities.	All Hazards	High	Lincolnton Fire, Public Services	Local	2030 Bi-annually	City staff meets twice a year with critical services, agencies and utilities and have done so over the past 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-9	Determine alternative water sources.	Drought	High	Public Works	Local, Grants	2030	Over the past 5 years, some alternative water sources were identified. The City has interconnections w/ Lincoln County and by association with Lincoln County to Catawba County with Hwy 16/150 interconnection in design phase.
P-12	Consider adoption of regulations that would restrict development on or near steep slopes.	Geological (Landslide)	Low	Lincolnton Planning	Local	2030	Pending funding and staff time. There are no high risk slopes identified in Lincoln County. Slope development is very localized presenting few challenges.
P-13	Coordinate the mapping and tracking of data associated with hazard events.	All Hazards	High	Lincolnton Planning and Development, Emergency Management, GIS, D4H (software provider), Damage Assessment	Local, Grants	2030	Requires continual data input. Over the past 5 years implementation of Lincoln County EM software has allowed archived and geolocated response and recovery documentation. Ongoing to remain current

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-14	Participate in FEMA's Community Rating System to further flood mitigation strategies and to help lower Flood Insurance rates for residents.	Flooding	Medium	Lincolnton Planning	Local	2030	Pending funding and staff time. Minimal Development in floodplains has occurred due to zoning and planning requirements. Implement if feasibility meets needs. 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.	Wildfires	High	Lincolnton Fire Department, Emergency Management, County Forester	Local	2030, monthly	Pending funding and staff time. City fire staff participate in monthly meetings with all local fire officials and NC Div of Forest Resources staff. County EM attends bi-monthly meetings with fire staff. Lincoln County Fire Rescue Association is the primary information sharing group.
P-16	Include references to hazard mitigation strategies in relevant public policy documents and plans.	All Hazards	High	Lincolnton Planning	Local	2030	Implementing this action is a goal of the LEPC. County Land Use Plan updated in 2023 includes mitigation strategies. References have been made to mitigation in additional public policy documents and is ongoing as growth and new processes are continual.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
P-17	Increase the number of USGS streamflow gauges in the county.	Flooding	Medium	USGS, NCGS, NCEM	Grants, Federal	2030	USGS, NCGS, NCEM continues to install additional streamflow gauges across the state. No new gauges in Lincoln County over the past 5 years. Requests for additional gauges has been made for eastern part of county.
P-18	Increase monitoring of precipitation and ground/surface water supplies.	Drought	Medium	Public Utilities, Catawba Wateree Management Group	Local, Grants	2030	Catawba Wateree Water Management Group allows for coordinated water use management. Precipitation and surface water monitoring is minimally funded, but we will continue to pursue funding.
P-19	Solicit the support of local representatives to advocate for the support of the General Assembly to include drought as a declarable natural hazard under that Stafford Act.	Drought	Low	City Staff	Local	2030	Implementing this action is a goal of the LEPC which Lincolnton participates in. 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 DHS/FEMA. Projects may include, but are not limited to: mitigation, redundant power to critical facilities, sheltering and other activities that reduce the loss of life and property as a result of impacts from natural hazards.	All Hazards	Medium	City Staff, Emergency Management	Federal Grants	As funding becomes available.	New action for the 2030 plan update.
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PP-1	Purchase property located in repetitively flooded areas	Flooding	Low	City of Lincolnton	HMA Grants	As funds are made available	Continue to evaluate need for funding to purchase property in the floodplain. Funding in low risk area has generally not been available.
Emergency Services							
ES-1	Initiate road clearing efforts early in storms. Especially near critical facilities.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Lincolnton Public Services-Solid Waste & Street Maintenance, NCDOT	Local	Implement directly after storm event	Implemented through existing NCDOT & City Public Works policies and procedures. NCDOT & City Public Works 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.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	City Management, Lincolnton Fire, County Emergency Management	Local	2030	Implemented through an existing Generator Agreement w/ State and Local vendors. No additional updates to agreement over past 5 years. A “Just in Time" Fuel plan has been implemented with vendors and is being used on a daily basis. Challenges occur when availability region wide is encountered.
Structural Projects							

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
S-1	Repave, re-grade or reconstruct stream crossings that are repetitively submerged under flood water.	Flooding	Medium	Lincolnton Public Services-Solid Waste & Street Maintenance, NCDOT	State	2030, Apply annually for funding to complete projects	Pending funding. Although funding is not always available, NCDOT & City Public Works continue 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	Lincolnton Public Utilities	Local	2030	As of 2025, currently active agreements w/ Lincoln County, and by association with connection agreement with Catawba County at Hwy 16 &150 in design phase. 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.	Flooding	Medium	Lincolnton Planning	Local, Grants	2030, Re-educate as new maps are produced	2023 Flood Hazard Map updates completed, but this activity will be continued periodically as necessary. Educational outreach opportunities provided as new information is available.
PEA-2	Notify all property owners with structures located in the 100-year flood plain of the importance of flood insurance.	Flooding	Low	Lincolnton Planning	Local, Grants	2030, Re-educate as new maps are produced	Completed, this activity will be continued periodically as necessary. Educational outreach opportunities provided as new information is available.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PEA-3	Encourage purchase of Weather Alert Radios and use of other available warning technologies	All Hazards	Medium	Lincolnton Management, Lincolnton Fire, LC Emergency Management	Local, Grants	2030 with Annual review and update	Pending funding. Weather Alert radios were distributed to key facilities. Providing more radios is pending funding. Encourage use of cellular alert capabilities such as WEA and weather apps to accomplish warning real time in mobile environment
PEA-6	Encourage the removal or trees and branches that could down power lines.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	High	Lincolnton Public Utilities, Lincolnton Public Services, LC Emergency Management	Local	2030, Annual review and update of outreach strategies	Pending funding Local Power Companies and Lincolnton Public Utilities conduct survey of all power lines annually. County outreach to citizens continually performed through a number of mediums utilizing county PIO officer.
PEA-7	Publicize the location of emergency shelters.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards Radiological Emergencies	Medium	Lincolnton Management , Lincoln County Emergency Management	Local	2030, Annual review and update of outreach strategies	All shelter locations are responsibility of the Lincoln County in partnership with Lincoln County DSS, Public Health , Red Cross. Outreach has been performed through a number of mediums including TV, radio, print, and internet, and social media coordinated by county PIO, but new mediums will be evaluated.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/	Potential Funding Sources	Implementation Schedule	Implementation Status (2025)
PEA-8	Educate public of road clearing priorities through use of a map.	Severe Winter Weather, Tornadoes/ Thunderstorms, Hurricane and Coastal Hazards	Medium	Lincolnton Public Services-Solid Waste & Street Maintenance, NCDOT	State and Local Public Works	2030	Maps of current road conditions are available through NCDOT TIMS system and 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.

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 to assess whether actions are being implemented in a timely fashion. The participating jurisdictions 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 municipal 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. Methods for integration may include:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

Since the initial plan was adopted in 2015 for all three counties, and with each County-specific plan prior to that, each County and the 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 and in Appendix E Completed Mitigation Actions. 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 and municipal meetings, and the annual review process described herein.

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.

Evaluation Criteria

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/municipal 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 and municipal 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 2025. 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 2025 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 2023 when North Carolina Emergency Management obtained HMGP funding to update 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 January 2024 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



Cleveland Gaston Lincoln 2024 Regional Hazard Mitigation Plan - Public Survey

We need your help!

Cleveland, Gaston, and Lincoln Counties and the municipalities within the counties are working together to become less vulnerable to 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, man-made, and technological hazards and identifies strategies that determine how to best mitigate 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.

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development in the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, please contact Hannah DeLude from ESP Associates, Inc. at hdelude@espassociates.com.

1 1\. Where do you live?*

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

* Choose one.

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

- ◯ Yes
- ◯ No

* Choose one.

3 3\. If "Yes," please explain.

4 4\. How concerned are you about the possibility of our community being impacted by a disaster?*

- ◯ Extremely concerned
- ◯ Somewhat concerned
- ◯ Not concerned

* Choose one.

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

- ◯ Drought
- ◯ Hurricane and Coastal Hazards
- ◯ Severe Winter Weather
- ◯ Flooding
- ◯ Geological (landslides, sinkholes, erosion)
- ◯ Infectious Disease
- ◯ Radiological Emergency
- ◯ Cyber
- ◯ Food Emergency
- ◯ Excessive Heat
- ◯ Tornadoes/Thunderstorms
- ◯ Dam Failure
- ◯ Earthquakes
- ◯ Wildfires
- ◯ Hazardous Substances
- ◯ Terrorism
- ◯ Electromagnetic Pulse
- ◯ Civil Disturbance

* Choose one.

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

- ◯ Drought
- ◯ Hurricane and Coastal Hazards
- ◯ Excessive Heat
- ◯ Tornadoes/Thunderstorms

- ◯ Severe Winter Weather
- ◯ Flooding
- ◯ Geological (landslides, sinkholes, erosion)
- ◯ Infectious Disease
- ◯ Radiological Emergency
- ◯ Cyber
- ◯ Food Emergency
- ◯ Dam Failure
- ◯ Earthquakes
- ◯ Wildfires
- ◯ Hazardous Substances
- ◯ Terrorism
- ◯ Electromagnetic Pulse
- ◯ Civil Disturbance

* Choose one.

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

8 8\. Is your home located in a floodplain?*

- ◯ Yes
- ◯ No
- ◯ I don't know

* Choose one.

9 9\. Do you have flood insurance?*

- ◯ Yes
- ◯ No
- ◯ I don't know

* Choose one.

10 10\. If you do not have flood insurance, why not?

- ◯ Not located in a floodplain
- ◯ Too expensive
- ◯ Not necessary because it never floods
- ◯ Not necessary because I'm elevated or otherwise protected
- ◯ Never really considered it
- ◯ Other

* Choose one.

11 11\. If "Other," please explain.

12 12\. Have you taken any steps to make your home or neighborhood more resistant to hazards?*

- ◯ Yes
- ◯ No

* Choose one.

13 13\. If "Yes," please explain.

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

- ◯ Yes
- ◯ No

* Choose one.

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

- ◯ Yes
- ◯ No

* Choose one.

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

- ◯ Newspaper
- ◯ Television
- ◯ Radio
- ◯ Internet (Including Social Media)
- ◯ Mail
- ◯ Public Workshops/Meetings
- ◯ School Meetings

* Choose one.

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

18 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?

19 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?

20 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 important you think each one is for your community to consider pursuing.

20\. **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.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

21 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, structural retrofits, and storm shutters.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

22 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 preservation, slope stabilization, riparian buffers, and forest management.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

23 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 modification, retaining walls and storm sewers.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

24 24\. **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.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

25 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 education programs, library materials and demonstration events.*

- ◯ Very important
- ◯ Somewhat important
- ◯ Not important

* Choose one.

26 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)

Thank you for taking the time to answer this survey! Your input is appreciated!

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.

Local Mitigation Plan Review Tool

Cover Page

The Local Mitigation Plan Review Tool (PRT) demonstrates how the local mitigation plan meets the regulation in 44 CFR § 201.6 and offers states and FEMA Mitigation Planners an opportunity to provide feedback to the local governments, including special districts.

1. The Multi-Jurisdictional Summary Sheet is a worksheet that is used to document how each jurisdiction met the requirements of the plan elements (Planning Process; Risk Assessment; Mitigation Strategy; Plan Maintenance; Plan Update; and Plan Adoption).
2. The Plan Review Checklist summarizes FEMA's evaluation of whether the plan has addressed all requirements.

For greater clarification of the elements in the Plan Review Checklist, please see Section 4 of this guide. Definitions of the terms and phrases used in the PRT can be found in Appendix E of this guide.

Plan Information	
Jurisdiction(s)	**Cleveland County** (Belwood, Boiling Springs, Casar, Earl, Fallston, Grover, Kingstown, Kings Mountain, Lattimore, Lawndale, Mooresboro, Patterson Springs, Polkville, Shelby, Waco), **Gaston County** (Belmont, Bessemer City, Cherryville, Cramerton, Dallas, Gastonia, High Shoals, Lowell, McAdenville, Mount Holly, Ranlo, Stanley), **Lincoln County** (Lincolnton)
Title of Plan	Cleveland Gaston Lincoln, Regional Hazard Mitigation Plan
New Plan or Update	Update
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	12/10/2024
Local Point of Contact	
Title	Nathan Slaughter, Hazard Mitigation Department Manager
Agency	ESP Associates, Inc.
Address	2200 Gateway Centre Blvd., Suite 216, Morrisville, NC 27560
Phone Number	919678-1070
Email	nslaughter@espassociates.com

Additional Point of Contact	
Title	Click or tap here to enter text.
Agency	Click or tap here to enter text.
Address	Click or tap here to enter text.
Phone Number	
Email	Click or tap here to enter text.

Review Information	
State Review	
State Reviewer(s) and Title	John Mello, Hazard Mitigation Planner
State Review Date	1/10/2025
FEMA Review	
FEMA Reviewer(s) and Title	Click or tap here to enter text.
Date Received in FEMA Region	Click or tap to enter a date.
Plan Not Approved	Click or tap to enter a date.
Plan Approvable Pending Adoption	Click or tap to enter a date.
Plan Approved	Click or tap to enter a date.

Multi-Jurisdictional Summary Sheet

In the boxes for each element, mark if the element is met (Y) or not met (N).

#	Jurisdiction Name	A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. HHPD Requirements	H. State Requirements
1	**Cleveland County**								
2	Town of Belwood								
3	Town of Boiling Springs								
4	Town of Casar								
5	Town of Earl								
6	Town of Fallston								
7	Town of Grover								
8	Town of Kingstown								
9	City of Kings Mountain								
10	Town of Lattimore								
11	Town of Lawndale								
12	Town of Mooresboro								
13	Town of Patterson Springs								
14	Town of Polkville								
15	City of Shelby								
16	Town of Waco								
17	**Gaston County**								

#	Jurisdiction Name	A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. HHPD Requirements	H. State Requirements
18	City of Belmont								
19	City of Bessemer City								
20	City of Cherryville								
21	Town of Cramerton								
22	Town of Dallas								
23	City of Gastonia								
24	Town of High Shoals								
25	City of Lowell								
26	Town of McAdenville								
27	City of Mount Holly								
28	Town of Ranlo								
29	Town of Stanley								
30	**Lincoln County**								
31	City of Lincolnton								

Plan Review Checklist

The Plan Review Checklist is completed by FEMA. States and local governments are encouraged, but not required, to use the PRT as a checklist to ensure all requirements have been met prior to submitting the plan for review and approval. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been "met" or "not met." FEMA completes the "required revisions" summary at the bottom of each element to clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is "not met." Sub-elements in each summary should be referenced using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and sub-element are described in detail in Section 4: Local Plan Requirements of this guide.

Plan updates must include information from the current planning process.

If some elements of the plan do not require an update, due to minimal or no changes between updates, the plan must document the reasons for that.

Multi-jurisdictional elements must cover information unique to all participating jurisdictions.

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))	**Section 2: 2.4 CGL HMPC** **2.6 Involving the Public** **2.7 Involving the Stakeholders**	
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?	Section 2: 2.3 Updating the Plan 2.4 CGL HMPC 2.5 Community Meetings and Workshops 2.6 Involving the Public 2.7 Involving the Stakeholders	

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Section2: 2.2 History of Hazard Mitigation Planning in CGL Region	
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))	**Section 2: 2.7 Involving the Stakeholders**	
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Section 2: 2.7 Involving the Stakeholders	Choose an item.
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))	**2.5 Community Meetings and Workshops** **2.6 Involving the Public**	
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	2.6 Involving the Public	Choose an item.
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))	**7.2 Conducting the Capability Assessment and throughout Section 7**	
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	7.2 Conducting the Capability Assessment and throughout Section 7.	Choose an item.

ELEMENT A REQUIRED REVISIONS

NCEM 1st Review:

Element A1-b. Asks "Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?

NCEM 1st Review: There are seven (7) jurisdictions that I was unable to identify in Section 2, or on Table 2.3 and 2.4; Cherryville, Dallas, Gastonia, High Shoals, Lowell, Mount Holly, Lincolnton. Section 2 states that these seven communities did participate in a group statement regarding all 28 communities. However, Table 2.4 does not list any "Members Designating Representatives" for these seven communities.

Please double check that this was an administrative documentation oversight or identify that these communities did not participate in the planning process. Add representation documentation to Table 2.4 and describe if any communities chose not to participate in the planning process.

ESP Response: Corrected table 2.4 to include Cherryville, Dallas, Gastonia, High Shoals, Lowell, Mount Holly and Lincolnton. Also removed Kings Mountain as they attended the Public Meeting held on 1/21/25.

Community	Meeting 1	Meeting 2	Meeting 3
Meeting Dates>>>>>>	1/9/2024	4/1/2024	8/8/2024
Unincorporated Cleveland County	pdf pg 15	pdf pg 15	pdf pg 15
Belwood	pdf pg 18	pdf pg 18	pdf pg 18
Boiling Springs	pdf pg 18	pdf pg 18	pdf pg 18
Casar	pdf pg 18	pdf pg 18	pdf pg 18
Earl	pdf pg 18	pdf pg 18	pdf pg 18
Fallston	pdf pg 18	pdf pg 18	pdf pg 18
Grover	pdf pg 18	pdf pg 18	pdf pg 18
Kingstown	pdf pg 18	pdf pg 18	pdf pg 18
Kings Mountain	pdf pg 18	pdf pg 18	pdf pg 18
Lattimore	pdf pg 18	pdf pg 18	pdf pg 18
Lawndale	pdf pg 18	pdf pg 18	pdf pg 18
Mooresboro	pdf pg 18	pdf pg 18	pdf pg 18
Patterson Springs	pdf pg 18	pdf pg 18	pdf pg 18
Polkville	pdf pg 18	pdf pg 18	pdf pg 18
Shelby	pdf pg 18	pdf pg 18	pdf pg 18
Waco	pdf pg 18	pdf pg 18	pdf pg 18
Unincorporated Gaston County	pdf pg 15	pdf pg 15	pdf pg 15
Belmont		pdf pg 15	
Bessemer City	pdf pg 18	pdf pg 18	pdf pg 18
Cherryville			
Cramerton	pdf pg 18	pdf pg 15	pdf pg 18
Dallas			
Gastonia			
High Shoals			
Lowell			
McAdenville	pdf pg 18	pdf pg 18	pdf pg 18

Mount Holly			
Ranlo	pdf pg 18	pdf pg 18	pdf pg 18
Stanley	pdf pg 18	pdf pg 18	pdf pg 18
Unincorporated Lincoln County	pdf pg 15	pdf pg 15	pdf pg 15
Lincolnton			

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))	**Section 4 and 5 throughout**	
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	4.4 Hazard Evaluation	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-b. Does the plan include information on the **location** of each identified hazard?	• **Drought** – 5.3.2 • **Excessive Heat** - 5.4.2 • **Hurricane & Coastal** – 5.5.2 • **Tornadoes/Thunderstorms** – 5.6.2 • **Severe Winter Weather** – 5.7.2 • **Earthquakes** – 5.8.2 • **Geological** – 5.9.2 • **Dam Failure** – 5.10.2 • **Flooding** – 5.11.2 • **Wildfires** – 5.12.2 • **Infectious Disease** – 5.13.2 • **Hazardous Substances** – 5.14.2 • **Radiological Emergency** – 5.15.2 • **Terrorism** – 5.16.2 • **Cyber** – 5.17.2 • **Electromagnetic Pulse** – 5.18.2 • **Civil Disturbance** – 5.19.2 • **Food Emergency** – 5.20.2	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-c. Does the plan describe the extent for each identified hazard?	• **Drought** – 5.3.2 • **Excessive Heat** - 5.4.2 • **Hurricane & Coastal** – 5.5.2 • **Tornadoes/Thunderstorms** – 5.6.2 • **Severe Winter Weather** – 5.7.2 • **Earthquakes** – 5.8.2 • **Geological** – 5.9.2 • **Dam Failure** – 5.10.2 • **Flooding** – 5.11.2 • **Wildfires** – 5.12.2 • **Infectious Disease** – 5.13.2 • **Hazardous Substances** – 5.14.2 • **Radiological Emergency** – 5.15.2 • **Terrorism** – 5.16.2 • **Cyber** – 5.17.2 • **Electromagnetic Pulse** – 5.18.2 • **Civil Disturbance** – 5.19.2 • **Food Emergency** – 5.20.2	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	• Drought – 5.3.3 • Excessive Heat - 5.4.3 • Hurricane & Coastal – 5.5.3 • Tornadoes/Thunderstorms – 5.6.3 • Severe Winter Weather – 5.7.3 • Earthquakes – 5.8.3 • Geological – 5.9.3 • Dam Failure – 5.10.3 • Flooding – 5.11.3, 5.11.4, 5.11.5 • Wildfires – 5.12.3 • Infectious Disease – 5.13.3 • Hazardous Substances – 5.14.3 • Radiological Emergency – 5.15.3 • Terrorism – 5.16.3 • Cyber – 5.17.3 • Electromagnetic Pulse – 5.18.3 • Civil Disturbance – 5.19.3 • Food Emergency – 5.20.3	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-e. Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature and sea levels), on the type, location and range of anticipated intensities of identified hazards?	• **Drought** – 5.3.4 • **Excessive Heat** - 5.4.4 • **Hurricane & Coastal** – 5.5.4 • **Tornadoes/Thunderstorms** – 5.6.4 • **Severe Winter Weather** – 5.7.4 • **Earthquakes** – 5.8.4 • **Geological** – 5.9.4 • **Dam Failure** – 5.10.4 • **Flooding** – 5.11.6 • **Wildfires** – 5.12.4 • **Infectious Disease** – 5.13.4 • **Hazardous Substances** – 5.14.4 • **Radiological Emergency** – 5.15.4 • **Terrorism** – 5.16.4 • **Cyber** – 5.17.4 • **Electromagnetic Pulse** – 5.18.4 • **Civil Disturbance** – 5.19.4 • **Food Emergency** – 5.20.4	Choose an item.
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	**Appendices F and G show municipal level flood and wildfire risk.**	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	• **Hurricane & Coastal** – 6.5.1 • **Tornadoes/Thunderstorms** – 6.5.2 • **Earthquakes** – 6.5.3 • **Geological** – 6.5.4 • **Flooding** – 6.5.5 • **Wildfires** – 6.5.6 • **Hazardous Substances** – 6.5.7 • **Dam Failure** – 6.5.8 • **Overall Risk Ratings, EAL, Risk Scores** – Table 5.37 (Section 5.21); Table 6.26 (Section 6.6)	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	• **Drought** – 5.3.5 • **Excessive Heat** - 5.4.5 • **Hurricane & Coastal** – 5.5.5, 6.5.1 • **Tornadoes/Thunderstorms** – 5.6.5, 6.5.2 • **Severe Winter Weather** – 5.7.5 • **Earthquakes** – 5.8.5, 6.5.3 • **Geological** – 5.9.5, 6.5.4 • **Dam Failure** – 5.10.5, 6.5.8 • **Flooding** – 5.11.7, 6.5.5 • **Wildfires** – 5.12.5, 6.5.6 • **Infectious Disease** – 5.13.5 • **Hazardous Substances** – 5.14.5, 6.5.7 • **Radiological Emergency** – 5.15.5 • **Terrorism** – 5.16.5 • **Cyber** – 5.17.5 • **Electromagnetic Pulse** – 5.18.5 • **Civil Disturbance** – 5.19.5 • **Food Emergency** – 5.20.5 • **Overall Risk Ratings, EAL, Risk Scores** – Table 5.37 (Section 5.21); Table 6.26 (Section 6.6)	Choose an item.
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Table 5.30, Section 5.11.5	Choose an item.

ELEMENT B REQUIRED REVISIONS
Required Revision: NCEM 1st Review: No revisions required.

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Section 7: Capability Assessment – entire section	Choose an item.
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Section 7: Capability Assessment – entire section	Choose an item.
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))	**Section 7: 7.3.4, pages 7:9-7:14; Table 7.2 NFIP Policy and Information**	
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Section 7: 7.3.4, pages 7:9-7:14; Table 7.2 NFIP Policy and Information	Choose an item.
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))	**Section 8.2, pages 8:3 and 8:4**	
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 8.2, pages 8:3 and 8:4	Choose an item.
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))	**Section 8 and 9 throughout.**	
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Section 8 and 9 throughout.	Choose an item.

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Section 9 throughout.	Choose an item.
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	**Section 8 and 9 throughout.**	
C5-a. Does the plan describe the criteria used for prioritizing actions?	Section 8, Section 8.1.1 pages 8:2 and 8:3.	Choose an item.
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Section 9 throughout	Choose an item.

ELEMENT C REQUIRED REVISIONS
Required Revision**:** NCEM 1st Review: No revisions required.

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))	**Section 10, 10.3 page 10:5**	
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Section 10, 10.3 page 10:5	Choose an item.

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))	**Section 10, 10.2, pages 10:2 through 10:4**	
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))	**Section 10, 10.1, pages 10:1 through 10:2**	
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Section 10, 10.1, pages 10:1 through 10:2	Choose an item.
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Section 10, 10.1, pages 10:1 through 10:2	Choose an item.
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	Section 10, 10.1, pages 10:1 through 10:2	Choose an item.

ELEMENT D REQUIRED REVISIONS
Required Revision**:** NCEM 1st Review: No revisions required.

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Section 3.3.3 Land Use	Choose an item.
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))	**Section 9 (entire Section) and Appendix E (entire Appendix)**	
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Section 8: 8.5 (Page 8:6)	Choose an item.
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Section 9 (entire Section)	Choose an item.
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Section 10: 10.1 (pages 10:1 and 10-:2), Section 9 throughout and Appendix E throughout	Choose an item.

ELEMENT E REQUIRED REVISIONS
Required Revision**:** NCEM 1st Review: No revisions required. Click or tap here to enter text.

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?		Choose an item.
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?		Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision: NCEM 1st Review: Plan adoption resolutions are pending formal approval by participating jurisdictions.		

Element G: High Hazard Potential Dams (Optional)

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?		
HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency?		Choose an item.
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?		Choose an item.

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?		Choose an item.
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?		Choose an item.
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?		Choose an item.
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?		Choose an item.
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?		Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?		Choose an item.
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?		Choose an item.
HHPD Required Revisions		
The HHPD was not addressed as an option to this plan.		

Plan Assessment

These comments can be used to help guide your annual/regularly scheduled updates and the next plan update.

Element A. Planning Process

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element B. Risk Assessment

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element C. Mitigation Strategy

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element D. Plan Maintenance

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element E. Plan Update

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

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

Meeting Participant Overview

NAME	AGENCY/DEPARTMENT/ TITLE	Internal Kickoff Mtg (1/9/24)	Stakeholder Kickoff Mtg (4/1/24)	HIRA/Mitigation Strategy Mtg (8/8/24)	Virtual Public Mtg (1/21/25)
CLEVELAND COUNTY					
Childress, Gerald	City of Kings Mountain, Chief of Police				✓
Culberton, Mark	Cleveland County, EM		✓		
Davis, Perry	Cleveland County, Director of EM/Fire Marshal	✓			
Horton, Bobby	Cleveland County, Deputy Fire Marshal	✓	✓	✓	✓
Queen, Josh	Cleveland County, Fire Inspector		✓	✓	
Main, Greg	City of Kings Mountain, Fire Chief				✓
GASTON COUNTY					
Falls, Corky	City of Belmont, Chief of Police		✓		
Goodman, Jena	Gaston County, Planning GIS Manager/E-911 Addressing Coordinator	✓	✓		✓
Hardee, Alex	Towns of Cramerton and Belmont, Fire Department		✓		
Hook, Allen	Gaston County, EM Planner	✓	✓	✓	
Hunter, Scott	Gaston County, Director of EM/Fire Marshal				
Sellers, Justin	Gaston County, Division Chief EM		✓		
Wilson, Brian	Gaston County, EM Planner	✓	✓		
LINCOLN COUNTY					
Bryant, Andrew	Lincoln County, Director of Development Services			✓	✓
Burrell, Byron	Lincoln County, GIS Analyst			✓	
Franklin, Rachel	Lincoln County, Community Health Manager			✓	
Holland, Joshua	Lincoln County, EM Planner	✓	✓	✓	✓
Howell, Mark	Lincoln County, EM Coordinator	✓	✓	✓	
Rhoades, Maegan	Lincoln County, Planner			✓	
Rombs, Ronald	Lincoln County, Director of Emergency Services				
Rubow, Justin	Lincoln County, System Administrator			✓	

CGL MEETING PARTICIPANTS AND SIGN-IN SHEETS

NAME	AGENCY/DEPARTMENT/ TITLE	Internal Kickoff Mtg (1/9/24)	Stakeholder Kickoff Mtg (4/1/24)	HIRA/Mitigation Strategy Mtg (8/8/24)	Virtual Public Mtg (1/21/25)
Wyant, Mattie	Lincoln County, Public Health Educator			✓	
GASTON COUNTY CRS STEERING COMMITTEE					
Garrett, Steve	NCEM State Floodplain Manager			✓	
Goodman, Jena L.	Gaston County, Planning GIS Manager/E-911 Addressing Coordinator	✓	✓		
Hunter, Scott	Gaston County, Director of EM/Fire Marshal				
Jones, June	United Way of Gaston County				
Saunders, Angie	Gaston Regional Chamber				
Sketo, Wesley	Wildfire Mitigation Forester, NC Forest Service			✓	
Webster, Andrea	NCORR, Resilience Policy Advisor			✓	
REGIONAL STAKEHOLDERS					
Baker, Carl	NCEM Hazard Mitigation Plans Section	✓	✓	✓	
Crew, Chris	NCEM Hazard Mitigation Plans Section	✓	✓	✓	
Delude, Hannah	ESP Associates	✓		✓	✓
Flores, John	ESP Associates	✓	✓	✓	
Kudla, Kymberly	FEMA Region 4		✓		
Mello, John	NCEM Hazard Mitigation Plans Section	✓	✓		
Slaughter, Nathan	ESP Associates	✓	✓	✓	✓

Scanned Sign-In Sheets
Larger Stakeholder Kickoff Meeting

Cleveland Gaston Lincoln Regional Hazard Mitigation Plan Update
Stakeholder Meeting

April 1, 2024
10:00 AM - Noon

Name	Agency/Department/Position	Phone Number	E-mail Address
MARK CULBERTSON	CCEM	704-300-0937	MARK. CULBERTSON@CLEVELAND COUNTY NC. GOV
Josh Queen	CCEM	980-484-4841	josh.queen@clevelandcountync.gov
Bobby Horton	CCEM	980-484-4841	Bobby.Horton@ClevelandCountyNC.gov
Mark Howell	Lincoln County EM	828-514-8058	mhowell@lincolncounty.org
Joshua Holland	LCEM	980-745-3866	joshua.holland@lincolncountync.gov
Brian Wilson	Gaston Co EM	980-289-2034	brian.wilson@gastongov.com
Justin Sellers	Gaston County EM	704-918-2390	Justin.sellers@gastongov.com
Allen Hook	Gaston County EM	704-718-4564	allen.hook@gastongov.com

Cleveland, Gaston, Lincoln :Hazard Mitigation Meeting
Sign-In Sheet – at LC Emergency Services
8/8/2024
(PLEASE PRINT CLEARLY)

NAME	AGENCY/DEPARTMENT /DIVISION	PHONE	E-MAIL
Mark Howell	Lincoln County EM	828-514-8058	Mark.howell@lincolncountync.gov
Joshua Holland	LCEM	980-745-3864	joshua.holland@lincolncountync.gov
Justin Rubow	LCIT	704-889-3058	justin.rubow@lincolncountync.gov
Mattie Wyant	LCHD	704-736-2023	mattie.wyant@lincolncountync.gov
Rachel Franklin	LCHD	980-241-7726	rachel.franklin@lincolncountync.gov
Maegan Rhoades	PID	704-736-8420	maegan.rhoades@lincolncountync.gov
Andrew C. Bryant	Lincoln County	704-766-6969	Andrew.Bryant@LincolnCountyNC.gov
Byron Burrell	Lincoln County / Public Utilities	704-736-8536	bburrell@lincolncountync.gov
Bobby Horton	Cleveland County EM	980-484-4841	Bobby.Horton@clevelandcounty.gov
Josh Queen	Cleveland County EM	980-484-4841	josh.queen@clevelandcountync.gov

Email Correspondence

Hi All,

I hope this message finds you well.

I am reaching out to inform you that Cleveland, Gaston, and Lincoln Counties are currently in the process of updating our regional hazard mitigation plan. As part of this important initiative, we would like to extend an invitation to neighboring jurisdictions to participate in the planning process.

We believe that collaboration is vital for effective hazard mitigation, and your insights and contributions would be invaluable to our efforts. Our team has created a project website, which you can access here: Regional Hazard Mitigation Project Website. This site contains important information about the project and ongoing updates.

Additionally, we will be hosting a public meeting to review the draft plan, and to facilitate your involvement, we encourage your attendance. Details regarding the date and time of this virtual meeting will be shared soon.

Thank you for considering this opportunity to collaborate on enhancing our regional resilience. We look forward to your participation and support.

Kind regards,

Nathan Slaughter, AICP, CFM

Neighboring Jurisdiction Contacts

Jurisdiction	Name	Title	Email
Rutherford County NC	Frankie Hamrick	Rutherford County EM Coordinator	frankie.hampick@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	Jason Williams	Catawaba County EM Coordinator	jasonw@catawbacountync.gov
Catwaba County NC	Chris Timberlake	Catawba County Planning Director	ctimberlake@catawbacountync.gov
Iredell County NC	Jody Smyre	Iredell County EM Coordinator	jsmyre@co.iredell.nc.us
Iredell County NC	Kathy Wolfe	Iredell County Floodplain Manager	kwolfe@co.iredell.nc.us
Charlotte-Mecklenburg County NC	Robert Graham	Charlotte-Mecklenburg EM Director	rgraham@ci.charlotte.nc.us
York County SC	Chuck Haynes	York County EM Director	ycoem@yorkcountygov.com
Cherokee County SC	Robin Caldwell	Cherokee County EM Director	robin.caldwell@cherokeecounty-nc.gov

Internal Stakeholder Meeting Kickoff
January 9th, 2024
10:00am – 11:00am
Teams Meeting

I. Welcome and Introductions

a. KICKOFF PLANNING PROCESS
b. PROJECT TEAM INTRODUCTIONS
c. PLANNING TEAM INTRODUCTIONS

II. Project Overview

a. REQUIREMENTS FOR UPDATE
b. TRENDS IN DISASTERS – WHY PLAN?
c. FOUR-PHASE PLANNING PROCESS
d. SCOPE OF WORK

III. Project Schedule

a. INTERNAL KICK-OFF MEETING – 1/9/24
b. PROPOSED DELIVERY OF DRAFT – 11/28/24
c. EXISTING PLAN EXPIRATION DATE – 5/28/24

IV. Next Steps

a. SHARE PUBLIC SURVEY
b. IDENTIFY/CONFIRM ALL STAKEHOLDERS/CONTACTS
c. SCHEDULE LARGER STAKEHOLDER MEETING

Internal Stakeholder Meeting Kickoff
January 9th, 2024
10:00am – 11:00am
Teams Meeting

The internal kickoff meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update marked the beginning of the planning process, following the last update in 2020. Key stakeholders from the three counties gathered to discuss the plan's objectives and outline the collaborative process ahead. Nathan Slaughter and John Flores from ESP Associates facilitated the meeting, which included a welcome and introductions.

The project overview highlighted the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), emphasizing that hazard mitigation planning is essential for maintaining eligibility for federal funding programs, such as Flood Mitigation Assistance (FMA), Building Resilient Infrastructure and Communities (BRIC), and the Hazard Mitigation Grant Program (HMGP). The participants acknowledged the inevitability of both natural and man-made hazards, stressing the importance of planning as municipalities grow and more people and assets are put at risk.

The planning process will involve organizing resources and forming a Hazard Mitigation Planning Committee comprised of county and municipal stakeholders. Public involvement will be integral, with plans for surveys and public meetings to gather input and feedback. The meeting also covered essential aspects of risk assessment, including hazard identification and vulnerability assessment, to understand the potential impacts of various hazards. Participants discussed the need for an "All-Hazards" approach aligned with the state Hazard Mitigation Plan (HMP).

The development of the mitigation plan will include revisiting existing planning goals and mitigation alternatives, with opportunities to add new actions based on the risk assessment findings. Chris emphasized the importance of outreach to utility and transportation officials to explore large-scale projects eligible for funding.

Adoption and implementation will involve collaboration with each county and municipality, with a focus on overcoming challenges faced in previous planning cycles. The meeting underscored the need for documentation of community participation, particularly from underserved populations, as well as considerations for climate change and equitable outcomes.

The project schedule includes planning for a larger kickoff meeting with more stakeholders and a series of follow-up meetings. The draft plan is expected to be completed by November 2024, ahead of the expiration of the current plan in May 2025. Next steps involve determining potential meeting locations and ensuring that all contacts are represented in the planning process. Overall, participants expressed appreciation for the collaborative effort and looked forward to the next phase of the planning process. Nathan will follow up with the counties on locations for upcoming meetings.

Cleveland Gaston Lincoln Region

2025 Hazard Mitigation Plan Update

January 9, 2024

Internal Kickoff (Microsoft Teams)



Agenda

- Welcome & Introductions
- Project Overview
- Project Schedule
- Next Steps
- Questions
- Adjourn

Project Overview

- Requirements for Update
- Trends in Disasters – Why Plan?
- Disaster Mitigation Act (DMA) of 2000 Requirements
- Scope of Work

Requirements for Update

- DMA (2000) Plan Update Requirement
  - Created Framework to Engage in Hazard Mitigation Planning
- HMGP Grant Process
  - Provided by NCEM
  - 75% Federal 25% Local Cost Share
- Eligibility for Federal Disaster Funding
  - Update HMP Every 5 Years

Trends in Disasters – Why Plan?

- **Increase in Population and Community Growth**
  - Greater Exposure to Hazard Risk (People, Infrastructure, Buildings)
  - Increased Exposure = More Damage
- **More Hazards (Man-Made Hazards)**
  - For Example: Technological, Civil, and Terrorist Attacks
- **Results in Increased Cost for Disaster Response and Recovery**
  - Continual Increase in Hazard Expenses
  - Increase in Issuance of Major Disaster Declarations
  - Costliest Natural Disasters in Last 45 Years (NOAA Estimates)
- **Reasons to Address Trends**
  - Cost of Doing Nothing is too High
  - Many Events are Predictable and Repetitive
  - Loss Reduction Activities can be Undertaken
  - Legal and Moral Responsibilities to Act

Event/Date/Cost (in Billions)
Hurricane Harvey (2017) - $156.3
Hurricane Ian (2022) - $116.3
Hurricane Sandy (2012) - $86.5
Hurricane Ida (2021) - $82.4
Hurricane Irma (2017) - $62.5
Drought/Heatwave (1980) - $39.6
Hurricane Ivan (2004) - $33.2
Hurricane Michael (2018) - $30.5
Hurricane Florence (2018) - $29.3
Winter Storm/Cold Wave (2021) - $26.5

ESP

DMA (2000) Requirements

Four-Phase Planning Process

- Organize Resources
- Risk Assessment
- Develop a Mitigation Plan
- Adoption and Implementation

Process Blends with Processes of FMA and CRS

- HMP Will Meet Requirements of all Three FEMA Programs

Step 1: Organize Resources



PLANNING FOR PUBLIC INVOLVEMENT



COORDINATING WITH DEPARTMENTS AND AGENCIES



FINALIZING A LIST OF STAKEHOLDERS FOR INVOLVEMENT (HMPC)

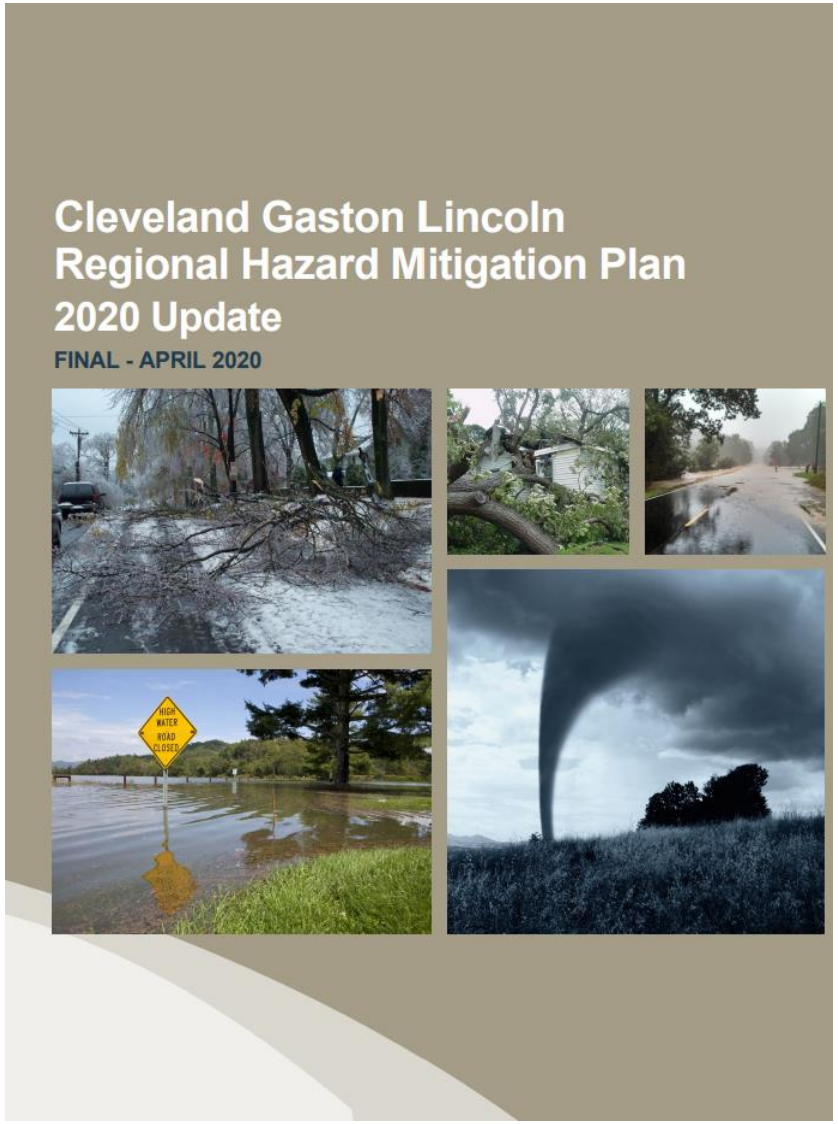
Step 2: Risk Assessment

- Hazard Identification (What Can Happen Here)
  - **Previously Identified Hazards**: Drought, Excessive Heat, Hurricane and Coastal Hazards, Tornadoes/Thunderstorms, Severe Winter Weather, Dam Failures, Flooding, Earthquakes, Geological, Wildfires, Infectious Disease, Hazardous Substances, Radiological Emergency, Terrorism, Cyberattack, Electromagnetic Pulse
- Vulnerability Assessment (What Will be Affected/Impacted)
  - Will Use County Parcel Data, FEMA Hazus Analysis, and NCEM Data
- Capability Assessment (How Prepared We Are)
  - **Communities to Self-Assess Capability**
    - What Mitigation Actions are Feasible
    - Where Gaps Exist

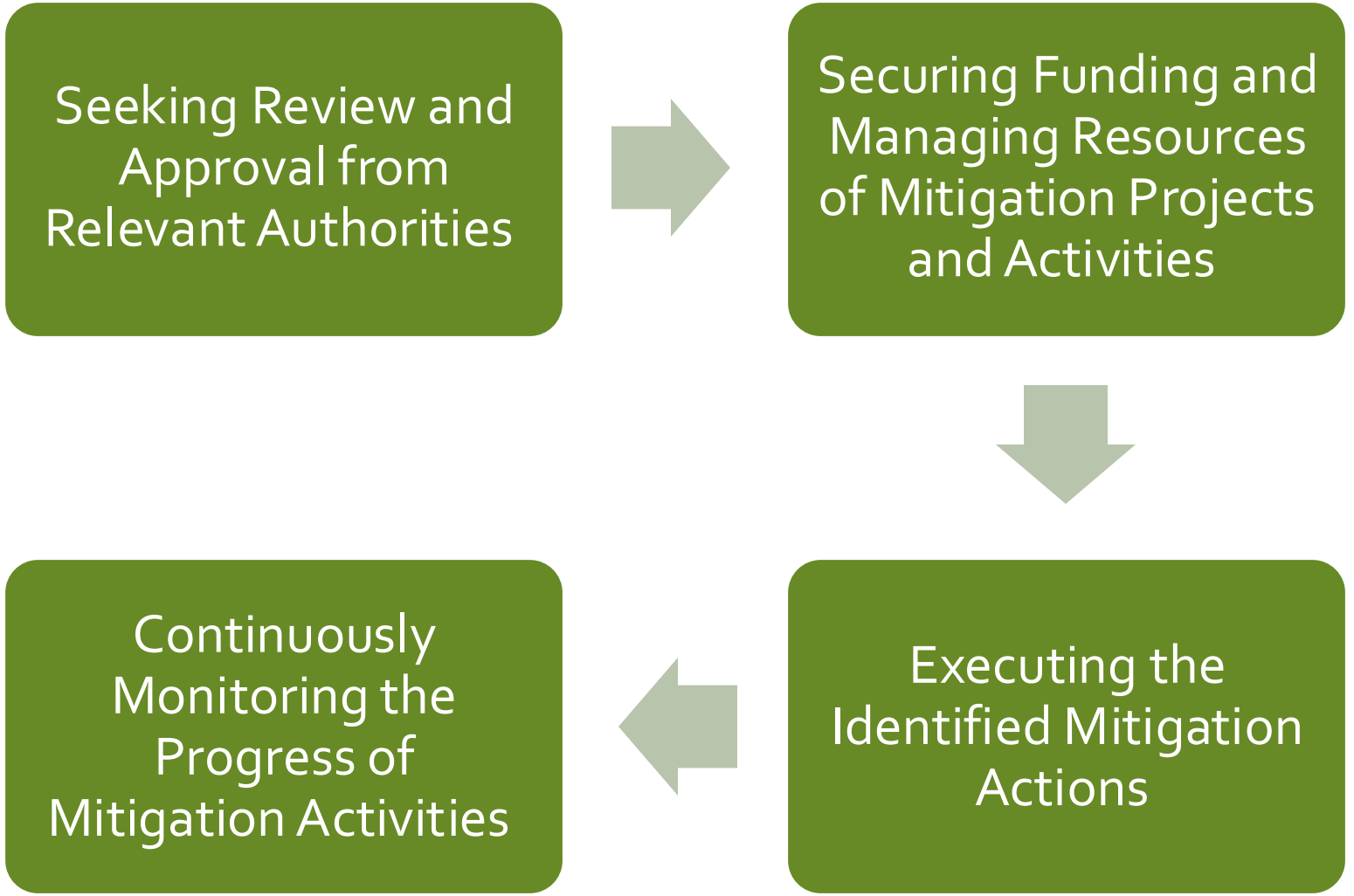
ESP

Step 3: Develop a Mitigation Plan

- **Setting Planning Goals**
- **Reviewing Mitigation Alternatives**
  - HMPC May Need to Develop New Actions
- **Drafting an Action Plan**



Step 4: Adoption and Implementation



ESP

Scope of Work

The plan will meet the following criteria:

- Will include all required elements (as defined by FEMA)
- Will meet or exceed the final rule for local mitigation planning found in 44 CFR, Section 201.6, in order to be approved by FEMA
- Natural hazards will coordinate with current FEMA-approved State Mitigation Plan
- Will include natural and human-caused hazards and mitigation measures
- Will incorporate any local climate adaptation data and findings
- Will address equitable outcomes (underserved communities and social vulnerability)

Project Schedule

- Project Kickoff Date – 1/9/24
- Proposed Delivery of Draft – 11/28/24
- Existing Plan Expiration Date – 5/28/2025



Information Online

- We request that counties and municipalities post relevant project information and updates
- Can be used as a tool for HMPC Coordination and Public Outreach
- Ideas for Website Content (we can provide):
  - Upcoming Meeting Announcements
  - Meeting Agendas and Minutes
  - Public Survey
  - Draft Documents of Plan Update
  - Information on Identified Hazards
  - Opportunities to Provide Feedback

Next Steps

Identify/Confirm all Primary, Secondary, and Citizen Contacts

- Larger Group will be Invited to Second Mitigation Meeting (Date TBD)

Capability Assessment Update

- Project Team will review Capability Data to update Capability Assessment

Mitigation Action Status Updates

- Be Prepared to Discuss Mitigation Goals and Past Actions
- More Information Must be Provided for "Ongoing" Actions
- Details on Completed Actions May be Provided in the Status

Mitigation Goals Update

- All Actions Must Relate to a Mitigation Goal



Questions

Questions/Comments/Concerns

Adjourn –
Thank you!

Contact Information

Nathan Slaughter –
nslaughter@espassociates.com

John Flores –
jflores@espassociates.com

Hannah DeLude –
hdelude@espassociates.com

Larger Stakeholder Meeting Kickoff
April 1st, 2024
10:00am – 12:00pm
Shelby, NC

I. Welcome and Introductions

a. KICKOFF PROJECT
b. PROJECT TEAM INTRODUCTIONS
c. PLANNING TEAM INTRODUCTIONS
d. MEETING OBJECTIVES

II. Mitigation Overview

a. MITIGATION DEFINITIONS
b. TYPES OF MITIGATION
c. MITIGATION TECHNIQUES

III. Purpose of Update

a. REFLECT ON CHANGING RISKS
b. INCREASE COMMUNITY RESILIENCE
c. ENSURE COMPLIANCE AND FUNDING
d. INCREASE PREPAREDNESS

IV. Plan Update Process

a. ORGANIZE RESOURCES
b. PERFORM RISK ASSESSMENT
c. DEVELOP MITIGATION PLAN
d. ADOPTION AND IMPLEMENTATION

V. Project Schedule

a. INTERNAL KICKOFF MEETING – 1/9/24
b. LARGER KICKOFF MEETING – 4/1/24
c. PROPOSED DELIVERY OF DRAFT – 11/28/24
d. EXISTING PLAN EXPIRATION DATE – 5/28/25
e. PUBLIC MEETINGS – TBD

VI. Next Steps

a. SHARE PUBLIC SURVEY ON MUNICIPAL SITES
b. SELECT TIME/LOCATION FOR PUBLIC MEETING #1
c. ENGAGE SMALLER COMMUNITIES TO ENCOURAGE PARTICIPATION

Larger Stakeholder Meeting Kickoff
April 1st, 2024
10:00am – 12:00pm
Shelby, NC

In April 2024, the kickoff meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update brought together the Hazard Mitigation Planning Committee (HMPC) to discuss key objectives and strategies for enhancing community resilience against hazards.

The meeting aimed to define hazard mitigation and explore its various types, focusing on existing developments' vulnerability and ensuring future developments minimize risks. Key mitigation techniques discussed included prevention strategies, property protection measures, natural resource management, structural projects, and emergency services enhancements. The meeting emphasized the importance of education and public awareness in fostering community resilience.

The update reflects changing risks due to increased development and a shift toward an “all hazards” approach, incorporating climate change considerations. The committee acknowledged the need to address new vulnerabilities, particularly among socially vulnerable populations, and to adopt effective strategies that maximize the value of implemented measures.

Compliance with the Disaster Mitigation Act of 2000 was highlighted, emphasizing the need for active planning to address areas with repetitive damage. The meeting discussed funding opportunities through various programs, including HMGP, FMA, BRIC, and CRS, and the expanded eligibility for BRIC projects.

The meeting outlined a four-step update process: organizing resources, conducting a risk assessment, developing a mitigation plan, and final adoption and implementation. Emphasis was placed on engaging smaller communities and stakeholders, utilizing data analysis for hazard identification, and preparing for public involvement.

Attendees were encouraged to analyze stakeholder input, share public surveys, and finalize dates for upcoming public meetings. Ongoing assessments of risks and capabilities were also highlighted, with actionable items for stakeholders to review the Mitigation Action Plan and engage with smaller communities.

The meeting concluded with a call for community involvement, emphasizing the importance of documenting engagement efforts and gathering feedback for the plan update. Participants were provided with contact information for follow-up and encouraged to schedule the next meeting promptly.

Cleveland Gaston Lincoln

2025 Hazard Mitigation Plan Update

Larger Stakeholder Meeting

April 1st, 2024

Shelby, NC



Agenda

- Welcome & Introductions
- Meeting Objectives
- Mitigation Overview
- Purpose of Update
- Plan Update Process
- Project Information & Next Steps
- Q&A Session

Introductions

Welcome!

Reminder to Sign-In

Meeting Objectives

Engage the Community

Gather Input

Educate and Inform

Enhance Plan Relevance

What is Mitigation?

“mit-i-gate”

1: to cause to become less harsh or hostile.

2: to make less severe or painful.

Hazard Mitigation

Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

Basic Types of Mitigation



Mitigating against hazard impacts on **existing development**

- Houses
- Businesses
- Infrastructure
- Critical Facilities



Ensuring **future development** is conducted in a way that does not increase vulnerability

- Plans
- Policies
- Procedures

Mitigation Techniques

1. Prevention
2. Property Protection
3. Natural Resource Management
4. Structural Projects
5. Emergency Services
6. Education and Awareness

Purpose of Update

- Reflect on Changing Risks
- Increase Community Resilience
- Compliance and Funding
- Ensure Preparedness

Purpose of Update – Changing Risks

1. Population Increase and Community Growth
   - Greater Exposure to Hazard Risk
   - Increased Exposure = More Damage
2. More Hazards (Man-Made)
   - Included in State Plan
   - Ex. Technological, Civil Disturbance, Terrorism
3. Climate Change
   - Anticipated Increase in Frequency and Magnitude
   - **New FEMA Requirement
4. Development Patterns
   - Increased Impermeable Surfaces
   - More Infrastructure and Assets at Risk

Purpose of Update – Increase Community Resilience

1. Identification of New Vulnerabilities
   - **Vulnerable Populations
2. Adopting Effective Mitigation Strategies



Purpose of Update – Compliance and Funding



Ensure compliance with federal and state requirements

- Disaster Mitigation Act of 2000
- NC GS 166 A



Maintain eligibility for disaster mitigation funding and assistance programs

- HMGP
- FMA
- BRIC
- CRS

Purpose of Update – Ensure Preparedness

The 2025 Plan Update ensures that Wake County is better prepared to:

1. Address existing and emerging hazards
2. Protect lives and property
3. Sustain continuity of essential services during and following an event



Planning	Planning for Public Involvement
Coordinating	Coordinating with Departments and Agencies
Finalizing	Finalizing a List of Stakeholders for Involvement (HMPC)

Plan Update Process

Step 1: Organize Resources



Hazard Identification

What Can Happen Here?

- Previously Identified Hazards
- Identify New Hazards



Vulnerability Assessment

What Will be Affected/Impacted?

- Will Use County Parcel Data, FEMA HAZUS Analysis, and NCEM Data



Capability Assessment

How Prepared Are We?

- Communities to Self-Assess Capability
- What Mitigation Actions are Feasible
- Where Gaps Exist

Plan Update Process
Step 2: Risk Assessment

Previously Identified Hazards (2020)

1. Drought	8. Geological (Landslides, Sinkholes, Erosion)
2. Excessive Heat	9. Cyber
3. Hurricane and Coastal Hazards	10. Wildfires
4. Tornadoes/Thunderstorms (Hailstorm, Lightning, Severe Thunderstorm)	11. Infectious Disease
5. Winter Storm and Freeze	12. Hazardous Substances
6. Dam Failures	13. Radiological Emergency
7. Flooding	14. Terrorism
8. Earthquakes	15. Electromagnetic Pulse

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

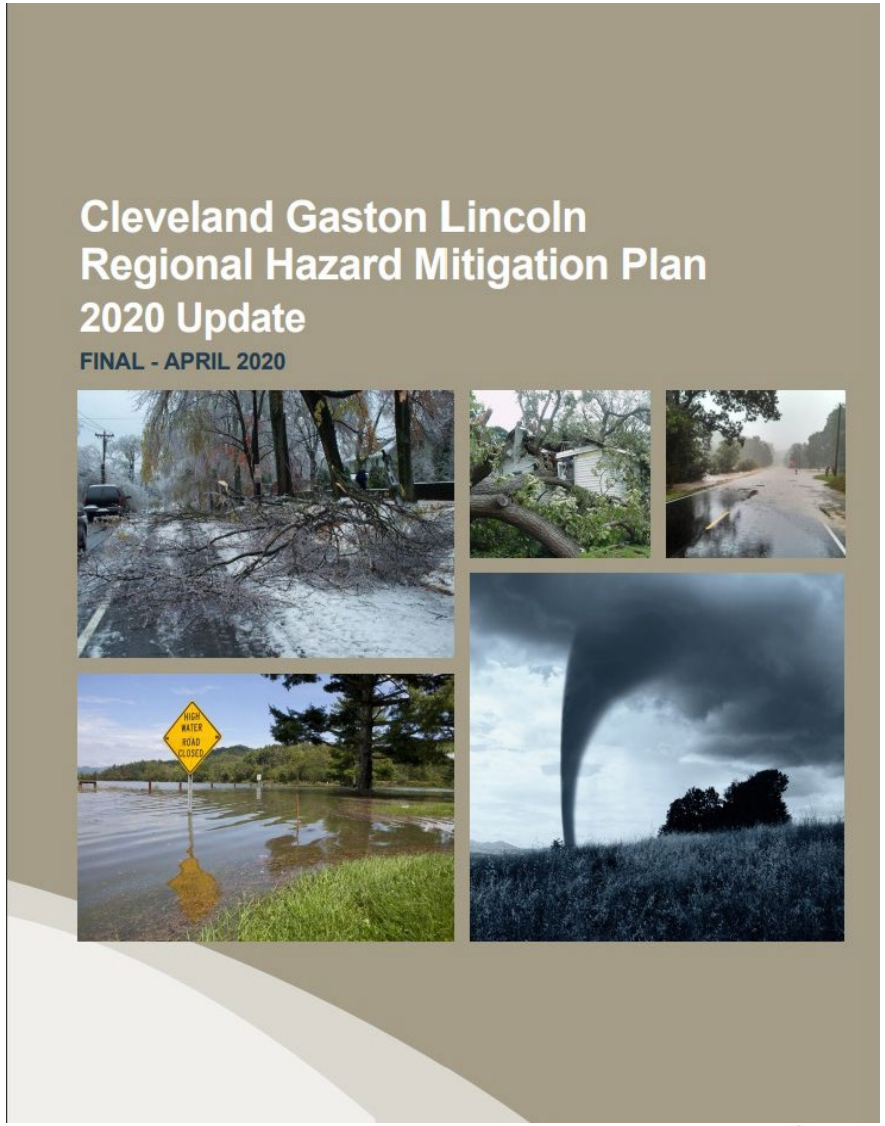
Plan Update Process
Step 3: Develop a Mitigation Plan

Setting Planning Goals

Reviewing Mitigation Alternatives

HMPC May Need to Develop New Actions

Drafting an Action Plan



Plan Update Process

Step 4: Adoption and Implementation

- Seeking Review and Approval from Relevant Authorities
- Securing Funding and Managing Resources of Mitigation Projects and Activities
- Executing the Identified Mitigation Actions
- Continuously Monitoring the Progress of Mitigation Activities

Project Schedule

Project Kickoff Date – 1/9/24

Larger Stakeholder Meeting –4/1/24

Public Meeting #1 – Date TBD

Proposed Delivery of Draft – 11/28/24

Public Meeting #2 – Date TBD

Existing Plan Expiration Date – 5/28/25



Plan Website

- Project Team requests counties/municipalities post relevant project information and updates
- Can be used as a Tool for HMPC Coordination and Public Outreach
- Ideas for Website Content (ESP can provide)
  - Upcoming Meeting Announcements
  - Meeting Agendas and Minutes
  - Public Survey
  - Draft Documents of Plan Update
  - Information on Identified Hazards
  - Opportunities to Provide Feedback

Next Steps

1. Record and analyze input received during Stakeholder Meeting
2. Share Public Survey on municipal and county websites
3. Select Date of Public Meeting #1 (online or in-person)
4. Continue working on the Risk Assessment (underway)
5. Continue working on Capability Assessment (underway)
6. Mitigation Strategy Development Meeting (date TBD)
7. Actionable Items for Stakeholders
    a. Begin reviewing Mitigation Action Plan and updating status of each action (FEMA requirement)
    b. Brainstorm dates for Public Meeting #1 (online or in-person)
    c. Brainstorm dates/locations for Mitigation Strategy Meeting
    d. Reach out to smaller communities to engage/include in the process

Complete and Share the Public Survey!

Scan the QR Code for Access to the Public Survey!

Or ACCESS THE SURVEY HERE

Questions

Questions/Comments/Concerns

Brainstorming Questions

1. What are key concerns or challenges you believe should be addressed in the hazard mitigation plan update?
2. How can the community be better prepared for potential hazards or disasters in the future?
3. Are there any specific areas or infrastructure that you feel require additional consideration?
4. What role do you think community members should play in implementing hazard mitigation strategies (if any)?
5. Do you have any additional suggestions or feedback regarding the plan update that you would like to share at this time?

Adjourn – Thank you!

Contact Information:

- Nathan Slaughter - nslaughter@espassociates.com
- Hannah DeLude - hdelude@espassociates.com
- John Flores - jflores@espassociates.com

CLEVELAND GASTON LINCOLN COUNTIES

REGIONAL HAZARD MITIGATION PLAN 2024 UPDATE

QR CODE TO PUBLIC SURVEY

Background

The Cleveland Gaston Lincoln Regional Hazard Mitigation Plan aims to assess, reduce, and prepare for the impact of natural and man-made hazards in the region. The 2024 Plan Update involves the identification of vulnerabilities and prioritization of mitigation strategies to better prepare for, respond to, and recover from a hazardous event. Through collaboration and coordination, the Plan Update seeks to engage stakeholders, raise awareness, and facilitate measures to mitigate risk and build a safer, more resilient region for current and future generations.

What is Mitigation?

FEMA defines Hazard Mitigation as:
"Sustained action taken to reduce or eliminate long-term risk to human life and property from hazards."

1 *EXISTING*

Mitigate hazard impacts on existing development in our communities (i.e. houses, businesses, infrastructure, critical facilities)

2 *FUTURE*

Ensure future development is conducted in a manner that does not increase vulnerability (i.e. strategic planning, policy, and procedures)

Disaster Mitigation Act of 2000

The Disaster Mitigation Act (DMA) of 2000 represents a major shift from reactive response to proactive prevention requiring local communities to develop/maintain hazard mitigation plans.

- **Revitalized Federal Planning Requirements**
  - State and Local Hazard Mitigation Plans
- **Federal Grant Funding Eligibility**
  - Hazard Mitigation Grant Program (HMGP)
  - Building Resilient Infrastructure and Communities (BRIC)
  - Flood Mitigation Assistance (FMA)

**Plans should be updated every 5 years to remain current.

Mitigation Techniques

1. Prevention - Planning and Zoning, Building Codes, Floodplain Regulations
2. Property Protection -Aquisition, Relocation, Elevation
3. Natural Resource Management - Floodplain Protection, Watershed Management, Riparian Buffers
4. Structural Projects - Reservoirs, Levees/Dams, Channel Modification
5. Emergency Services - Warning Systems, Evacuation Planning, Shelters
6. Public Education and Awareness - Outreach Projects, Real Estate Disclosures, Hazard Map Information

Task 1 Scope: Plan Development

Subtask	Status	Notes
Task 1.1: Planning Process	In Progress	Involves internal kickoff, planning team meetings (3 minimum), and public meetings (2 minimum).
Task 1.2: Risk Assessment	In Progress	Update previously developed risk assessment with latest data for hazard profiles and risk assessment techniques.
Task 1.3: Capability Assessment	In Progress	Project team to update previous capability assessment survey from last update. Communities to confirm changes and revise as needed.
Task 1.4: Mitigation Strategy	Not Started	Update status of existing mitigation actions from previous plan and propose new actions based on need.
Task 1.5: Plan Maintenance Procedures	Not Started	Includes analysis of previous methods/schedules of plan monitoring, evaluating, and updating.

Task 1.1: Meeting Breakdown

HAZARD MITIGATION PLANNING TEAM MEETINGS BREAKDOWN

First Meeting

- Introduce plan update process and roles
- Preliminary data collection efforts for risk assessment
- Proposed outline of the HMP
- Draft copy of Public Survey

Second Meeting

- Preliminary results of risk assessment
- Building consensus of goals and actions
- Implementation status of existing actions
- Propose new actions to be included in update

Third Meeting

- Review the initial draft of the plan update
- Emphasis on completion of mitigation strategy
- Summary of public meetings and input
- Refine proposed actions and projects

Fourth Meeting (Optional)

- If there is a need to cover required items that were not covered in the previous 3 meetings

An internal meeting was held on January 9th, 2024 with stakeholders from all counties present. During this meeting, Gaston County volunteered to host the larger stakeholder kickoff meeting and Lincoln County agreed to host the subsequent meeting (which will either be Public Meeting #1 or the Mitigation Strategy Meeting) in their new facility.

The dates and location of the meetings remain TBD at this time. The first public meeting must be held within **60 days** from the larger stakeholder kickoff meeting.

Next Steps and Upcoming Items

- Share and encourage completion of the Public Survey (QR Code on handout)
- Brainstorm goals and actions for the plan update
- Review/Revise Capability Assessment Survey (to be completed by project team)
- Update the status of existing mitigation actions ("Ongoing" has been deemed too vague by FEMA)
- Propose new mitigation actions to address the current needs of the community in the face of climate change
- Determine a time and location for Public Meeting #1 (other regions are in favor of a virtual public meeting)
- Determine a time and location for Mitigation Strategy Meeting (following completion of risk assessment)

Thank you!

Thank you for your participation in the Cleveland Gaston Lincoln Regional HMP 2024 Update!

Combined HIRA/Mitigation Strategy Meeting
August 8th, 2024
10:00am – 12:00pm
Lincolnton, NC

I. Meeting Objectives

a. IDENTIFY HAZARDS
b. ASSESS HAZARDS AND VULNERABILITY
c. DETERMINE POTENTIAL IMPACTS AND PRIORITIES
d. DISCUSS FINDINGS
e. EDUCATE AND INFORM

II. Hazard Identification and Risk Assessment

a. IDENTIFIED HAZARDS
b. PROFILED HAZARD EVENTS
c. INVENTORIED ASSETS
d. ESTIMATED LOSSES

III. Capability Assessment

a. CAPABILITY INDICATORS
b. CAPABILITY OVERALL RATINGS
c. SUBSTANTIAL DAMAGE ESTIMATES (SDE) PROCEDURES

IV. Mitigation Strategy

a. PRIORITY RISK INDEX (PRI) SCORES
b. MITIGATION GOALS
c. MITIGATION ALTERNATIVES (EXISTING AND NEW)
d. MITIGATION ACTION PLAN

V. Initial Public Survey Results

a. TOTAL RESPONSES TO DATE
b. KEY FINDINGS

VI. Next Steps

a. SUBMIT UPDATED AND NEW MITIGATION ACTIONS
b. REVIEW DRAFT CAPABILITY ASSESSMENT
c. PROVIDE SDE PROCEDURES
d. SCHEDULE PUBLIC MEETING(S)
e. SUBMIT DRAFT PLAN MID-DECEMBER 2024

Combined HIRA/Mitigation Strategy Meeting
August 8th, 2024
10:00am – 12:00pm
Lincolnton, NC

On August 8, 2024, the Hazard Identification and Risk Assessment (HIRA)/Mitigation Strategy Meeting convened relevant stakeholders to discuss the third update of the Regional Hazard Mitigation Plan, reflecting 15 years of work in the region. The meeting was facilitated by Nathan Slaughter from ESP Associates, contracted through the State Emergency Management (EM) agency.

The primary goals included identifying hazards, assessing vulnerabilities, determining potential impacts, and educating participants about the hazard mitigation planning process. Stakeholders were invited to engage actively and provide insights into community needs and priorities.

Agenda Highlights:

- Hazard Identification: A review of hazards documented in previous plans, including FEMA Major Disasters and other significant risks like drought, extreme heat, hurricanes, tornadoes, and flooding.
- Asset Inventory: Analysis of population changes, critical facilities, and social vulnerability in the region.
- Hazard Profiles: Detailed assessments of 18 hazards, including their background, location, frequency, and potential interactions with other hazards. The session underscored the compounding effects of multiple hazards occurring simultaneously.
- Climate Change Considerations: Emphasis on how climate change is likely to increase the frequency and intensity of certain hazards, particularly extreme heat and drought.

Key Discussions:

- Extreme Heat: Presentations highlighted the increasing risks associated with rising temperatures, including public health impacts and emergency response needs. Data indicated a significant rise in extreme heat days projected for the future.
- Flooding: Identified as the leading weather-related hazard, the meeting examined the extent of floodplain areas and historical flooding occurrences.
- Wildfire Risks: The region's vulnerability to wildfires, particularly in the Wildfire Urban Interface (WUI), was discussed, with resources shared for potential funding opportunities to mitigate risks.
- Emerging Hazards: New hazards such as infectious diseases, hazardous substances, and cyber threats were noted, reflecting the evolving landscape of risks affecting the region.

The tabulated Preliminary Risk Indicator (PRI) results were presented, categorizing hazards into high, moderate, and low-risk groups. High-risk hazards identified included tornadoes, thunderstorms, excessive heat, severe winter weather, and flooding. Low-risk hazards were not prioritized for mitigation.

Comments on Specific Hazards:

- Excessive heat was noted for its immediate impact on sensitive populations but is easier to mitigate with advance warning.
- Cyber threats were highlighted as unpredictable, with six attacks on municipalities reported this year, emphasizing the need for robust cyber defenses.
- A radiological emergency was considered low risk despite high consequences, while food emergencies were suggested to be higher priority due to their potential public health impacts. Communication about food safety was identified as a crucial mitigation measure.

The Four-Step Mitigation Strategy:

- Organizing Resources: Planning for public involvement and coordinating efforts.
- Risk and Capability Assessments: Conducting hazard identification, vulnerability assessments, and evaluating community capabilities. Findings indicated increased capabilities across most municipalities.
- Mitigation Strategy Development: Setting goals and reviewing alternatives, with a focus on aligning actions with FEMA BRIC grant requirements.
- Plan Adoption and Implementation: Discussing the distribution of documents and follow-up actions required for stakeholders.

Initial findings from a public survey revealed tornadoes/thunderstorms as the highest perceived threat, with significant interest in hazard resilience measures. A majority preferred information via internet/social media.

Stakeholders were urged to submit updated and new mitigation actions, review draft assessments, and prepare for the draft plan submission in late November. The meeting concluded with a commitment to distribute all relevant documents and resources for further collaboration and input.

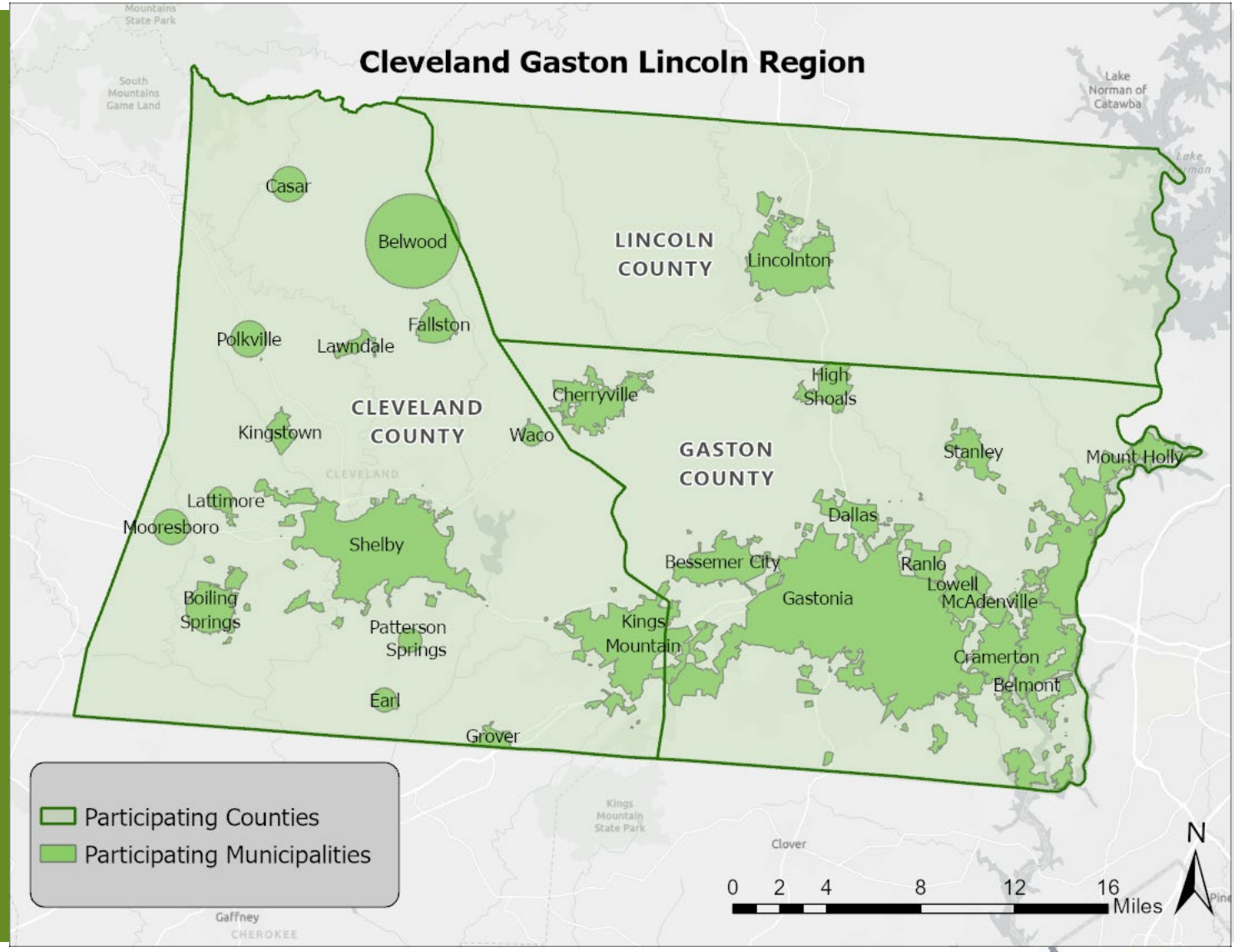
Cleveland Gaston Lincoln Region

2025 Hazard Mitigation Plan Update

HIRA/Mitigation Strategy Meeting

August 8, 2024

151 Sigmon Road, Lincolnton, NC



Agenda

- Welcome & Introductions
- Meeting Objectives
- Hazard Identification
- Asset Inventory
- Hazard Profiles: Risk & Vulnerability
- Discuss Findings
- Capability Assessment Findings
- Mitigation Strategy
- Next Steps & Questions

Introductions

Welcome!

Reminder to Sign-In

Introductions: Project Team and Participants

Meeting Objectives



Identify Hazards



Assess Hazards and Vulnerability



Determine Potential Impacts & Priorities

Discuss Findings



Educate and Inform

Planning Process

- Step 1: Organize to Prepare the Plan
- Step 2: Involve the Public (*ongoing*)
- Step 3: Coordinate (*ongoing*)
- **Step 4: Assess the Hazard (current)**
- **Step 5: Assess the Problem (current)**
- **Step 6: Set Goals (current)**
- **Step 7: Review Possible Activities (current)**
- **Step 8: Draft an Action Plan (current)**
- Step 9: Adopt the Plan
- Step 10: Implement, Evaluate, & Revise the Plan

Hazard Identification & Risk Assessment (HIRA) Process

Risk = a combination of hazard, vulnerability, and exposure; each factor is assessed in the process

1. Identify Hazards
2. Profile Hazard Events
3. Inventory Assets
4. Estimate Losses

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 must include information on previous occurrences of hazard events and on the probability of future hazard events.

Hazard Identification

FEMA Major 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 STORMS/FLOODING	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
2020	4487	COVID-19 PANDEMIC	X	X	X
2020	4543	SEVERE STORMS, TORNADOES, & FLOODING	X	X	

Total Declarations: **10**

- Categories
  - Hurricanes and coastal storms (2)
  - Severe winter weather (3)
  - Tornadoes and thunderstorms (4)
  - Pandemic (1)

Review of Existing Plan Hazards

Hazard	Included in 2023 State HMP?	Included in 2020 CGL Plan?	Included in 2025 CGL Plan Update?
Flooding	X	X	X
Hurricanes and Coastal Hazards	X	X	X
Severe Winter Weather (Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold)	X	X	X
Excessive Heat	X	X	X
Earthquake	X	X	X
Wildfire	X	X	X
Dam Failure	X	X	X
Drought	X	X	X
Tornadoes/Thunderstorms (Thunderstorm Wind, High Wind, Hail, Lightning)	X	X	X
Geological (Landslides, Sinkholes, Erosion)	X	X	X
Hazardous Substances	X	X	X
Radiological Emergency	X	X	X
Terrorism	X	X	X
Infectious Disease	X	X	X
Cyber Threat	X	X	X
Electromagnetic Pulse	X	X	X
Civil Disturbance (new)	X		X
Food Emergency (new)	X		X

Hazard Identification

Hazards Not Included

- Avalanche
- Nor'easter
- Expansive Soils
- Land Subsidence
- Tsunami
- Volcano
- Storm Surge

The rationale for not incorporating certain hazards may include **no geographic relevance, applicability to previous state/regional hazard mitigation plans, and poor availability of risk data**

Hazards Profiled

1. Drought
2. Excessive Heat
3. Hurricane and Coastal Hazards
4. Tornadoes/Thunderstorms
5. Severe Winter Weather
6. Earthquakes
7. Geological
8. Dam Failure
9. Flooding
10. Wildfire
11. Infectious Disease
12. Hazardous Substances
13. Radiological Emergency
14. Terrorism
15. Cyber
16. Electromagnetic Pulse
17. Civil Disturbance
18. Food Emergency

Hazard Profiles to include:

- *Background*
- *Location*
- *Extent*
- *Historical Occurrences*
- *Probability of Future Occurrence/FEMA NRI info*
- *Changing Future Conditions*
- *Summaries by Jurisdiction*
- *Vulnerability Assessment*

Potential Compounding Hazards

Compounding Hazard = a hazard that may either act as a key driver or lead to secondary risks associated with the primary hazard

HAZARD	COMPOUNDING - NATURAL											COMPOUNDING - 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	Civil Disturbance	Food Emergency
NATURAL HAZARDS																		
DROUGHT (6)		•			•		•		•	•								•
EXCESSIVE HEAT (7)	•			•			•		•	•	•							•
HURRICANE AND COASTAL HAZARDS (7)				•			•	•	•			•	•					•
TORNADOES/THUNDERSTORMS (6)		•	•				•		•	•		•						
SEVERE WINTER WEATHER (6)	•			•			•		•		•							•
EARTHQUAKES (5)							•	•	•			•	•					
GEOLOGICAL (8)	•	•	•	•	•	•		•	•									
DAM FAILURE (5)			•			•	•		•					•				
FLOODING (11)	•	•	•	•	•	•	•	•			•	•						•
WILDFIRES (3)	•	•		•														
INFECTIOUS DISEASE (7)		•			•				•			•		•			•	•
TECHNOLOGICAL HAZARDS																		
HAZARDOUS SUBSTANCES (9)			•	•		•			•	•	•		•	•				•
RADIOLOGICAL EMERGENCY (7)			•			•						•		•	•	•		•
TERRORISM (7)								•			•	•	•		•	•	•	
CYBER (4)													•	•		•	•	
ELECTROMAGNETIC PULSE (4)													•	•	•		•	
CIVIL DISTURBANCE (4)											•			•	•	•		
FOOD EMERGENCY (8)	•	•	•		•				•		•	•	•					

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. This description must include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008, must also address NFIP insured structures that have been repetitively damaged by floods.

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 dollar 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.

Asset Inventory

Asset Inventory – Population (2000-2022)

*__Note__: 2010 and 2020 counts from Decennial Census; 2021 and 2022 counts from 5-Year ACS Estimates

Jurisdiction	Population Estimates				% Change 2010-2020
	2022	2021	2020	2010	
Cleveland County	**99,527**	**98,898**	**99,519**	**98,030**	**1.5%**
Belwood	1,103	1,143	857	949	-9.7%
Boiling Springs	4,622	4,511	4,615	4,641	-0.6%
Casar	391	380	305	297	2.7%
Earl	358	321	198	260	-23.8%
Fallston	670	718	627	606	3.5%
Grover	598	577	802	707	13.4%
Kingstown	533	491	656	823	-20.3%
Kings Mountain	11,246	10,775	11,142	10,631	4.8%
Lattimore	557	618	406	426	-4.7%
Lawndale	599	621	570	696	-18.1%
Mooresboro	204	200	293	354	-17.2%
Patterson Springs	854	852	571	554	3.1%
Polkville	500	516	516	672	-23.2%
Shelby	21,712	21,564	21,918	20,417	7.4%
Waco	278	300	310	257	20.6%
Gaston County	**228,972**	**226,097**	**227,943**	**206,150**	**10.6%**
Belmont	14,842	14,442	15,010	10,252	46.4%
Bessemer City	5,472	5,452	5,428	5,342	1.6%
Cherryville	6,113	6,044	6,078	5,761	5.5%
Cramerton	5,294	5,190	5,296	4,168	27.1%
Dallas	5,889	5,777	5,927	4,492	31.9%
Gastonia	80,615	79,483	80,411	71,757	12.1%
High Shoals	675	659	595	695	-14.4%
Lowell	3,692	3,620	3,654	3,527	3.6%
McAdenville	1,125	1,019	890	650	36.9%
Mount Holly	17,644	17,315	17,703	13,662	29.6%
Ranlo	4,487	4,395	4,511	3,436	31.3%
Spencer Mountain	0	0	0	37	-100.0%
Stanley	3,967	3,911	3,963	3,558	11.4%
Lincoln County	**87,933**	**85,670**	**86,810**	**78,400**	**10.7%**
Lincolnton	11,225	10,926	11,091	10,503	5.6%
Cleveland Gaston Lincoln Region Total	**416,432**	**410,665**	**414,272**	**382,580**	**8.3%**

Asset Inventory – Parcels & Building Exposure (2010+)

*__Note__: building footprints were originally provided in 2010 with a limited extent of updates since

Location	Estimated Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Cleveland County	**60,202**	**$8,571,365,224**	**52,131**	**$6,050,709,300**
Belwood	809	$79,046,553	707	$42,417,605
Boiling Springs	1,871	$392,752,093	1,497	$324,967,081
Casar	278	$23,005,409	291	$15,075,457
Earl	186	$13,275,934	168	$9,735,994
Fallston	516	$54,854,845	394	$41,555,871
Grover	487	$43,656,602	388	$35,844,646
Kings Mountain	5,684	$1,313,430,398	5,011	$1,097,513,340
Kingstown	406	$22,623,982	299	$16,792,157
Lattimore	254	$29,126,882	206	$21,458,749
Lawndale	509	$23,652,431	355	$17,480,992
Mooresboro	257	$23,912,130	220	$15,358,032
Patterson Springs	272	$20,635,705	294	$15,045,388
Polkville	436	$42,204,761	351	$31,088,056
Shelby	11,478	$2,218,277,363	9,799	$1,745,371,272
Waco	202	$17,415,265	180	$13,289,170
Unincorporated Area	36,557	$4,253,494,871	31,971	$2,607,715,490
Gaston County	**112,272**	**$29,016,433,820**	**170,964**	**$26,504,985,850**
Belmont	7,669	$3,170,415,690	6,989	$2,976,688,100
Bessemer City	3,143	$537,474,640	4,700	$512,902,950
Cherryville	3,294	$591,971,060	5,210	$565,991,060
Cramerton	2,840	$1,079,399,610	2,726	$1,009,082,560
Dallas	2,513	$504,755,060	3,109	$465,591,430
Gastonia	33,901	$9,980,792,570	42,282	$9,338,811,110
High Shoals	408	$61,614,750	611	$52,807,210
Lowell	1,961	$693,325,860	2,990	$612,137,520
McAdenville	531	$164,380,880	671	$148,512,900
Mount Holly	8,479	$2,781,769,590	9,358	$2,540,194,780
Ranlo	1,862	$431,915,880	2,658	$400,199,120
Stanley	1,969	$467,780,350	2,622	$458,834,960
Unincorporated Area	43,702	$8,550,837,880	87,038	$7,423,232,150
Lincoln County	**55,389**	**$17,803,321,858**	**57,682**	**$13,443,048,934**
Lincolnton	5,256	$1,817,072,109	5,925	$1,512,552,113
Unincorporated Area	50,133	$15,986,249,749	51,757	$11,930,496,821
CLEVELAND GASTON LINCOLN REGION TOTAL	**227,863**	**$55,391,120,902**	**280,692**	**$45,998,744,084**

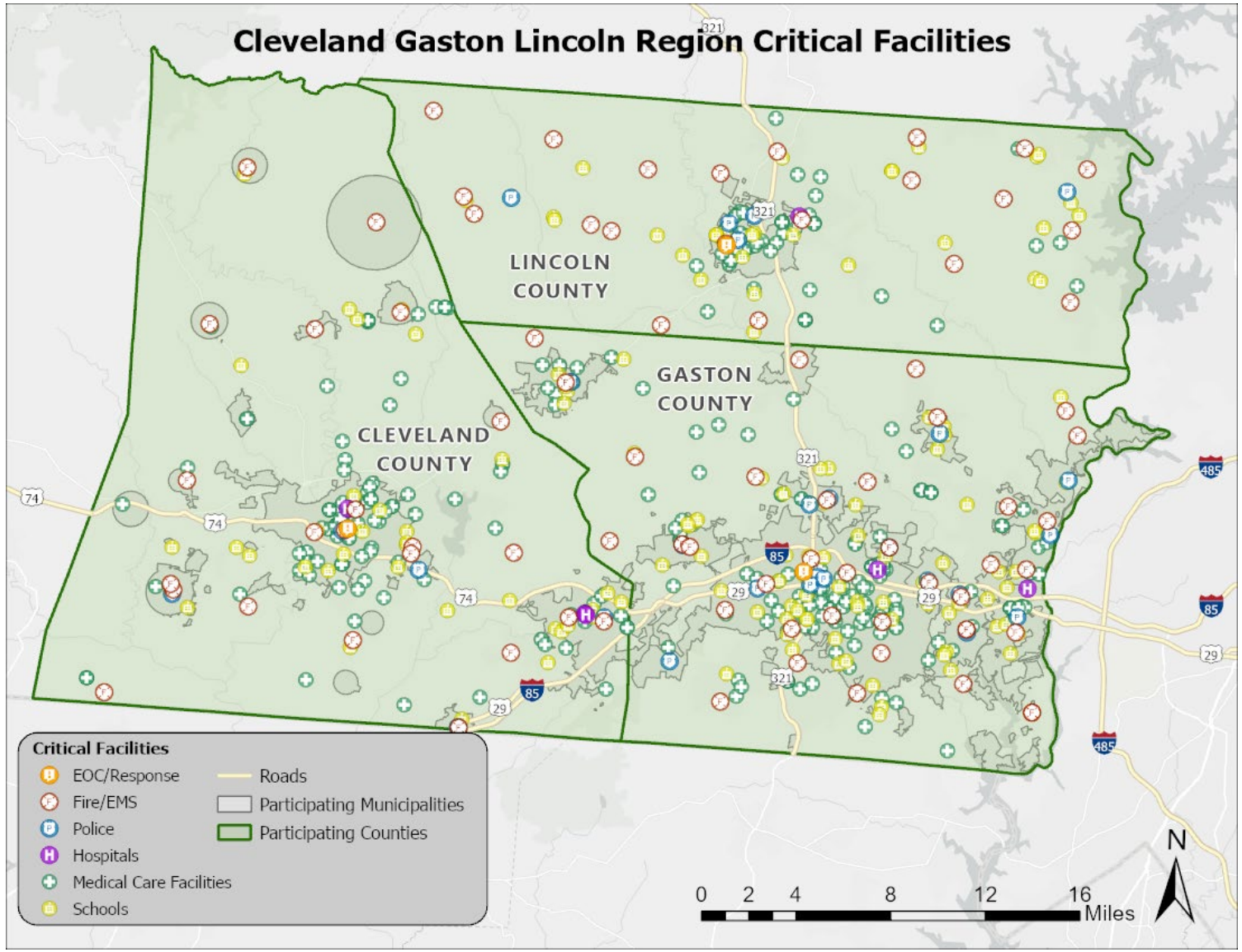
Asset Inventory – Critical Facilities

***Note**: approximate counts using available georeferenced facility data (NC OneMap, 2023) and updated municipal boundaries

Location	Fire Stations	Police Stations	Medical Care Facilities	EOC	Schools	Other
Cleveland County	**22**	**6**	**108**	**1**	**35**	**0**
Belwood	0	0	0	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	3	0	1	0
Grover	2	1	2	0	1	0
Kings Mountain	4	1	15	0	8	0
Kingstown	0	0	2	0	0	0
Lattimore	1	0	0	0	0	0
Lawndale	2	0	17	0	0	0
Mooresboro	1	0	3	0	0	0
Patterson Springs	0	0	0	0	0	0
Polkville	1	0	0	0	0	0
Shelby	6	3	64	1	10	0
Waco	1	0	0	0	0	0
Unincorporated Area	0	0	1	0	13	0
Gaston County	**38**	**17**	**151**	**1**	**73**	**75**
Belmont	5	1	13	0	6	4
Bessemer City	4	1	11	0	6	5
Cherryville	2	1	9	0	4	7
Cramerton	2	1	2	0	2	3
Dallas	2	2	6	0	1	9
Gastonia	11	4	97	1	25	26
High Shoals	1	0	0	0	0	1
Lowell	1	1	0	0	1	3
McAdenville	1	1	1	0	2	2
Mount Holly	5	2	6	0	4	6
Ranlo	1	1	0	0	1	1
Stanley	1	1	5	0	4	4
Unincorporated Area	2	1	1	0	17	4
Lincoln County	**21**	**5**	**52**	**1**	**31**	**4**
Lincolnton	9	3	45	1	8	4
Unincorporated Area	12	2	7	0	23	0
CLEVELAND GASTON LINCOLN REGION TOTAL	**81**	**28**	**311**	**3**	**139**	**79**

Asset Inventory – Critical Facilities

*__Note__: approximate counts using available georeferenced facility data (NC OneMap, 2023) and updated municipal boundaries



Asset Inventory – Social Vulnerability

*__Note__: highest variable by county is shown in **bold**; FEMA National Risk Index (NRI) values are reported on a scale of 100 points

Variable	Cleveland County	Gaston County	Lincoln County
Percent of the population over age 5 that speaks a language other than English (2022 ACS 5-Year)	4.5%	**8.5%**	7.8%
Percent of the population that has a disability (2022 ACS 5-Year)	**16.2%**	14.7%	14.4%
Percent of the population that lives below the poverty level (2022 ACS 5-Year)	**18.4%**	12.4%	9.3%
Social Vulnerability Index (CDC/ATSDR, 2022)	**0.8524**	0.65	0.2517
Environmental Justice Index (CDC/ATSDR, 2022)	15 high-burden tracts	**26 high-burden tracts**	4 high-burden tracts
Base Risk Index (FEMA NRI, 2024)	70.57	**81.55**	64.94
Social Vulnerability (FEMA NRI, 2024)	**87.6**	71.7	33.7
Community Resilience (FEMA NRI, 2024)	35.0	**52.8**	52.6

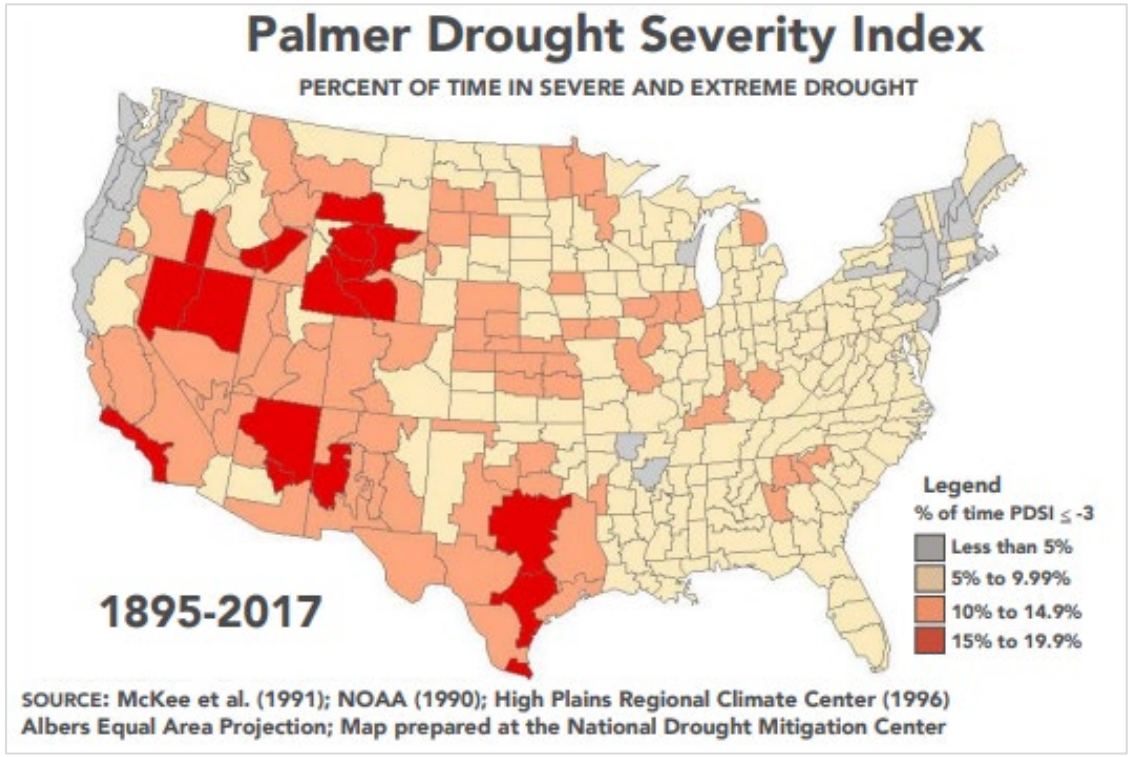
Hazard Profiles

Hazard Risk Summary

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought	Agricultural, Hydrological	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Excessive Heat		Likely	Critical	Large	More than 24 hours	Less than 1 week	3.0
Hurricane and Coastal Hazards	Storm Surge, Severe Weather	Possible	Critical	Large	More than 24 hours	Less than 1 week	2.7
Tornadoes/ Thunderstorms	High Wind, Hail, Lightning	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	3.1
Severe Winter Weather	Snow, Blizzards, Wind Chill, Extreme Cold, Ice Storms, Freezing Rain	Likely	Critical	Large	More than 24 hours	Less than 1 week	3.0
Earthquakes		Possible	Limited	Moderate	Less than 6 hours	Less than 6 hours	2.3
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 1 week	2.5
Flooding		Likely	Limited	Moderate	6 to 12 hours	Less than 1 week	3.0
Wildfires		Likely	Limited	Moderate	12 to 24 hours	More than 1 week	2.7
Infectious Disease	Foreign Animal Disease	Possible	Critical	Large	More than 24 hours	More than 1 week	2.8
Technological Hazards							
Hazardous Substances		Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.5
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	2.4
Terrorism	Explosive, Chemcial, Radiological, Biological, Nuclear	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	2.5
Cyber		Possible	Limited	Moderate	Less than 6 hours	More than 1 week	2.6
Electromagnetic Pulse		Unlikely	Critical	Moderate	12 to 24 hours	More than 1 week	2.4
Civil Disturbance		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	2.2
Food Emergency		Possible	Limited	Moderate	More than 24 hours	More than 1 week	2.3

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Minor	Large	More than 24 hours	More than 1 week

Drought



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**
  - Negative effects on crops, water supplies, recreational areas, and wildlife
  - If a drought extends over a longer period, the direct and indirect economic impacts can be significant
- **4 main types**:
  - Meteorological
  - Hydrological
  - Agricultural
  - Socioeconomic

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Minor	Large	More than 24 hours	More than 1 week

Drought

Location	Years with Drought Occurrences (2000-2024)	Recent Years with Exceptional Drought
Cleveland County	24	3
Gaston County	24	3
Lincoln County	24	3

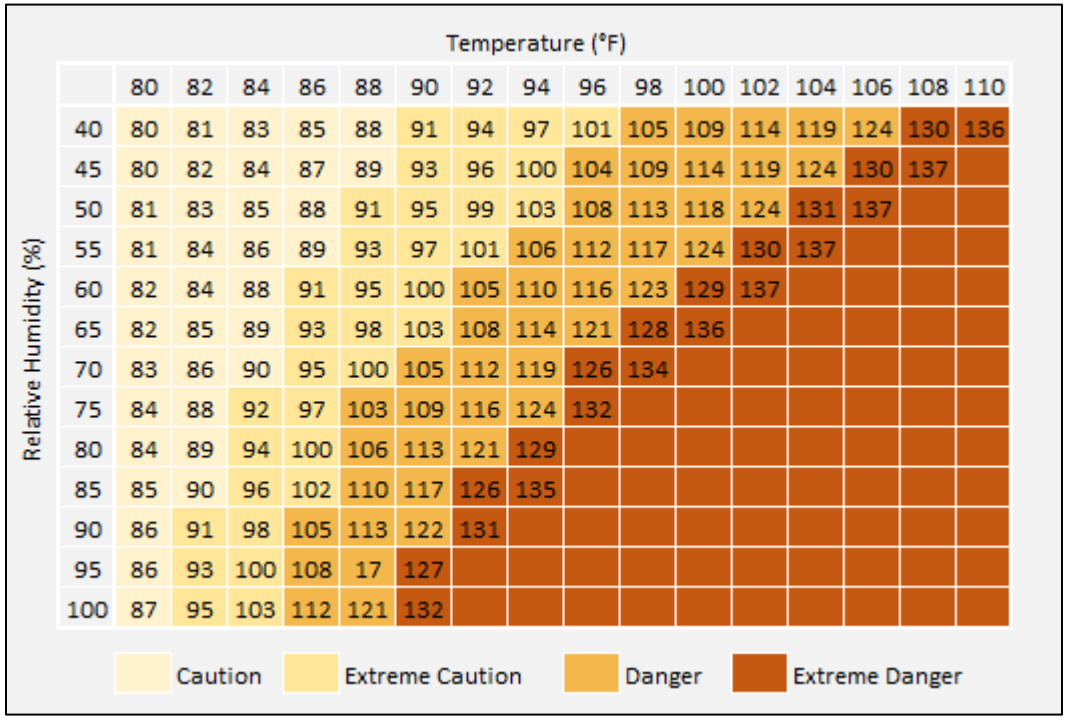
Source: North Carolina Drought Monitor (through February 2024)

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

- According to the North Carolina Drought Monitor, all counties in the region have had some level of drought occurrences in roughly 24 of the last 25 years (2000-2024)
  - **Exceptional droughts** (D4) in 2002, 2007, and 2008
- Frequency and intensity of droughts are likely to continue to increase along with average temperatures
- **2024 FEMA National Risk Index (NRI) drought hazard risk ratings**:
  - Cleveland – Very low
  - Gaston – Very low
  - Lincoln – Relatively low

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Large	More than 24 hours	Less than 1 week

Excessive Heat



Relative Humidity (%)	Temperature (°F)															
	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	17	127										
100	87	95	103	112	121	132										

Source: NOAA, National Weather Service

Excessive heat leads the nation in terms of weather-related mortality. Per the CDC, it has caused an average of **1,200** deaths each year nationwide.

- **Excessive heat** poses little risk to property but can have devastating impacts on public health
- Often referred to as "**extreme heat**" or a "**heat wave**"
- The National Weather Service developed the **Heat Index** (see left image) to better inform the public of heat dangers

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Large	More than 24 hours	Less than 1 week

Excessive Heat

*__Note__: National Centers for Environmental Information (NCEI) records only include those officially reported by the agency. It is highly likely that additional events, damages, and casualties have occurred that are not fully captured in this dataset.

**NCEI EXCESSIVE HEAT OCCURRENCES (1996-2023)

County	Number of Events	Deaths/ Injuries	Property Damage (2023 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

MAX RECORDED TEMPERATURES BY COUNTY

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

AVERAGE MAX TEMPERATURE IN LINCOLNTON, LINCOLN COUNTY (MOST CENTRALIZED STATION)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	68.6	71.6	79.2	85.2	89.1	93.5	95.5	94.7	91.4	84.4	77.1	68.8

Source: State Climate Office of North Carolina

- **2024 FEMA NRI excessive heat hazard ratings**:
  - Cleveland – Relatively low
  - Gaston – Relatively moderate
  - Lincoln – Relatively low
- According to 2022 climate summary data from NOAA:
  - NC average temps have risen over 1°F since the 20th century
  - Temps have consistently risen above averages since the late 1990s
  - Recent summer average temps were warmest on record for the last 16 years (2005-2020)
  - Future heat waves are likely to be more intense

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Critical	Large	More than 24 hours	Less than 1 week

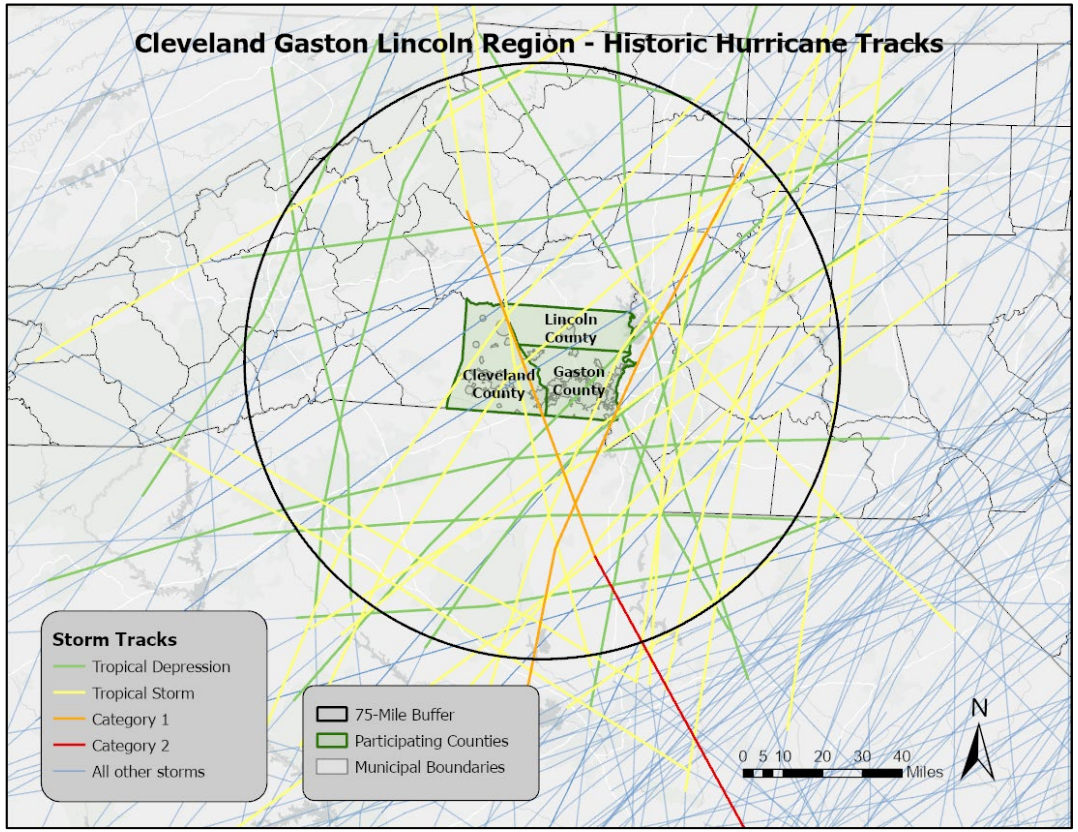
Hurricane & Coastal Hazards

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

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Critical	Large	More than 24 hours	Less than 1 week

Hurricane & Coastal Hazards



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

A hurricane-level storm makes landfall in NC roughly **once every 3 years**.

- North Carolina is vulnerable to hurricanes and tropical storms beyond the Atlantic coast
- Per the National Hurricane Center, roughly **50 hurricane or tropical storm tracks have passed within 75 miles of the CGL Region** since 1850
  - 11 tracks directly crossed
- Climate models project that hurricane-associated storm intensity and rainfall rates will increase in the future
- **2024 FEMA NRI hurricane hazard ratings**:
  - Cleveland – Relatively low
  - Gaston – Relatively low
  - Lincoln – Relatively low

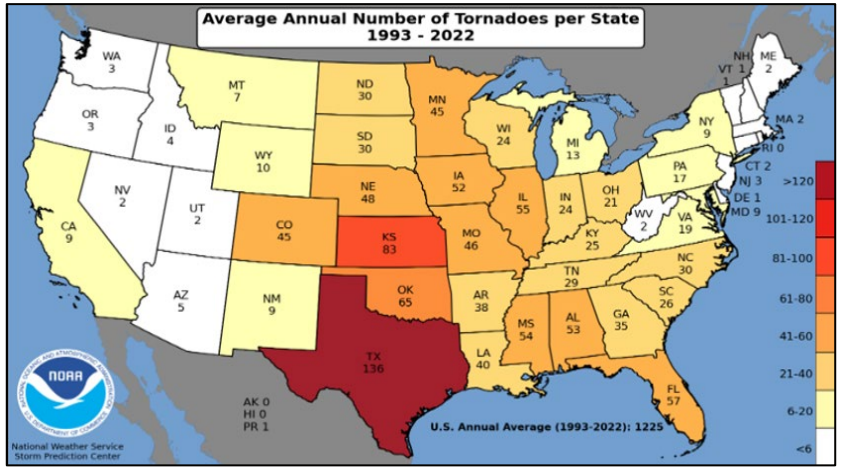
Hurricane & Coastal Hazards – Building Loss Estimates from 100-year Hurricane Winds (NCEM)

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	**41,548**	**48,873**	**$17,580,462**	**3,311**	**$8,477,392**	**745**	**$1,559,534**	**52,929**	**$27,617,386**
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	6,037	7,300	$2,678,176	568	$2,882,739	136	$362,739	8,004	$5,923,654
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
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	21,719	26,005	$8,958,393	1,152	$2,349,370	223	$689,195	27,380	$11,996,958
Gaston County	**73,916**	**106,751**	**$20,869,643**	**9,147**	**$4,078,786**	**2,032**	**$1,972,389**	**117,930**	**$26,920,818**
Belmont	3,931	5,791	$1,436,414	402	$265,325	162	$110,542	6,355	$1,812,281
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	1,432	2,833	$695,181	177	$70,816	51	$50,164	3,061	$816,160
Dallas	1,853	2,168	$410,562	190	$39,456	106	$32,292	2,464	$482,310
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	688	1,152	$149,036	81	$18,440	31	$5,667	1,264	$173,143
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	423	488	$120,628	52	$34,108	18	$5,733	558	$160,468
Mount Holly	3,411	5,770	$1,378,306	541	$367,472	106	$58,187	6,417	$1,803,965
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	38	1	$124	35	$13,258	2	$324	38	$13,707
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,058	42,028	$6,039,809	2,678	$844,860	497	$414,612	45,203	$7,299,282
Lincoln County	**18,963**	**43,906**	**$13,688,289**	**3,794**	**$6,354,139**	**510**	**$2,832,093**	**48,210**	**$22,874,520**
Lincolnton	6,028	6,770	$2,072,276	786	$1,064,622	156	$222,782	7,712	$3,359,679
Unincorporated Area	12,935	37,136	$11,616,013	3,008	$5,289,517	354	$2,609,311	40,498	$19,514,841
Cleveland Gaston Lincoln Region Total	**134,427**	**199,530**	**$52,138,394**	**16,252**	**$18,910,317**	**3,287**	**$6,364,016**	**219,069**	**$77,412,724**

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours

Tornadoes / Thunderstorms – Tornado

*__Note__: National Centers for Environmental Information (NCEI) records only include those officially reported by the agency. It is highly likely that additional events, damages, and casualties have occurred that are not fully captured in this dataset.



Source: NOAA Storm Prediction Center

ENHANCED FUJITA (EF) SCALE

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.

- **North Carolina averages 30 tornadoes per year**, with formation most likely between March-May
- Tornado magnitude is reported according to the Enhanced Fujita Scale (effective 2005) shown in the table
- Per NCEI, tornadoes have resulted in 66 recorded events up to category F4 and over $154 million (2023 dollars) in property damages in the region since 1950*
  - 5 deaths, 78 injuries
- Total number of tornadoes is not significantly different from the past, but clustering appears to be increasing
- **2024 FEMA NRI tornado hazard ratings**:
  - Cleveland – Relatively moderate
  - Gaston – Relatively moderate
  - Lincoln – Relatively moderate

Tornadoes / Thunderstorms – Building Loss Estimates from F2 Tornado (NCEM)

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	**41,571**	**48,902**	**$5,843,276,509**	**3,312**	**$4,068,564,677**	**745**	**$764,184,548**	**52,959**	**$10,676,025,738**
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	6,037	7,300	$893,510,474	568	$1,074,126,130	136	$140,668,031	8,004	$2,108,304,636
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	21,742	26,034	$2,923,581,781	1,153	$1,240,731,370	223	$243,093,034	27,410	$4,407,406,186
Gaston County	**73,961**	**106,825**	**$8,712,225,188**	**9,163**	**$4,445,219,510**	**2,033**	**$1,188,593,568**	**118,021**	**$14,346,038,269**
Belmont	3,931	5,791	$596,177,471	402	$345,416,767	162	$99,405,677	6,355	$1,040,999,915
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	1,432	2,833	$317,083,866	177	$90,431,076	51	$28,319,034	3,061	$435,833,976
Dallas	1,853	2,168	$175,895,252	190	$62,542,655	106	$50,117,719	2,464	$288,555,626
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	687	1,152	$79,005,564	81	$21,558,599	31	$7,512,226	1,264	$108,076,388
Lowell	1,667	1,987	$154,086,322	235	$111,503,549	57	$33,244,719	2,279	$298,834,590
McAdenville	423	488	$48,777,906	52	$69,409,298	18	$8,647,104	558	$126,834,308
Mount Holly	3,411	5,770	$626,175,373	541	$303,474,271	106	$58,815,279	6,417	$988,464,923
Ranlo	1,370	1,709	$143,743,108	92	$111,723,083	26	$16,027,705	1,827	$271,493,897
Spencer Mountain	38	1	$53,819	35	$10,918,848	2	$805,478	38	$11,778,145
Stanley	4,863	4,875	$374,941,792	272	$169,826,968	69	$51,676,715	5,216	$596,445,475
Uninc. Area	23,104	42,102	$2,631,352,759	2,694	$727,084,726	498	$245,681,486	45,294	$3,604,118,972
Lincoln County	**18,963**	**43,906**	**$4,623,084,518**	**3,794**	**$3,596,171,135**	**510**	**$668,104,774**	**48,210**	**$8,887,360,427**
Lincolnton	6,028	6,770	$758,994,378	786	$932,220,331	156	$135,845,813	7,712	$1,827,060,522
Uninc. Area	12,935	37,136	$3,864,090,140	3,008	$2,663,950,804	354	$532,258,961	40,498	$7,060,299,905
Cleveland Gaston Lincoln Region Total	**134,495**	**199,633**	**$19,178,586,215**	**16,269**	**$12,109,955,322**	**3,288**	**$2,620,882,890**	**219,190**	**$33,909,424,434**

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours

Tornadoes / Thunderstorms – Thunderstorm Wind

NCEI THUNDERSTORM / HIGH WIND EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	**279**	**0/7**	**$2,293,282**
Belwood	6	0/0	$35,003
Boiling Springs	18	0/1	$283,241
Casar	15	0/0	$2,554
Earl	9	0/0	$9,991
Fallston	6	0/0	$33,360
Grover	8	0/0	$8,308
Kings Mountain	17	0/0	$8,095
Kingstown	0	0/0	$0
Lattimore	6	0/0	$14,722
Lawndale	9	0/0	$138,562
Mooresboro	9	0/0	$203,678
Patterson Springs	9	0/0	$91,519
Polkville	10	0/0	$18,200
Shelby	52	0/6	$240,218
Waco	11	0/0	$88,357
Unincorporated Area	94	0/0	$1,117,474
Gaston County	**261**	**3/8**	**$2,277,126**
Belmont	17	0/0	$68,508
Bessemer City	14	0/0	$18,259
Cherryville	22	0/1	$264,796
Cramerton	7	0/0	$16,686
Dallas	16	0/0	$160,058
Gastonia	59	2/1	$274,576
High Shoals	2	0/0	$0
Lowell	3	0/0	$30,446
McAdenville	3	0/1	$0
Mount Holly	11	0/0	$172,830
Ranlo	1	0/0	$0
Spencer Mountain	1	0/0	$0
Stanley	8	0/0	$31,500
Unincorporated Area	97	1/5	$1,239,467
Lincoln County	**167**	**1/1**	**$1,847,982**
Lincolnton	49	0/1	$302,802
Unincorporated Area	101	1/0	$1,545,180
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**707**	**4/16**	**$6,418,390**

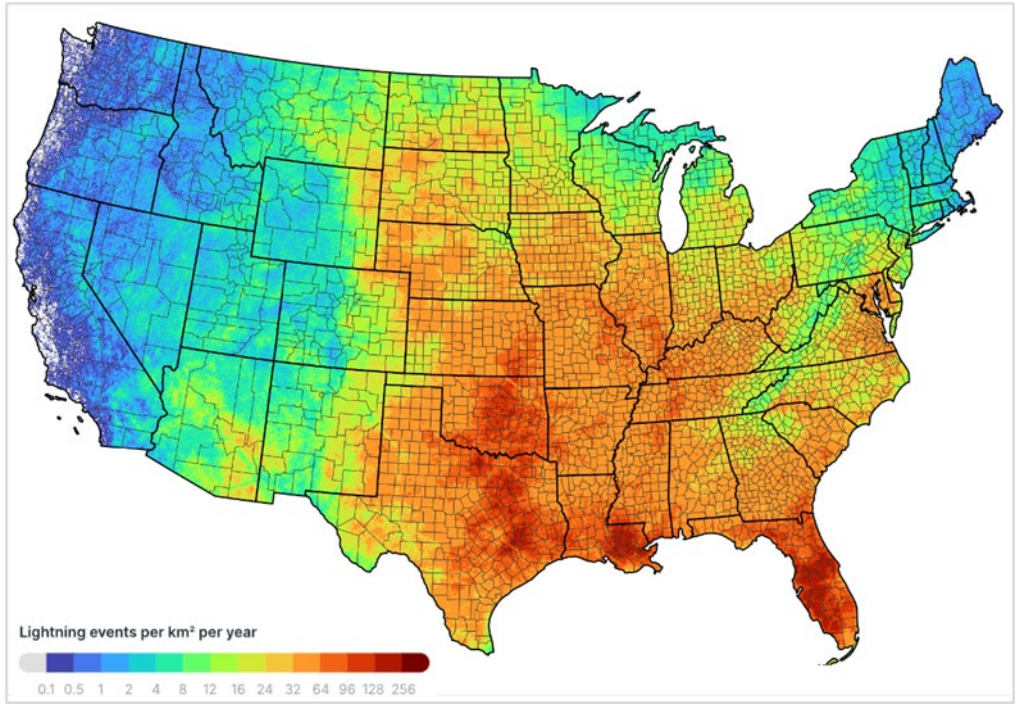
- Although thunderstorms generally affect a small area, they are very dangerous and may cause severe property damage
- According to the NWS, **100,000+ thunderstorms occur each year**
  - **≈10%** are “severe”
  - Uniform exposure due to atmospheric conditions
- According to NASA, severe storm events are likely to become more frequent and intense throughout the Southeast U.S. over time
- **2024 FEMA NRI strong wind hazard ratings**:
  - Cleveland – Relatively moderate
  - Gaston – Relatively high
  - Lincoln – Relatively moderate

Tornadoes / Thunderstorms – Building Loss Estimates from 50-year Thunderstorm Winds (NCEM)

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	**41,548**	**48,873**	**$17,580,462**	**3,311**	**$8,477,392**	**745**	**$1,559,534**	**52,929**	**$27,617,386**
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	6,037	7,300	$2,678,176	568	$2,882,739	136	$362,739	8,004	$5,923,654
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
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	21,719	26,005	$8,958,393	1,152	$2,349,370	223	$689,195	27,380	$11,996,958
Gaston County	**73,916**	**106,751**	**$20,869,643**	**9,147**	**$4,078,786**	**2,032**	**$1,972,389**	**117,930**	**$26,920,818**
Belmont	3,931	5,791	$1,436,414	402	$265,325	162	$110,542	6,355	$1,812,281
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	1,432	2,833	$695,181	177	$70,816	51	$50,164	3,061	$816,160
Dallas	1,853	2,168	$410,562	190	$39,456	106	$32,292	2,464	$482,310
Gastonia	23,256	30,019	$7,714,234	3,466	$1,711,079	710	$975,466	34,195	$10,400,778
High Shoals	688	1,152	$149,036	81	$18,440	31	$5,667	1,264	$173,143
Lowell	1,667	1,987	$331,984	235	$109,385	57	$42,630	2,279	$483,999
McAdenville	423	488	$120,628	52	$34,108	18	$5,733	558	$160,468
Mount Holly	3,411	5,770	$1,378,306	541	$367,472	106	$58,187	6,417	$1,803,965
Ranlo	1,370	1,709	$335,437	92	$110,333	26	$36,042	1,827	$481,812
Spencer Mountain	38	1	$124	35	$13,258	2	$324	38	$13,707
Stanley	4,863	4,875	$817,794	272	$158,208	69	$89,744	5,216	$1,065,746
Unincorporated Area	23,058	42,028	$6,039,809	2,678	$844,860	497	$414,612	45,203	$7,299,282
Lincoln County	**18,963**	**43,906**	**$13,688,289**	**3,794**	**$6,354,139**	**510**	**$2,832,093**	**48,210**	**$22,874,520**
Lincolnton	6,028	6,770	$2,072,276	786	$1,064,622	156	$222,782	7,712	$3,359,679
Unincorporated Area	12,935	37,136	$11,616,013	3,008	$5,289,517	354	$2,609,311	40,498	$19,514,841
Cleveland Gaston Lincoln Region Total	**134,427**	**199,530**	**$52,138,394**	**16,252**	**$18,910,317**	**3,287**	**$6,364,016**	**219,069**	**$77,412,724**

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours

Tornadoes / Thunderstorms – Lightning



Source: Vaisala U.S. National Lightning Detection Network, 2016-2022

- **Lightning strikes** are highly localized and may damage buildings, critical facilities, natural resources, and infrastructure by igniting a fire
- Per NCEI, lightning has resulted in 56 recorded events and over $3.9 million (2023 dollars) in regional property damages since 1994
  - 16 injuries
- CGL Region averages **16-32 lightning events per square kilometer per year** (2016-2023 Vaisala NLDN data)
- **2024 FEMA NRI lightning hazard ratings**:
  - Cleveland – Relatively moderate
  - Gaston – Relatively moderate
  - Lincoln – Relatively moderate

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours

Tornadoes / Thunderstorms – Hail

TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m²	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 – 0.2	No damage
H1	Potentially Damaging	5-15	>20	0.2 – 0.6	Slight general damage to plants, crops
H2	Significant	10-20	>100	0.4 – 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	0.8 – 1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	1.0 – 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	1.2 – 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		1.6 – 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		2.0 – 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-90		1.6 – 3.5	(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

- **Hailstorms** are a potentially damaging outgrowth of severe thunderstorms and form by ice crystallization of warm air updrafts
- Per NCEI, hail has resulted in 454 recorded events and over $2.4 million (2023 dollars) in property damages in the region since 1959
  - 0.75-inch to 4.5-inch hail
- **2024 FEMA NRI hail hazard ratings**:
  - Cleveland – Relatively low
  - Gaston – Relatively low
  - Lincoln – Relatively moderate

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Large	More than 24 hours	Less than 1 week

Severe Winter Weather

NCEI WINTER WEATHER EVENTS

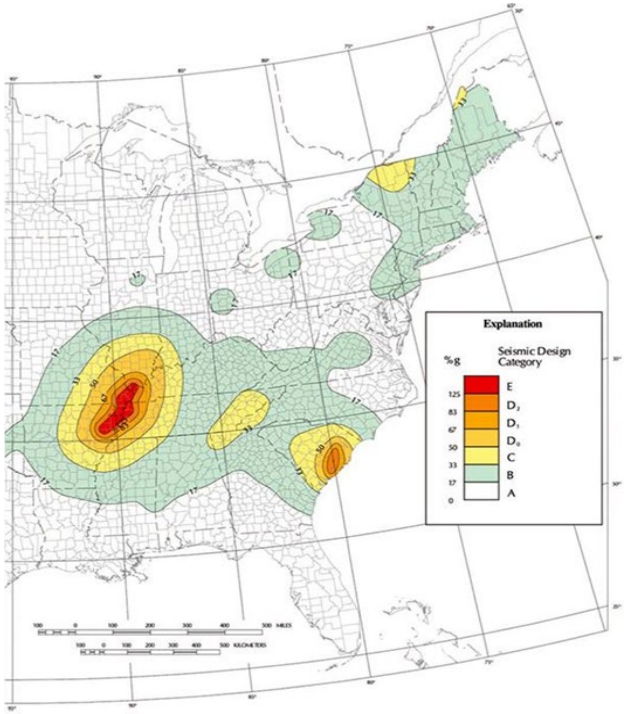
Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Cleveland County	89	0/0	$15,421,821
Gaston County	77	0/0	$30,760,227
Lincoln County	88	0/0	$15,341,908
CLEVELAND GASTON LINCOLN REGION TOTAL	**254**	**0/0**	**$61,523,956**

Severe winter weather is a top hazard in the nation in terms of weather-related mortality. Frigid winter conditions contribute to a high number of deaths and injuries each year. In recent years, **U.S. death rates have spiked by 8-12% in the winter months**.

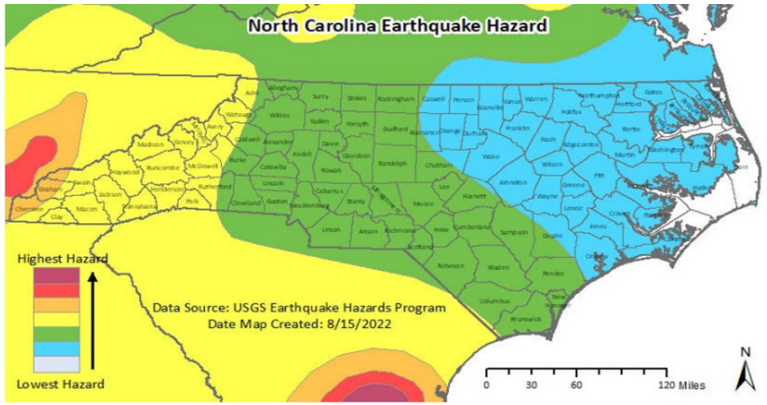
- A winter storm can range from moderate snowfall or ice over a few hours to blizzard conditions with blinding snow that lasts for several days
- **Severe winter weather** can lead to dangerous driving conditions, communications and utility disruptions, and severe injuries
- Winter weather has resulted in 3 disaster declarations and 254 recorded events in the region since 1993 per NCEI records
- According to NOAA, average winter temps in urban hubs of NC have recently spiked by 2-3°F
- **2024 FEMA NRI winter weather hazard ratings**:
  - Cleveland – Very low
  - Gaston – Very low
  - Lincoln – Relatively low

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Moderate	Less than 6 hours	Less than 6 hours

Earthquake



Source: United States Geological Survey



Source: North Carolina Geological Survey

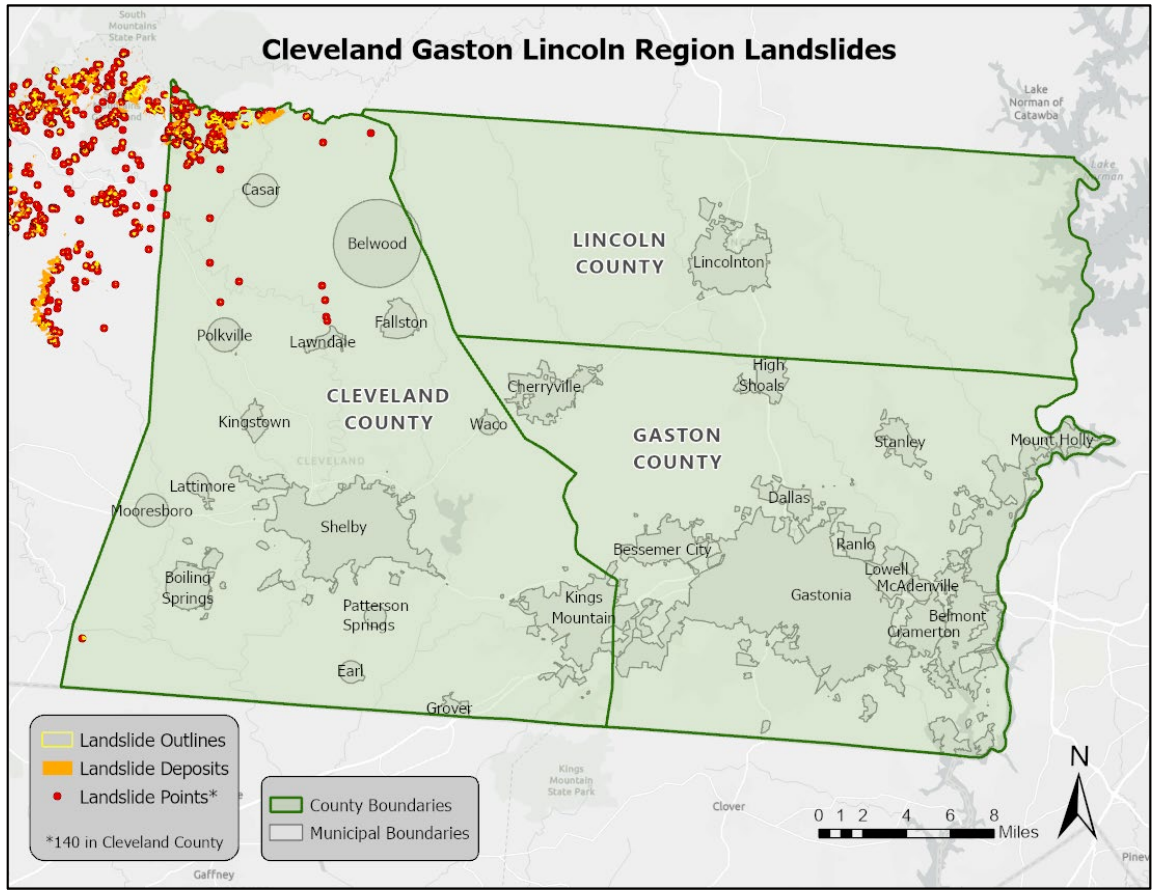
- **Moderate risk of less frequent, less intense earthquake events in the Eastern U.S.** vs. other regions
- Earthquakes are measured by **magnitude** (Richter) and **intensity** (Modified Mercalli Intensity – MMI)
- At least 29 earthquakes have affected the planning region since 1886
  - Strongest: VII (MMI scale)
  - Most: Cleveland (15)
- USGS reports a 5-25% chance of a VI (MMI) or higher earthquake in NC using a 100-year return period (2023)
- **2024 FEMA NRI earthquake hazard ratings**:
  - Cleveland – Relatively low
  - Gaston – Relatively low
  - Lincoln – Relatively low

Earthquake – Building Loss Estimates from 500-Year Earthquake (NCEM)

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	**41,571**	**48,902**	**$12,150,506**	**3,312**	**$16,876,625**	**745**	**$3,610,256**	**52,959**	**$32,637,390**
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	6,037	7,300	$1,938,346	568	$4,261,252	136	$650,612	8,004	$6,850,210
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	21,742	26,034	$5,798,598	1,153	$4,859,027	223	$1,161,515	27,410	$11,819,139
Gaston County	**73,961**	**106,825**	**$14,083,265**	**9,163**	**$19,062,645**	**2,033**	**$5,285,663**	**118,021**	**$38,431,573**
Belmont	3,931	5,791	$958,346	402	$1,532,320	162	$459,268	6,355	$2,949,934
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	1,432	2,833	$494,928	177	$394,008	51	$114,981	3,061	$1,003,917
Dallas	1,853	2,168	$299,242	190	$282,217	106	$200,727	2,464	$782,186
Gastonia	23,256	30,019	$4,800,727	3,466	$8,886,589	710	$2,291,328	34,195	$15,978,644
High Shoals	687	1,152	$118,462	81	$81,671	31	$31,007	1,264	$231,141
Lowell	1,667	1,987	$238,032	235	$492,669	57	$146,561	2,279	$877,262
McAdenville	423	488	$75,540	52	$286,600	18	$34,828	558	$396,968
Mount Holly	3,411	5,770	$902,573	541	$1,206,321	106	$262,843	6,417	$2,371,737
Ranlo	1,370	1,709	$214,887	92	$433,239	26	$76,675	1,827	$724,801
Spencer Mountain	38	1	$69	35	$40,344	2	$2,220	38	$42,633
Stanley	4,863	4,875	$555,629	272	$630,105	69	$216,069	5,216	$1,401,803
Unincorporated Area	23,104	42,102	$4,475,958	2,694	$3,007,429	498	$1,070,173	45,294	$8,553,559
Lincoln County	**18,963**	**43,906**	**$7,323,337**	**3,794**	**$12,510,202**	**510**	**$2,256,306**	**48,210**	**$22,089,845**
Lincolnton	6,028	6,770	$1,483,499	786	$3,703,519	156	$558,863	7,712	$5,745,881
Unincorporated Area	12,935	37,136	$5,839,838	3,008	$8,806,683	354	$1,697,443	40,498	$16,343,964
Cleveland Gaston Lincoln Region Total	**134,495**	**199,633**	**$33,557,108**	**16,269**	**$48,449,472**	**3,288**	**$11,152,225**	**219,190**	**$93,158,808**

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Small	Less than 6 hours	Less than 6 hours

Geological – Landslides, Sinkholes, Erosion



Source: North Carolina Geological Survey, Asheville Regional Office

- The **geological** hazard includes landslides, sinkholes, and erosion for consistency with the State HMP
- Some steep topography of the region makes it susceptible to landslides, although soil profiles suggest sinkholes and erosion are uncommon
- Landslide activity is significant in the region (140 reports in Cleveland County per NCGS)
  - USGS has previously mapped large eastern areas of Cleveland County, central and northern Gaston County, and southern Lincoln County at high risk of incidence (1982)
- The number of landslides is projected to increase due to more extreme rainfall events
- **2024 FEMA NRI landslide hazard ratings**:
  - Cleveland – Relatively low
  - Gaston – Relatively moderate
  - Lincoln – Relatively moderate

Probability	Impact	Spatial Extent	Warning Time	Duration
Unlikely	Critical	Moderate	Less than 6 hours	Less than 1 week

Dam Failure

NC 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

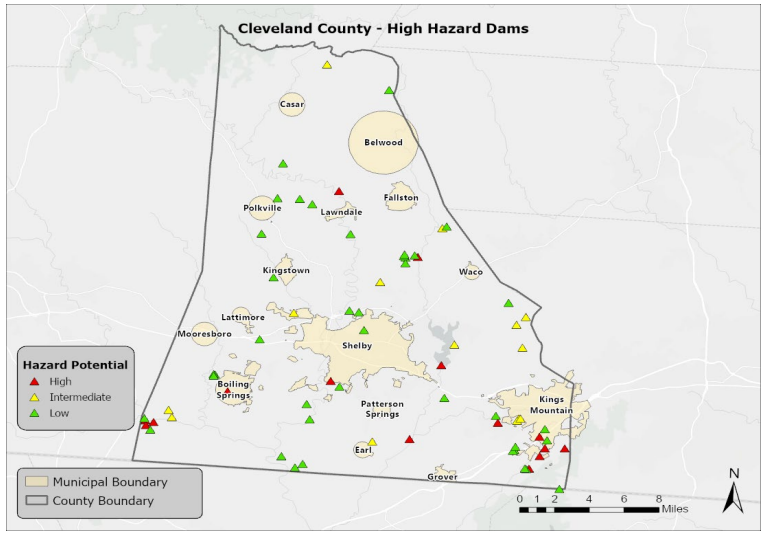
CGL REGION HIGH-HAZARD DAMS

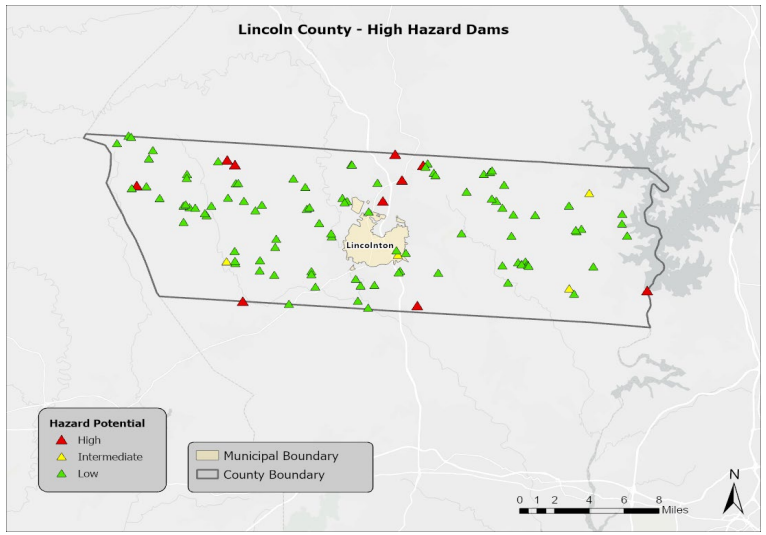
Location	Number of High Hazard Dams
Cleveland County	16
Gaston County	24
Lincoln County	10
Cleveland Gaston Lincoln Region Total	**50**

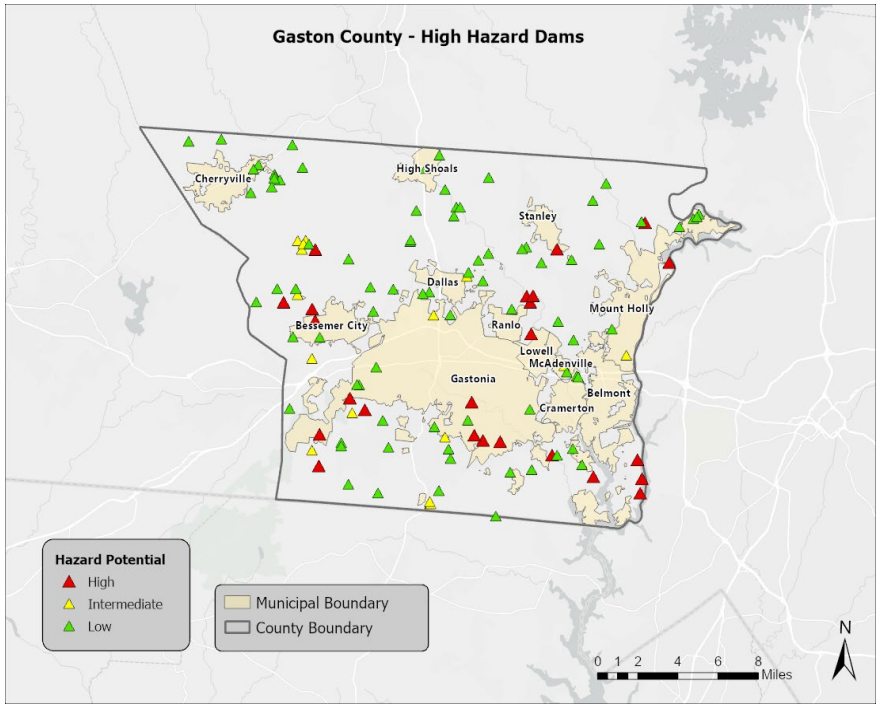
- Interest in **dam safety** has recently increased due to (1) aging infrastructure, (2) new hydrologic data, and (3) population growth near downstream SFHAs
  - **FEMA priority**
- Although unlikely, dam failure carries serious risks as the energy of water stored behind even a small dam is capable of significant loss of life and property
- Per NCDEQ as of December 2023, there are **299 dams** in the CGL Region
  - **≈17%** are classified as high-hazard dams
- Projected increases in extreme weather could affect peak streamflow and future structural integrity

Probability	Impact	Spatial Extent	Warning Time	Duration
Unlikely	Critical	Moderate	Less than 6 hours	Less than 1 week

Dam Failure







Source: North Carolina Division of Energy, Mineral, and Land Resources, 2023

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Moderate	6 to 12 hours	Less than 1 week

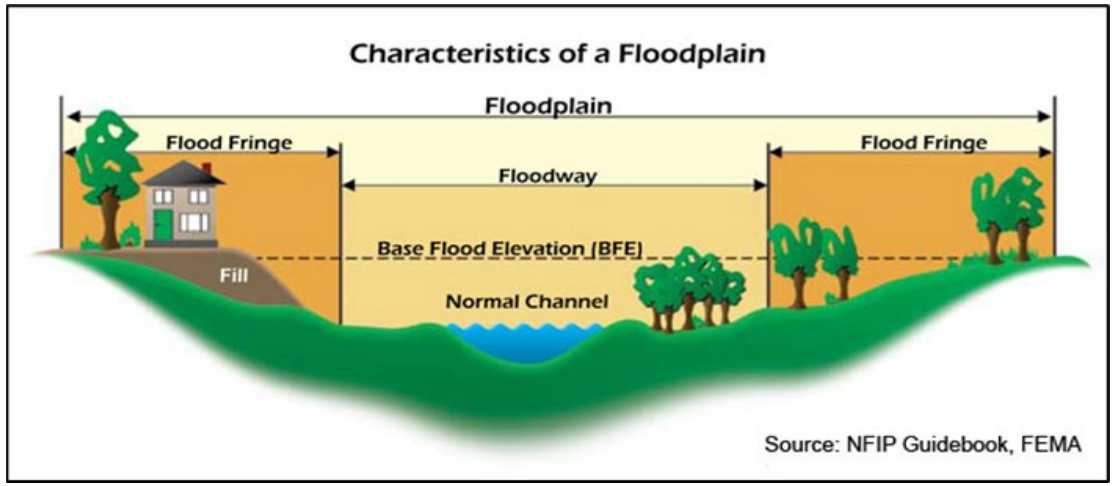
Flooding

SUMMARY OF APPROXIMATE FLOODPLAIN AREAS

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**

Source: Federal Emergency Management Agency, Map Service Center

These floodplain areas account for **≈7.4%** of the total land area in the CGL Region (≈1,140 square miles).

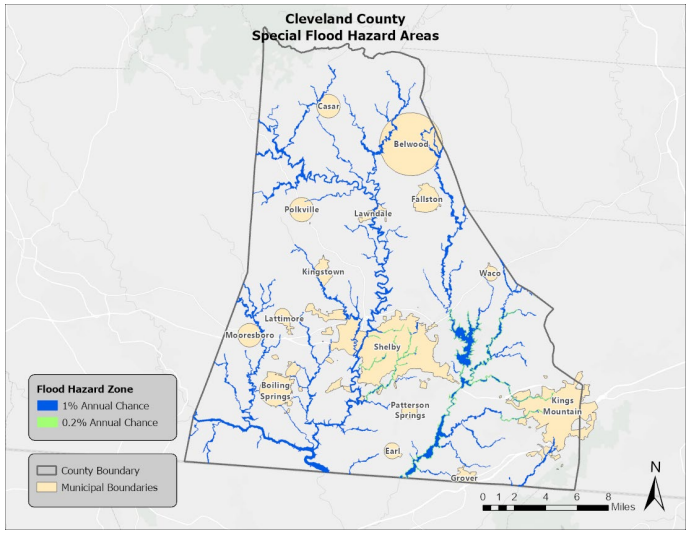


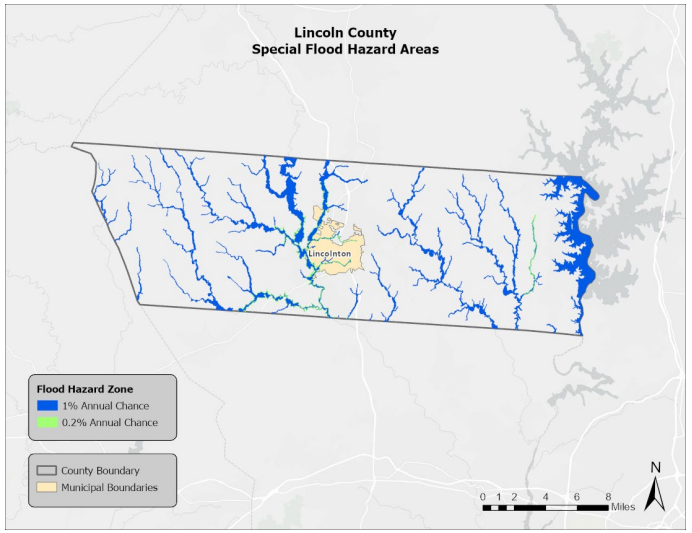
Structures in a Special Flood Hazard Area (SFHA) have a ≈**26% chance of flooding** during the span of a 30-year mortgage.

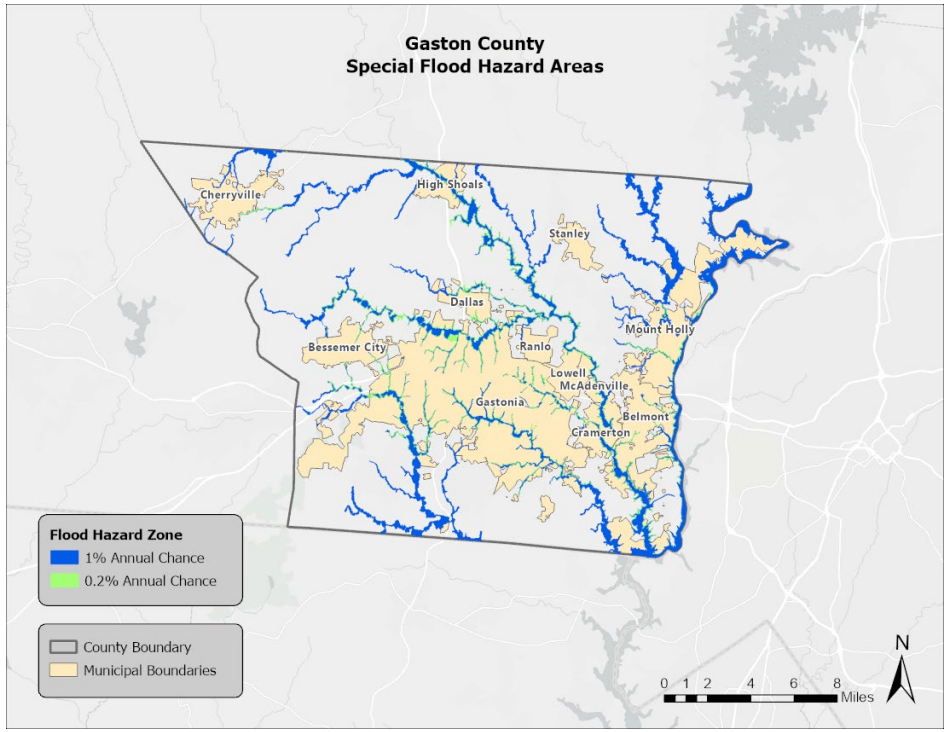
- **Flooding** is a top hazard in the nation for weather-related mortality and **the most common and costly natural hazard**
  - Many compounding hazards can intensify
  - Urban stormwater needs are growing
- **2 main sources**:
  - Riverine flooding
  - Flash flooding
- NC climate projections suggest a likely increase in total annual precipitation and a very likely increase in extreme precipitation frequency/intensity
- **2024 FEMA NRI riverine flooding hazard ratings**:
  - Cleveland – Very low
  - Gaston – Relatively low
  - Lincoln – Relatively low

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Moderate	6 to 12 hours	Less than 1 week

Flooding







Source: Federal Emergency Management Agency, Map Service Center

Flooding – Historical Occurrences from NCEI (1993 – 2023)

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
CLEVELAND COUNTY	**18**	**0/0**	**$2,059,821**
Belwood	0	0/0	$0
Boiling Springs	4	0/0	$1,955,218
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	$12,969
Kingstown	0	0/0	$0
Lattimore	0	0/0	$0
Lawndale	0	0/0	$0
Mooresboro	0	0/0	$0
Patterson Springs	1	0/0	$589
Polkville	0	0/0	$0
Shelby	3	0/0	$14,051
Waco	0	0/0	$0
Unincorporated Area	6	0/0	$76,994
GASTON COUNTY	**28**	**1/0**	**$6,905,280**
Belmont	0	0/0	$0
Bessemer City	3	0/0	$17,449
Cherryville	2	0/0	$0
Cramerton	0	0/0	$0
Dallas	1	0/0	$0
Gastonia	5	0/0	$4,851
High Shoals	1	0/0	$67,701
Lowell	1	0/0	$0
McAdenville	1	0/0	$2,593
Mount Holly	1	0/0	$0
Ranlo	1	0/0	$0
Spencer Mountain	5	1/0	$0
Stanley	0	0/0	$0
Unincorporated Area	7	0/0	$6,812,686
LINCOLN COUNTY	**30**	**0/0**	**$3,304,932**
Lincolnton	12	0/0	$551,873
Unincorporated Area	18	0/0	$2,753,059
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**76**	**1/0**	**$12,270,033**

Flooding – NFIP Historical Losses and Repetitive Loss Properties (2024)

NFIP INSURED FLOOD LOSSES

Location	Flood Losses	Claims Payments
CLEVELAND COUNTY	**50**	**$535,544.73**
Belwood	0	$0
Boiling Springs	0	$0
Casar	0	$0
Earl*	-	-
Falston*	-	-
Grover	0	$0
Kings Mountain	3	$11,804.30
Kingstown	0	$0
Lattimore*	-	-
Lawndale	0	$0
Mooresboro*	-	-
Patterson Springs*	-	-
Polkville	0	$0
Shelby	40	$494,446.85
Waco	0	$0
Unincorporated Area	7	$29,293.58
GASTON COUNTY	**77**	**$609,374.09**
Belmont	5	$8,066.59
Bessemer City	0	$0
Cherryville	2	$91,964.86
Cramerton	9	$98,868.02
Dallas	2	$12,878.96
Gastonia	34	$75,285.54
High Shoals	0	$0
Lowell	0	$0
McAdenville	0	$0
Mount Holly	12	$233,063.20
Ranlo	0	$0
Spencer Mountain	0	$0
Stanley	0	$0
Unincorporated Area	13	$89,246.92
LINCOLN COUNTY	**13**	**$229,648.32**
Lincolnton	1	$3,933.91
Unincorporated Area	12	$225,714.41
CLEVELAND GASTON LINCOLN REGION TOTAL	**140**	**$1,374,567.14**

*This community does not participate in the National Flood Insurance Program. Therefore, no values were reported.

Source: Federal Emergency Management Agency, National Flood Insurance Program

NFIP REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Cleveland County	**5**	**18**
Belwood	0	0
Boiling Springs	0	0
Casar	0	0
Earl*	--	--
Fallston*	--	--
Grover	0	0
Kings Mountain	0	0
Kingstown	0	0
Lattimore*	--	--
Lawndale	0	0
Mooresboro*	--	--
Patterson Springs*	--	--
Polkville	0	0
Shelby	5	18
Waco	0	0
Unincorporated Area	0	0
Gaston County	**6**	**12**
Belmont	0	0
Bessemer City	0	0
Cherryville	1	2
Cramerton	2	4
Dallas	0	0
Gastonia	2	4
High Shoals	0	0
Lowell	0	0
McAdenville	0	0
Mount Holly	0	0
Ranlo	0	0
Spencer Mountain	0	0
Stanley	0	0
Unincorporated Area	1	0
Lincoln County	**1**	**2**
Lincolnton	0	0
Unincorporated Area	1	2
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**12**	**32**

Flooding – Building Loss Estimates from 100-year Flood (NCEM)

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	**82**	**107**	**$1,084,608**	**4**	**$1,091,131**	**0**	**0**	**111**	**$2,175,739**
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	7	7	$22,729	0	$0	0	$0	7	$22,729
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
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	**374**	**605**	**$3,086,490**	**46**	**$1,999,413**	**2**	**$114,745**	**653**	**$5,200,647**
Belmont	14	18	$159,163	2	$18,448	0	$0	20	$177,610
Bessemer City	5	5	$39,630	0	$0	0	$0	5	$39,630
Cherryville	4	6	$15,263	0	$0	0	$0	6	$15,263
Cramerton	47	51	$370,186	7	$125,327	1	$81,712	59	$577,225
Dallas	23	23	$63,227	0	$0	0	$0	23	$63,227
Gastonia	149	177	$790,719	11	$1,489,764	0	$0	188	$2,280,483
High Shoals	6	3	$447	3	$55,220	0	$0	6	$55,667
Lowell	0	8	$30,639	0	$0	0	$0	8	$30,639
McAdenville	4	2	$33,312	2	$1,029	1	$33,033	5	$67,375
Mount Holly	16	43	$206,648	2	$32,592	0	$0	45	$239,240
Ranlo	2	3	$3,246	0	$0	0	$0	3	$3,246
Spencer Mountain	2	1	$22,770	1	$3,285	0	$0	2	$26,055
Stanley	1	1	$573	0	$0	0	$0	1	$573
Unincorporated Area	101	264	$1,350,667	18	$273,748	0	$0	282	$1,624,414
Lincoln County	**95**	**142**	**$273,308**	**20**	**$208,577**	**1**	**$4,502**	**163**	**$486,387**
Lincolnton	54	51	$149,138	12	$167,445	0	$0	63	$316,583
Unincorporated Area	41	91	$124,170	8	$41,132	1	$4,502	100	$169,804
Cleveland Gaston Lincoln Region Total	**551**	**854**	**$4,444,406**	**70**	**$3,299,121**	**3**	**$119,247**	**927**	**$7,862,773**

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Moderate	12 to 24 hours	More than 1 week

Wildfire

CGL REGION WILDLAND URBAN INTERFACE (WUI)

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
LT 1hs/40ac	1,881	0.5 %	96,749	17.9 %
1hs/40ac to 1hs/20ac	3,553	1.0 %	65,799	12.2 %
1hs/20ac to 1hs/10ac	11,787	3.3 %	94,591	17.5 %
1hs/10ac to 1hs/5ac	25,054	6.9 %	90,868	16.8 %
1hs/5ac to 1hs/2ac	65,252	18.0 %	98,876	18.3 %
1hs/2ac to 3hs/1ac	241,845	66.9 %	93,367	17.2 %
GT 3hs/1ac	12,267	3.4 %	1,130	0.2 %
Total	**361,639**	**100.0 %**	541,380	100.0 %

Source: Southern Wildfire Risk Assessment

CGL REGION BURN PROBABILITY

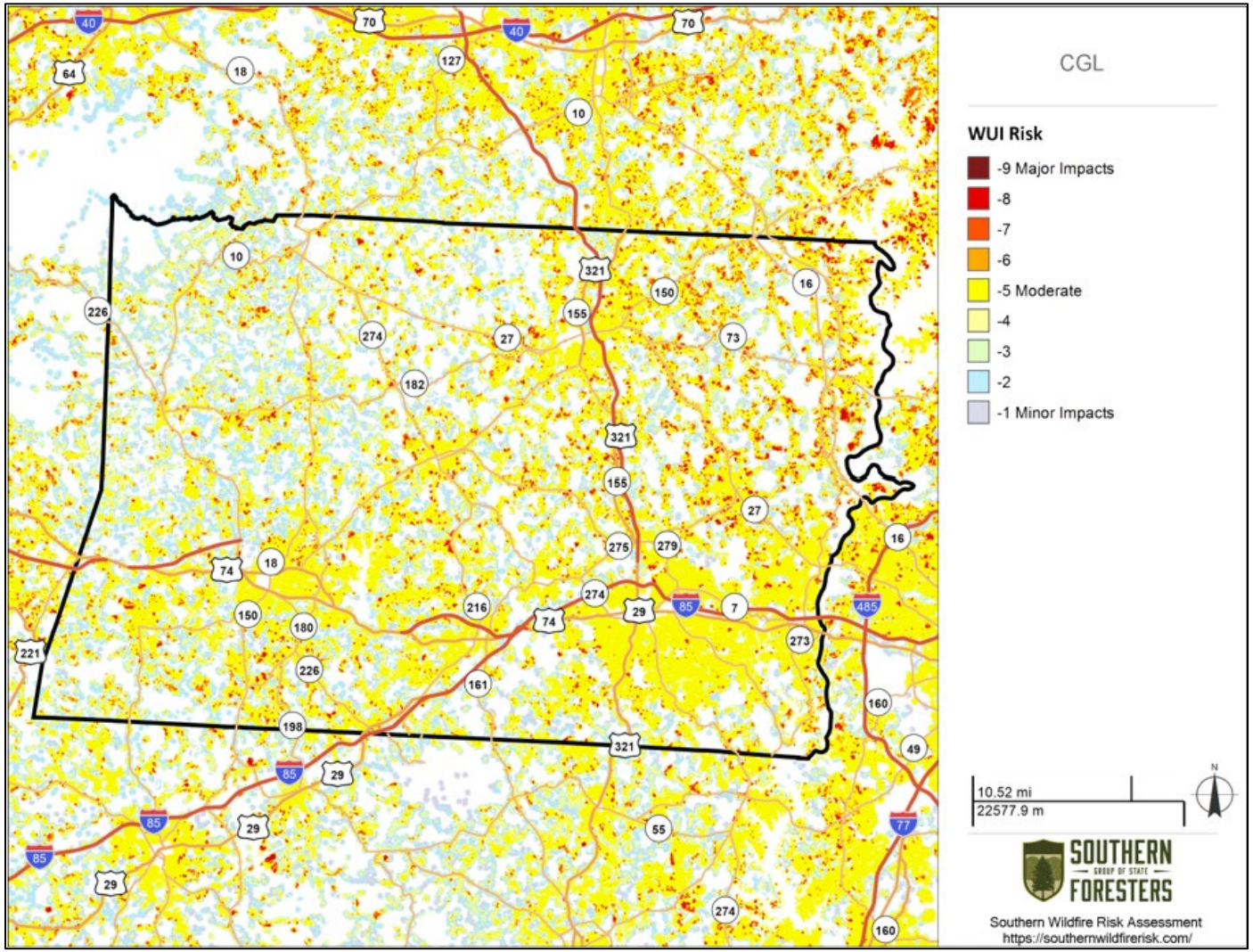
Class	Acres	Percent
1 (Lowest Probability)	128,977	23.6 %
2	117,950	21.6 %
3	130,272	23.8 %
4	99,836	18.3 %
5	69,292	12.7 %
6	0	0.0 %
7	0	0.0 %
8	0	0.0 %
9	0	0.0 %
10 (Highest Probability)	0	0.0 %
Total	**546,327**	**100.0 %**

Source: Southern Wildfire Risk Assessment

- **Wildfire risk** depends on local weather conditions, potential fuel sources, outdoor activities, and the degree of public cooperation with fire prevention policies
  - Droughts and other natural hazards can exacerbate risks
- The entire region is at risk, especially near the **wildland-urban interface** (WUI)
  - **≈52%** of NC homes in WUI
- Each county in the region experiences an average of 40-80 wildfires per year
- Wildfire risks are growing in response to climate stressors, fuel loading, and WUI acreage
- **2024 FEMA NRI wildfire hazard ratings**:
  - Cleveland – Very low
  - Gaston – Very low
  - Lincoln – Very low

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Moderate	12 to 24 hours	More than 1 week

Wildfire

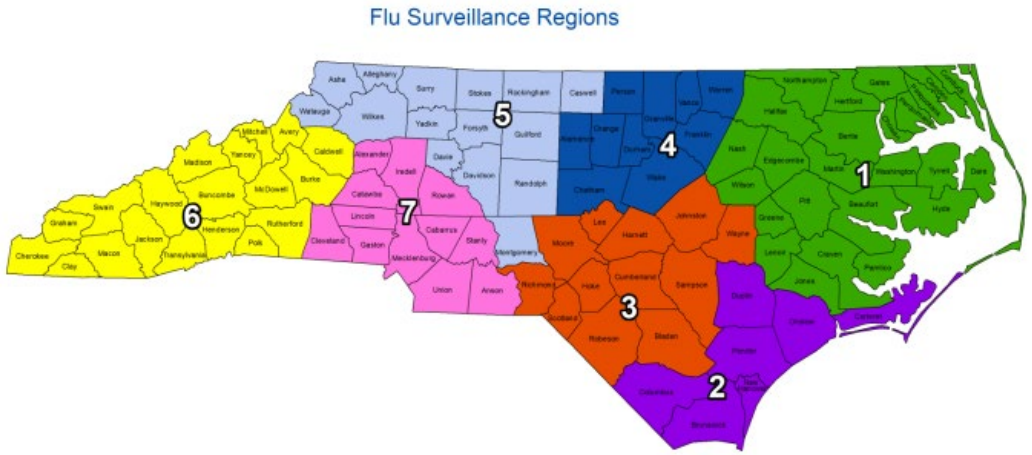


Wildfire – Building Loss Estimates from Wildfire Event (NCEM)

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	1,287	1,809	$266,157,541	137	$348,604,942	17	$60,910,491	1,963	$675,672,973
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
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	6,573	7,494	$896,037,258	128	$0	0	$0	7,610	$442,414,804
GASTON COUNTY	**8,694**	**14,418**	**$1,095,394,325**	**1,204**	**$410,446,700**	**227**	**$229,909,034**	**15,849**	**$1,735,750,059**
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	475	694	$79,754,141	48	$43,799,072	22	$24,962,258	764	$148,515,470
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	1,391	4,676	$15,328,932	388	$0	0	$0	5,009	$0
LINCOLN COUNTY	**7,065**	**16,456**	**$2,031,961,986**	**1,213**	**$1,476,611,189**	**165**	**$405,721,327**	**17,834**	**$3,914,294,502**
Lincolnton	1,399	2,099	$323,376,902	168	$271,195,694	34	$75,658,870	2,301	$670,231,467
Unincorporated Area	5,666	14,357	$1,708,585,084	1,045	$1,205,415,495	131	$330,062,457	15,533	$3,244,063,035
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**27,754**	**44,879**	**$5,081,253,178**	**3,109**	**$2,720,649,774**	**523**	**$916,489,404**	**48,511**	**$8,718,392,357**

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Critical	Large	More than 24 hours	More than 1 week

Infectious Disease

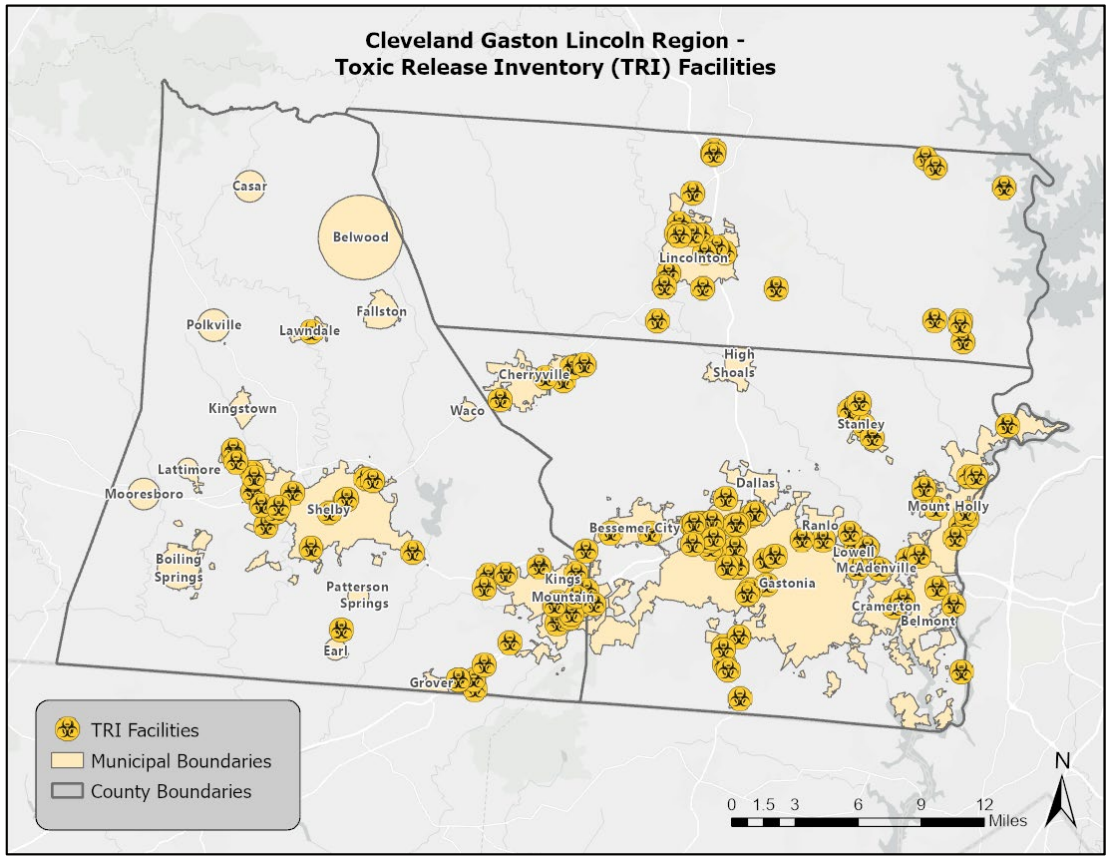


Source: NCDHHS Division of Public Health

- **Infectious disease** hazards include infectious diseases, vector-borne diseases, and foreign animal diseases (FAD) for consistency with the State HMP
- All counties in the region are in **Flu Surveillance Region 7**
- According to NCDHHS, the primary respiratory viruses treated during the 2022-2023 season included influenza and SARS-CoV-2 (COVID-19)
- Diseases of future concern include influenza, coronavirus, norovirus, antibiotic-resistant superbugs, and emerging FADs
- Per the CDC, milder winters, warmer summers, and fewer days of frost could cause more infectious diseases to spread

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Small	Less than 6 hours	Less than 24 hours

Hazardous Substances

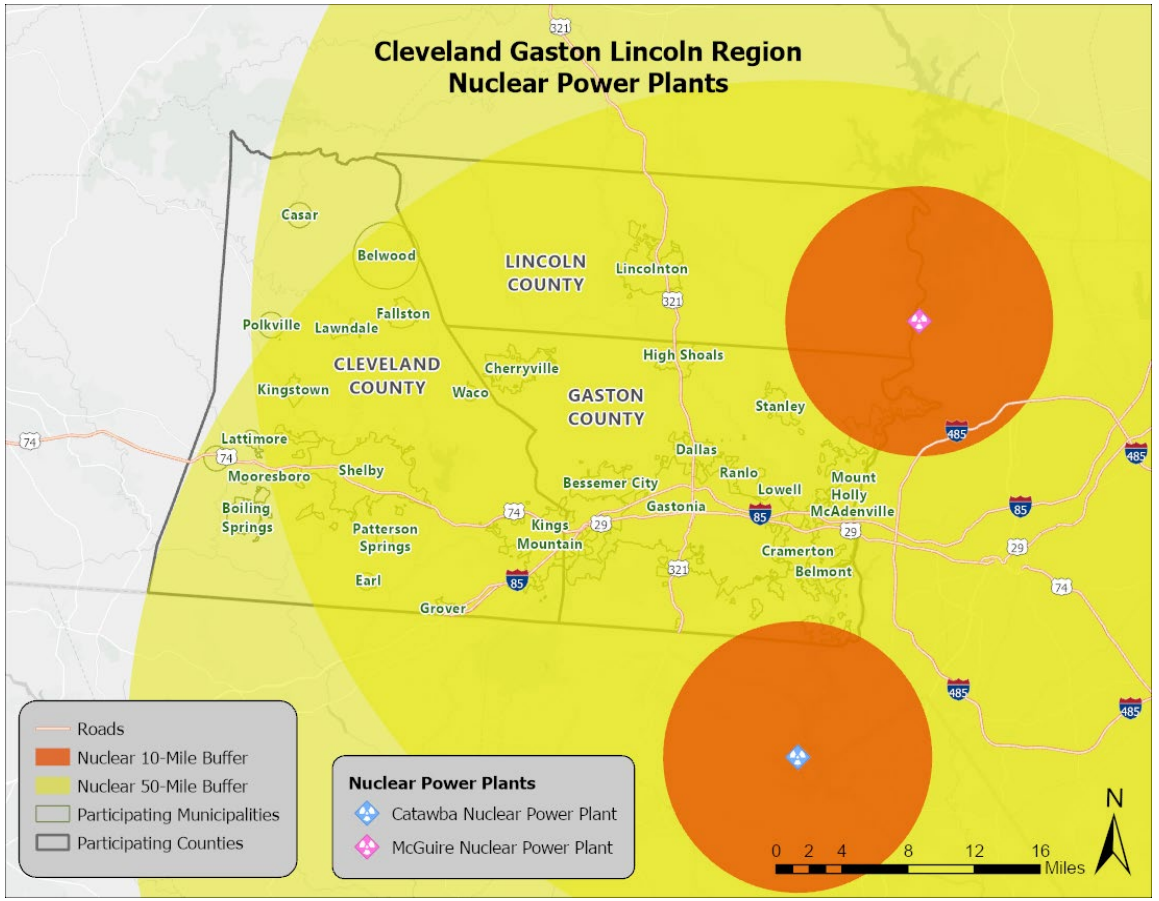


Source: Environmental Protection Agency

- **Hazardous substances** are found in many forms and quantities and pose a threat to people, property, and the environment if mishandled
- **≈6,774** hazardous materials (HAZMAT) incidents happen nationwide each year
  - **21 serious incidents** reported in the CGL Region through USDOT (PHMSA)
- Per 2023 EPA data, **139 toxic release inventory (TRI) facilities** in the region
- More growth = greater vulnerability of the population to this hazard, especially near transportation facilities
- Chemical releases by county (EPA, 2022)
  - Cleveland – 53.5k lbs. by air and 1.1k lbs. by water
  - Gaston – 138.9k lbs. by air and 47 lbs. by water
  - Lincoln – 1.0k lbs. by air and 2 lbs. by water

Probability	Impact	Spatial Extent	Warning Time	Duration
Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week

Radiological Emergency



Source: NCEM

- The IAEA defines a **nuclear accident** as "an event that has led to significant consequences to people, the environment, or the facility"
- While radiological emergencies are rare, many incidents are recognized by their large area of impact and chronic biological effects
- **McGuire** and **Catawba Nuclear Stations** are both within 50 miles the region and 10-mile buffers intersect Lincoln County and Gaston County
- Although this hazard is very unlikely, potential damage to nuclear facilities necessitates close monitoring

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Critical	Small	Less than 6 hours	Less than 24 hours

Terrorism

Location	2022 Population Estimate
Cleveland County	**99,527**
Belwood	1,103
Boiling Springs	4,622
Casar	391
Earl	358
Fallston	670
Grover	598
Kingstown	533
Kings Mountain	11,246
Lattimore	557
Lawndale	599
Mooresboro	204
Patterson Springs	854
Polkville	500
Shelby	21,712
Waco	278
Unincorporated Area	55,302
Gaston County	**228,972**
Belmont	14,842
Bessemer City	5,472
Cherryville	6,113
Cramerton	5,294
Dallas	5,889
Gastonia	80,615
High Shoals	675
Lowell	3,692
McAdenville	1,125
Mount Holly	17,644
Ranlo	4,487
Spencer Mountain	0
Stanley	3,967
Unincorporated Area	79,157
Lincoln County	**87,933**
Lincolnton	11,225
Unincorporated Area	76,708
CLEVELAND GASTON LINCOLN REGIONAL TOTAL	**416,432**

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

- The main categories of weapons used in terror attacks excluding small arms and vehicles are **Chemical, Biological, Radiological, Nuclear, and Explosive** (CBRNE)
- Terror threats are more likely to target (1) **areas with a high population density**, (2) **critical infrastructure**, or (3) **symbolic locations**
- No major terror attacks have been reported
- As the population of the region continues to increase, the risk of an attack can increase as well

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Moderate	Less than 6 hours	More than 1 week

Cyber

- **Cyberattacks** are deliberate attacks on information technology systems to gain illegal access to a computer, steal information, or purposely cause damage
  - Types: data breaches, phishing, malware, ransomware, DDoS attacks
  - Impacts: PII records, municipal services, utilities, hospitals/EMS
- Mitigating and preparing for this hazard remains challenging because of how diverse and complex cyberattacks can be
  - **Lead federal agency** – FBI
  - **Lead state agency** – North Carolina Department of Information Technology
- Cyberattacks can happen in both the public and private sectors, with **83% of breaches involving external actors** and most of them being financially motivated (2023 Verizon Data Breach Investigations Report)
- Highest # of cybercrimes in NC are personal data breaches (FBI IC3, 2023)
- Ongoing preparedness and training efforts for future threats in the region are crucial

Probability	Impact	Spatial Extent	Warning Time	Duration
Unlikely	Critical	Moderate	12 to 24 hours	More than 1 week

Electromagnetic Pulse

- The U.S. 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"
- Congress amended the Homeland Security Act of 2002 by passing the **Critical Infrastructure Protection Act** (CIPA) in 2015 which integrated more protections and awareness related to EMP threats
- Bigger cities with higher population densities and concentrated electrical infrastructure in the region may be more susceptible to critical damages
- This hazard is highly unlikely as natural EMP events typically have limited lasting effects and man-made EMPs require highly specialized equipment and extensive resources

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Small	Less than 6 hours	Less than 24 hours

Civil Disturbance

- **Civil disturbances** often refer to incidents in which multiple people knowingly act against established laws or regulations, with a common goal of bringing attention to a specific cause or larger sociopolitical movement
- The extent of any civil disturbance will depend on the scale of its location and crowd size
- If a public disturbance or riot occurs, local law enforcement agencies are mobilized followed by state law enforcement
  - National Guard may be activated as determined by the NC Governor
- **Can materialize under different circumstances:**
  - Spontaneous actions or a direct result of escalating tensions
  - Most likely when large numbers of people are clustered together for an event or interest-based gathering
  - Arenas and stadiums with large capacities are areas of concern
- Civil disturbances are anticipated to occur at some point in the future as they are highly unpredictable features of social life

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Limited	Moderate	More than 24 hours	More than 1 week

Food Emergency

- Per FEMA, a **food emergency** refers to the "adulteration and/or contamination, threatened or actual, of food that impacts or may impact human health or the safety or availability of the state's food supply"
- A food emergency may be caused by inclement weather events, technological storage failures, or human activities
- This hazard could have **severe consequences across the larger industry** including anywhere affected by regional food markets and may jeopardize the public health of any locally affected populations
- Changing climate patterns of drought, heat, and precipitation may increase the risk of food emergencies as they affect crop yields and the spread of pathogens
- Unpredictable hazard with limited historical data

Priority Risk Index (PRI) Methodology

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

Tabulated PRI Results

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought	Agricultural, Hydrological	Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Excessive Heat		Likely	Critical	Large	More than 24 hours	Less than 1 week	3.0
Hurricane and Coastal Hazards	Storm Surge, Severe Weather	Possible	Critical	Large	More than 24 hours	Less than 1 week	2.7
Tornadoes/ Thunderstorms	High Wind, Hail, Lightning	Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours	3.1
Severe Winter Weather	Snow, Blizzards, Wind Chill, Extreme Cold, Ice Storms, Freezing Rain	Likely	Critical	Large	More than 24 hours	Less than 1 week	3.0
Earthquakes		Possible	Limited	Moderate	Less than 6 hours	Less than 6 hours	2.3
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 1 week	2.5
Flooding		Likely	Limited	Moderate	6 to 12 hours	Less than 1 week	3.0
Wildfires		Likely	Limited	Moderate	12 to 24 hours	More than 1 week	2.7
Infectious Disease	Foreign Animal Disease	Possible	Critical	Large	More than 24 hours	More than 1 week	2.8
Technological Hazards							
Hazardous Substances		Likely	Limited	Small	Less than 6 hours	Less than 24 hours	2.5
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	2.4
Terrorism	Explosive, Chemcial, Radiological, Biological, Nuclear	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	2.5
Cyber		Possible	Limited	Moderate	Less than 6 hours	More than 1 week	2.6
Electromagnetic Pulse		Unlikely	Critical	Moderate	12 to 24 hours	More than 1 week	2.4
Civil Disturbance		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	2.2
Food Emergency		Possible	Limited	Moderate	More than 24 hours	More than 1 week	2.3

Categorized PRI Results

*__Note__: table is not ordered in succession and low-risk hazards are not prioritized for mitigation

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

Questions

Questions/Comments/Concerns

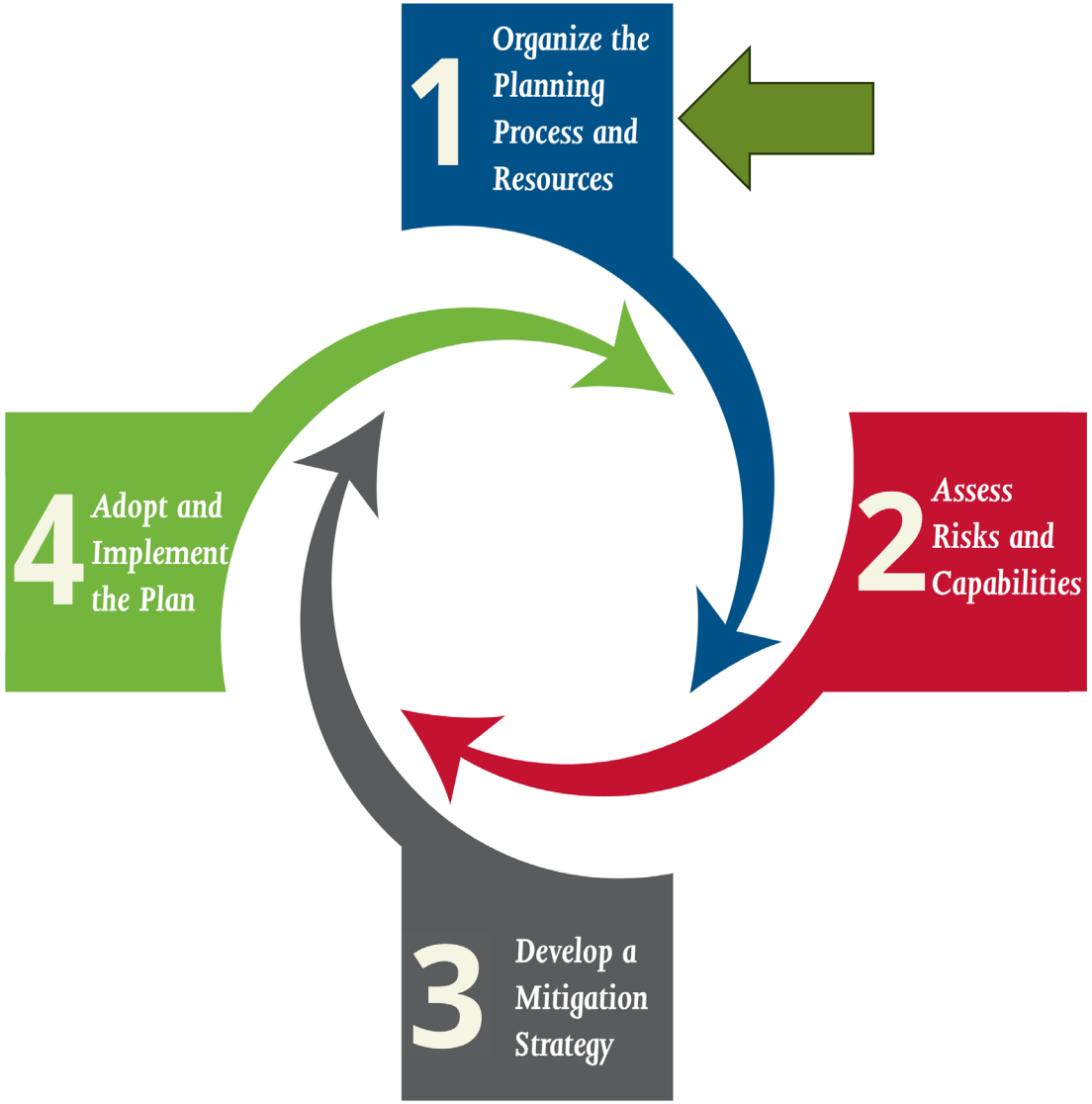
Mitigation Strategy

Mitigation Strategy Meeting Objectives

Capability Assessment
➢ Overview of Capability Assessment
➢ Summary of Initial Findings
➢ Identify Changes Since Last Update
➢ Discuss New Requirement on SDEs
➢ Influence/Role on Mitigation Actions

Mitigation Strategy Development
➢ Overview of Mitigation
➢ Consider Mitigation Techniques Available
➢ Review Previous Mitigation Goals
➢ Discuss Existing Actions and Update Status
➢ Identify New Actions and Opportunities

Organize Resources



Plan Update Process

Step 1: Organize Resources



Planning

Planning for Public Involvement

Status: Ongoing

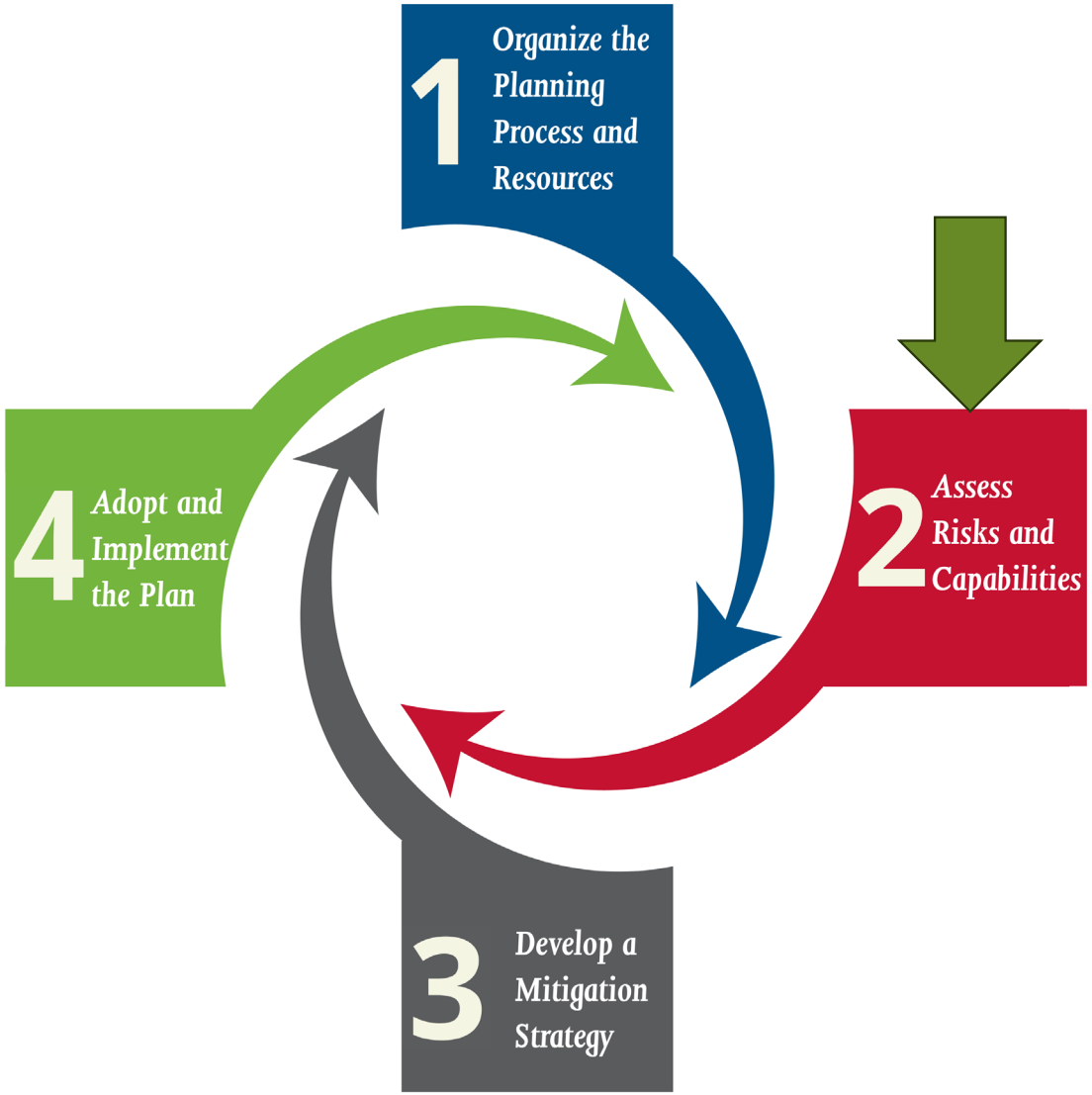


Coordinating

Coordinating with Departments and Agencies

Status: Ongoing

Risk & Capability Assessment



Plan Update Process

Step 2: Risk and Capability Assessments



Hazard Identification

What Can Happen Here?

- Previously Identified Hazards
- Identify New Hazards
- **Status**: Completed



Vulnerability Assessment

What Will be Affected/Impacted?

- Will Use County Parcel Data, FEMA HAZUS Analysis, and NCEM Data
- **Status**: Ongoing



Capability Assessment

What is our capacity to mitigate?

- Communities previously Self-Assessed Capability
- What Mitigation Actions are Feasible
- Where Gaps Exist
- **Status**: Current

What is Capability?

- Measures community capability to implement hazard mitigation activities
- Identifies and target gaps, conflicts and opportunities with existing local plans, programs, policies, etc.
- Identifies mitigation measures already in place or underway
- *Coupled with the Risk Assessment, the Capability Assessment helps to form the foundation for identifying Mitigation Actions*

Capability Indicators

Indicators help evaluate a community's resources, capability, and readiness to effectively implement and maintain mitigation activities.

Plans and Regulatory – Plans, programs, & ordinances

Administrative and Technical – Relevant staff, personnel, and expertise

Fiscal Resources – Bonds, fees, and taxes

Education and Resources – Education programs, volunteer groups, and certifications

Mitigation Resources – Mitigation grants and activities

Political Will – Decision-making, investments, regulation enforcement

Capability Indicator Examples

Plans and Regulatory
Hazard Mitigation Plan
Comprehensive Land Use Plan
Stormwater Management Plan
Flood Prevention Ordinance
National Flood Insurance Program
Community Rating System

Fiscal Resources
Capital Improvement Program
CDBG Funding
Special Purpose Taxes
Gas/Electric Utility Fees
Stormwater Utility Fees
Special Tax Bonds

Administrative and Technical
Building Official
Emergency Manager
Floodplain Manager
Grant Writers
Land Surveyors
GIS-Skilled Personnel

Education and Outreach
Local Citizen Groups
School Programs
Ongoing Education Programs
Storm Ready Certification
Firewise Community Certification
Public-Private Partnerships

Cleveland County Capability Assessment Initial Findings

Jurisdiction	Overall Capability Rating
Cleveland County	**High**
Belwood	Moderate
Boiling Springs	Moderate
Casar	Moderate
Earl	Moderate
Fallston	Moderate
Grover	Moderate
Kings Mtn.	Moderate
Kingstown	Moderate
Lattimore	Moderate
Lawndale	Moderate
Mooresboro	Moderate
Patterson Springs	Moderate
Polkville	Moderate
Shelby	Moderate
Waco	Moderate

Capability Rating Summary
High Capability – 1 jurisdictions
Moderate Capability – 15 jurisdictions
Low Capability – 0 jurisdictions

	Low Vulnerability	Moderate Vulnerability	High Vulnerability
High Capability	(Best Case Scenario)		
Moderate Capability			
Low Capability			(Worst Case Scenario)

Gaston County Capability Assessment Initial Findings

Jurisdiction	Overall Capability Rating
Gaston County	**High**
Belmont	Moderate
Bessemer	Moderate
Cherryville	Moderate
Cramerton	Moderate
Dallas	Moderate
Gastonia	High
High Shoals	Moderate
Lowell	Moderate
McAdenville	Moderate
Mount Holly	Moderate
Ranlo	Moderate
Spencer Mtn.	Moderate
Stanly	Moderate

Capability Rating Summary

High Capability – 1 jurisdictions

Moderate Capability – 13 jurisdictions

Low Capability – 0 jurisdictions

	Low Vulnerability	Moderate Vulnerability	High Vulnerability
High Capability	(Best Case Scenario)		
Moderate Capability			
Low Capability			(Worst Case Scenario)

Lincoln County Capability Assessment Initial Findings

Jurisdiction	Overall Capability Rating
Lincoln County	**High**
Lincolnton	Moderate

Capability Rating Summary
High Capability – 1 jurisdictions
Moderate Capability – 1 jurisdictions
Low Capability – 0 jurisdictions

	Low Vulnerability	Moderate Vulnerability	High Vulnerability
High Capability	(Best Case Scenario)		
Moderate Capability			
Low Capability			(Worst Case Scenario)

New FEMA Requirement on Substantial Damage Estimates (SDEs) for Capability Assessments

Rationale:

1. Focuses on identifying structures at risk of substantial damage from future flood events
2. Helps prioritize mitigation strategies and allocate resources effectively
3. Ensures a proactive approach to reduce vulnerability and enhance community resilience to floods
4. Emphasizes the importance of incorporating SDE findings into hazard mitigation planning for risk reduction

Follow-up Action Required: Must collect this information from each municipality individually (example below):

Immediately after a flood event, employees across multiple departments that consist of Town planners, stormwater and transportation engineers, inspectors, building officials, and certified floodplain managers deploy to the affected areas. The town is broken into three areas and each area has a dedicated number of teams to conduct windshield surveys and assess damage.

This is tracked digitally and on paper forms and then logged into Town databases. Once homeowners come in for permits for repair work, this data is referenced and if a substantial damage is triggered then the building must come into compliance with all Town ordinances, including the floodplain ordinance.

If a homeowner or applicant comes in to improve the property voluntarily without damage, then substantial improvement protocols are activated. This entails a lengthy review during plan review of the project scope, evaluating the building's depreciated value either by tax assessor value or through an appraisal, and the work is adjusted accordingly depending on the determination. All work is also field verified by inspectors to make sure construction is up to code and in compliance with Town ordinances.

Impact on Mitigation Actions

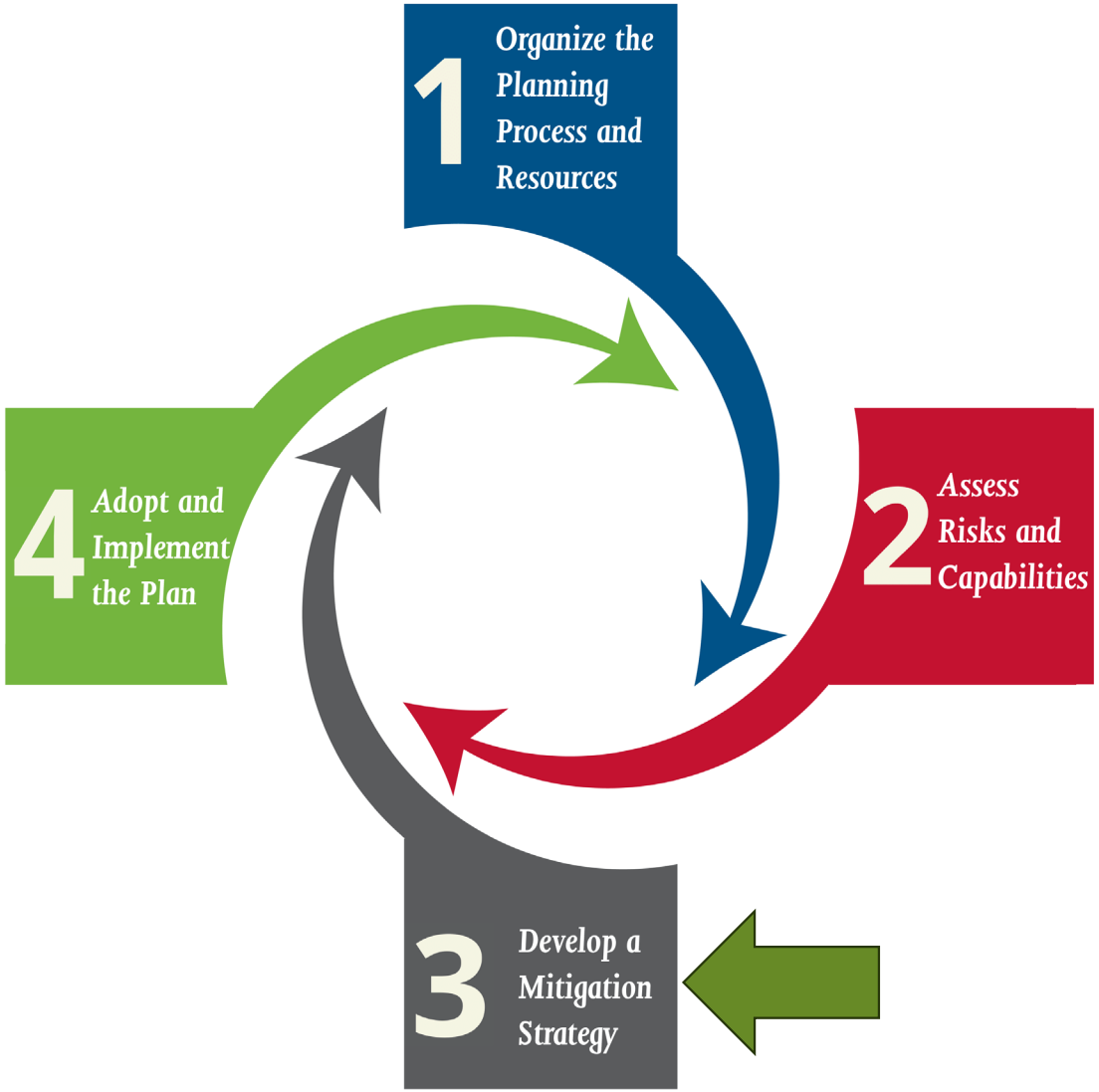
***Note**: Hazard scores may be adjusted in later versions of the draft plan based on new feedback.

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

Analysis of risks alongside capabilities is essential for informed decision-making and mitigation strategy development because the combined data:

1. Provides a complete picture of the risks faced by the community and its readiness to manage them
2. Helps identify gaps in preparedness and allocates resources strategically to address vulnerabilities
3. Ensures investments in mitigation measures are targeted at areas and/or populations at highest risk (supports prioritization of actions)

Mitigation Strategy Development



Plan Update Process

Step 3: Mitigation Strategy Development

- Setting Mitigation Goals
- Reviewing Mitigation Alternatives
- Drafting an Action Plan

****Status of All Tasks**: Current

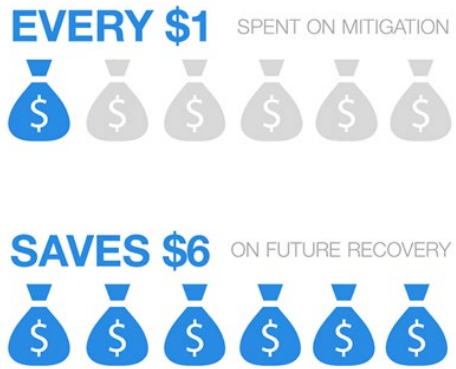
What is a Mitigation Strategy?

What is the purpose?

- Reduce vulnerability and mitigate the impact of natural and man-made hazards on communities
- Prioritize actions and allocate resources effectively
- Collaborate with stakeholders, heighten awareness, and build capacity for continued hazard mitigation efforts

What does it entail?

- Development, prioritization, and implementation of feasible measures to prevent, prepare for, respond to, and recover from potential disasters



Basic Types of Mitigation



Mitigating against hazard impacts on **existing development**

- Houses
- Businesses
- Infrastructure
- Critical Facilities



Ensuring **future development** is conducted in a way that does not increase vulnerability

- Plans
- Policies
- Procedures

Mitigation Techniques

1. Prevention
2. Property Protection
3. Natural Resource Management
4. Structural Projects
5. Emergency Services
6. Education and Awareness

Mitigation Techniques – Examples

Prevention
Planning/Zoning
Building Codes
Open Space Preservation
Floodplain Regulations
Stormwater Mgmt.
Drainage Maintenance

Natural Resource Mgmt.
Floodplain Protection
Watershed Mgmt.
Riparian Buffers
Erosion/Sediment Control
Wetland Restoration
Habitat Preservation

Emergency Services
Warning Systems
Response Equipment
Shelter Operations
Evacuation Planning
Response Training
Sandbagging

Property Protection
Acquisition/Relocation
Building Elevation
Critical Facility Protection
Retrofitting
Safe Room/Shutters
Insurance

Structural Projects
Reservoirs
Dams, Levees, Dikes
Stormwater Diversions
Retention Basins
Channel Modification
Storm Sewers

Education/Awareness
Outreach Projects
Speaker Series
Hazard Map Info
Real Estate Disclosure
Library Materials
Hazard Expositions

Setting 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.

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 the capabilities of local governments through coordination between the three participating counties to reduce future hazard impacts and improve the effectiveness of mitigation actions.
Goal #5	Create and enhance policies and ordinances that will reduce the negative impacts of hazards.

Review Mitigation Alternatives

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.

1. Review previous plan to determine the status of existing actions
   - FEMA Requirement
   - Completed, deleted, progress update
   - "Ongoing" is too broad
2. Identify new mitigation actions to address evolving needs/vulnerabilities
   - To be discussed in length at today's meeting

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.

Review Previous Mitigation Action Plans (2020)

Action	Description	Hazard(s) Addressed	Priority	Lead Agency	Potential Funding Sources	Implementation Schedule	Implementation Status
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.

What goals/objectives does this action address?

What hazards does this action address?

What is the estimated cost of this action?

How long will it take to implement?

Developing a Mitigation Action Plan

Identify New Mitigation Actions

- Brainstorm and discuss a full range of possible mitigation projects/available mitigation techniques
  - Consistent with mitigation goals and other community objectives
  - Based on hazard risk and local capability
  - Consider BRIC projects for inclusion
- Use available resources to aid in strategy development
  - FEMA's Local Mitigation Planning Handbook
  - FEMA's Mitigation Ideas
  - FEMA's Economic Development Strategy and Hazard Mitigation Plan Alignment

Mitigation Strategy – Examples

Potential Actions to Mitigate Extreme Heat (high-risk events):

1. Increase Green Space, Parks, and Urban Forests
2. Develop and Implement Heat Emergency Response Plans/Protocols
3. Install Public Cooling Stations, Misting Stations, and Water Fountains in Public Spaces
4. Conduct Outreach Campaigns to Raise Awareness About Heat-Related Risks

Mitigation Strategy – Examples

Potential Actions to Mitigate Severe Storms (high-risk events):

1. Strengthen Building Codes
2. Protect Power Lines/Traffic Signs
3. Retrofit Buildings/Facilities to Withstand High Winds
4. Require/Designate Safe Rooms in Certain Types of Buildings

Mitigation Strategy – Examples

Potential Actions to Mitigate Flooding (high-risk events; the most common and destructive hazard nationwide)

1. Remove Existing Structures from Flood Hazard Zones
2. Increase the Capacity of Storm Drainage Systems
3. Protect and Preserve Wetlands
4. Develop an Open Space Acquisition, Reuse, and Preservation Plan

Public Survey – Initial Findings

- 193 responses thus far (19% respondents live in Gastonia; 15% from unincorporated Gaston County; 14% from unincorporated Lincoln County)
- Tornadoes/Thunderstorms ranked highest threat to your community and Flooding ranked second highest
- 50% of respondents have taken measures to make their home more resistant to hazards (tree removal/trimming, drainage improvements, upgraded roof, installed generator)
- 65% of respondents do not know what office to contact for more information on hazard risk reduction
- 59% of respondents indicate the internet/social media is the most effective way to receive information; 25% selected mail

Public Survey – Initial Findings

Mitigation Techniques

Respondents were asked the rank the importance of the six mitigation techniques ranging from "Not Important" to "Very Important" – Respondents ranked the following techniques as "Very Important"

1. Emergency Services – 89%
2. Prevention - 79%
3. Public Education and Awareness – 79%
4. Natural Resource Protection – 75%
5. Structural Projects – 61%
6. Property Protection – 52%

Public Survey

Current Responses: 193

Scan the QR Code for Access to the Public Survey!

Or ACCESS SURVEY HERE

Project Schedule

Project Kickoff Date: 4/1/24

Public Meeting #1: Date TBD

HIRA/Mitigation Strategy Meeting: *Today*

Proposed Delivery of Draft: 11/28/24

Public Meeting #2: Date TBD

Existing Plan Expiration Date: 5/8/25



Next Steps

1. Submit Updated Mitigation Actions
2. Submit New Mitigation Actions (if any)
3. Review Draft Capability Assessment – Provide Input
4. Submit Substantial Damage Estimate (SDE) Procedures
5. Draft Plan Submitted in mid-December

Following Draft Plan Approval:

Adopt & Implement the Plan



Plan Update Process

Step 4: Adoption and Implementation

- Seeking Review and Approval from Relevant Authorities
- Securing Funding and Managing Resources of Mitigation Projects and Activities
- Executing the Identified Mitigation Actions
- Continuously Monitoring the Progress of Mitigation Activities

Questions

Questions/Comments/Concerns

Adjourn –
Thank you!

Contact Information

Nathan Slaughter –
nslaughter@espassociates.com

John Flores –
jflores@espassociates.com

Hannah DeLude –
hdelude@espassociates.com



Heat Vulnerability in Cleveland, Gaston and Lincoln Counties

Andrea Webster
Resilience Policy Advisor
NCORR
andrea.webster@ncdps.gov

But we live in the South!







What can we expect?

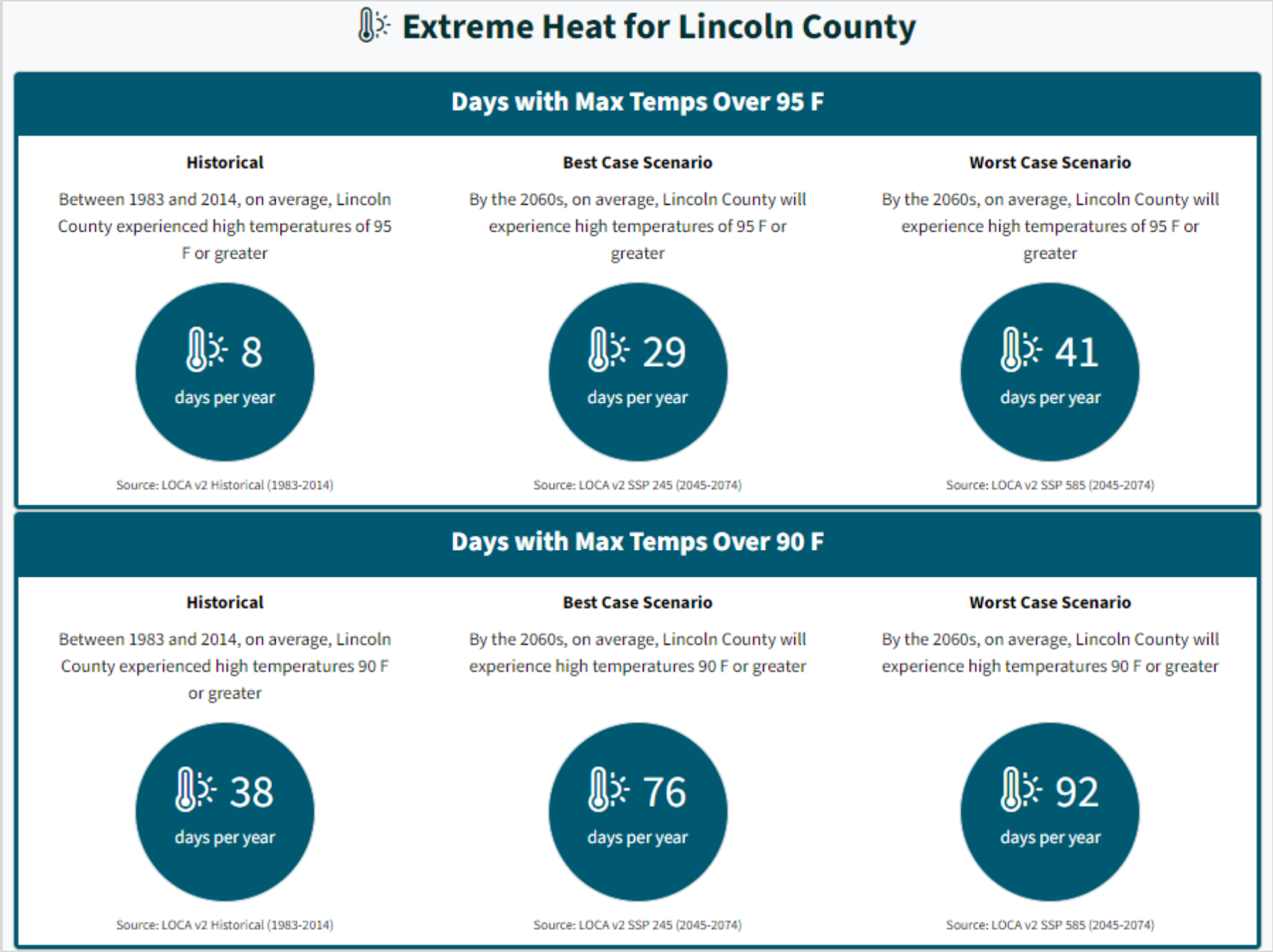
- Temperatures will continue increasing

What can we expect?

- Temperatures will continue increasing

It is **likely** that the number of very hot days (95°F or higher) will increase.

It is **very likely** that the number of very warm nights (above 75 °F) will increase.

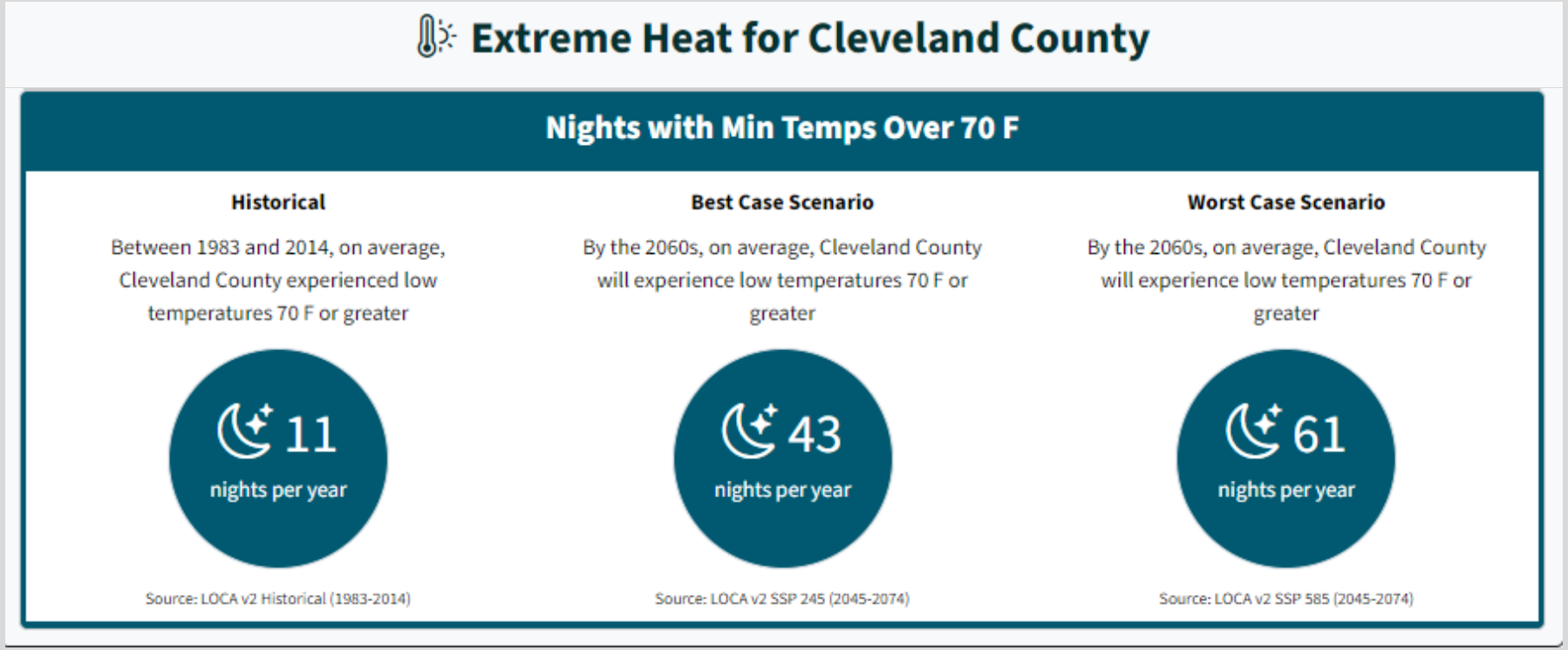


Daytime Temps

Daytime temperature data for Cleveland and Gaston Counties are very similar

www.resilienceexchange.nc.gov/
> Climate Projections

Nighttime Temps



www.resilienceexchange.nc.gov/

> Climate Projections

Nighttime Temps

Extreme Heat for Lincoln County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Lincoln County experienced low temperatures 70 F or greater

22 nights per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Lincoln County will experience low temperatures 70 F or greater

60 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Lincoln County will experience low temperatures 70 F or greater

78 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

Extreme Heat for Gaston County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Gaston County experienced low temperatures 70 F or greater

28 nights per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Gaston County will experience low temperatures 70 F or greater

65 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Gaston County will experience low temperatures 70 F or greater

82 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

www.resilienceexchange.nc.gov/

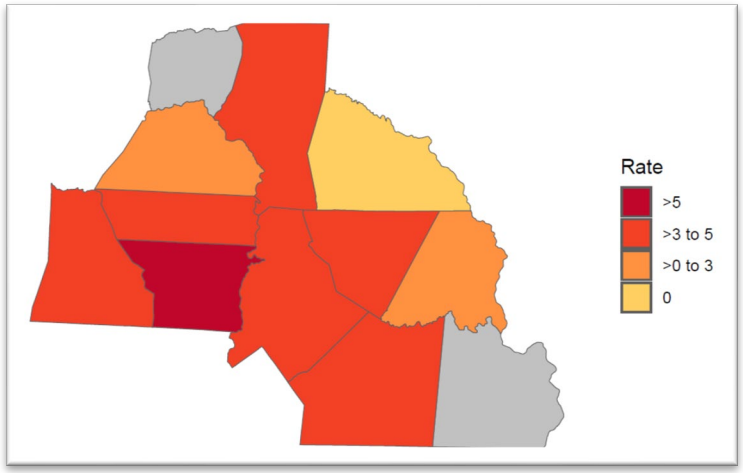
> Climate Projections

Why should we care?

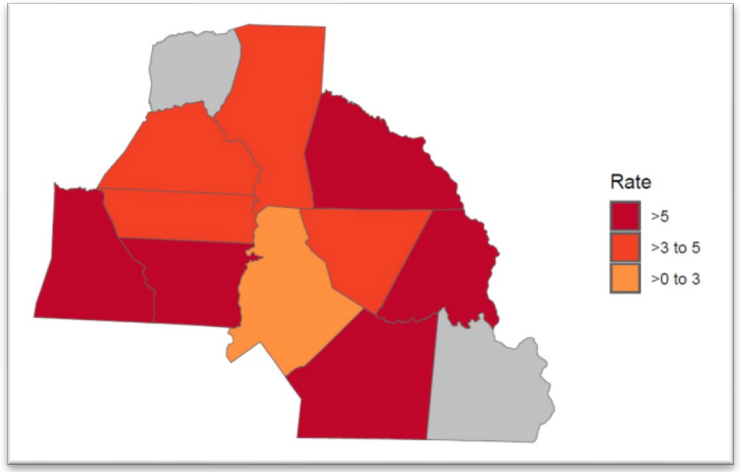
NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Public Health

Rate of Heat-Related Illness Emergency Department (HRI ED) Visits
Per 100,000 Population

June 30 – July 6, 2024:
98 HRI ED Visits



July 7 – 13, 2024:
113 HRI ED Visits



July 14 – 20, 2024:
78 HRI ED Visits

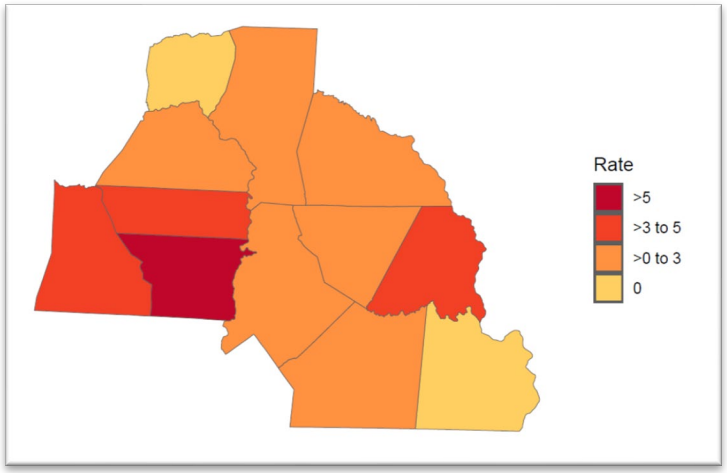
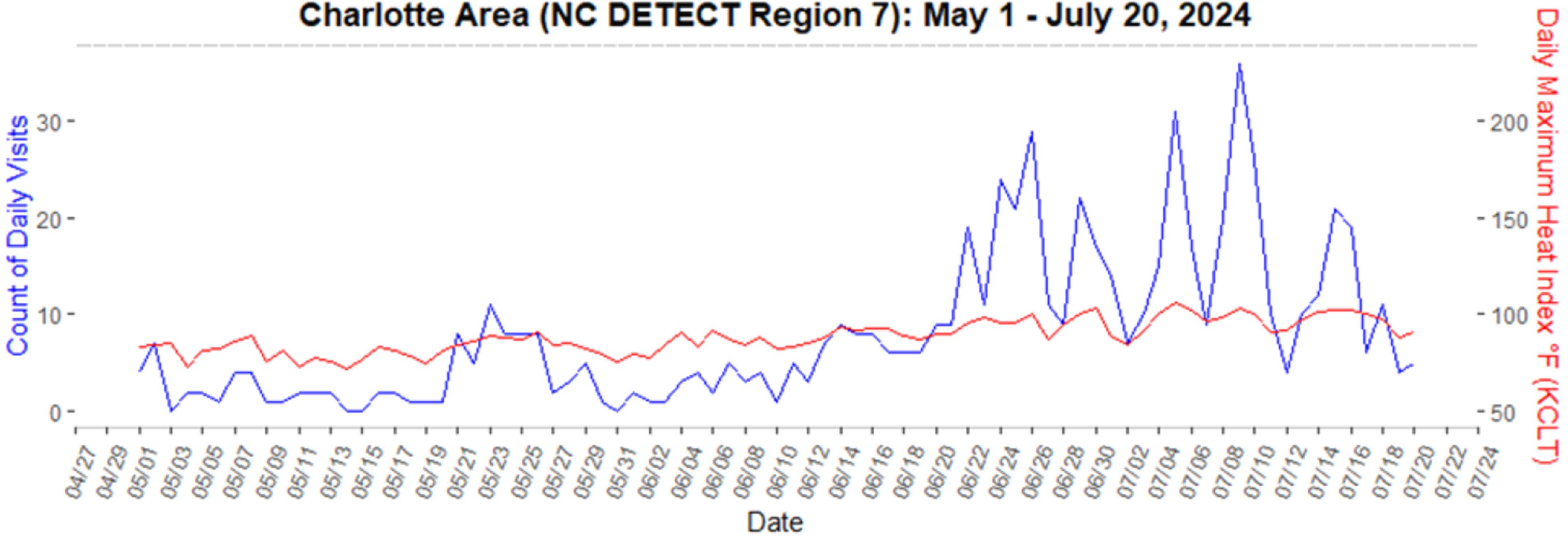


Figure 3. Count of Emergency Department Visits for Heat-related Illness and Maximum Heat Index
Charlotte Area (NC DETECT Region 7): May 1 - July 20, 2024

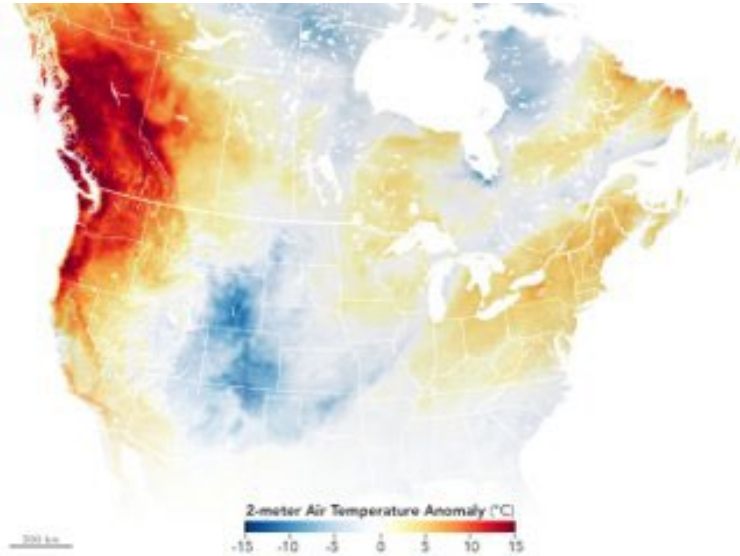


Source: NC DETECT Data and State Climate Office at NC State University

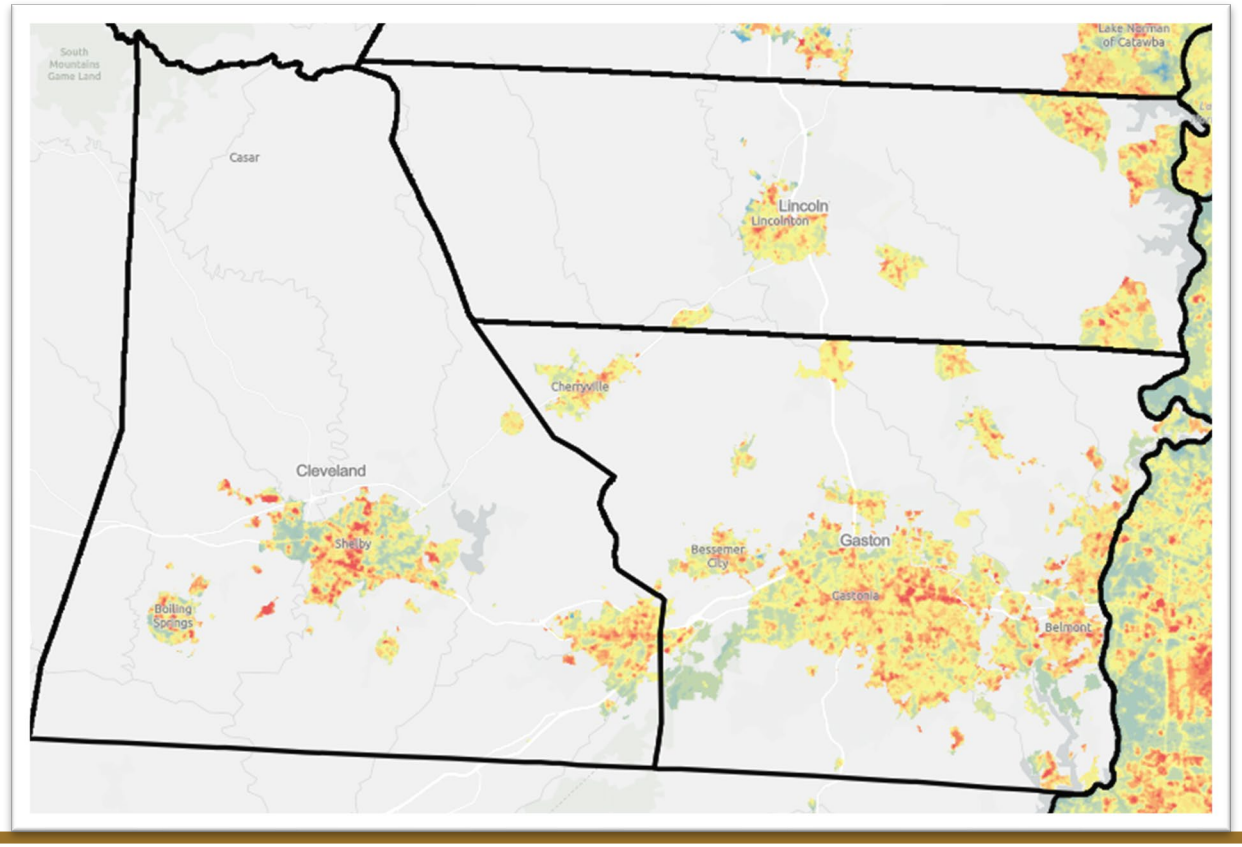
Why should we care?

People can die from extreme heat

- 2021 Pacific Northwest Heat Wave → 1,000+ deaths
- 2010 Russian Heat Wave → 55,000 deaths
- 2006 California Heat Wave → 650 deaths
- 2003 European Heat Wave → 30,000 deaths
- 1995 Chicago Heat Wave → 739 deaths (mostly poor, elderly, and black)



Urban Heat Islands – Urban areas only



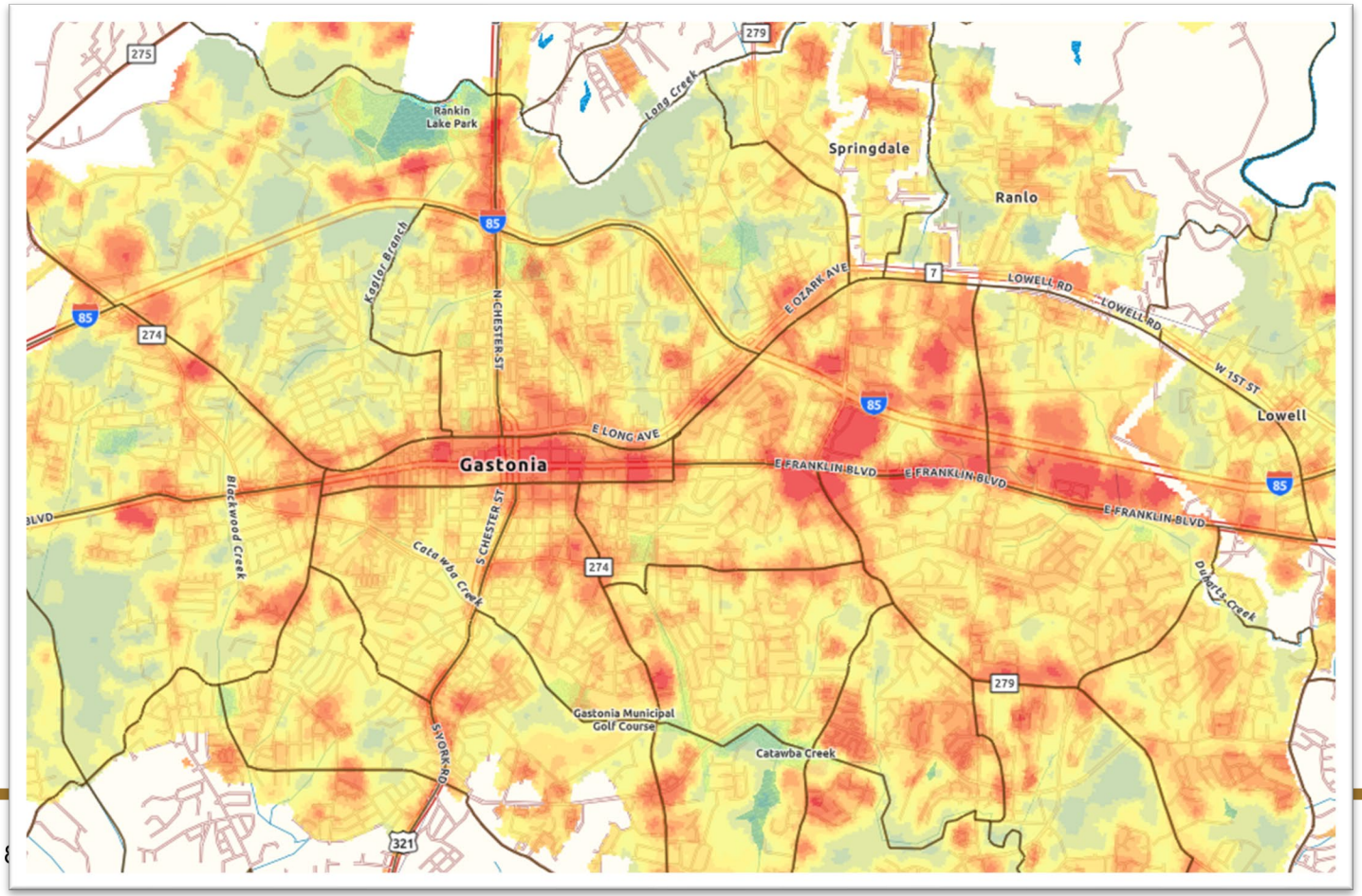
Red and orange areas on the map are hotter than the city's average temperature.

Blue and green colors are cooler than the city's average temperature.

www.resilienceexchange.nc.gov/
> Vulnerability Maps

NCORR

Urban Heat Islands: Gastonia



Red and orange areas on the map are hotter than the city's average temperature.

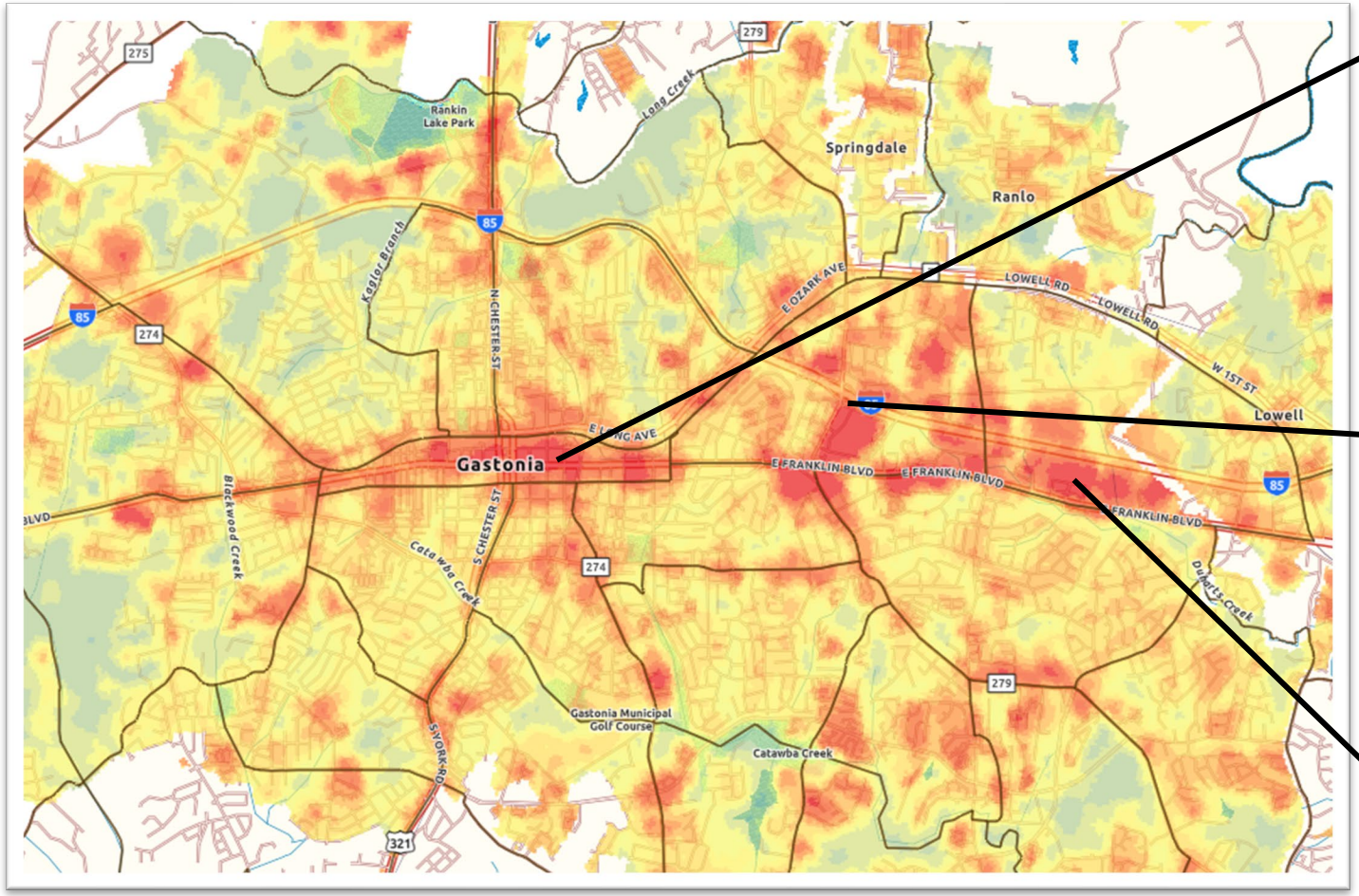
Blue and green colors are cooler than the city's average temperature.

www.resilienceexchange.nc.gov/
> Vulnerability Maps

N•C DPS EQUAL HOUSING OPPORTUNITY

Population Stats

Gastonia



- Population: 770
- Daytime population: 4,630
- 29.5% (153) of residents live below poverty
- 35.3% (190) of residents live with a disability

- 67.5% (1,346) of households are renter-occupied
- 14.9% (1,133) of households do not have a vehicle
- 17.6% (512) residents are 65+ years old

- 33.4% (631) residents live below poverty
- High Black and Latino populations

8/20/2024

Why should we care?

Groups at Higher Risk from Extreme Heat

- Infants and children
- Pregnant persons
- Persons taking certain medications
- Older adults (65+)
- Outdoor workers
- Low income
- People with underlying health conditions
- Athletes

Impacts of high temperatures

Human Health

- More heat-related illnesses and deaths
- Higher temperatures means more air pollution (Heat interacts with tailpipe emissions to form ozone)

Utility Costs

- Utility needs will increase, meaning costs will increase

Agricultural

- Can our crops and livestock grow productively with increasing temperatures?

Questions to consider

- Are we sure that our electricity infrastructure could withstand a heat wave?
- Do local governments have a heat wave response protocol?
- Which residents need a place to go during a heat wave?
  - How will they get there?
- Which workers need access to air conditioning?
- Would our community benefit from education about the warning signs of heat-induced illness?
- Where can we add greenery to paved and hard surfaces in our communities?
- Are our most vulnerable residents English speakers? Can we provide translation?

Resiliency

NCORR



Andrea Webster
Resilience Policy Advisor
NCORR
andrea.webster@ncdps.gov
919-576-6450

Public Meeting
January 21st, 2025
6:00pm – 7:00pm
Teams Meeting

I. Meeting Objectives

a. ENGAGE THE COMMUNITY
b. GATHER INPUT
c. EDUCATE AND INFORM
d. ENHANCE PLAN RELEVANCE

II. Mitigation Overview

a. MITIGATION DEFINITIONS
b. TYPES OF MITIGATION
c. MITIGATION TECHNIQUES

III. Purpose of Update

a. REFLECT ON CHANGING RISKS
b. INCREASE COMMUNITY RESILIENCE
c. ENSURE COMPLIANCE AND FUNDING
d. INCREASE PREPAREDNESS

IV. Project Overview

a. FOUR-PHASE PLANNING PROCESS
b. PROJECT SCHEDULE
c. PLAN STRUCTURE
d. PLAN SECTIONS

V. Findings

a. PRIORITY RISK INDEX (PRI) SCORES
b. PUBLIC SURVEY FINDINGS

VI. Next Steps

a. IMPLEMENT REVISIONS FROM FEEDBACK
b. SUBMIT TO NCEM & FEMA
c. LOCAL ADOPTION OF PLAN

Public Meeting
January 21st, 2025
6:00pm – 7:00pm
Teams Meeting

In January of 2025, the public meeting for the Cleveland, Gaston, and Lincoln County Regional Hazard Mitigation Plan Update was held to educate and inform the public on the development of the draft plan as well as next steps. In addition to raising public awareness, the aim of this meeting was to offer the public an opportunity to ask questions and provide feedback/input to enhance plan relevance.

The meeting aimed to define hazard mitigation and explore its various types, focusing on existing developments' vulnerability and ensuring future developments minimize risks. Key mitigation techniques discussed included prevention strategies, property protection measures, natural resource management, structural projects, and emergency services enhancements. The update reflects changing risks due to increased development and a shift toward an “all hazards” approach, incorporating climate change considerations.

The project overview highlighted the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), emphasizing that hazard mitigation planning is essential for maintaining eligibility for federal funding programs, such as Flood Mitigation Assistance (FMA), Building Resilient Infrastructure and Communities (BRIC), and the Hazard Mitigation Grant Program (HMGP).

The planning process was reviewed, which outlined a four-step update process: organizing resources, conducting a risk assessment, developing a mitigation plan, and final adoption and implementation. The structure of the plan was also reviewed during this meeting to facilitate clarity and understanding, sharing the breakdown of plan sections such as hazard identification, risk assessment, and mitigation action strategies.

Key findings were also shared with meeting participants including the priority risk index (PRI) as well as public survey findings. The tabulated PRI results were presented, categorizing hazards into high, moderate, and low-risk groups. High-risk hazards identified included cyber, excessive heat, tornadoes/thunderstorms, flooding, and infectious disease. Initial findings from the public survey revealed tornadoes/thunderstorms as the highest perceived threat, with significant interest in hazard resilience measures.

Next steps were shared toward the end of the meeting, including the integration of any additional feedback received at the public meeting, the submittal of the plan to both NCEM and FEMA for review and approval, and the local adoption process. For timing purposes, the local adoption process can occur simultaneously with NCEM and FEMA review, so once approved, the plan will be officially adopted. The adoption process may vary per community, but the most common approach is adoption by resolution.

Cleveland Gaston Lincoln

2025 Hazard Mitigation Plan Update

Public Meeting

1/21/25



Agenda

- Welcome & Introductions
- Meeting Objectives
- Mitigation Overview
- Purpose of Update
- Plan Update Process
- Plan Structure
- Next Steps
- Q&A Session

Introductions

Welcome!

Participating Jurisdictions

Municipalities that participated in the 2025 Plan Update

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

Lincoln County	
Lincolnton	Unincorporated Lincoln County

Meeting Objectives

Engage the Community

Gather Input

Educate and Inform

Enhance Plan Relevance

What is Mitigation?

“mit-i-gate”

1: to cause to become less harsh or hostile.

2: to make less severe or painful.

Hazard Mitigation

Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

Basic Types of Mitigation



Mitigating against hazard impacts on **existing development**

- Houses
- Businesses
- Infrastructure
- Critical Facilities



Ensuring **future development** is conducted in a way that does not increase vulnerability

- Plans
- Policies
- Procedures

Mitigation Techniques

1. Prevention
2. Property Protection
3. Natural Resource Management
4. Structural Projects
5. Emergency Services
6. Education and Awareness

Mitigation Techniques – Examples

Prevention
Planning/Zoning
Building Codes
Open Space Preservation
Floodplain Regulations
Stormwater Mgmt.
Drainage Maintenance

Natural Resource Mgmt.
Floodplain Protection
Watershed Mgmt.
Riparian Buffers
Erosion/Sediment Control
Wetland Restoration
Habitat Preservation

Emergency Services
Warning Systems
Response Equipment
Shelter Operations
Evacuation Planning
Response Training
Sandbagging

Property Protection
Acquisition/Relocation
Building Elevation
Critical Facility Protection
Retrofitting
Safe Room/Shutters
Insurance

Structural Projects
Reservoirs
Dams, Levees, Dikes
Stormwater Diversions
Retention Basins
Channel Modification
Storm Sewers

Education/Awareness
Outreach Projects
Speaker Series
Hazard Map Info
Real Estate Disclosure
Library Materials
Hazard Expositions

Purpose of Update

- Reflect on Changing Risks
- Increase Community Resilience
- Compliance and Funding
- Ensure Preparedness

Purpose of Update – Changing Risks

Population Increase and Community Growth

- Greater Exposure to Hazard Risk
- Increased Exposure = More Damage

More Hazards (Man-Made)

- Included in State Plan
- Ex. Technological, Civil Disturbance, Terrorism

Climate Change

- Anticipated Increase in Frequency and Magnitude
- **New FEMA Requirement

Development Patterns

- Increased Impermeable Surfaces
- More Infrastructure and Assets at Risk

Purpose of Update – Increase Community Resilience

1. Identification of New Vulnerabilities
   - **Vulnerable Populations
2. Adopting Effective Mitigation Strategies



Purpose of Update – Compliance and Funding



Ensure compliance with federal and state requirements

- Disaster Mitigation Act of 2000
- NC GS 166 A



Maintain eligibility for disaster mitigation funding and assistance programs

- HMGP
- FMA
- BRIC
- CRS

Purpose of Update – Ensure Preparedness

The 2025 Plan Update ensures that Cleveland, Gaston, and Lincoln Counties are better prepared to:

1. Address existing and emerging hazards
2. Protect lives and property
3. Sustain continuity of essential services during and following an event



Planning	Planning for Public Involvement
Coordinating	Coordinating with Departments and Agencies
Finalizing	Finalizing a List of Stakeholders for Involvement (HMPC)

Plan Update Process

Step 1: Organize Resources



Hazard Identification

What Can Happen Here?

- Previously Identified Hazards
- Identify New Hazards



Vulnerability Assessment

What Will be Affected/Impacted?

- Will Use County Parcel Data, FEMA HAZUS Analysis, and NCEM Data



Capability Assessment

How Prepared Are We?

- Communities to Self-Assess Capability
- What Mitigation Actions are Feasible
- Where Gaps Exist

Plan Update Process
Step 2: Risk Assessment

Step 2: Risk Assessment

Hazard ID & Vulnerability Assessment

Identify hazards that could impact the region (existing and evolving)	NEW Civil Disturbance (added based on State HMP) NEW Food Emergency (added based on State HMP)
Evaluate historical data, past incidents, and scientific assessments	Helps determine likelihood and extent Identifies problem/vulnerable areas
Analyze the potential impact of the hazard including future conditions	Describe how climate change may affect magnitude/frequency
Engage stakeholders, experts, and community members to gather insights, experiences and local knowledge	Address gaps in data/modeling

Step 2: Risk Assessment

Hazard ID & Vulnerability Assessment (2025 Plan)

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

Step 2: Risk Assessment

Capability Assessment

1. What is your community's capacity to prepare for, respond to, and recover from a hazard event?
2. Evaluates resources, capabilities, and readiness to effectively implement/sustain mitigation activities
   - Plans and Regulatory
   - Administrative and Technical
   - Financial Resources
3. Helps identify strengths, weakness, and gaps
   - Informs development of mitigation strategies appropriate/feasible for each community

Plan Update Process
Step 3: Develop a Mitigation Plan

- Setting Planning Goals
- Reviewing Mitigation Alternatives
- Drafting an Action Plan

Step 3: Develop Mitigation Plan

Status Update & New Actions

1. Planning team reviewed previous plan to determine the status of existing actions
   - FEMA Requirement
   - Completed, deleted, progress update
   - "Ongoing" is too broad
2. Planning team identified new mitigation actions to address evolving needs/vulnerabilities
   - Consider BRIC projects for inclusion
   - To be discussed in length at the Mitigation Strategy Meeting

Plan Update Process

Step 4: Adoption and Implementation

- Seeking Review and Approval from Relevant Authorities
- Securing Funding and Managing Resources of Mitigation Projects and Activities
- Executing the Identified Mitigation Actions
- Continuously Monitoring the Progress of Mitigation Activities

Project Schedule

Project Kickoff Date – 1/9/24

Larger Stakeholder Meeting –4/1/24

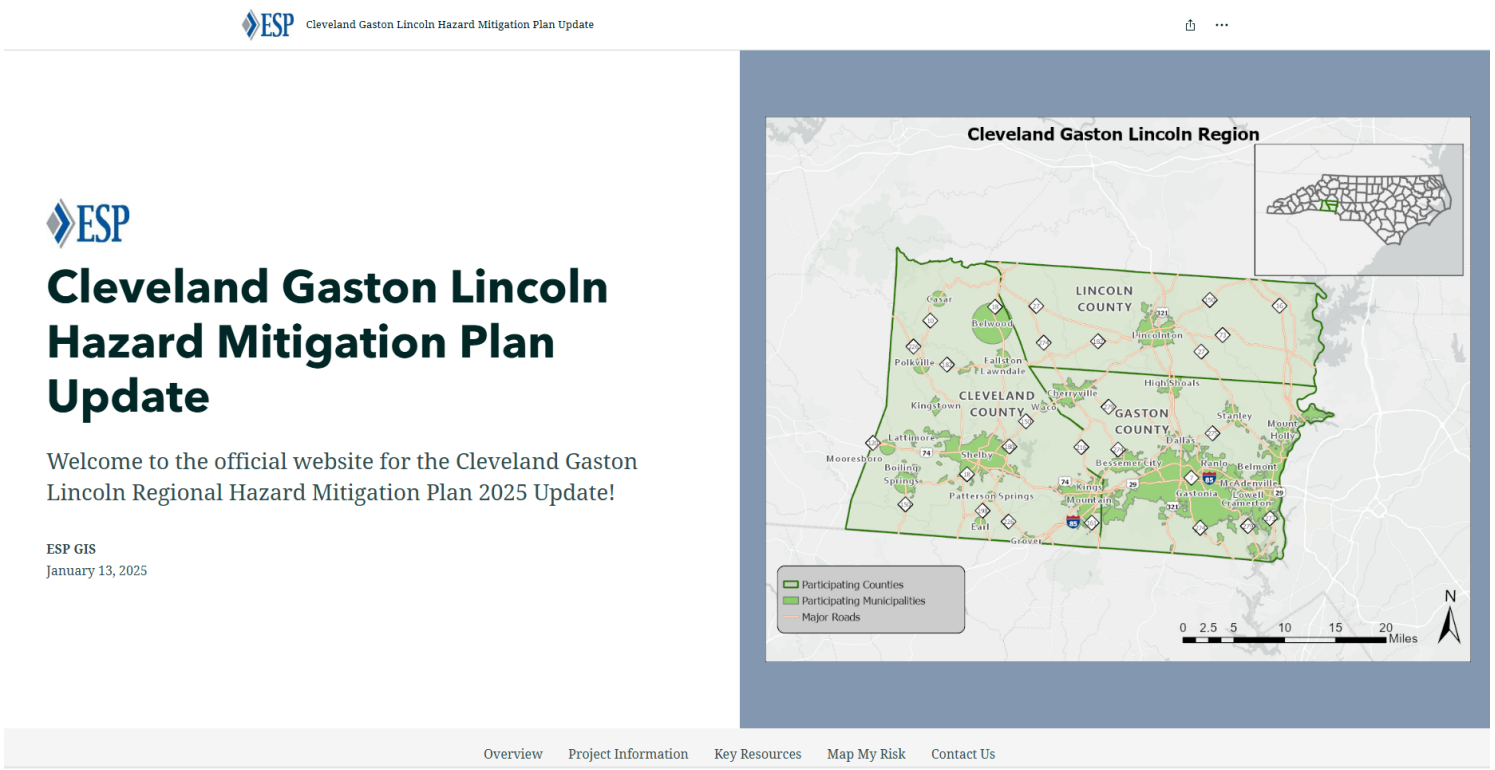
Delivery of Draft – 11/28/24

Public Meeting #1 – 1/21/25

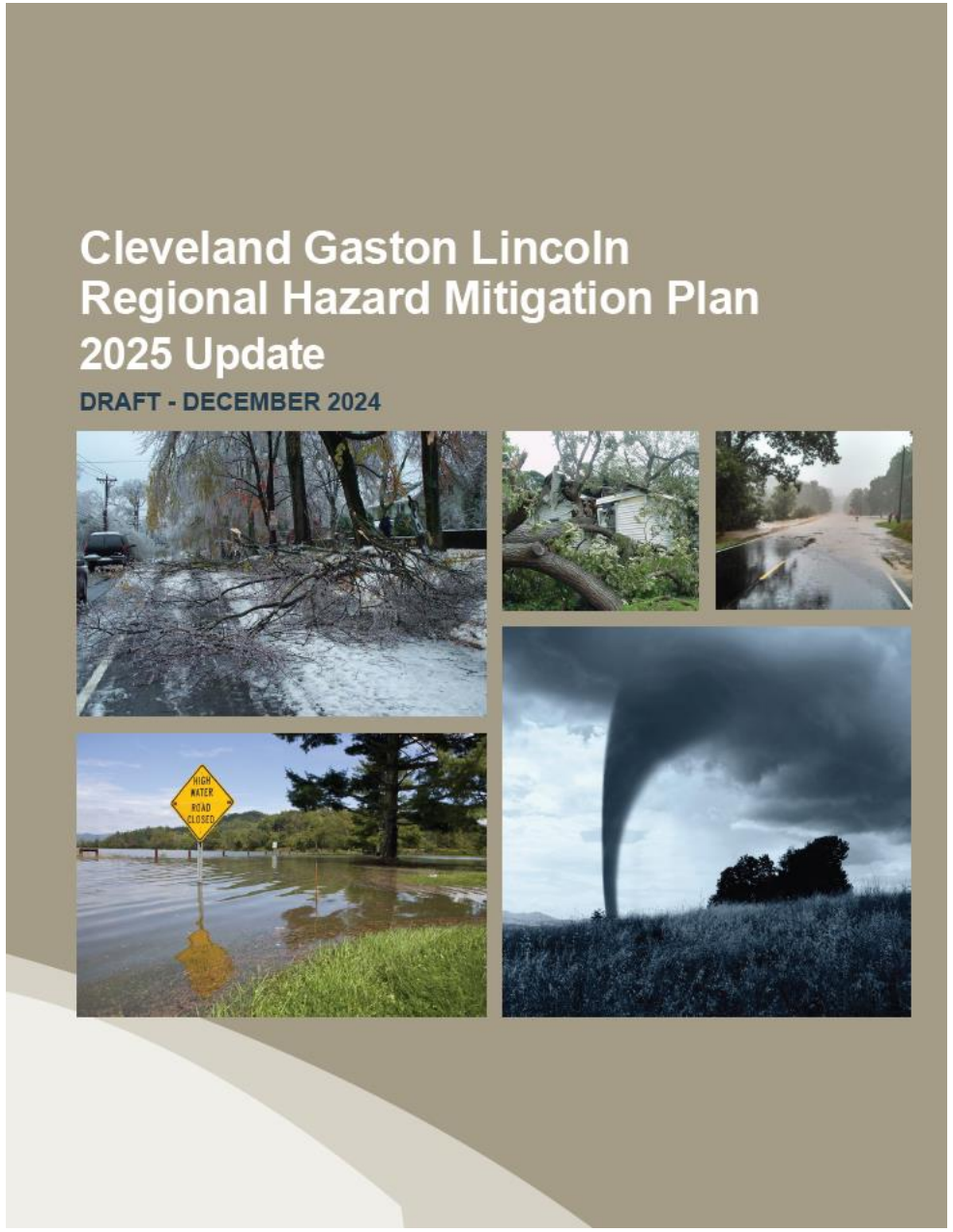
Existing Plan Expiration Date – 5/28/25



Plan Website



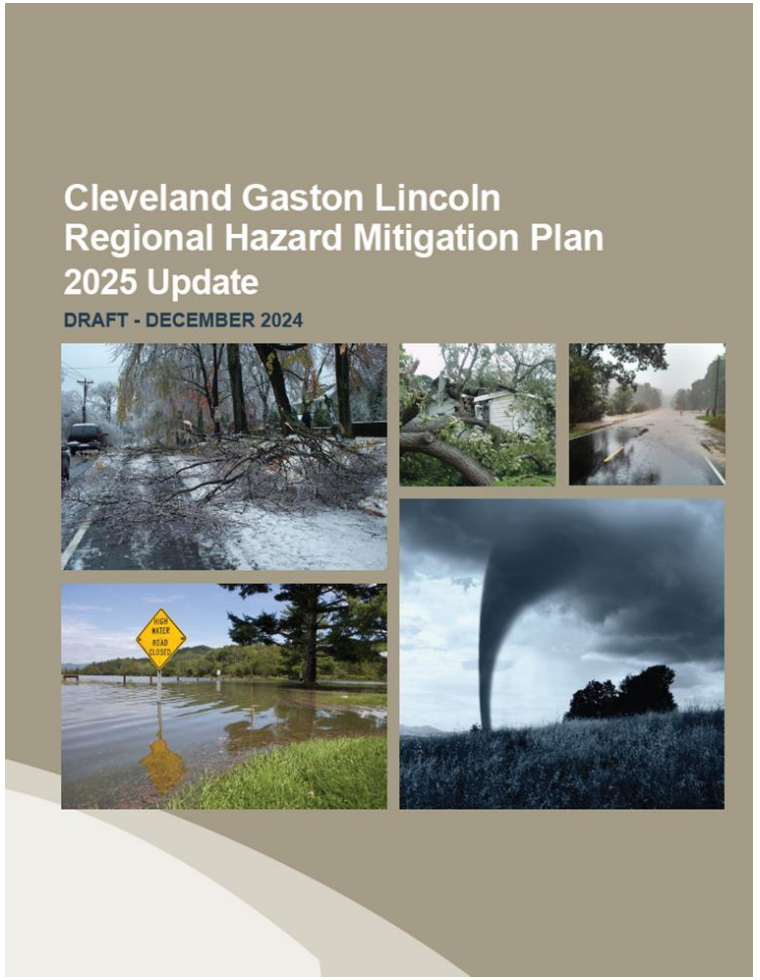
Plan Structure



Plan Structure – Overview

1. Introduction
2. Planning Process
3. Community Profile
4. Hazard Identification
5. Hazard Profiles
6. Vulnerability Assessment
7. Capability Assessment
8. Mitigation Strategy
9. Mitigation Action Plans
10. Plan Maintenance

Appendices



Plan Structure – Sections

1. **Introduction**
   - I. Background
   - II. Purpose
   - III. Scope
   - IV. Authority
   - V. Summary of Plan Contents

Provides context and justification for the plan

2. **Planning Process**
   - I. Overview of Hazard Mitigation Planning
   - II. History of HM Planning in the Region
   - III. Updating the Plan in 2025
   - IV. Hazard Mitigation Planning Committee
   - V. Meetings and Workshops
   - VI. Involving the Public
   - VII. Involving the Stakeholders
   - VIII. Documentation of Plan Progress

Explains the steps followed to prepare the plan and documents the process

Plan Structure – Sections

3. **Community Profile**
   I. Geography and Environment
   II. Population and Demographics
   III. Housing, Infrastructure, Land Use
   IV. Employment and Industry
4. **Hazard Identification**
5. **Hazard Profiles**
6. **Vulnerability Assessment**

Provides an overview of the current conditions in the planning area by participating jurisdiction

Identifies hazards, exposure, and vulnerability and prioritizes hazards for mitigation

Plan Structure – Sections

7. **Capability Assessment**
   - I. What is a Capability Assessment?
   - II. Conducting the Capability Assessment
   - III. Capability Assessment Findings
   - IV. Conclusions on Local Capability

Details capability indicators by jurisdiction and reviews key capabilities in place

8. **Mitigation Strategy**
   - I. Goals and Objectives
   - II. Identification & Analysis of Mitigation Activities

Reviews the goals and objectives and the process used; details the mitigation action identification and prioritization process

9. **Mitigation Action Plans**
   - I. Participating Jurisdiction Plans

Tables detailing the mitigation actions by jurisdiction

10. **Plan Maintenance**
    - I. Implementation
    - II. Monitoring, Evaluation, and Enhancement
    - III. Continued Public Involvement

Summarizes the HMPC and participating jurisdictions' responsibilities once the plan is adopted

Plan Structure – Supporting Information

Appendices

A. **Plan Adoption**
B. **Planning Tools**
C. **Local Mitigation Plan Review Tool**
D. **Planning Process Documentation**
E. **Completed Mitigation Actions**
F. **Flood Hazard Maps**
G. **Wildfire Hazard Maps**
H. **NCEI Storm Event Data**
I. **FEMA National Risk Index Report**

Public Survey – Initial Findings

- 285 responses thus far (31% respondents live in unincorporated Lincoln County; 13% from Gastonia; 10% from Lincolnton, 10% unincorporated Gaston County)
- Tornadoes/Thunderstorms ranked highest threat to the region and Flooding ranked second highest
- 51% of respondents have taken measures to make their home more resistant to hazards (tree removal/trimming, drainage improvements, upgraded roof, installed generator)
- 70% of respondents do not know what office to contact for more information on hazard risk reduction
- 59% of respondents indicate the internet/social media is the most effective way to receive information; 25% selected mail

Public Survey – Initial Findings

Mitigation Techniques

Respondents were asked the rank the importance of the six mitigation techniques ranging from "Not Important" to "Very Important" – Respondents ranked the following techniques as "Very Important"

1. Emergency Services – 89%
2. Prevention - 80%
3. Public Education and Awareness – 78%
4. Natural Resource Protection – 75%
5. Structural Projects – 62%
6. Property Protection – 53%

Public Survey

Scan the QR Code for Access to the Public Survey!

Or ACCESS SURVEY HERE

Next Steps

1. Record and analyze input received during Public Meeting #1
2. Draft Plan being reviewed by NCEM and FEMA
3. Local adoption of the plan to occur soon



Questions

Questions/Comments/Concerns

Brainstorming Questions

1. What are key concerns or challenges you believe should be addressed in the hazard mitigation plan update?
2. How can the community be better prepared for potential hazards or disasters in the future?
3. Are there any specific areas or infrastructure that you feel require additional consideration?
4. What role do you think community members should play in implementing hazard mitigation strategies (if any)?
5. Do you have any additional suggestions or feedback regarding the plan update that you would like to share at this time?

Adjourn – Thank you!

Contact Information:

- Nathan Slaughter - nslaughter@espassociates.com
- Hannah DeLude - hdelude@espassociates.com
- John Flores - jflores@espassociates.com



Cleveland Gaston Lincoln 2024 Regional Hazard Mitigation Plan - Public Survey

We need your help!

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

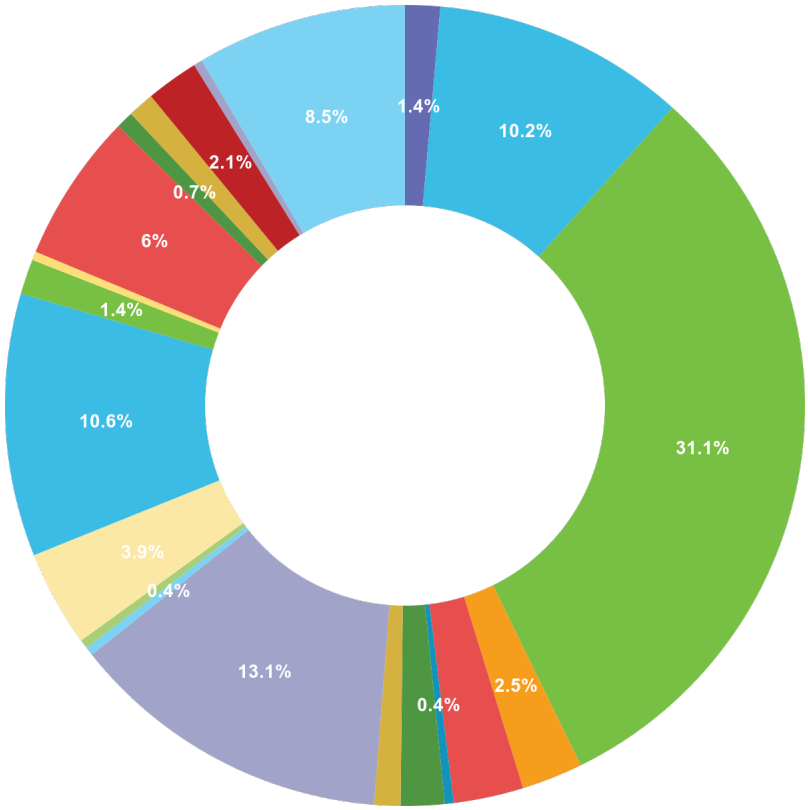
The counties, along with local jurisdictions and other partners, are working to update the multi-jurisdictional Regional Hazard Mitigation Plan. This plan identifies and assesses our community's natural, man-made, and technological hazards and identifies strategies that determine how to best mitigate 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.

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development in the Cleveland Gaston Lincoln Regional Hazard Mitigation Plan, please contact Hannah DeLude from ESP Associates, Inc. at hdelude@espassociates.com.

Q1 1\. Where do you live?*

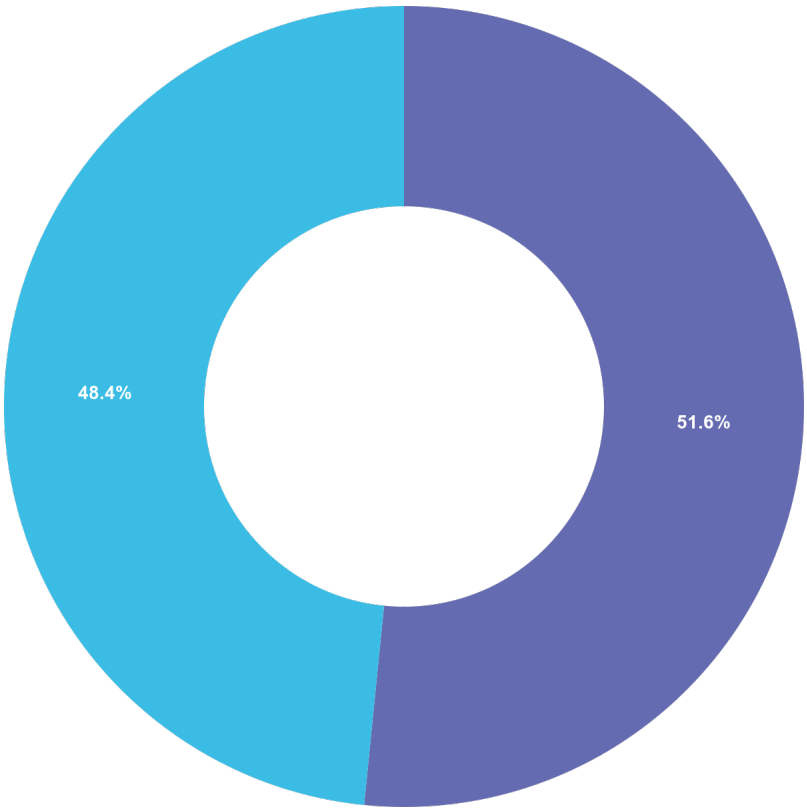


Answered: 283 **Unanswered:** 0

Choice	Total
Unincorporated Cleveland County	4
Unincorporated Gaston County	29
Unincorporated Lincoln County	88
Belwood	0
Belmont	7
Bessemer City	8
Boiling Springs	0
Casar	1
Cherryville	5
Dallas	3
Earl	0
Fallston	0
Gastonia	37
Grover	1
High Shoals	1
Kings Mountain	11
Kingstown	0
Lattimore	0
Lawndale	0
Lincolnton	30
Lowell	4
McAdenville	1
Mooresboro	0
Mount Holly	17
Patterson Springs	0
Polkville	0
Ranlo	2
Shelby	3

Choice	Total
Spencer Mountain	0
Stanley	6
Waco	1
Other	24

Q2 2\. Have you ever experienced or been impacted by a disaster?*



Answered: 283 **Unanswered:** 0

Choice	Total
Yes	146
No	137

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

Monday, December 2, 2024 at 2:26 PM UTC

hugo helna

Wednesday, November 20, 2024 at 1:09 PM UTC

loss of power for many days and shelter damage due to trees and limbs. slight flooding

---

Friday, September 6, 2024 at 4:28 PM UTC

May 2024 2 tornadoes took out power for 3 days, knocked down many large trees and took out multiple areas of fence in 3 livestock pastures. Earlier in 2024, intensive rainfall caused flash flooding in the roads and fields, washed out sections of fencing and killed several calves. In the past winter ice storms we have lost power for 3 to 5 days, been left to travel untreated secondary roads to feed livestock and to assist others who were stranded or stuck due to the road conditions who could not call for assistance because of the extremely poor cell phone service.

Friday, September 6, 2024 at 3:17 PM UTC

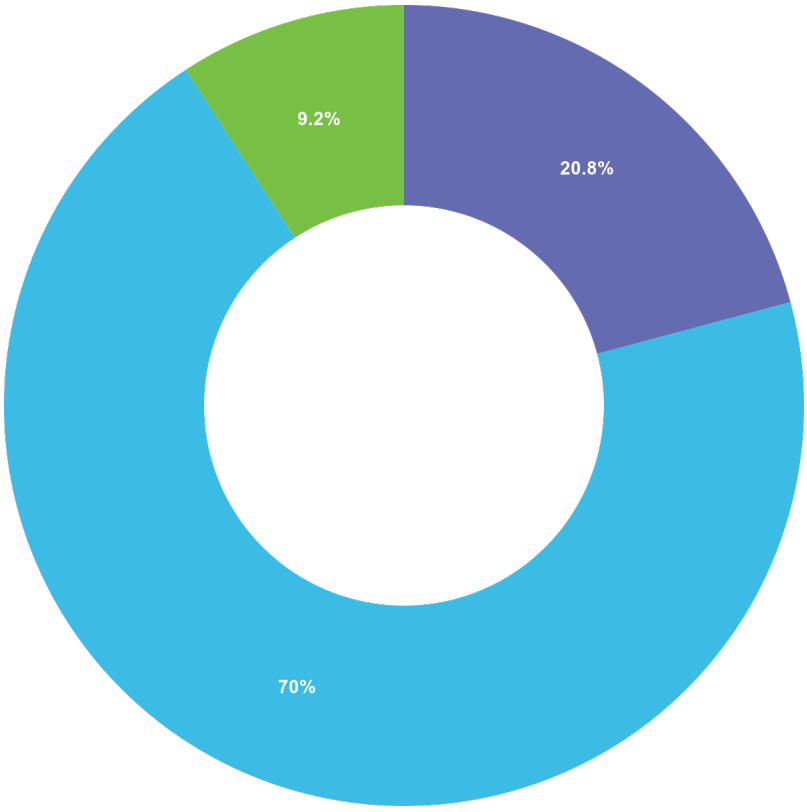
Hugo - home damage; power loss for 6-7 days

Wednesday, September 4, 2024 at 12:53 AM UTC

ice storm and hurricane took trees down, hail damaged roof and cars.

Answered: 283 **Unanswered:** 0

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

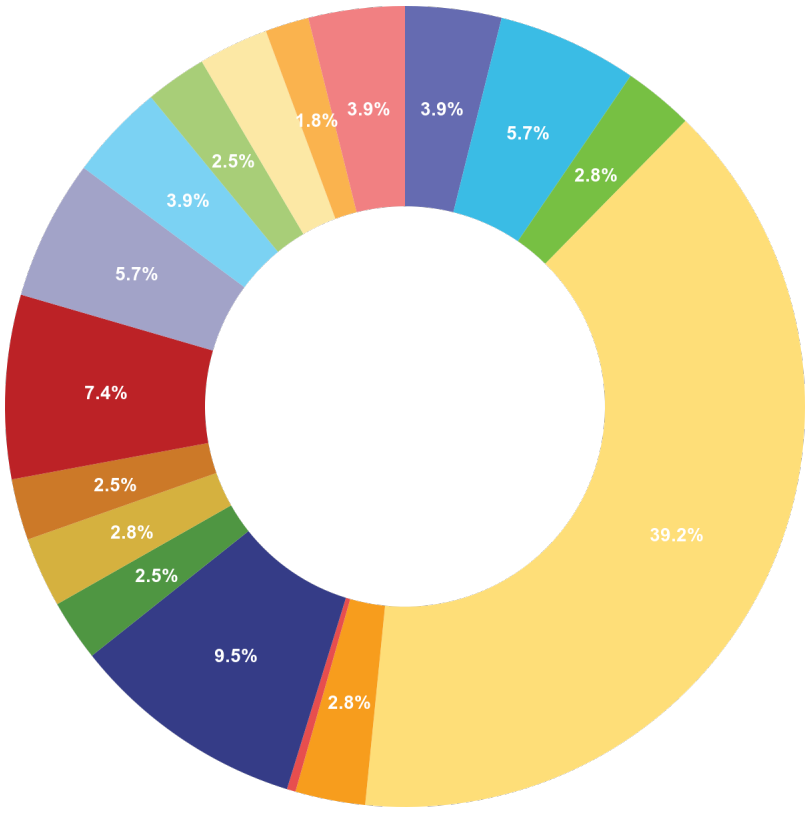


Answered: 283 **Unanswered:** 0

Choice	Total

Choice	Total
Extremely concerned	59
Somewhat concerned	198
Not concerned	26

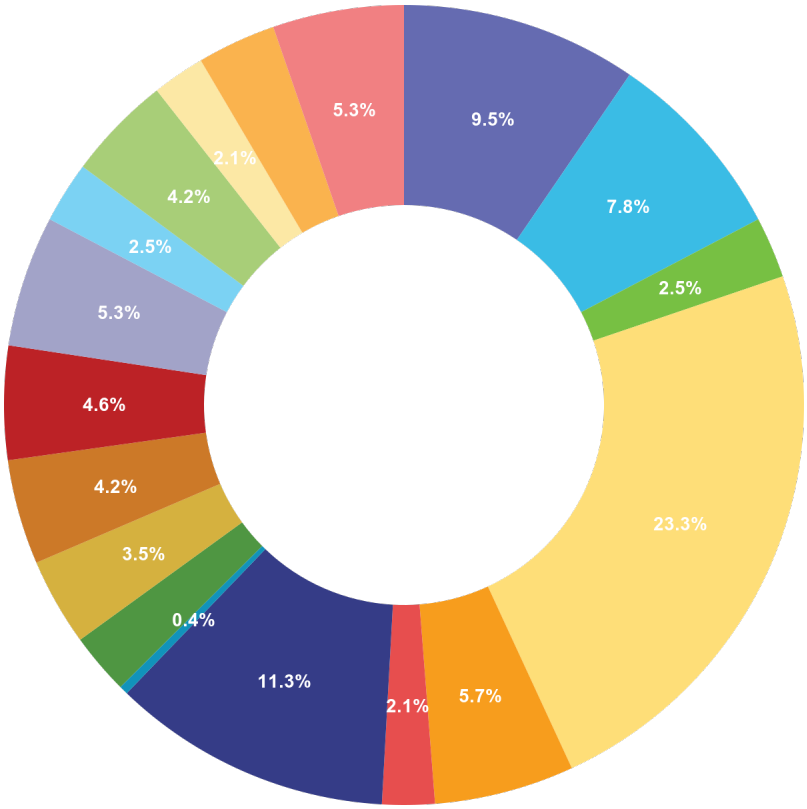
Q5 5\. Please select the **one** hazard you think is the highest threat to your neighborhood:*



Answered: 283 **Unanswered:** 0

Choice	Total
Drought	11
Excessive Heat	16
Hurricane and Coastal Hazards	8
Tornadoes/Thunderstorms	111
Severe Winter Weather	8
Dam Failure	1
Flooding	27
Earthquakes	0
Geological (landslides, sinkholes, erosion)	7
Wildfires	8
Infectious Disease	7
Hazardous Substances	21
Radiological Emergency	16
Terrorism	11
Cyber	7
Electromagnetic Pulse	8
Food Emergency	5
Civil Disturbance	11

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



Answered: 283 **Unanswered:** 0

	Choice	Total
	Drought	27
	Excessive Heat	22
	Hurricane and Coastal Hazards	7
	Tornadoes/Thunderstorms	66
	Severe Winter Weather	16
	Dam Failure	6
	Flooding	32
	Earthquakes	1
	Geological (landslides, sinkholes, erosion)	7
	Wildfires	10

Choice	Total
Infectious Disease	12
Hazardous Substances	13
Radiological Emergency	15
Terrorism	7
Cyber	12
Electromagnetic Pulse	6
Food Emergency	9
Civil Disturbance	15

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

Friday, September 6, 2024 at 4:28 PM UTC

Lack of technology infrastructure to my home and livestock operations make communication and information extremely difficult on a regular good weather day and impossible during hazardous weather conditions. Cell phone signal has large gaps where there is no reception at all and in the majority of the rest of the fields and pastures and my personal residence, the signal is so poor that calls drop and we experience frequent and lengthy gaps where we receive no signal at all. There is no broadband internet internet service access available to my residence and 4 neighbors located adjacent to our farm operation areas.

Friday, September 6, 2024 at 3:17 PM UTC

Wednesday, September 4, 2024 at 12:53 AM UTC

Coal Ash, Nuclear Power Plant

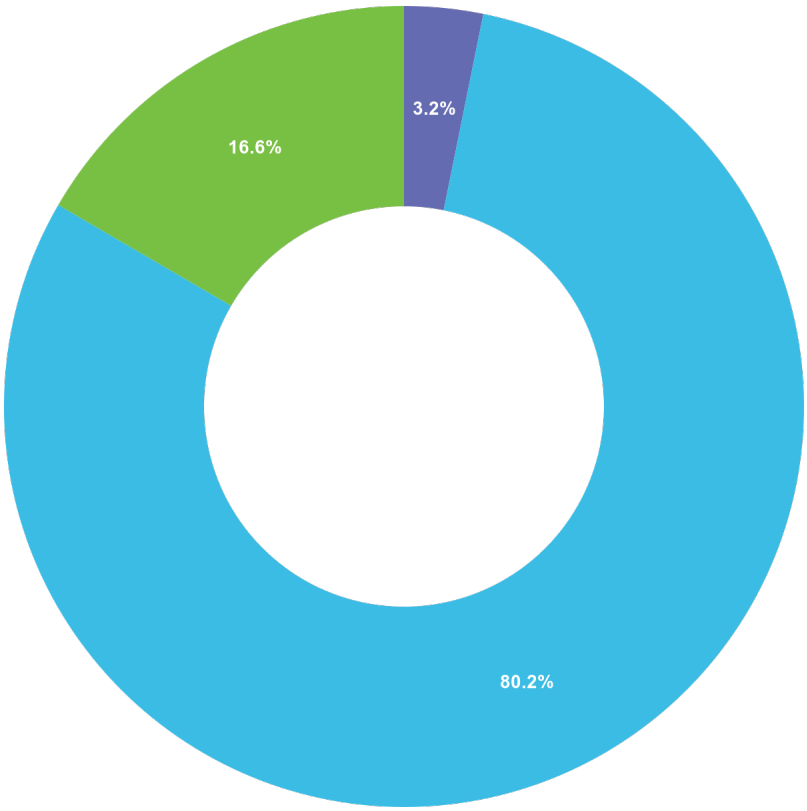
Sunday, September 1, 2024 at 4:49 PM UTC

Stone blasting & over building by developers and gov’t!!

Sunday, September 1, 2024 at 3:48 PM UTC

Answered: 276 **Unanswered:** 7

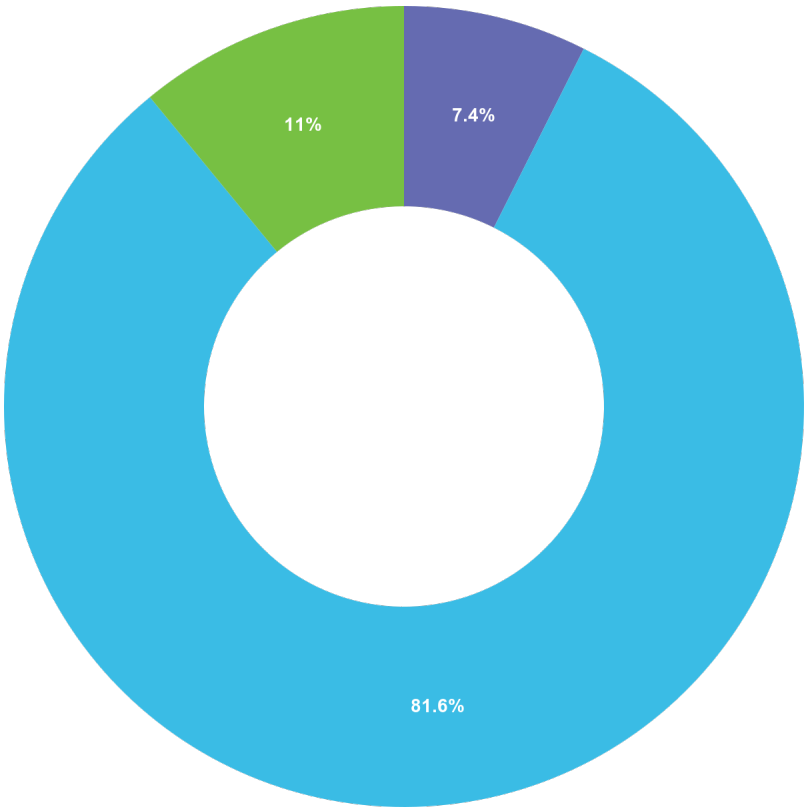
Q8 8\. Is your home located in a floodplain?*



Answered: 283 **Unanswered:** 0

Choice	Total
Yes	9
No	227
I don't know	47

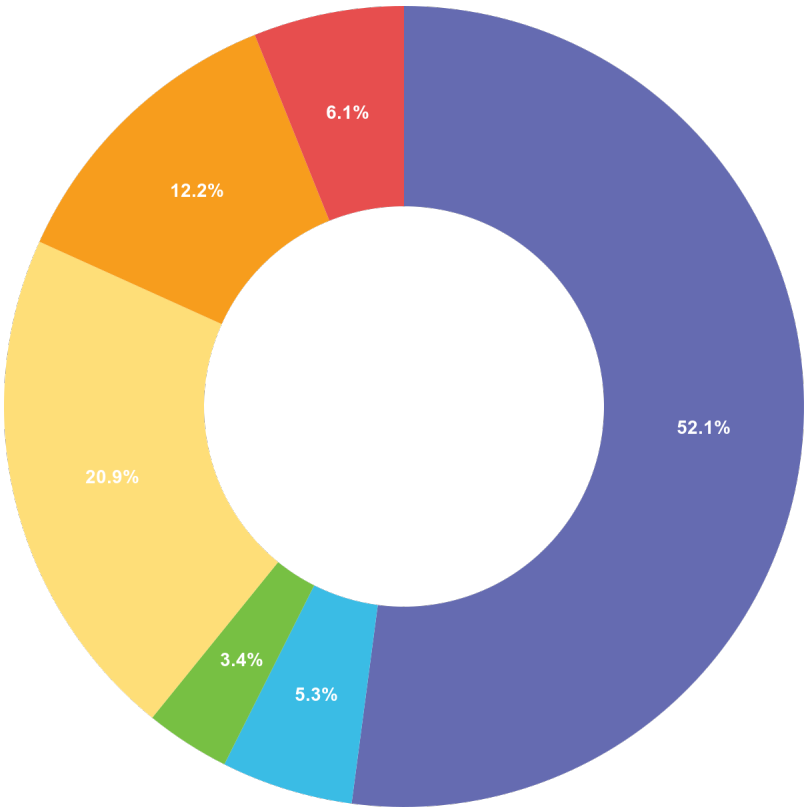
Q9 9\. Do you have flood insurance?*



Answered: 283 **Unanswered:** 0

Choice	Total
Yes	21
No	231
I don't know	31

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



Answered: 263 **Unanswered:** 20

Choice	Total
Not located in a floodplain	137
Too expensive	14
Not necessary because it never floods	9
Not necessary because I'm elevated or otherwise protected	55
Never really considered it	32
Other	16

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

Friday, September 6, 2024 at 4:28 PM UTC

Friday, September 6, 2024 at 3:17 PM UTC

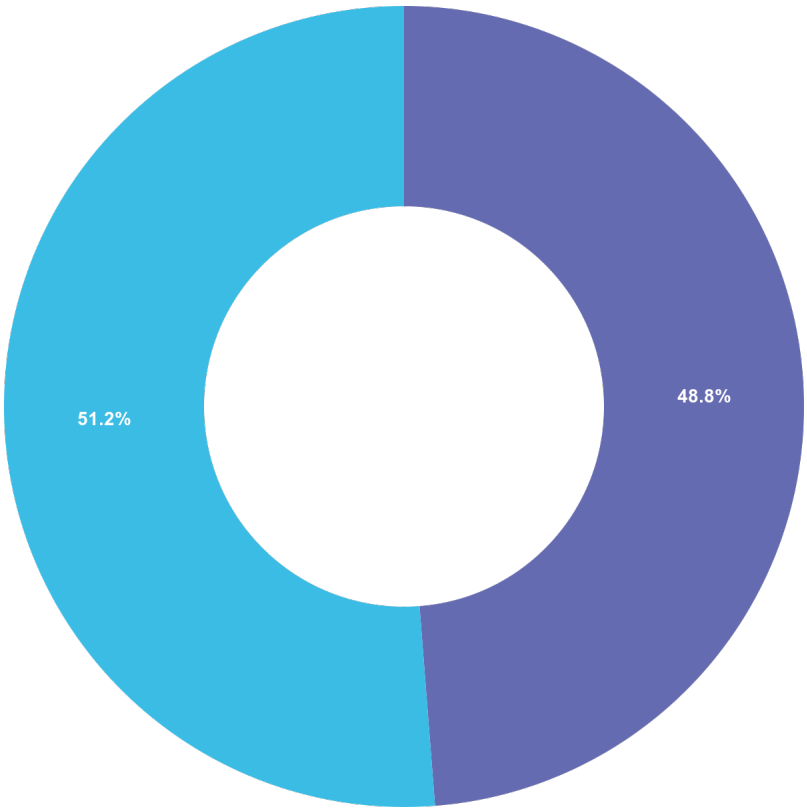
Wednesday, September 4, 2024 at 12:53 AM UTC

Sunday, September 1, 2024 at 4:49 PM UTC

Sunday, September 1, 2024 at 3:48 PM UTC

Answered: 281 **Unanswered:** 2

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



Answered: 283 **Unanswered:** 0

Choice	Total
Yes	138
No	145

Q13 13\. If "Yes," please explain.

Monday, December 2, 2024 at 2:26 PM UTC

cut down trees that could fall on home

Friday, September 6, 2024 at 4:28 PM UTC

We have purchased emergency generators, trucks and vehicles capable of operation during icy conditions, a heat source that doesn’t rely upon electricity and personal food sustainability.

Friday, September 6, 2024 at 3:17 PM UTC

Installed generator; work to channel water flow from runoff

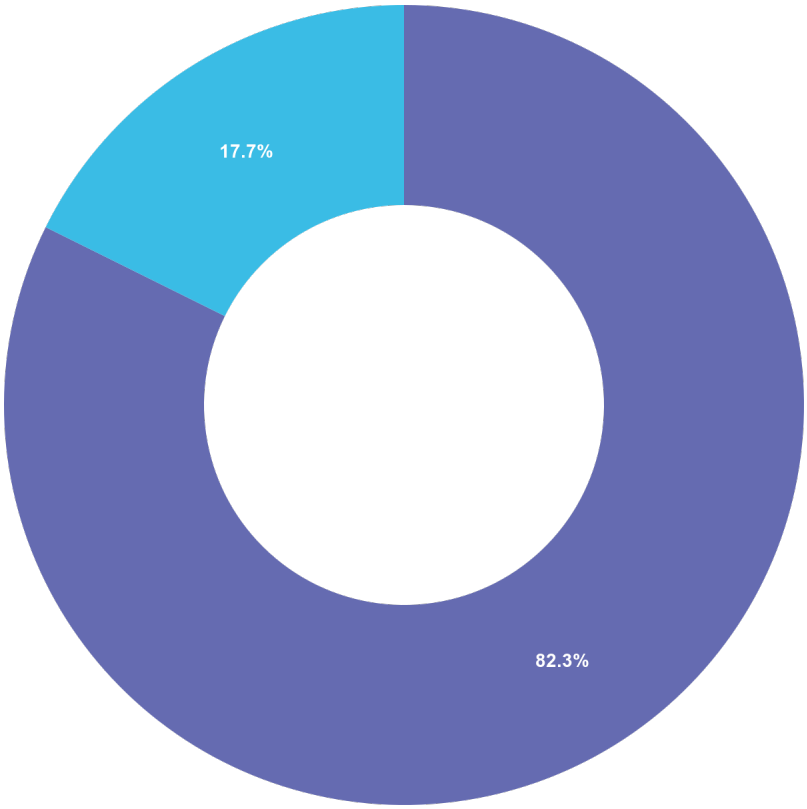
Wednesday, September 4, 2024 at 12:53 AM UTC

Sunday, September 1, 2024 at 4:49 PM UTC

Active involvement!

Answered: 281 **Unanswered:** 2

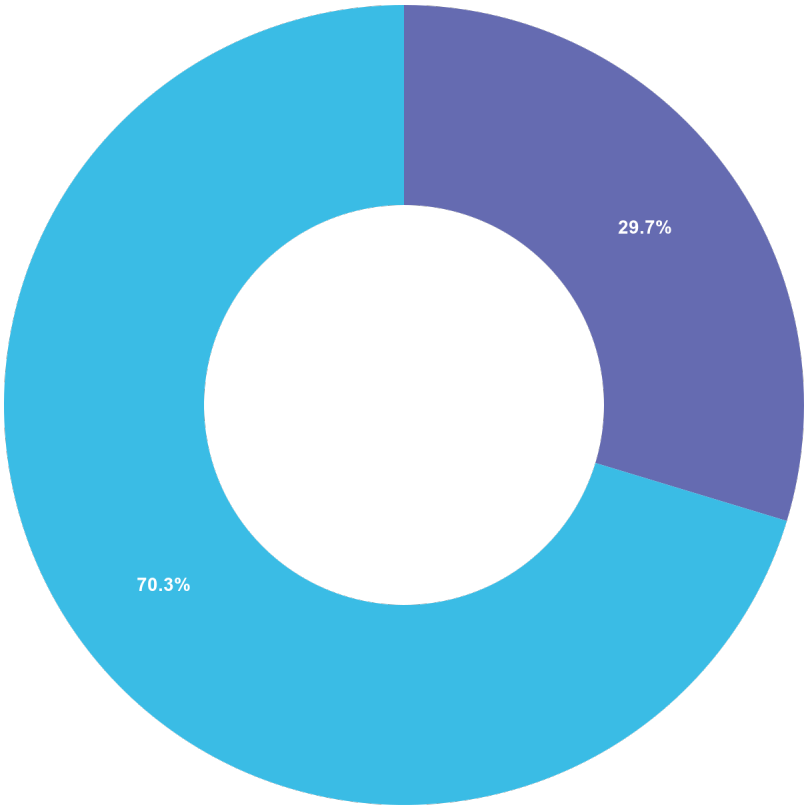
Q14 14\. Are you interested in making your home or neighborhood more resistant to hazards?*



Answered: 283 **Unanswered:** 0

	Choice	Total
●	Yes	233
●	No	50

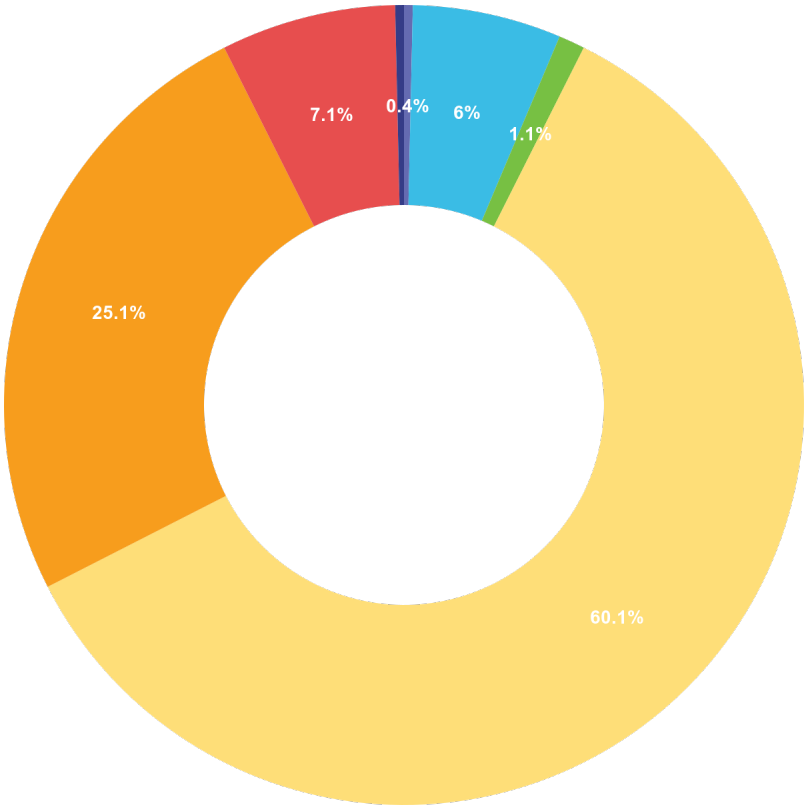
Q15 15\. Do you know what office to contact to find out more information about how to reduce your risks to hazards in your area?*



Answered: 283 **Unanswered:** 0

Choice	Total
Yes	84
No	199

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?*



Answered: 283 **Unanswered:** 0

	Choice	Total
	Newspaper	1
	Television	17
	Radio	3
	Internet (Including Social Media)	170
	Mail	71
	Public Workshops/Meetings	20
	School Meetings	1

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

Friday, September 6, 2024 at 4:28 PM UTC

With the lack of accessibility to modern technology I am limited to receiving information in written form only. I would prefer to receive the same access to modern technology available to the majority of citizens in this state and county.

Friday, September 6, 2024 at 3:17 PM UTC

Wednesday, September 4, 2024 at 12:53 AM UTC

news

Sunday, September 1, 2024 at 4:49 PM UTC

Sunday, September 1, 2024 at 3:48 PM UTC

Answered: 278 **Unanswered:** 5

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?

Monday, December 2, 2024 at 2:26 PM UTC

keep power rightways clear of trees and things that could take out power

---

Friday, September 6, 2024 at 4:28 PM UTC

Decrease development in and around agricultural areas to avoid exacerbating excessive heat and drought conditions. Removing trees and natural resources and replacing them with paved areas and buildings places agricultural operations in greater risk of losses and is directly affecting local farmers from being able to afford to plant and harvest food crops that they have contributed to this community, state and nation. Failing to acknowledge or address the public services that farm operations provide for the county and state has and will continue to be damaging to the natural environment, success of support businesses for agricultural, food security and quality of life for the rural communities. At minimum, the agricultural producers need a seat at the table!

Friday, September 6, 2024 at 3:17 PM UTC

Public workshops; Availabilities to HOAs, neighborhoods to discuss preparedness

---

Wednesday, September 4, 2024 at 12:53 AM UTC

a better weather warning system.

Sunday, September 1, 2024 at 4:49 PM UTC

Stop issuing Building Permits. There is over crowding in schools (kids spend too much time on buses and then sit in cafeterias waiting for class) so parents drive, causing traffic congestion on two lane roads. Stop building developments and widen the roads. You knew this would happen by the number of permits issued. Get a plan in place.

Answered: 280 **Unanswered:** 3

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?

Friday, September 6, 2024 at 4:28 PM UTC

While I understand that growth is important and necessary, I feel that this needs to occur with true input from the communities, businesses and citizens who will be impacted the most. Taking a lesson from the mistakes made by Mecklenburg County is imperative. Recently there was a local news story that interviewed Mr. Belk and he addressed how the county had not protected nor supported agricultural operations in the county for decades. The results have been that there are large pockets of food scarce areas throughout the county as well as excessive prices for food across the entire county. If this is not addressed in other counties they will experience even greater impacts due to the location and shipping logistics.

Friday, September 6, 2024 at 3:17 PM UTC

Wednesday, September 4, 2024 at 12:53 AM UTC

Sunday, September 1, 2024 at 4:49 PM UTC

Safety for all!

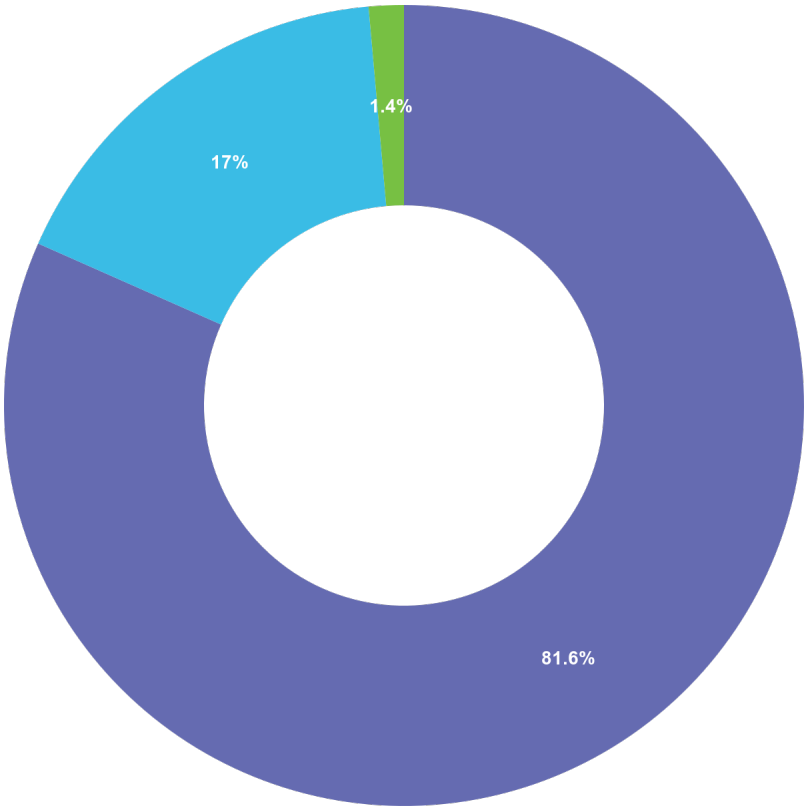
Sunday, September 1, 2024 at 3:48 PM UTC

Answered: 279 **Unanswered:** 4

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 important you think each one is for your community to consider pursuing.

20\. **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.*

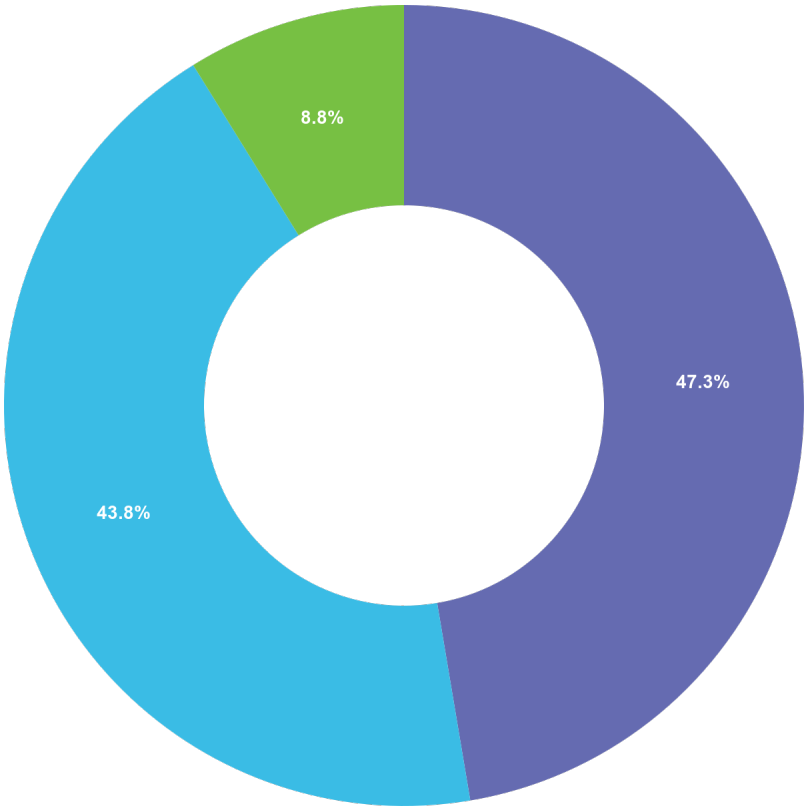


Answered: 283 **Unanswered:** 0

Choice	Total
Very important	231

Choice	Total
Somewhat important	48
Not important	4

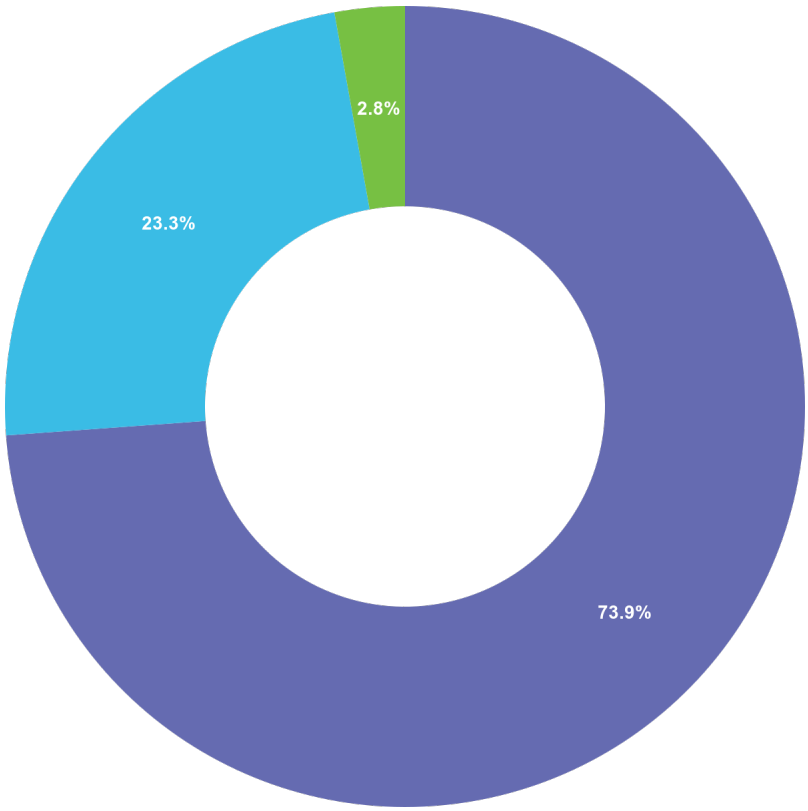
Q21 21\. **Property Protection** - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.*



Answered: 283 **Unanswered:** 0

Choice	Total
Very important	134
Somewhat important	124
Not important	25

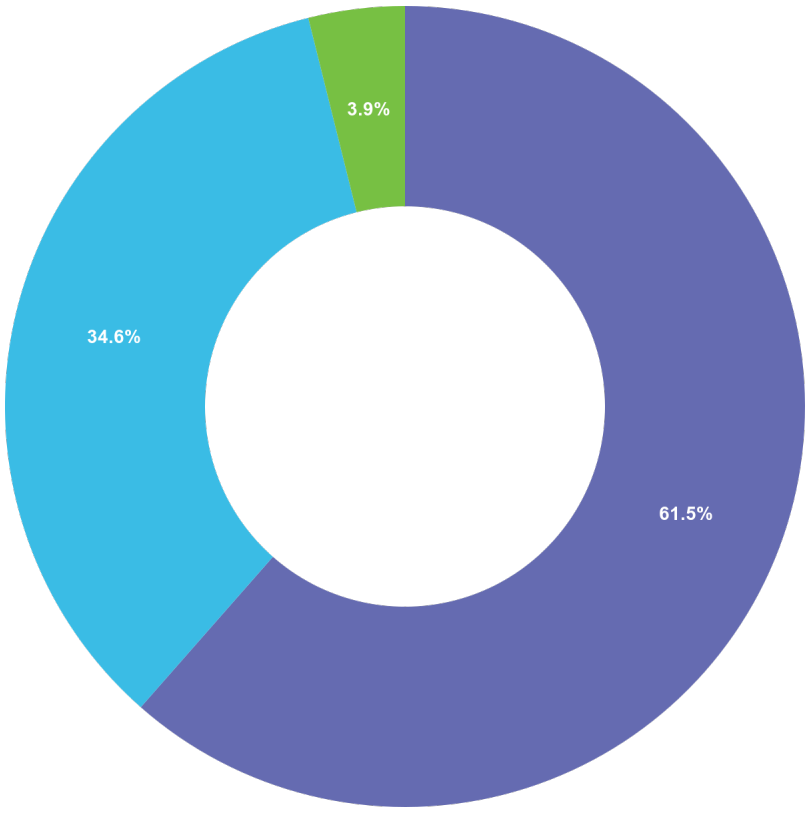
Q22 22\. **Natural Resource Protection** - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.*



Answered: 283 **Unanswered:** 0

Choice	Total
Very important	209
Somewhat important	66
Not important	8

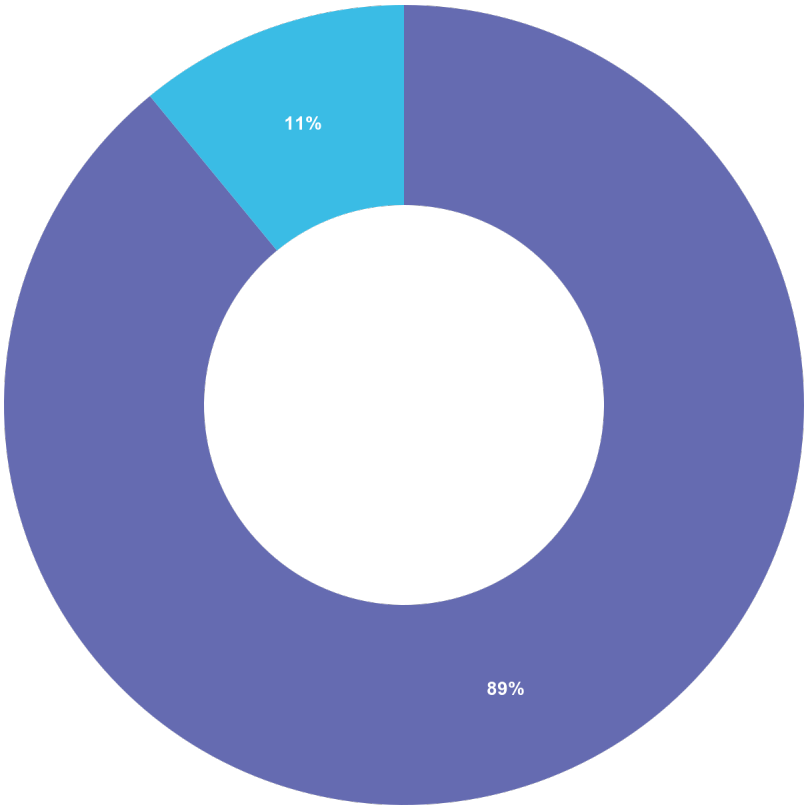
Q23 23\. **Structural Projects** - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.*



Answered: 283 **Unanswered:** 0

Choice	Total
Very important	174
Somewhat important	98
Not important	11

Q24 24\. **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.*

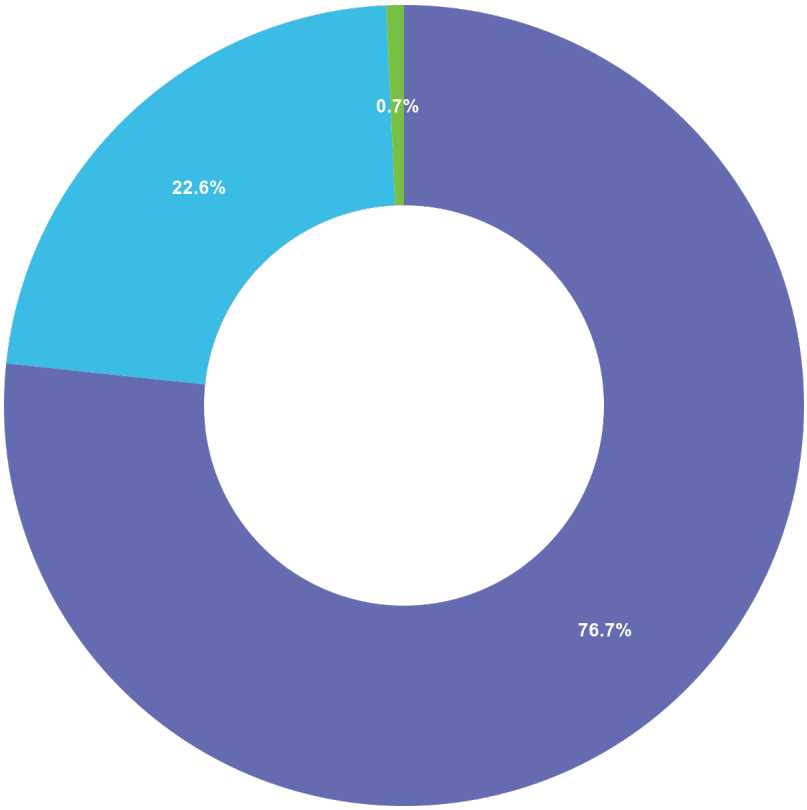


Answered: 283 **Unanswered:** 0

	Choice	Total
	Very important	252
	Somewhat important	31
	Not important	0

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 education programs, library materials and

demonstration events.*



Answered: 283 **Unanswered:** 0

	Choice	Total
●	Very important	217
●	Somewhat important	64
●	Not important	2

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 concerns. (Optional)

Friday, September 6, 2024 at 4:28 PM UTC

Lisa Stroup
1402 Dameron Rd
Bessemer City, NC 28016
910-929-6155
lstroup93@gmail.com

Friday, September 6, 2024 at 3:17 PM UTC

Bryant Kinney - bryantkinney@gmail.com

Wednesday, September 4, 2024 at 12:53 AM UTC

Sunday, September 1, 2024 at 4:49 PM UTC

Sunday, September 1, 2024 at 3:48 PM UTC

Answered: 277 **Unanswered:** 6

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
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
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
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
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
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
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.
P-3	Join to participate in the National Flood Insurance Program	Flood	High	Emergency Management	Local	Completed	The Town joined the NFIP on March 25, 2015. This action will be moved to the list of completed mitigation actions in 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 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
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
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
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
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
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
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
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
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
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
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
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
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
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

ction #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

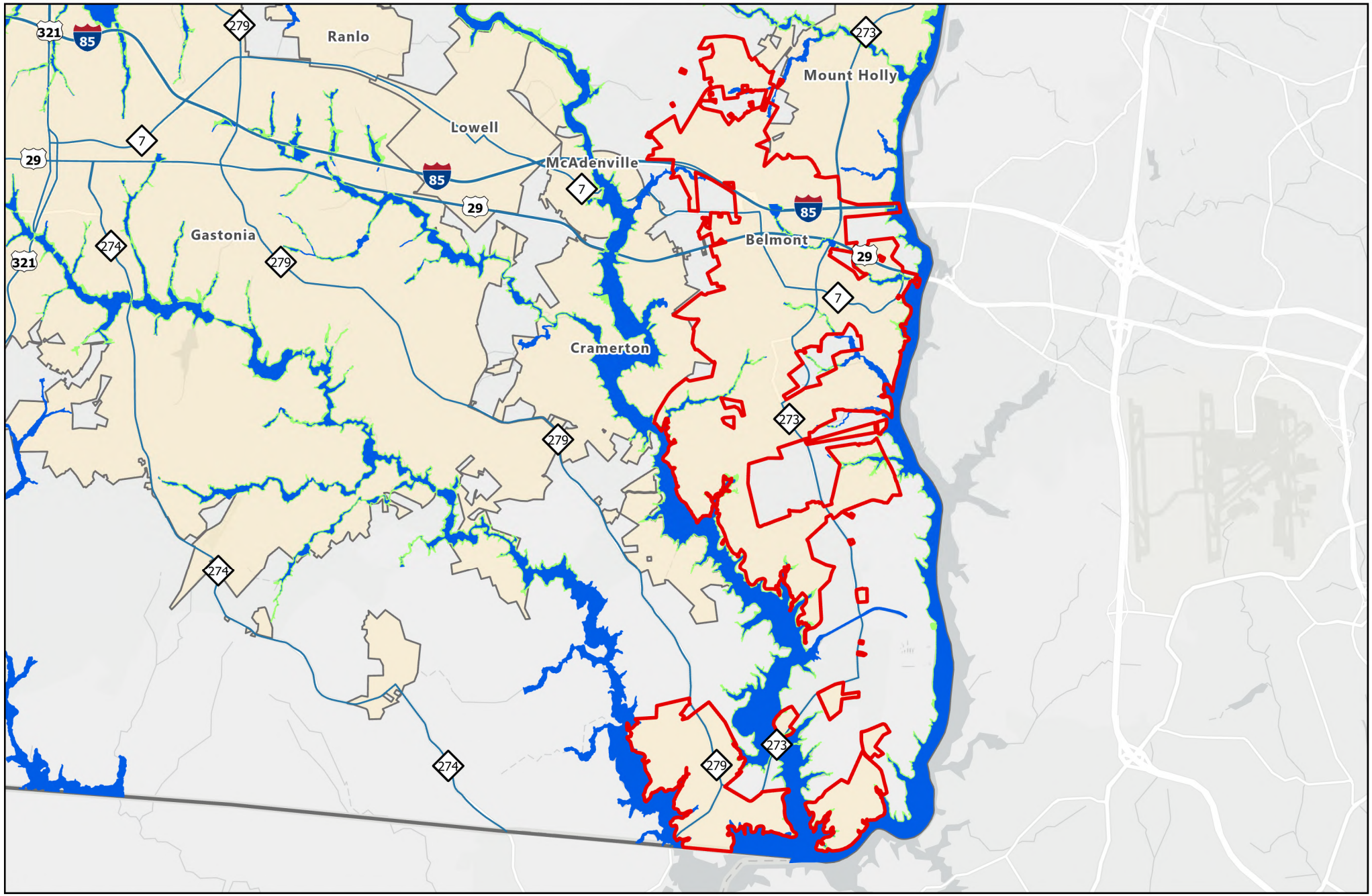
Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Potential Funding Sources	Implementation Schedule	Implementation Status
Prevention							
P-1	Encourage developers not to modify flood plain and to work with the natural yield of the land.	Flood	High	P&ID	Local	Completed	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
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
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

Belmont - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

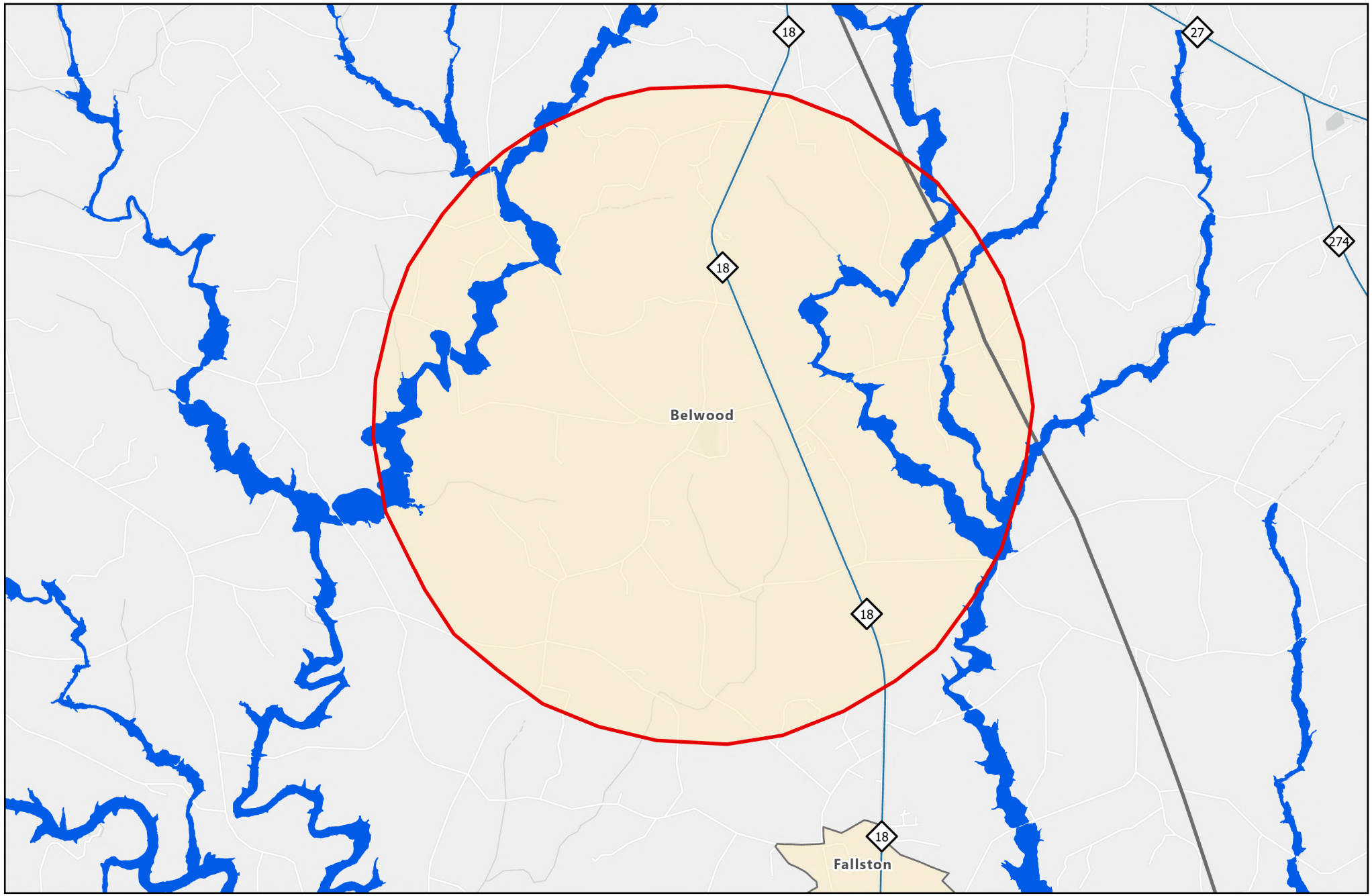
- 500-Year Flood Zone
- 100-Year Flood Zone

0 1.25 2.5 5 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Belwood - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

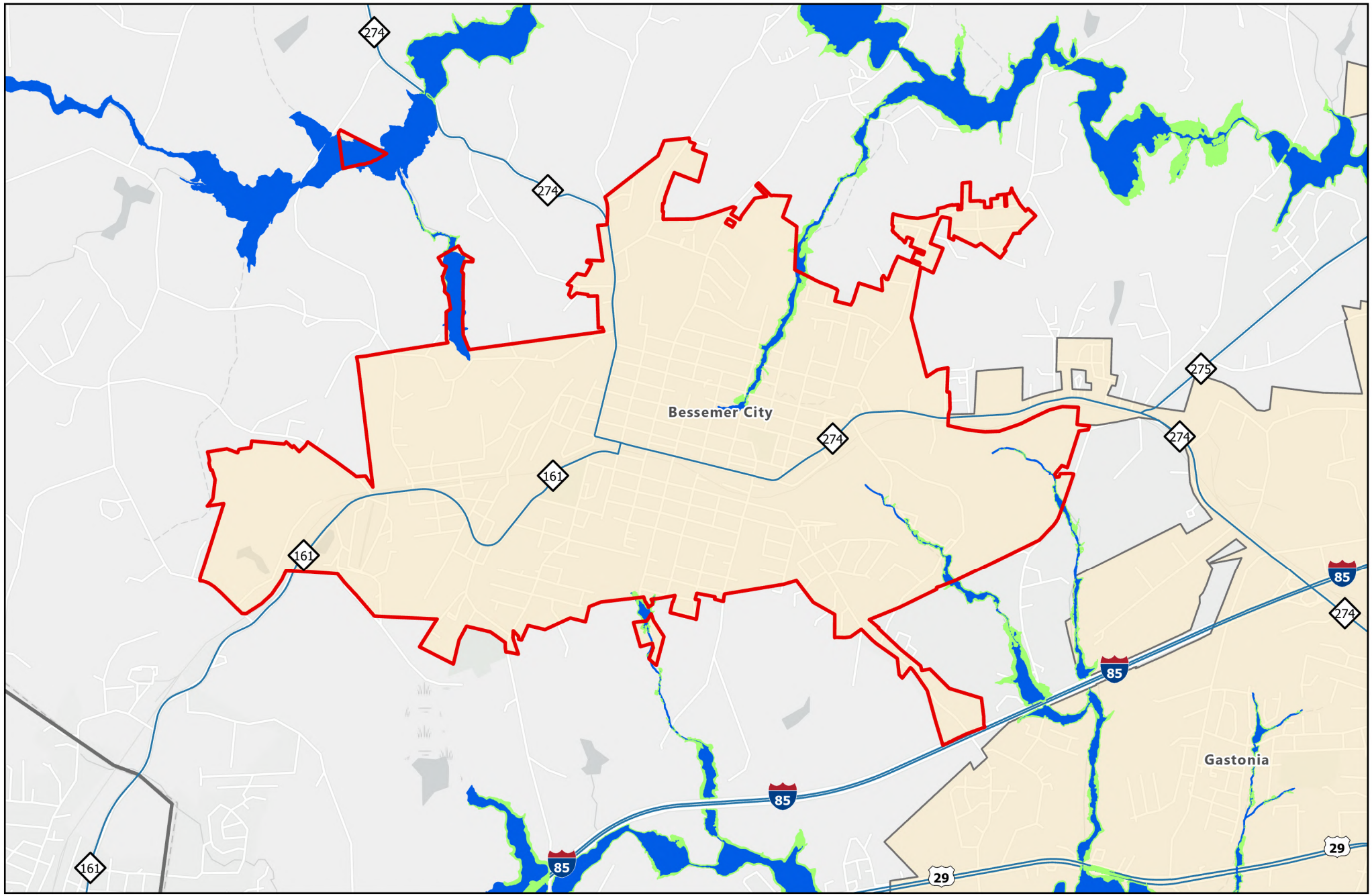
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Bessemer City - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

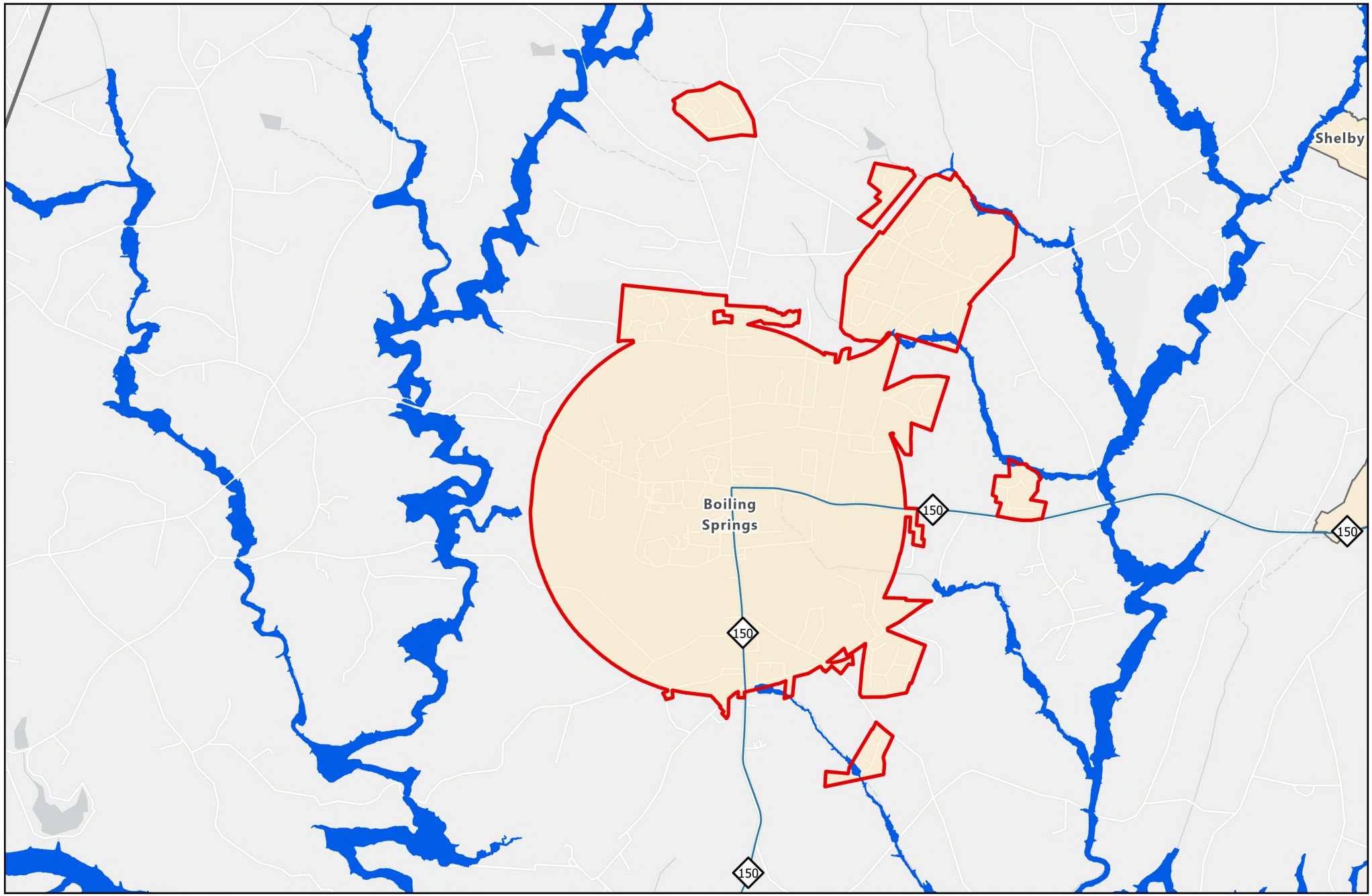
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

N

Boiling Springs - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

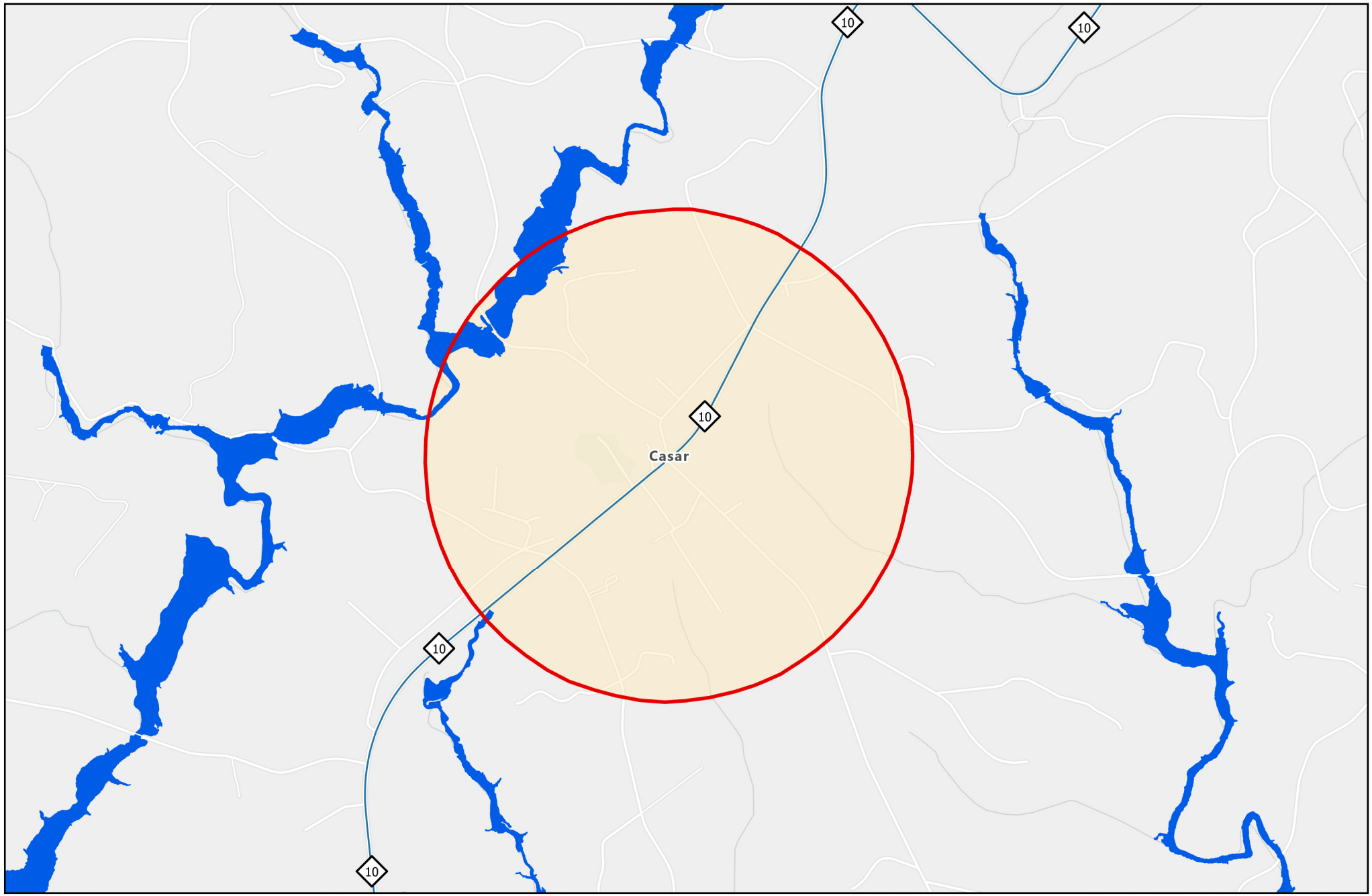
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Casar - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

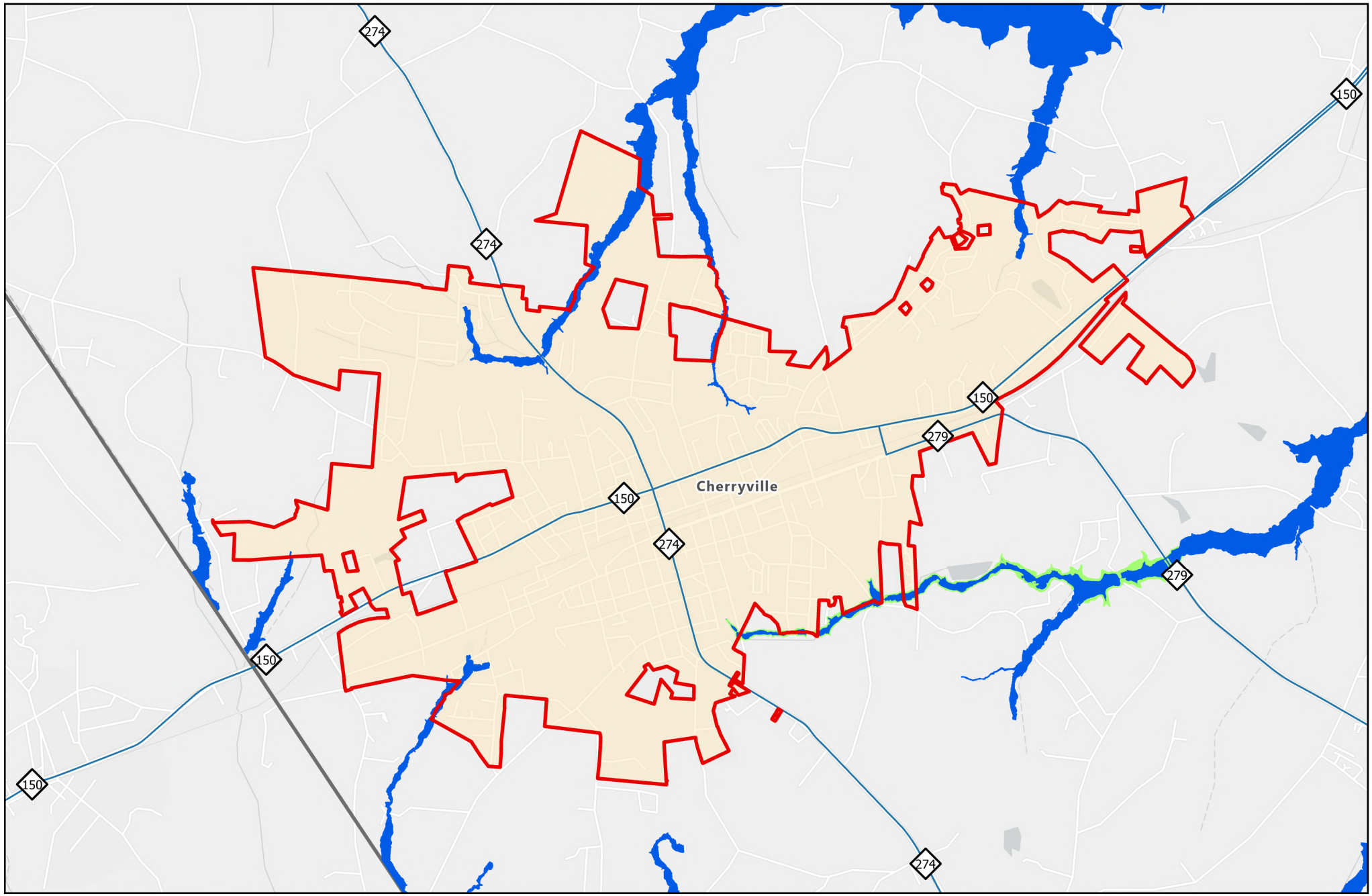
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Cherryville - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

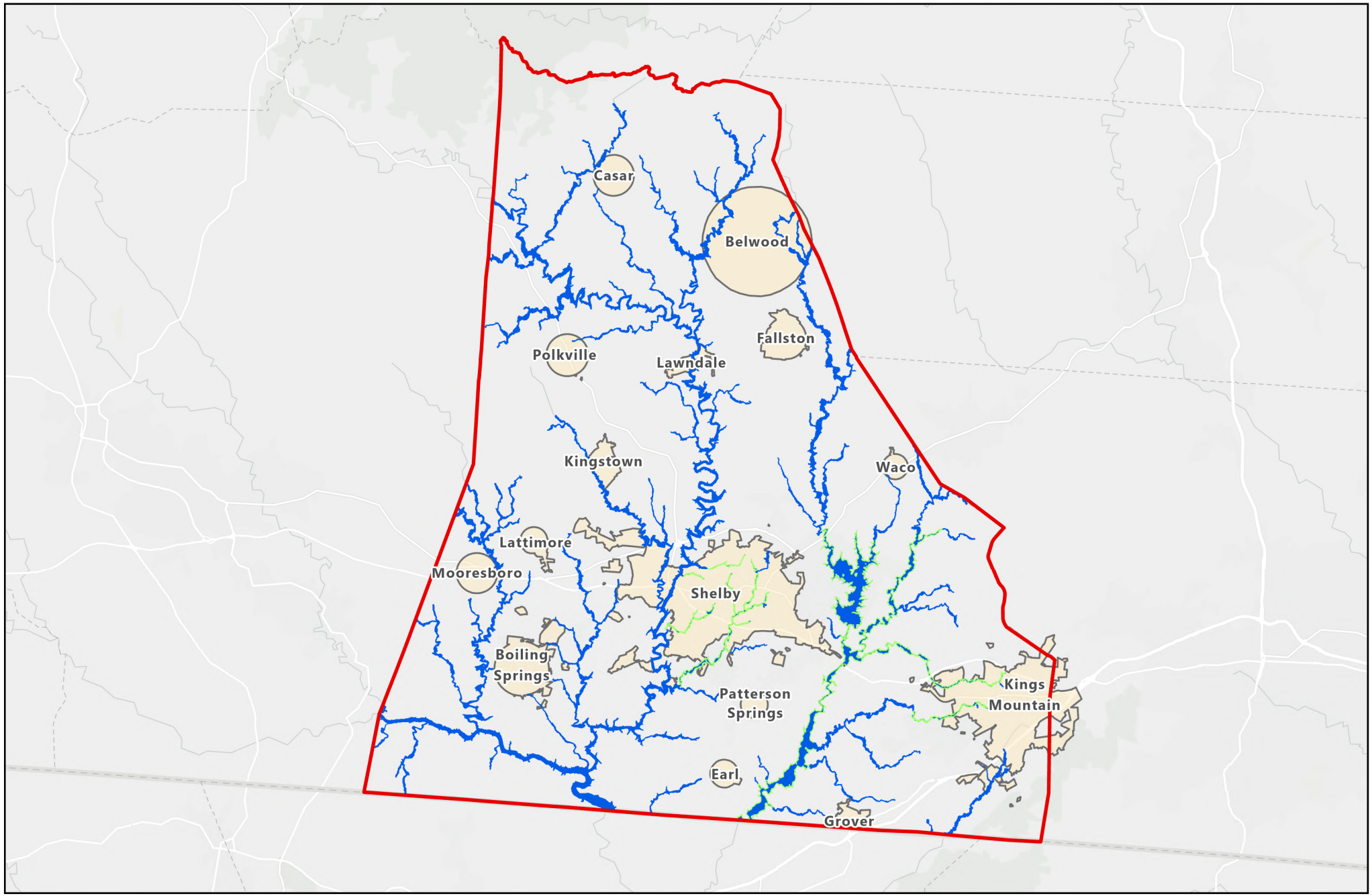
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

N

Cleveland County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

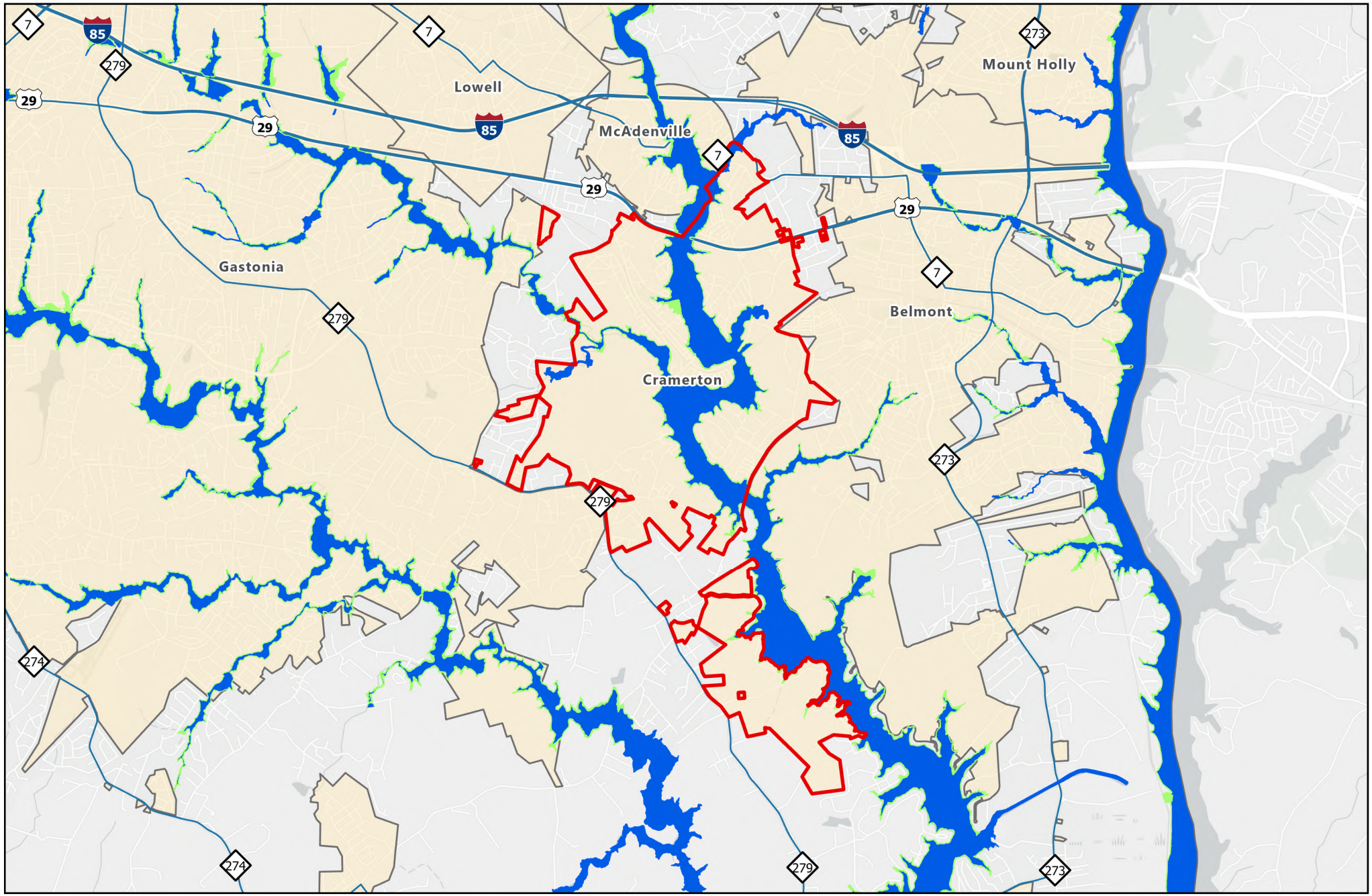
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4 8 16 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Cramerton - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

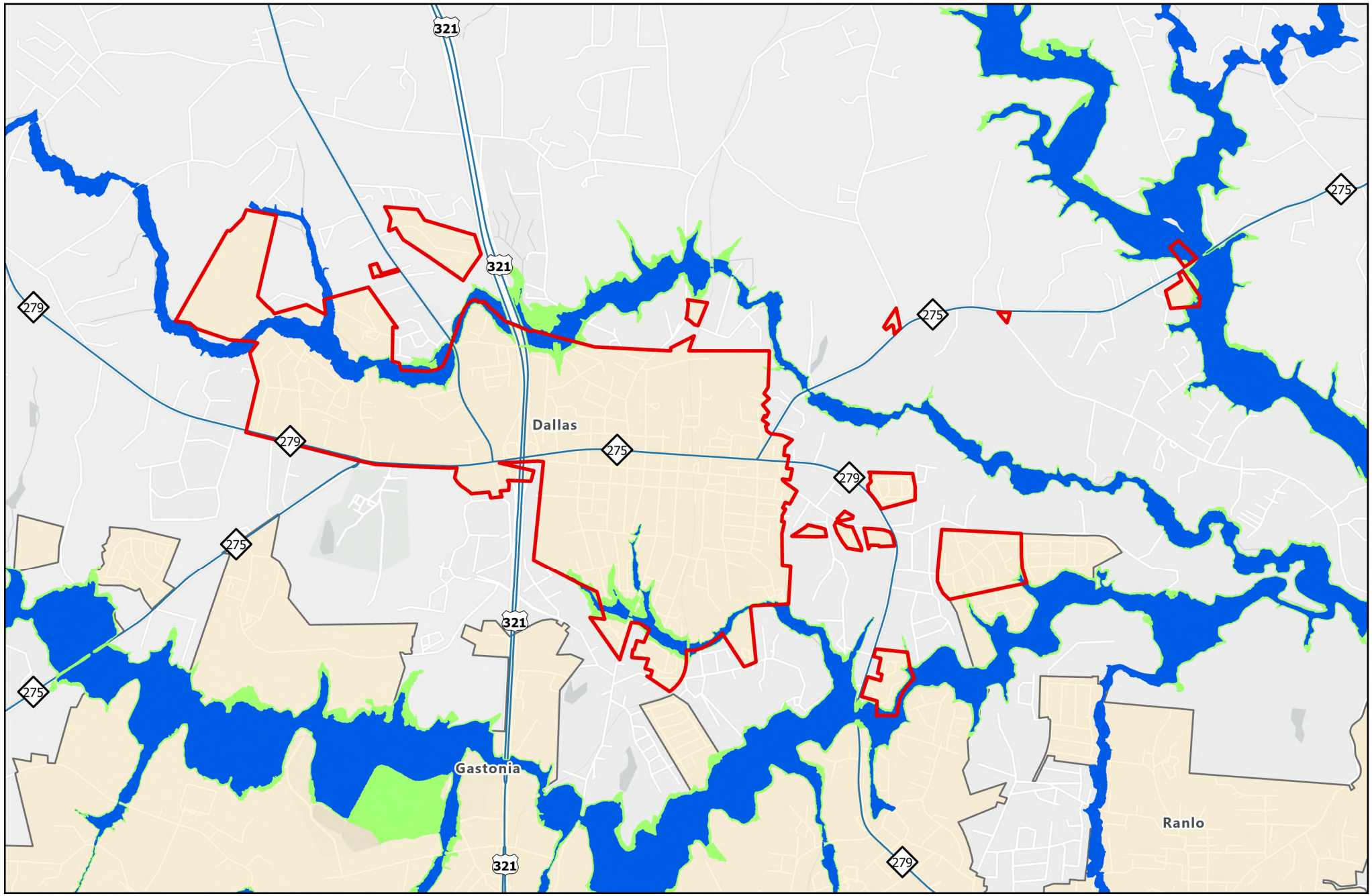
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.75 1.5 3 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

N

Dallas - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

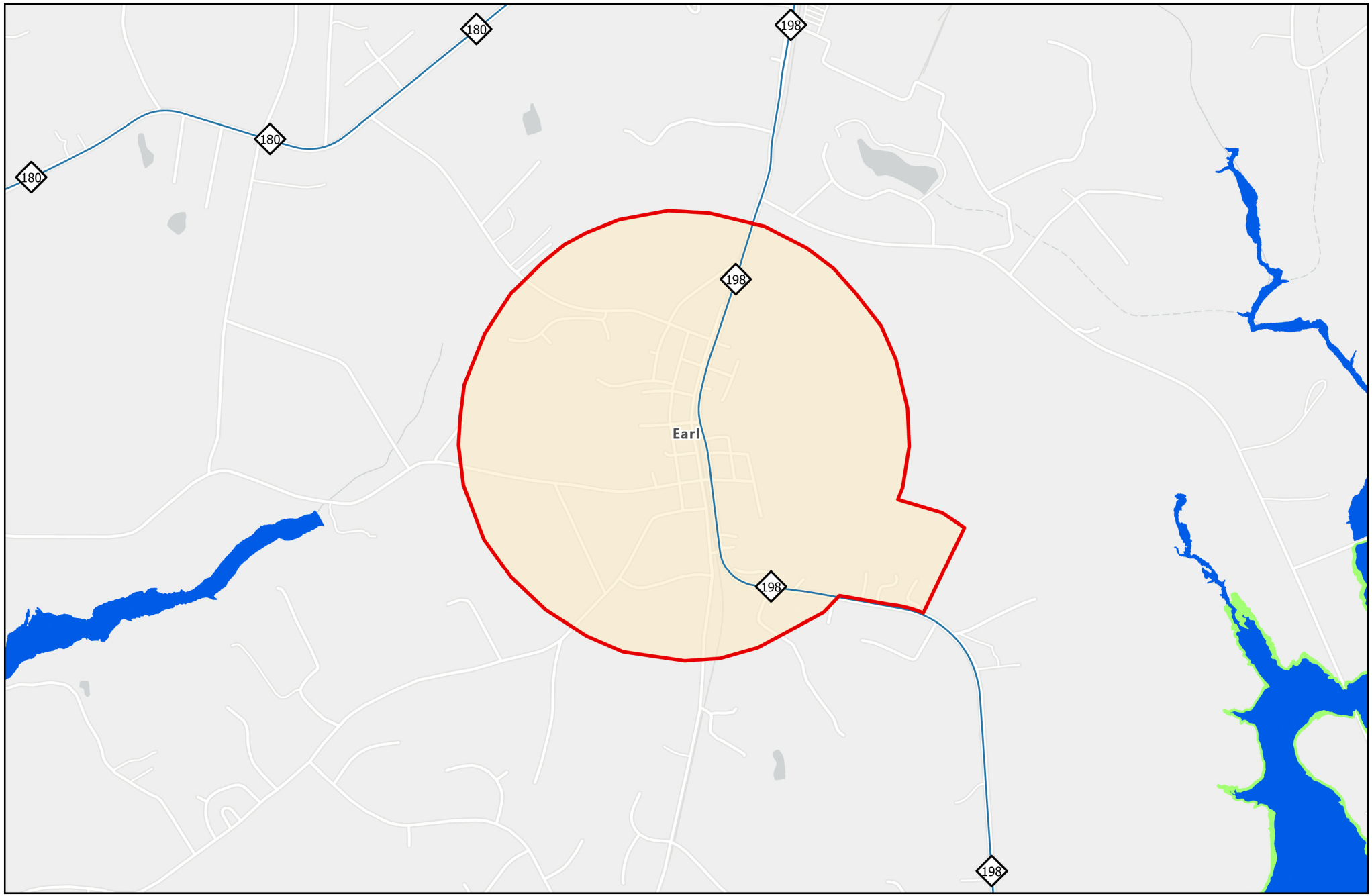
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Earl - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

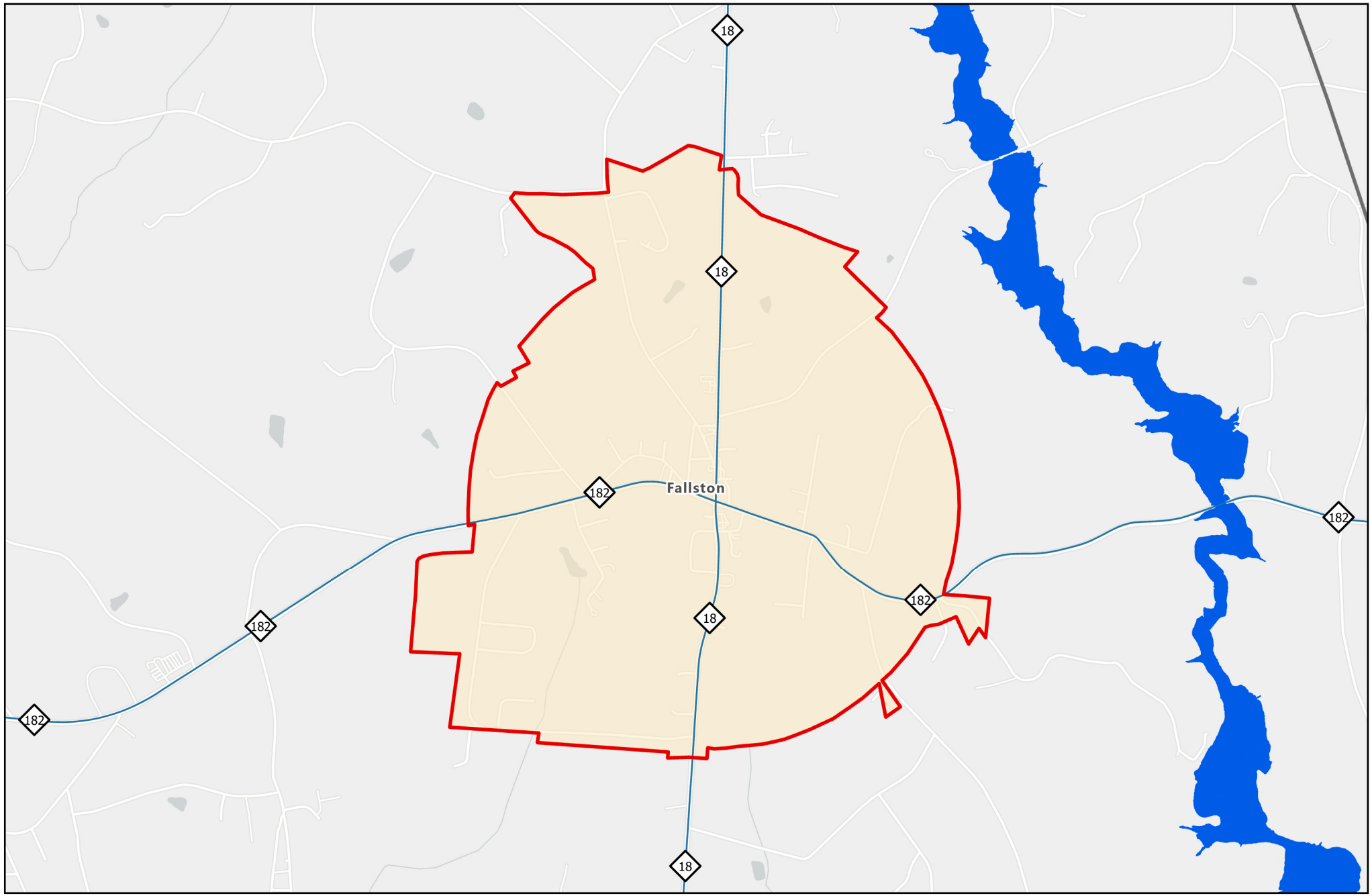
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Fallston - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

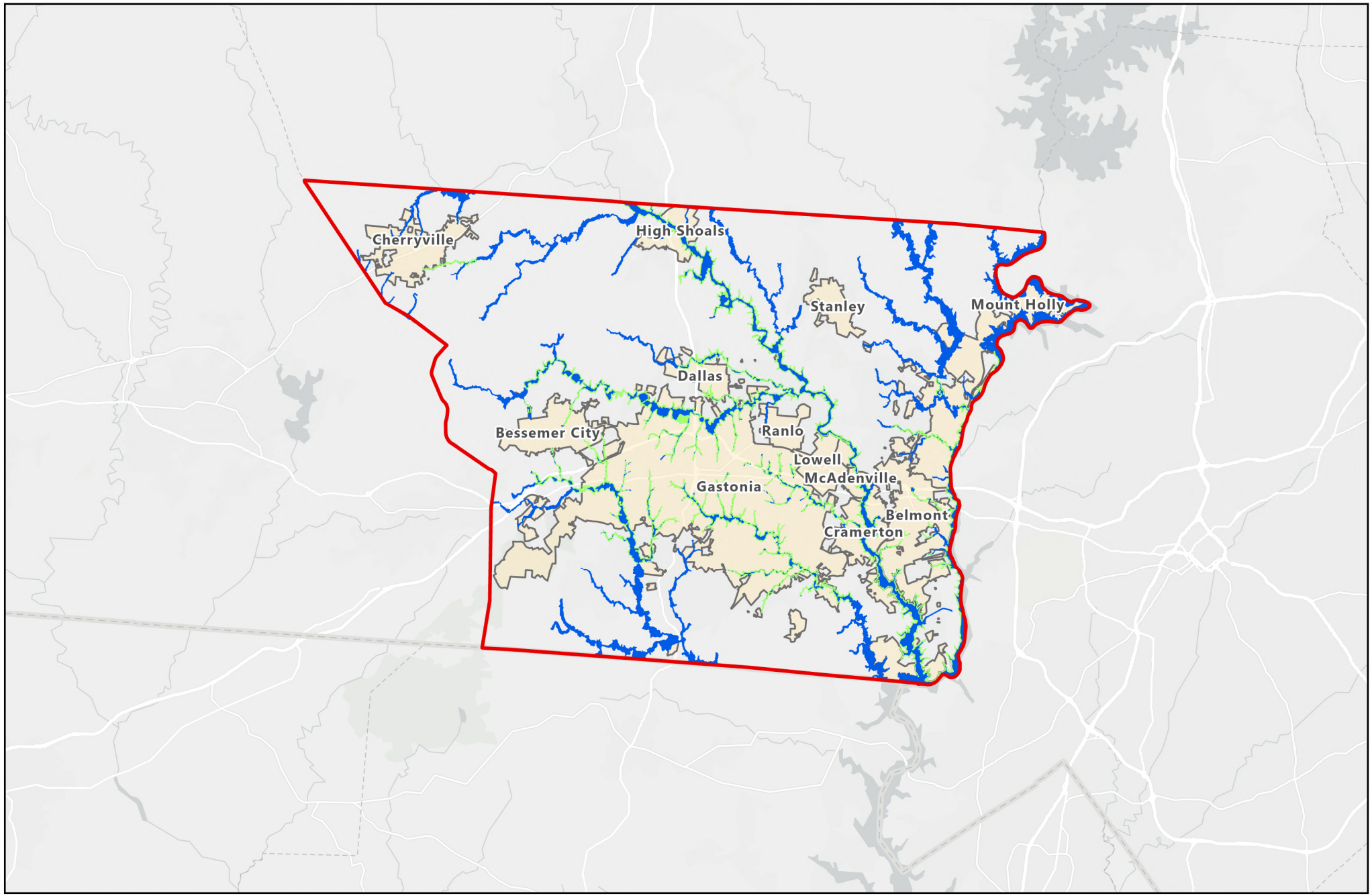
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Gaston County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

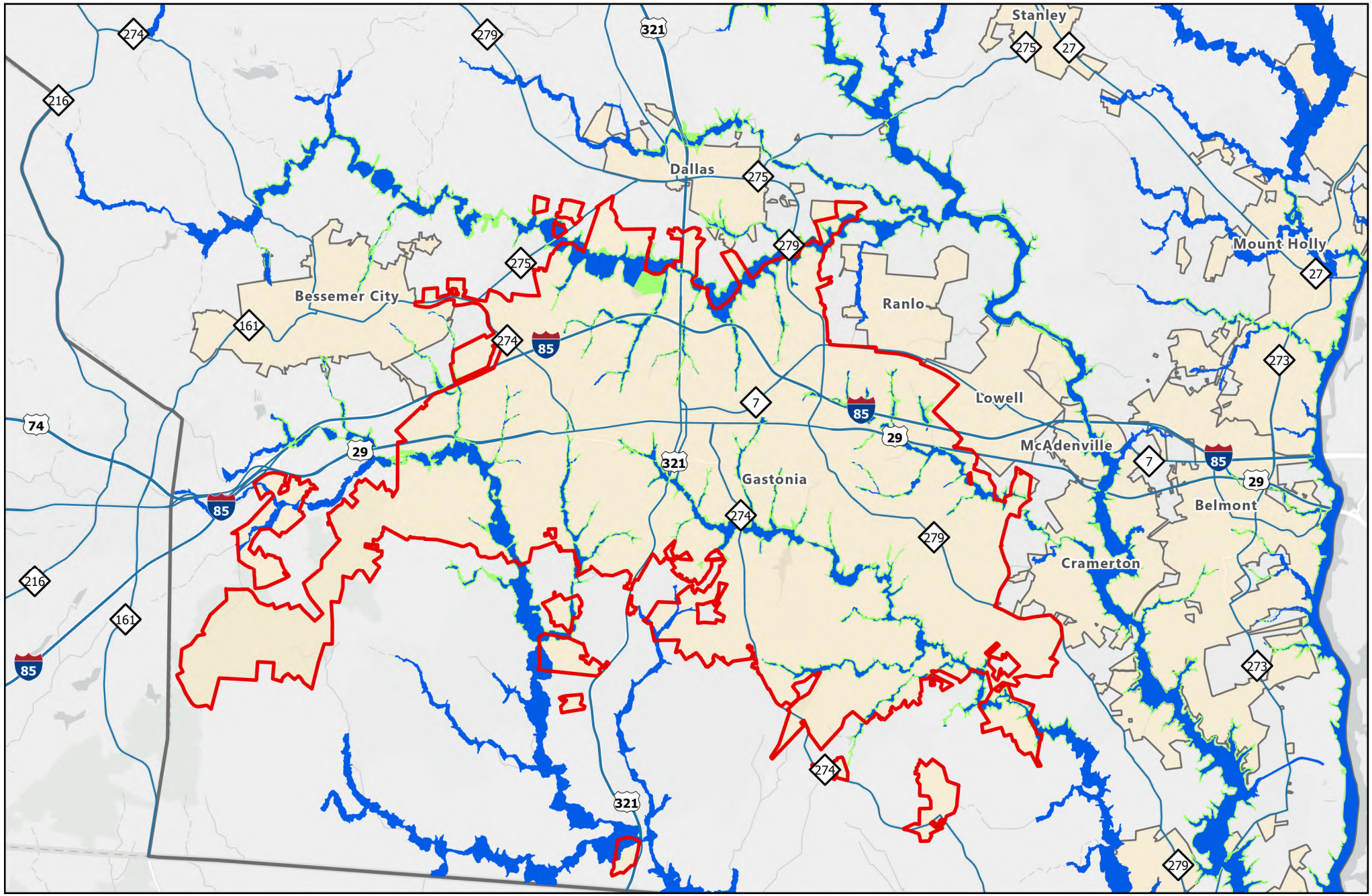
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4 8 16 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Gastonia - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

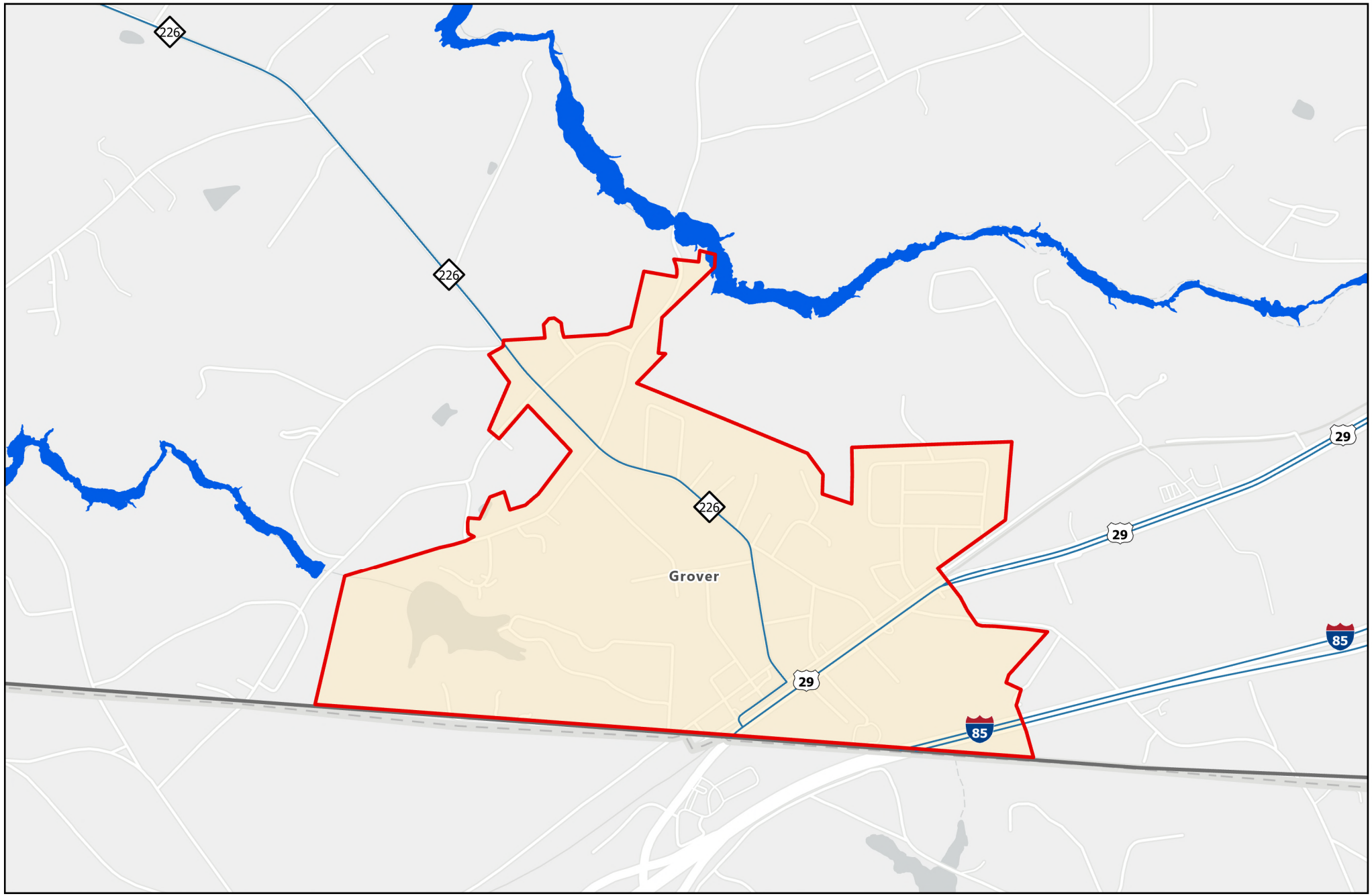
- 500-Year Flood Zone
- 100-Year Flood Zone

0 1.5 3 6 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Grover - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

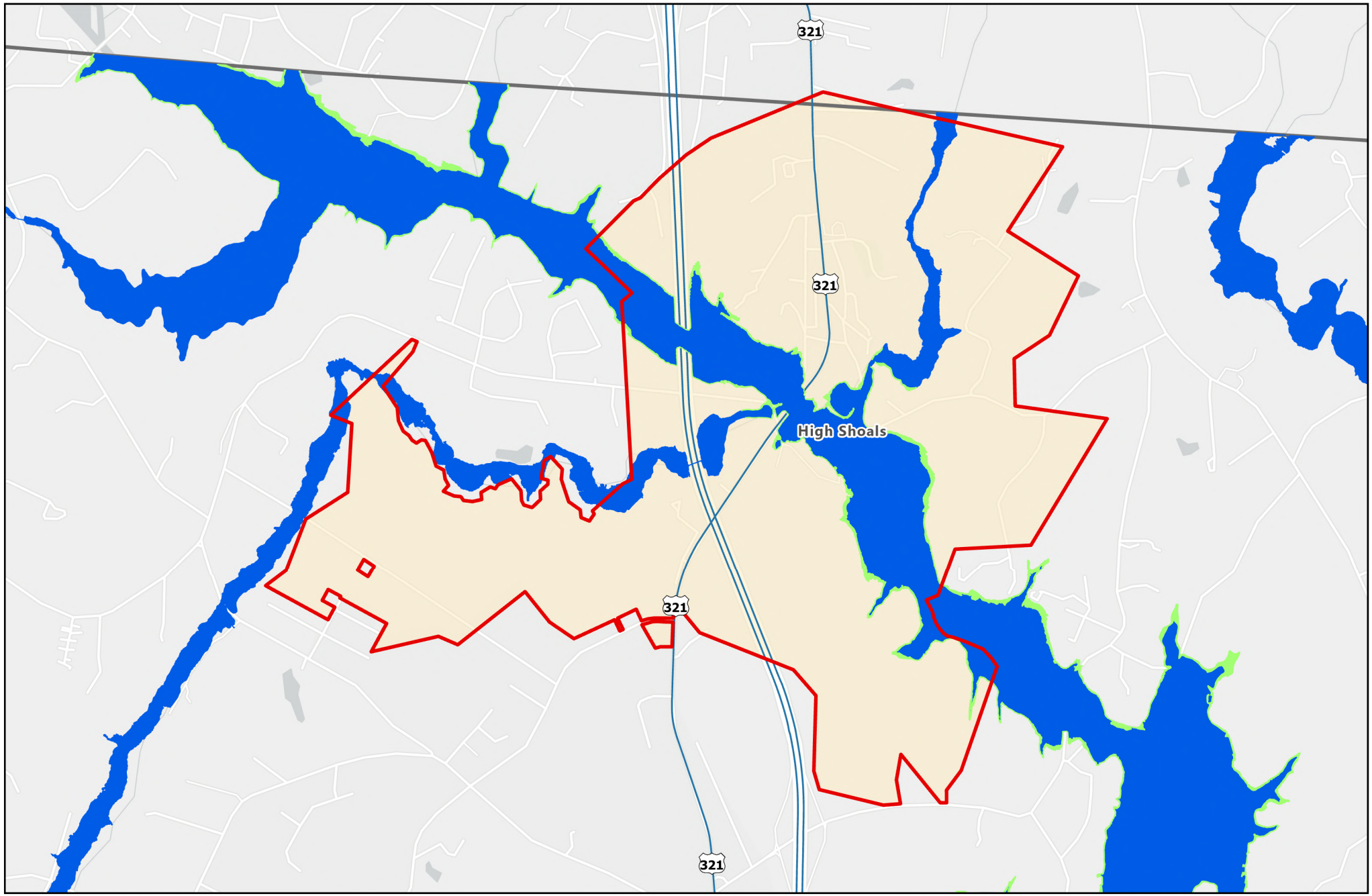
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

High Shoals - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

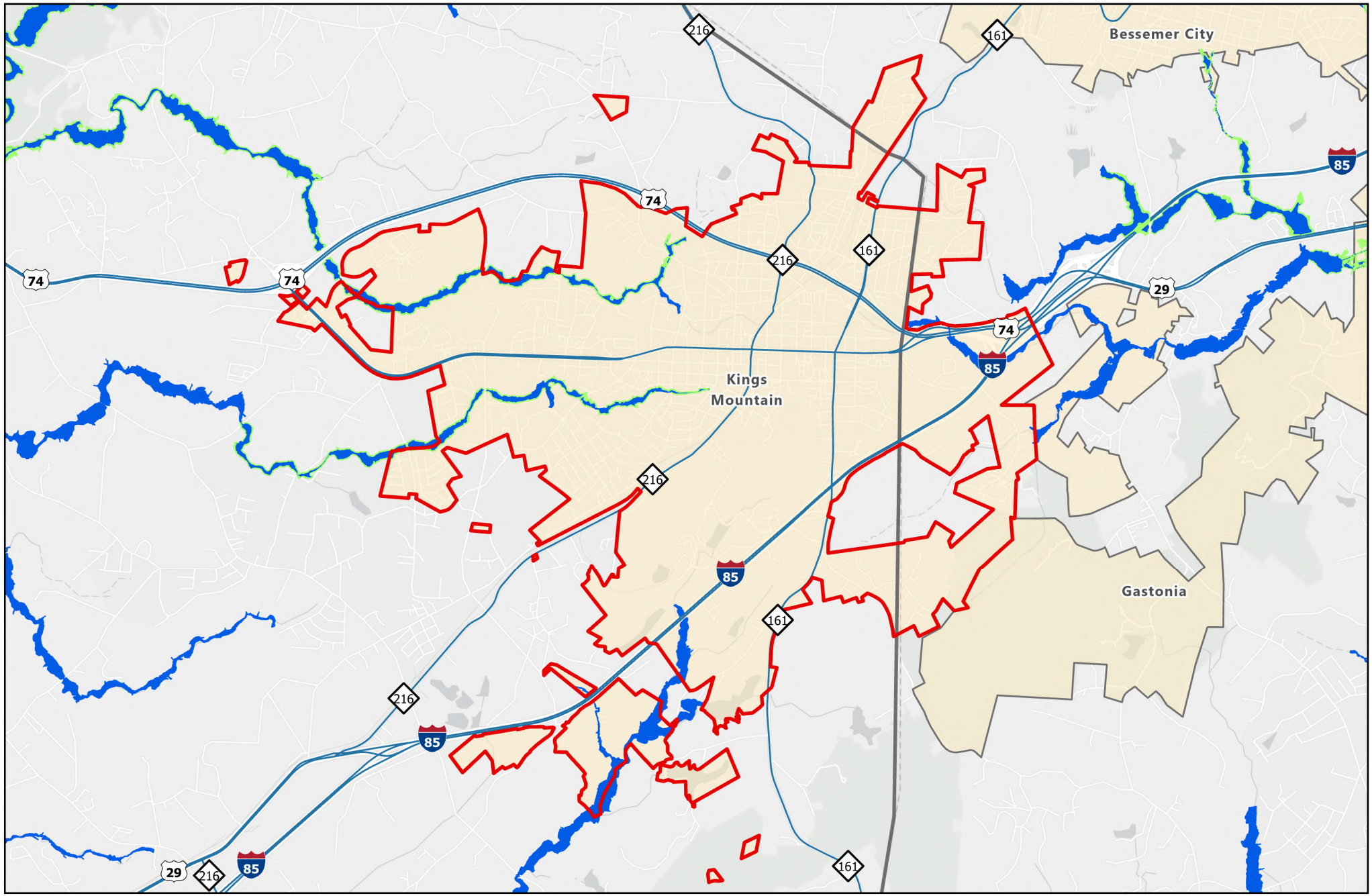
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Kings Mountain - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

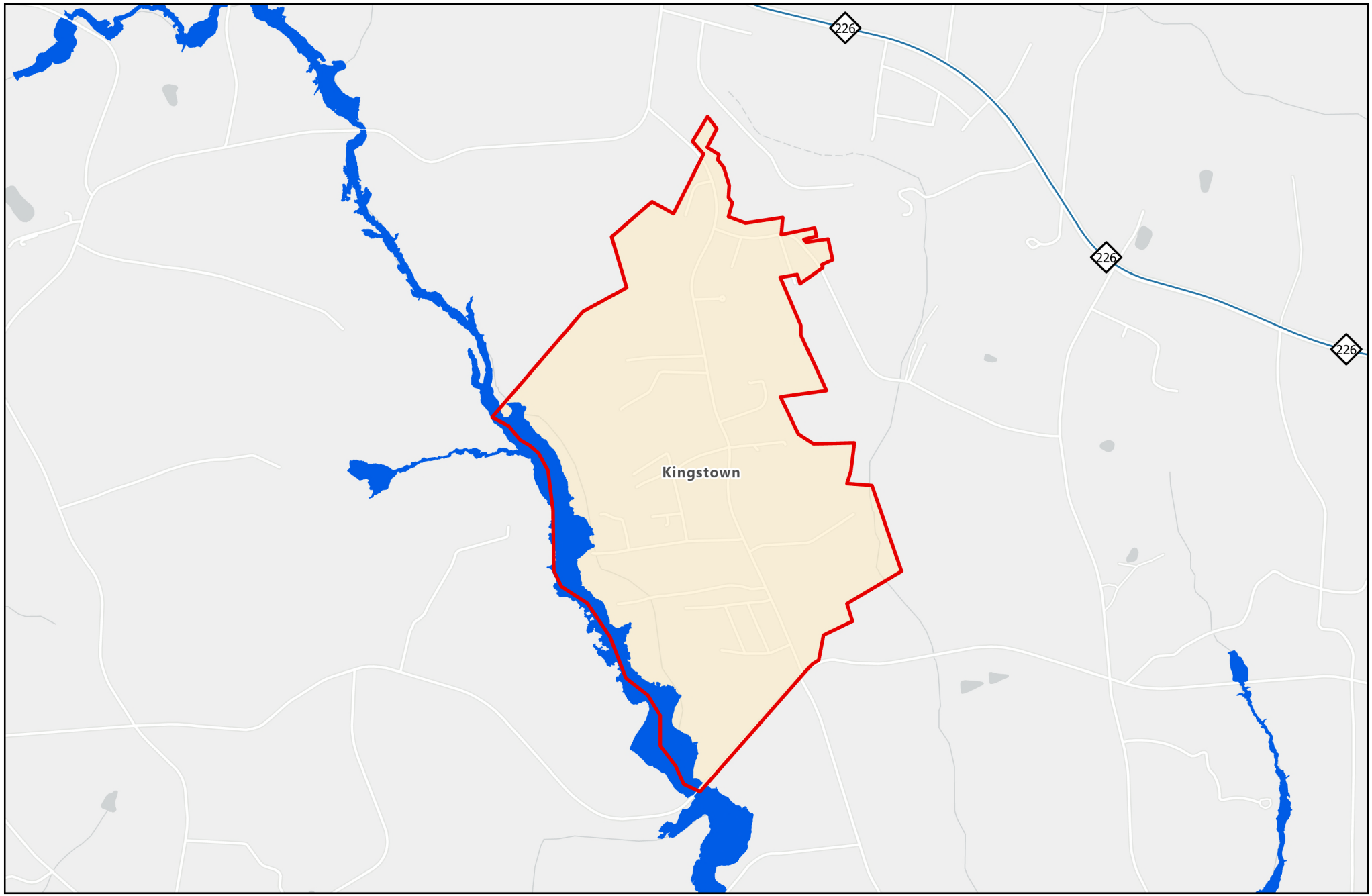
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.75 1.5 3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Kingstown - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

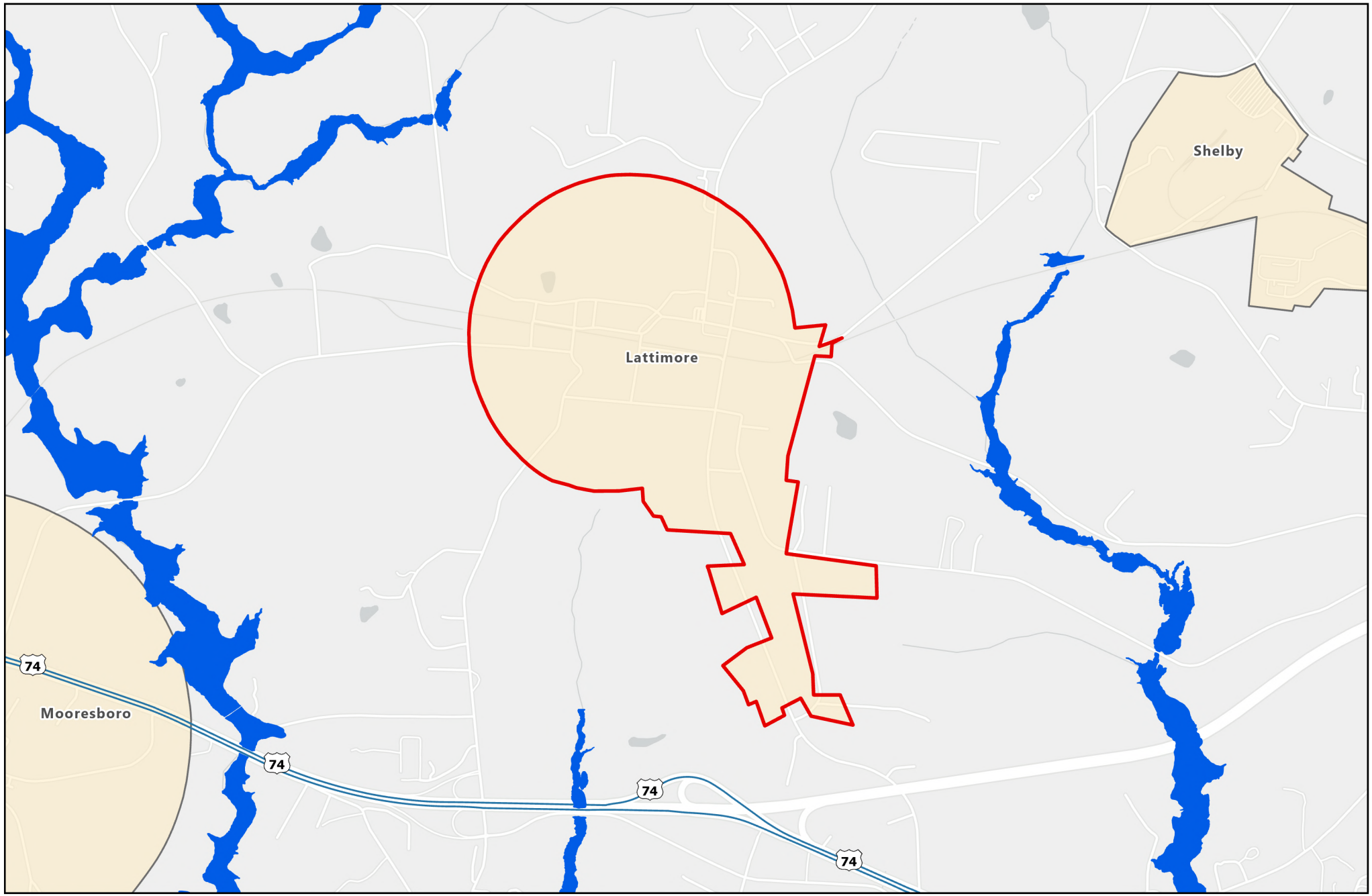
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Lattimore - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

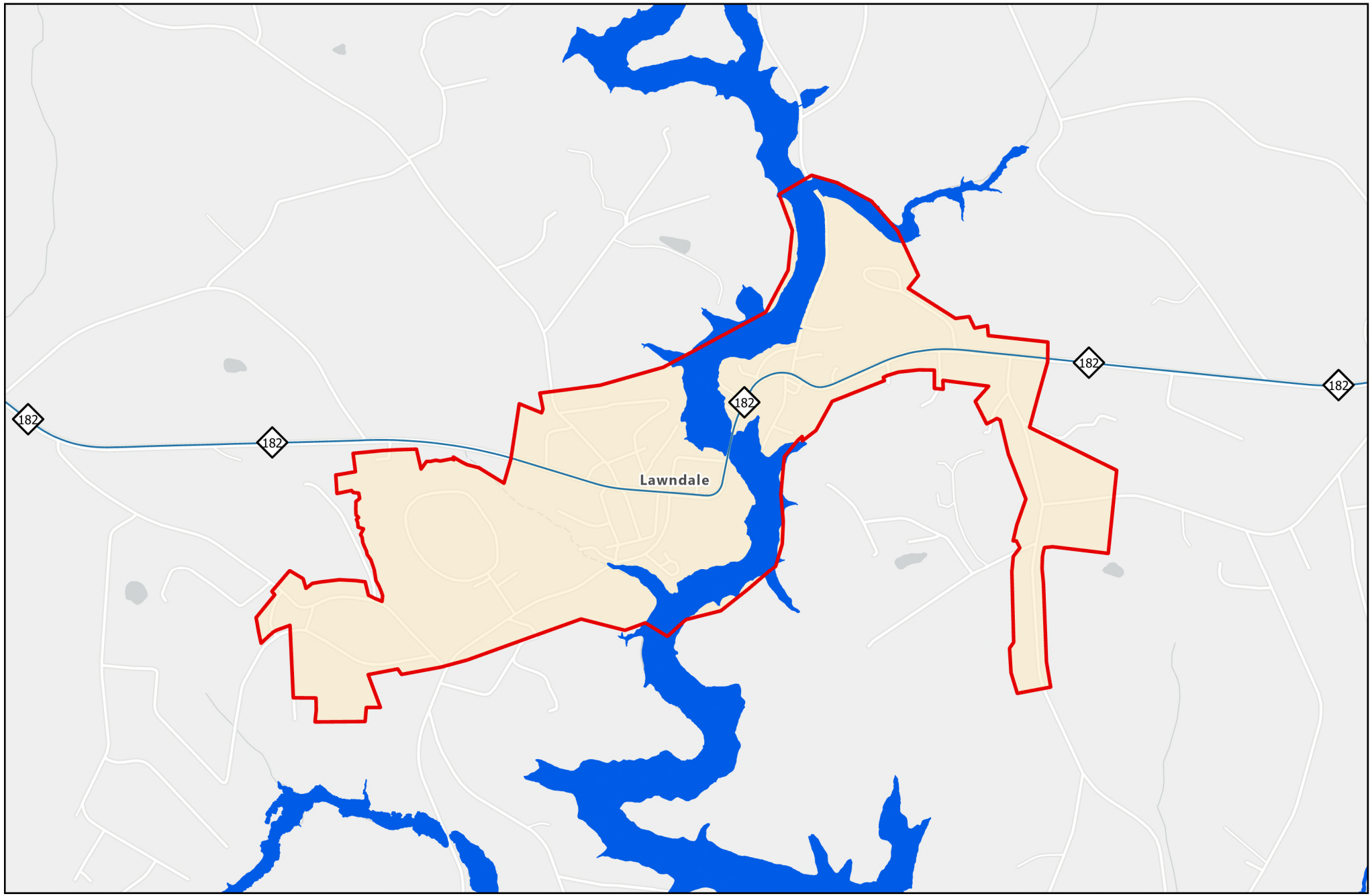
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Lawndale - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

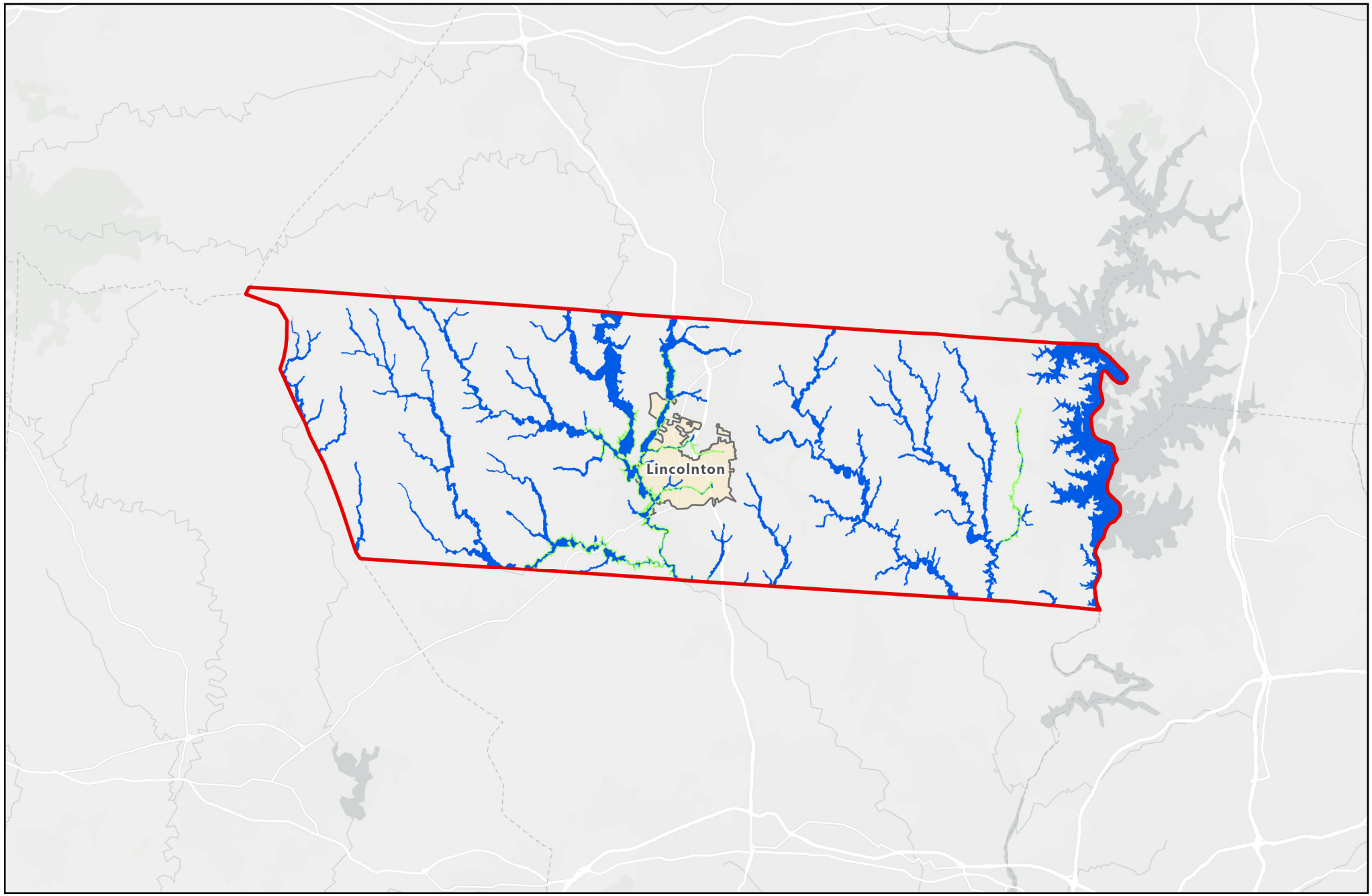
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Lincoln County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

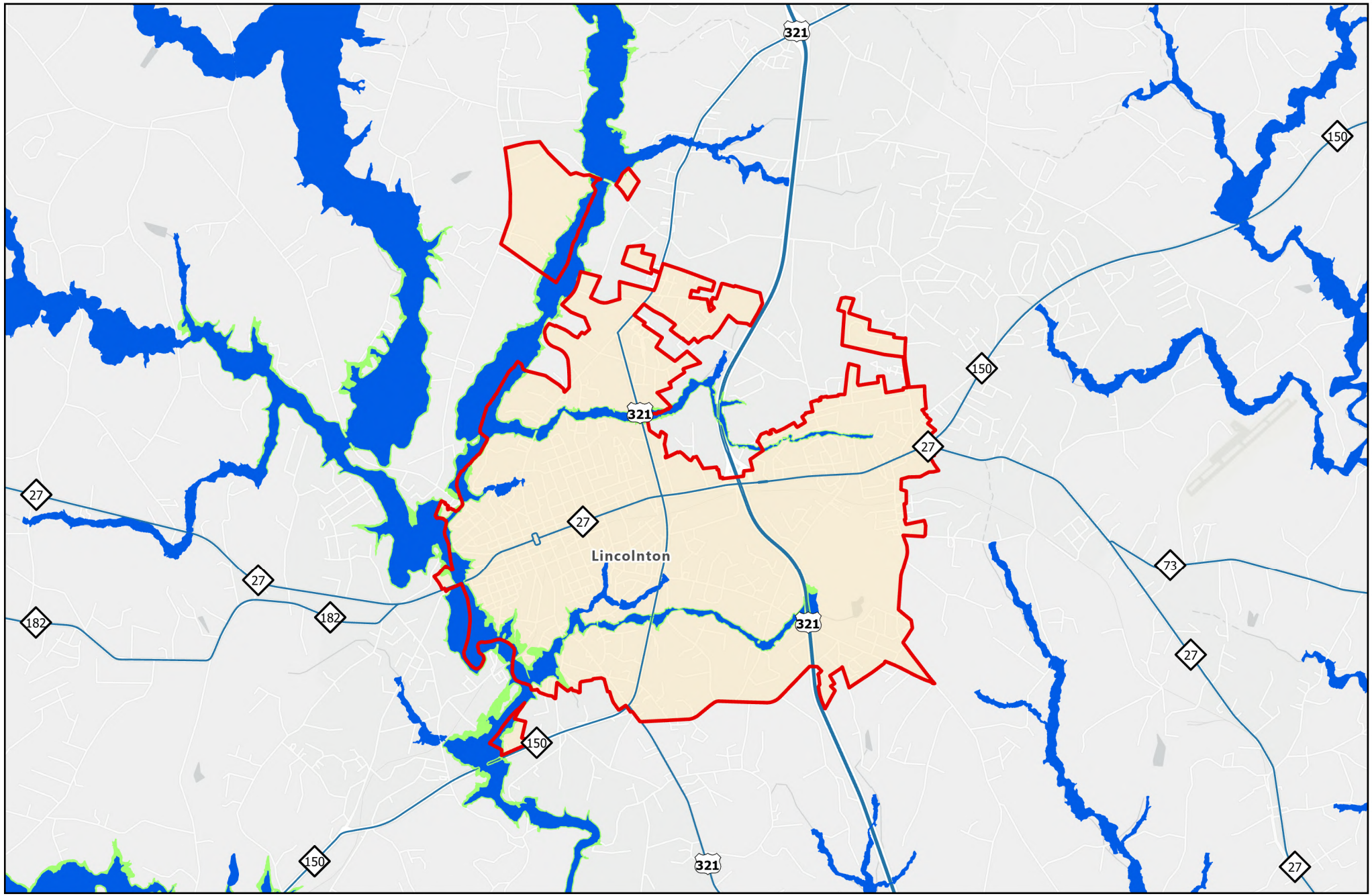
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4 8 16 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37109C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: N/A

Lincolnton - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

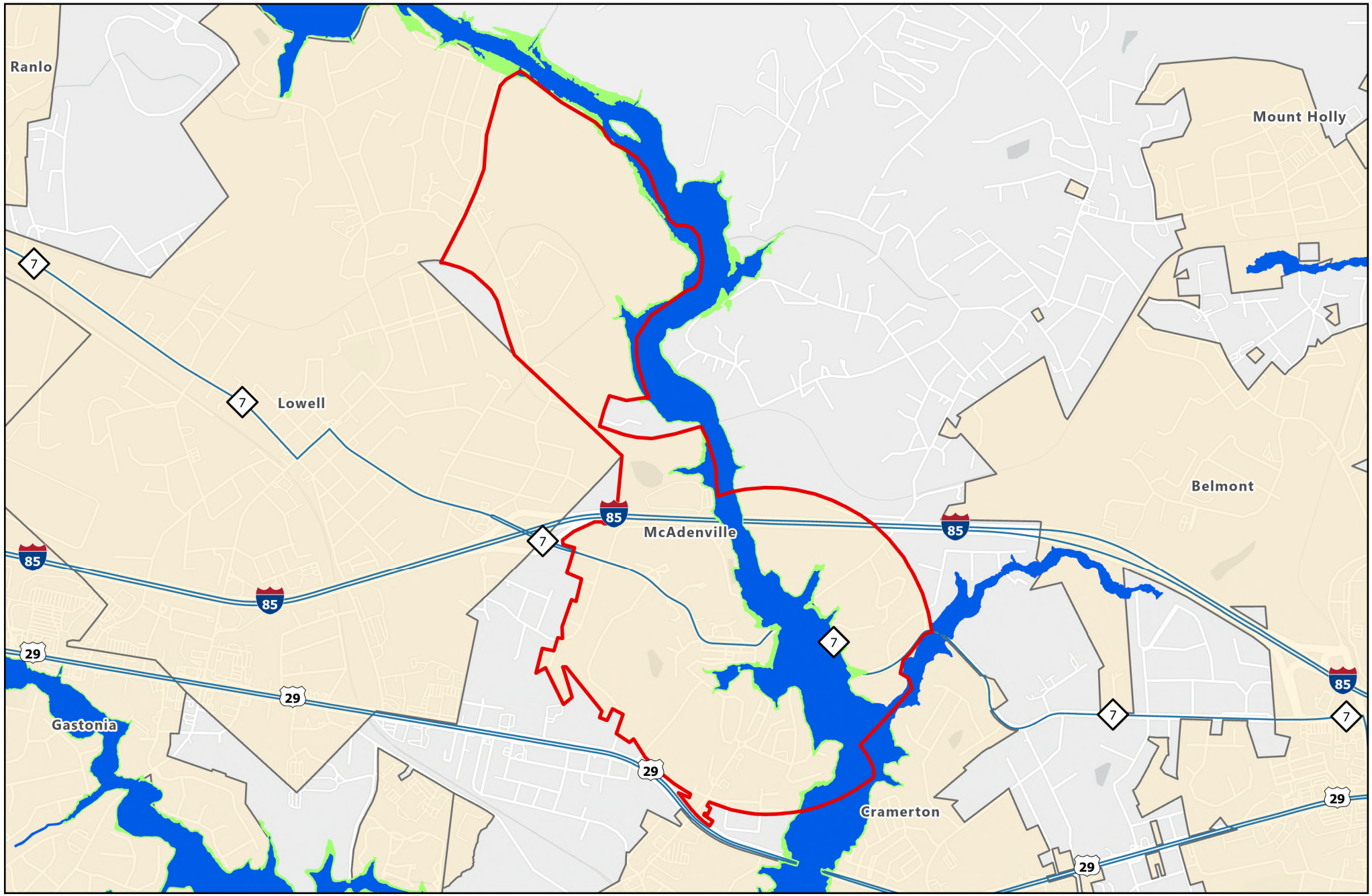
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.75 1.5 3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37109C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: N/A

McAdenville - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

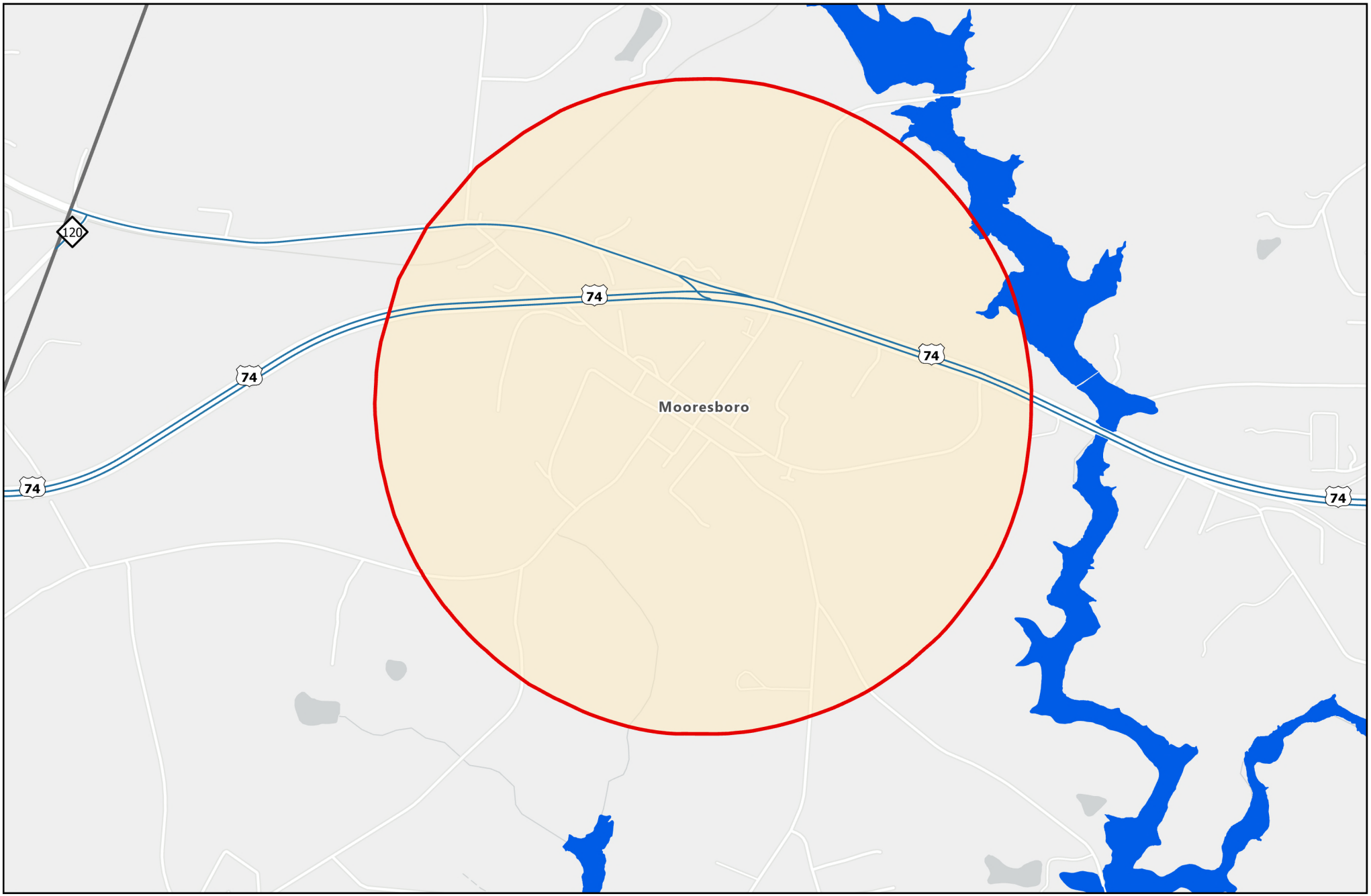
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Mooresboro - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

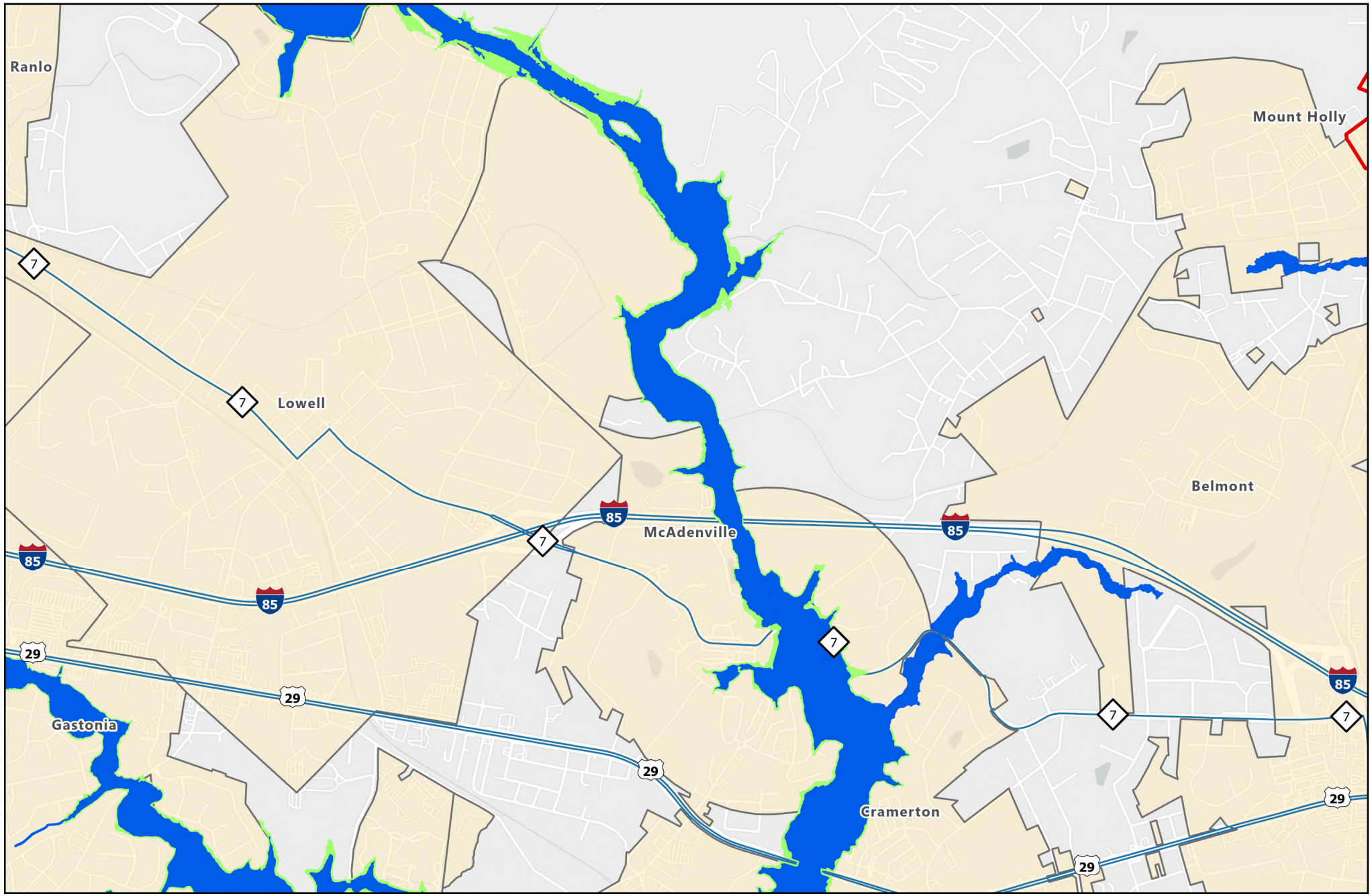
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Mount Holly - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

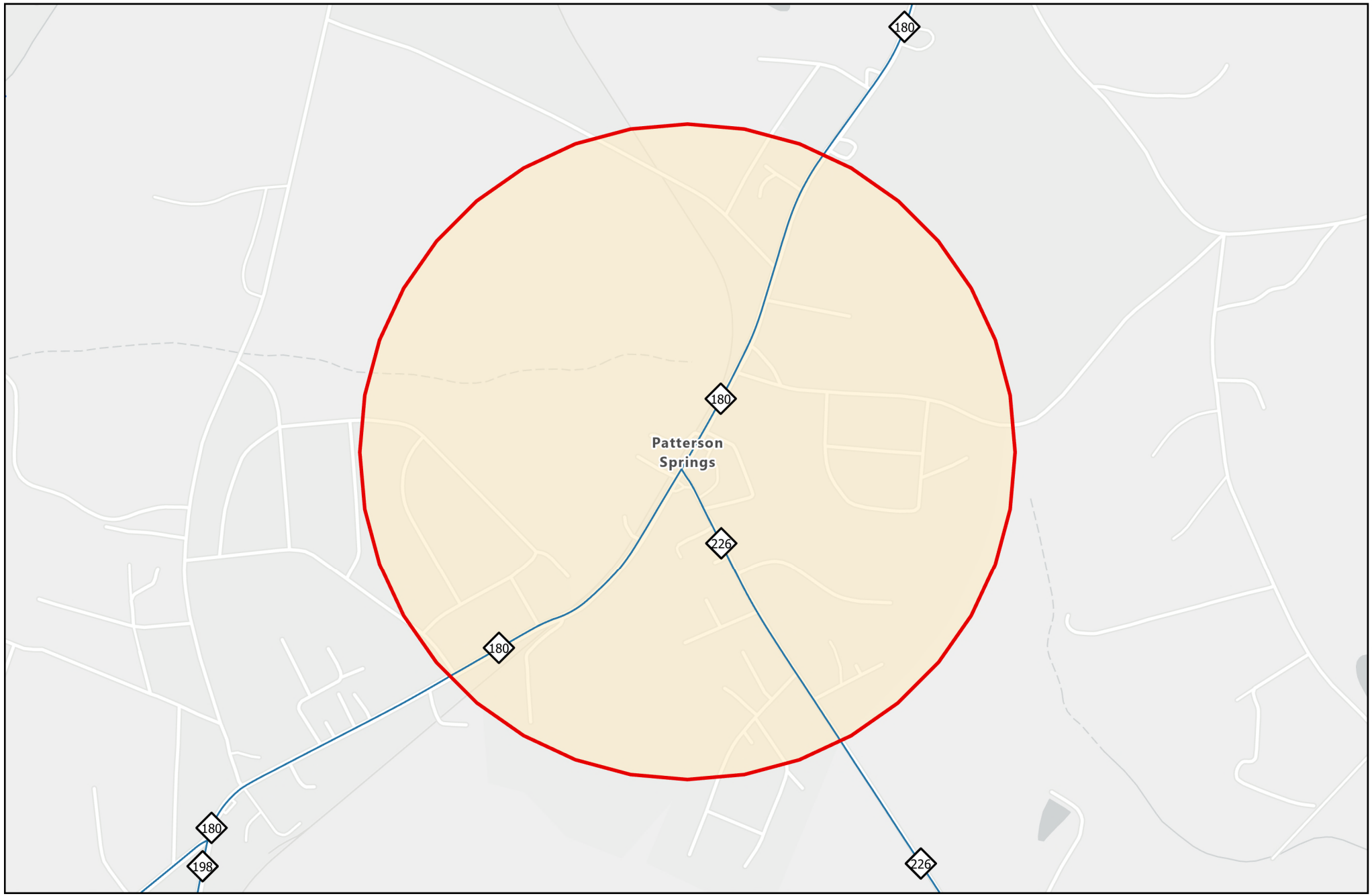
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

N

Patterson Springs - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

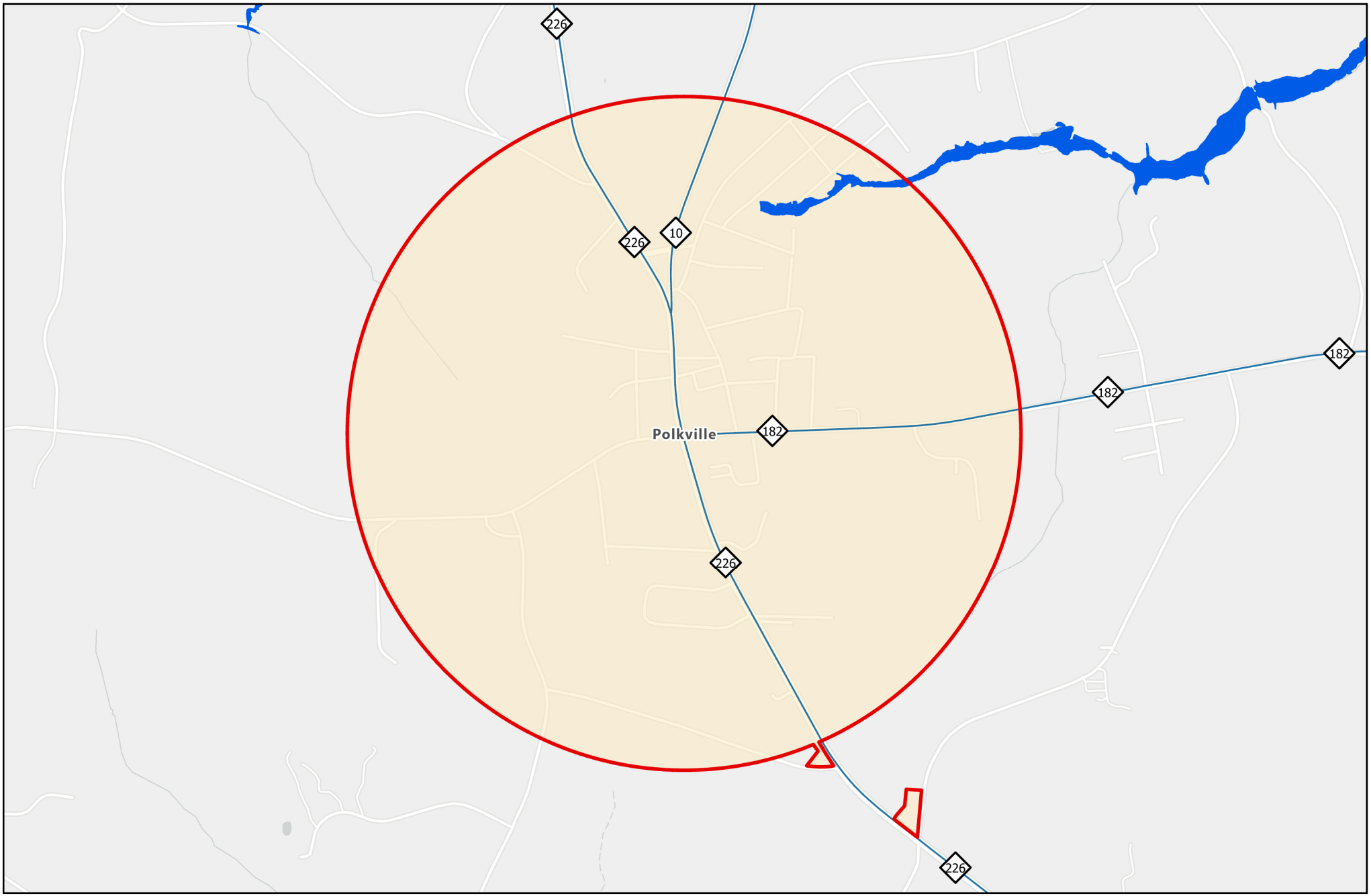
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.15 0.3 0.6 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Polkville - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

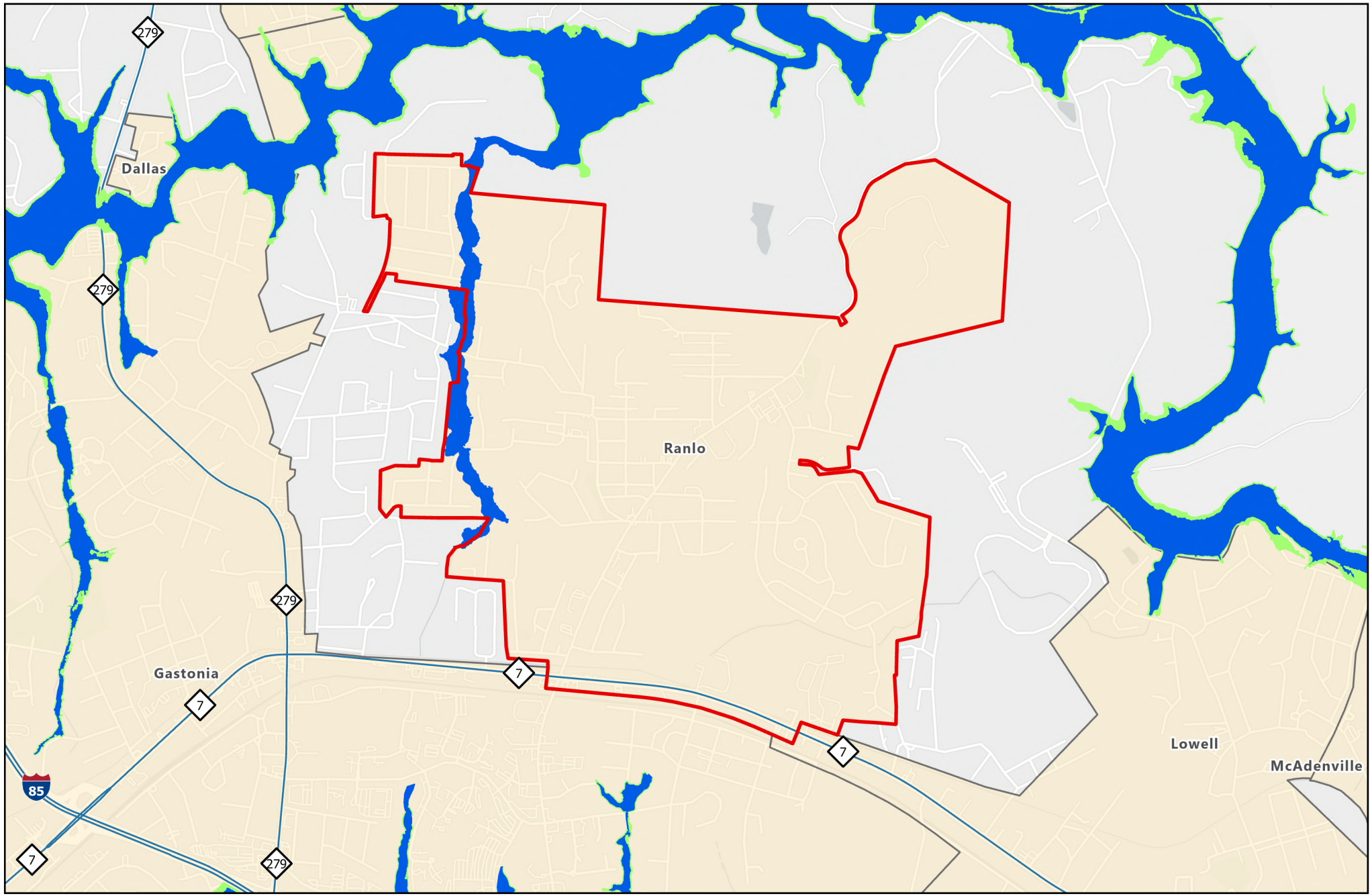
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

N

Ranlo - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

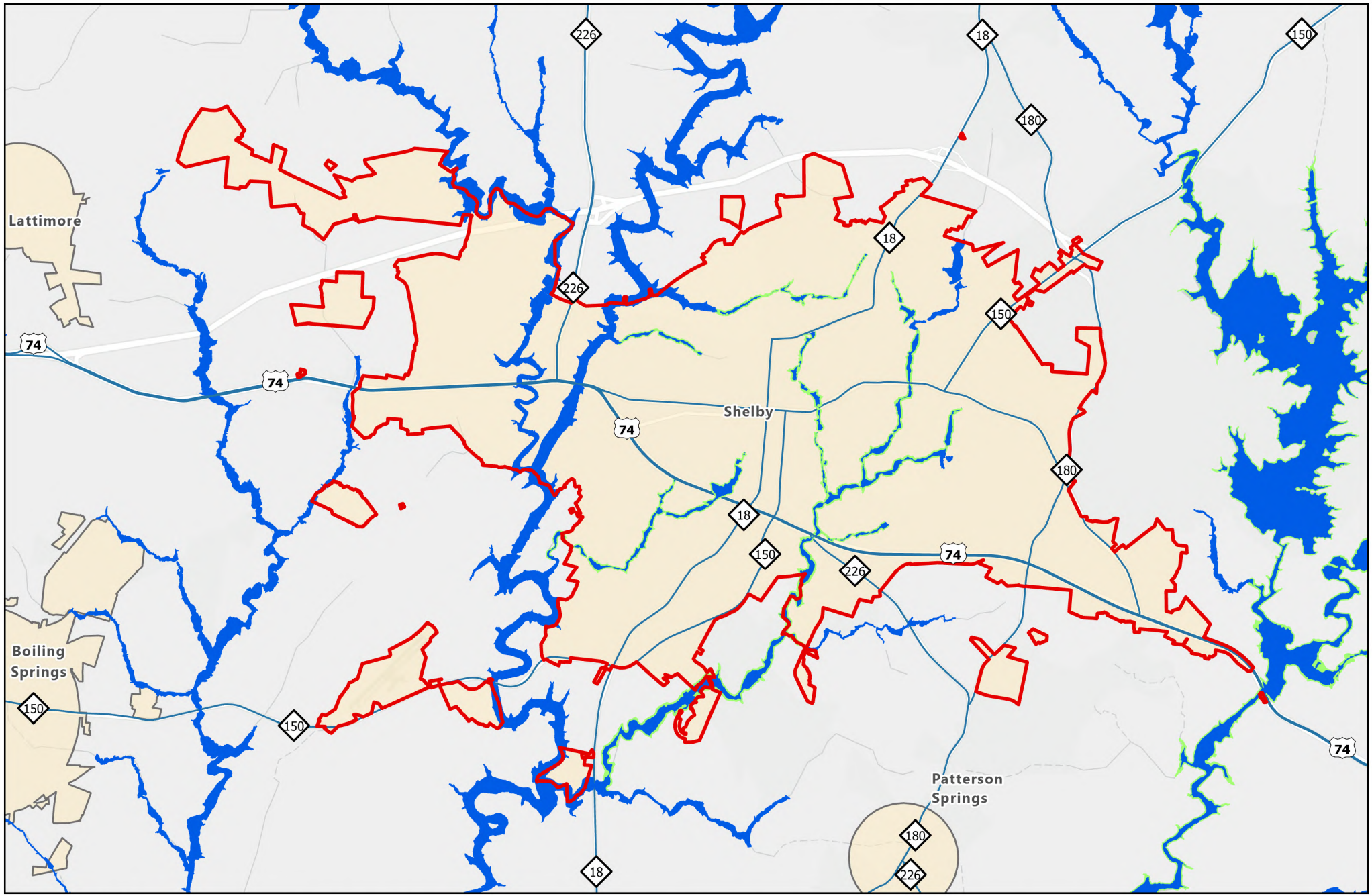
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

Shelby - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

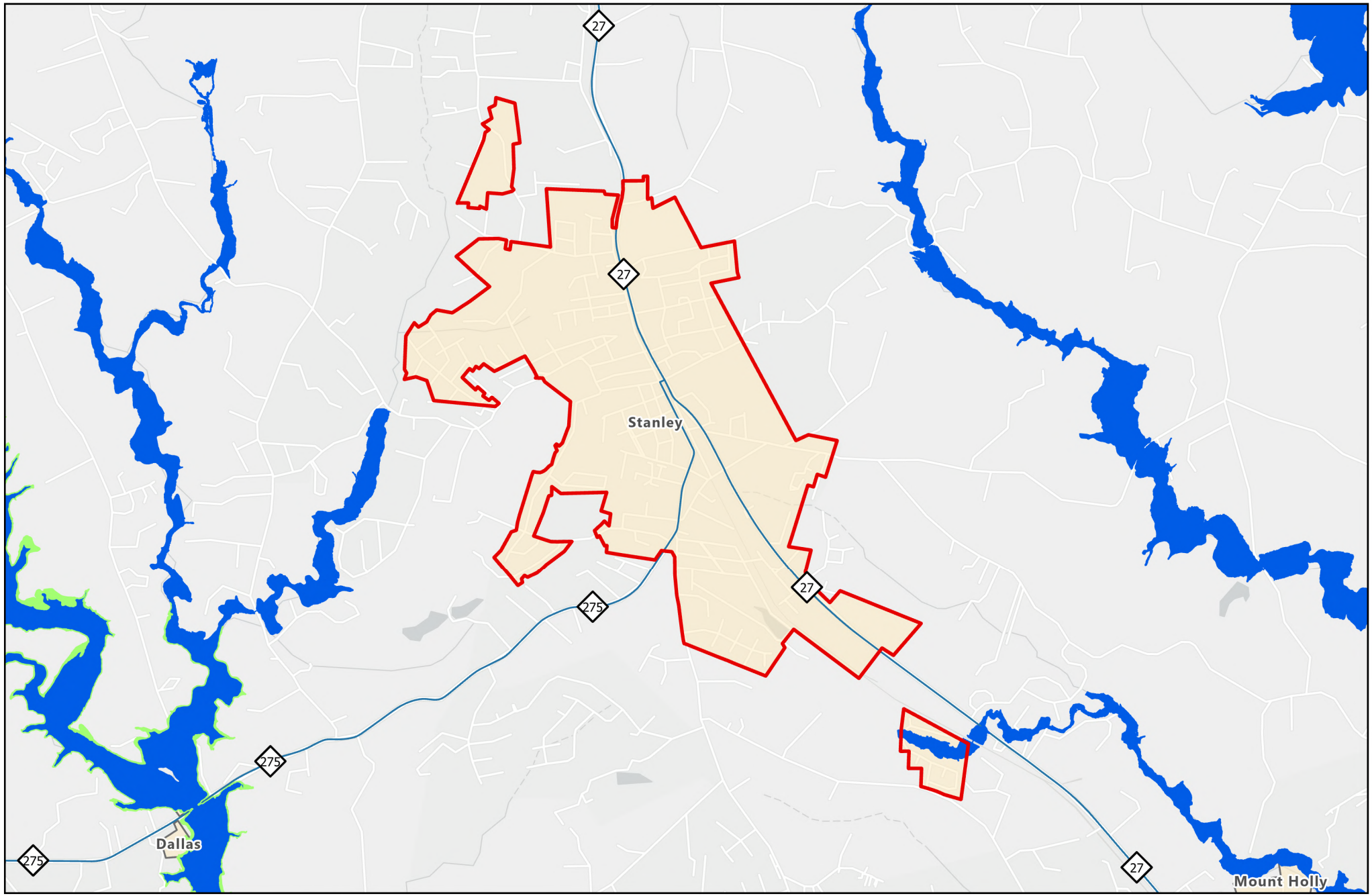
- 500-Year Flood Zone
- 100-Year Flood Zone

0 1 2 4 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Stanley - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

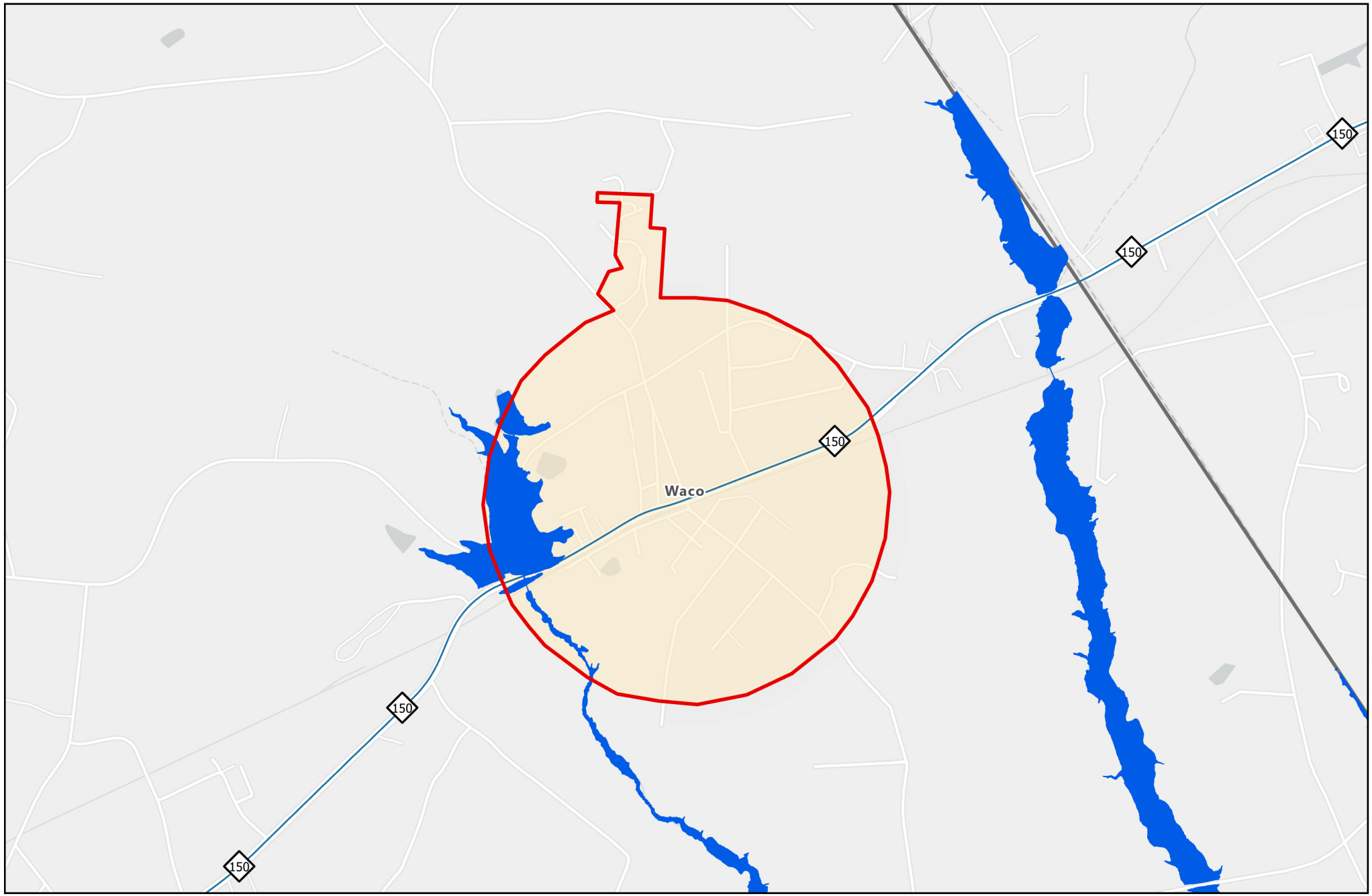
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37071C
Latest Study Effective Date: 9/2/2015
Latest LOMR Effective Date: 8/5/2024

N

Waco - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

- 500-Year Flood Zone
- 100-Year Flood Zone

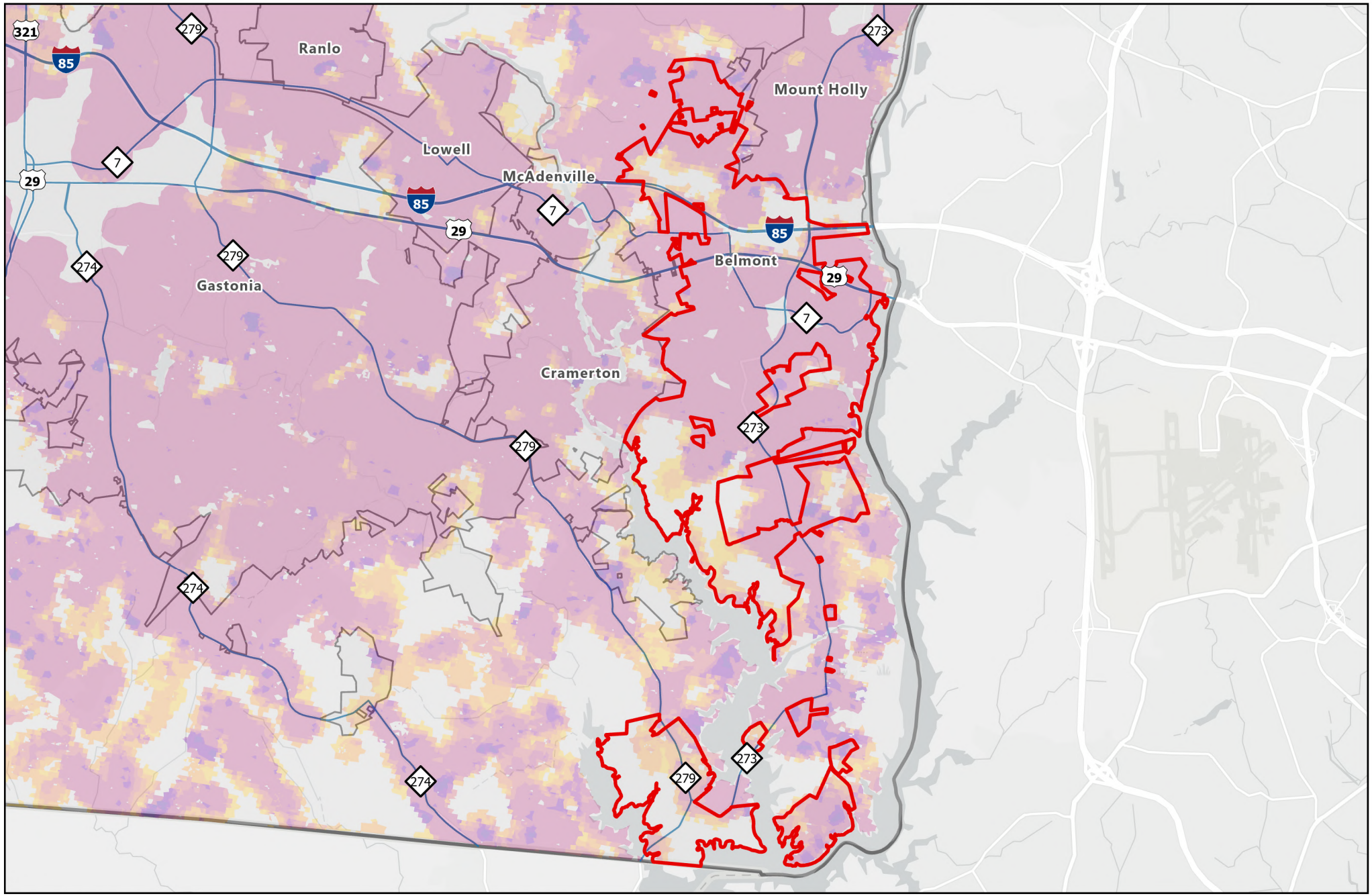
0 0.25 0.5 1 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37045C
Latest Study Effective Date: 7/2/2008
Latest LOMR Effective Date: 3/6/2020

Appendix G
Wildfire Hazard Maps

Belmont - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

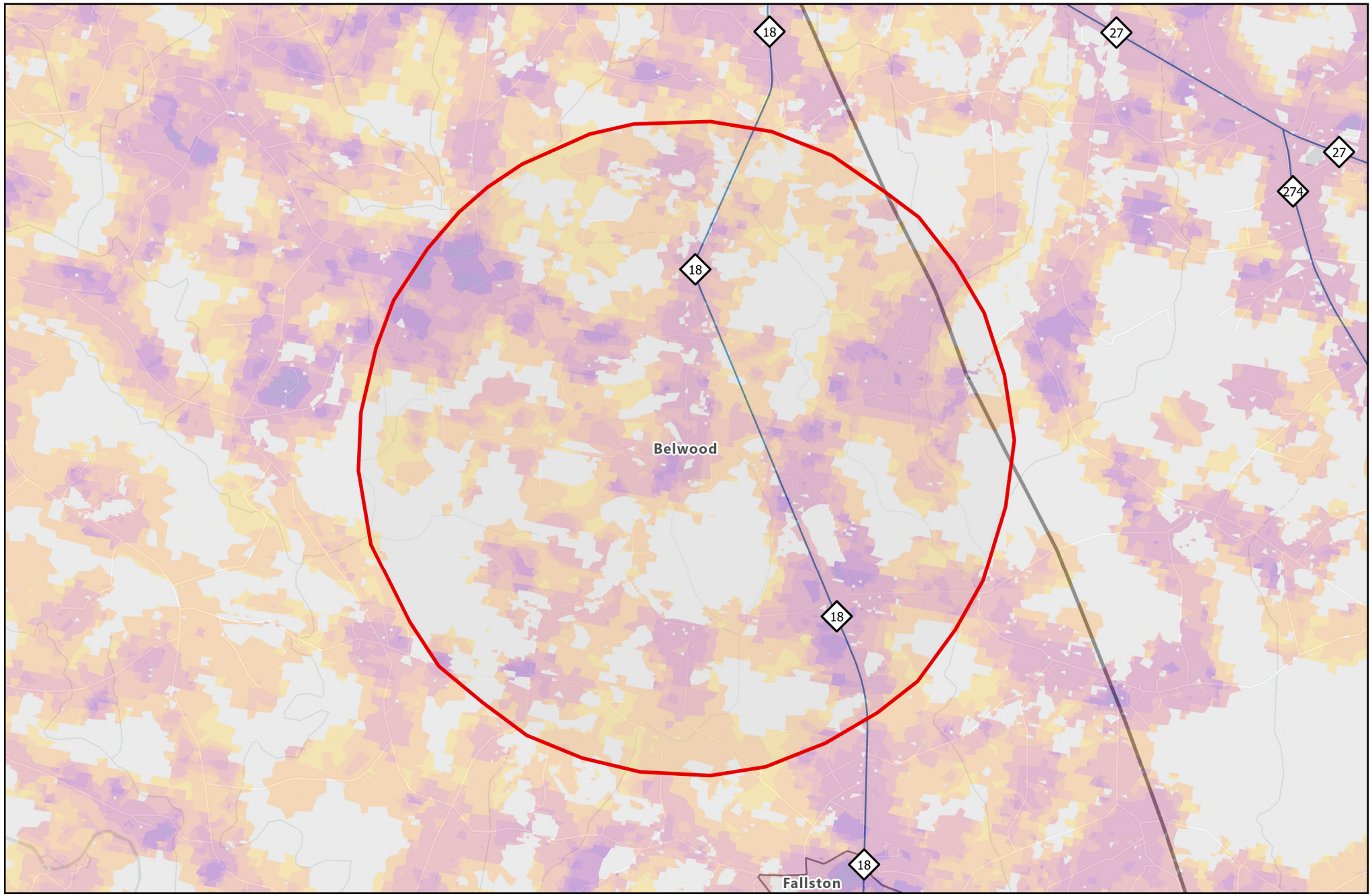
Low High

0 1.25 2.5 5 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Belwood - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

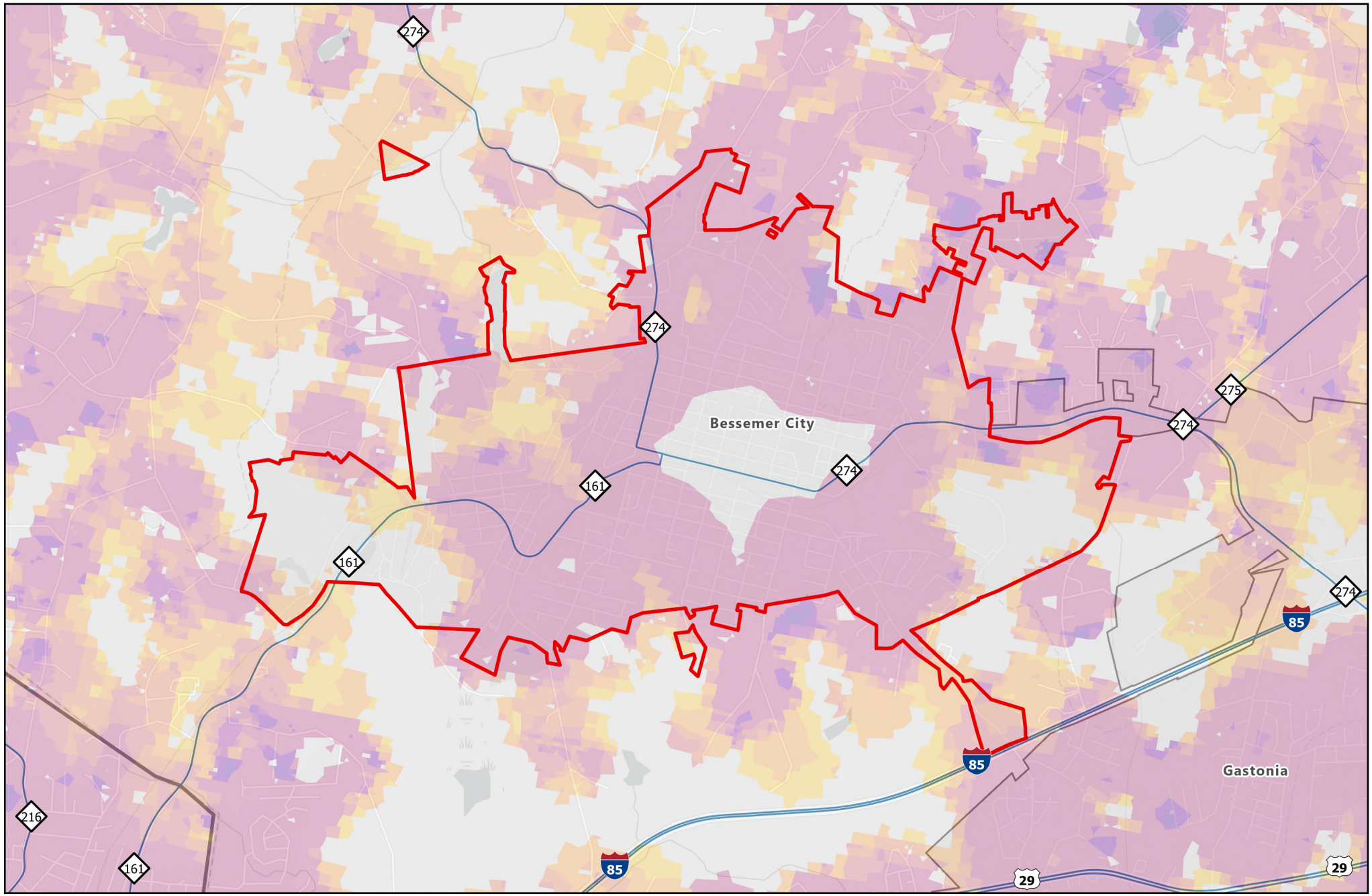
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Bessemer City - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

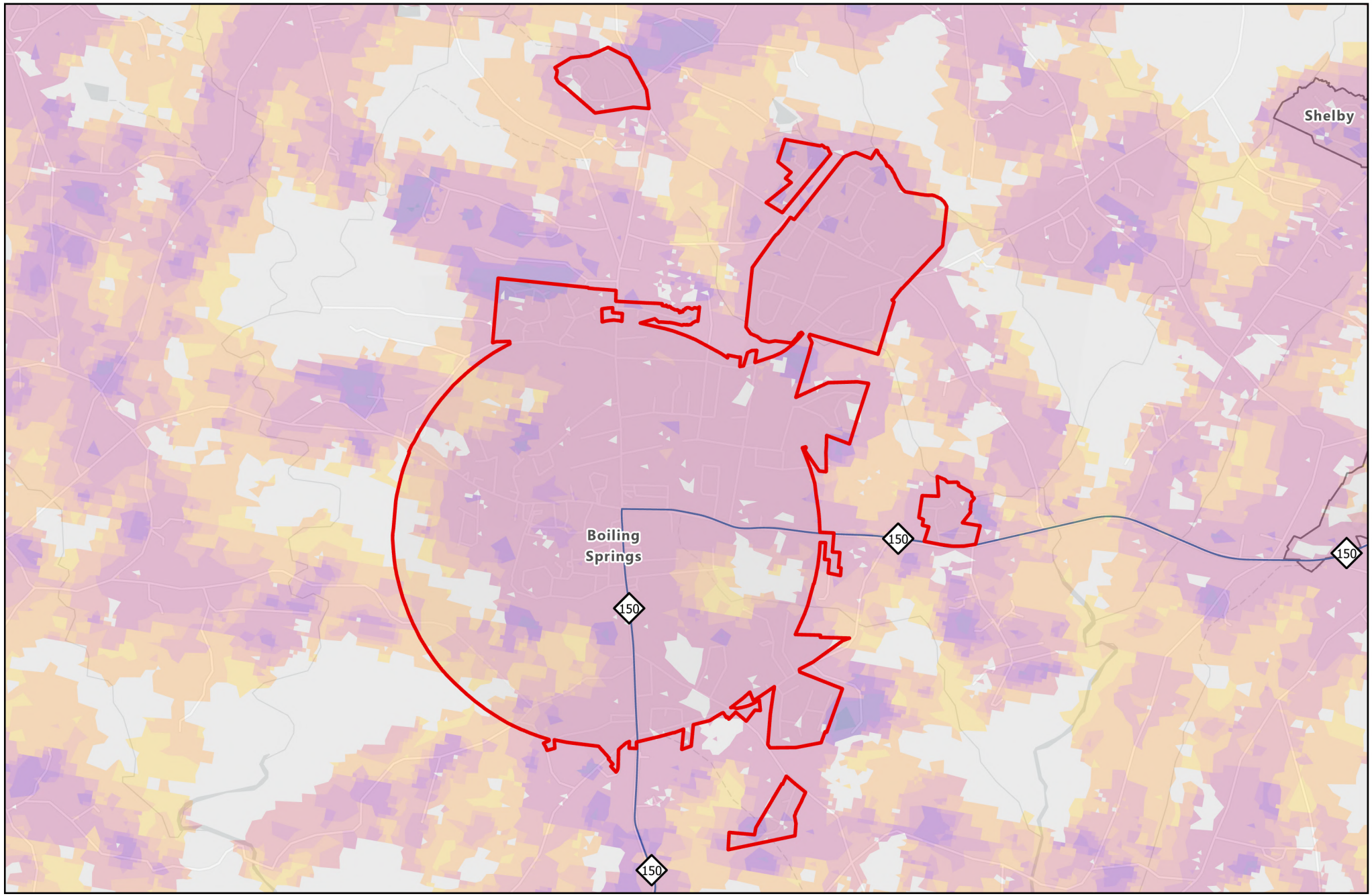
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Boiling Springs - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

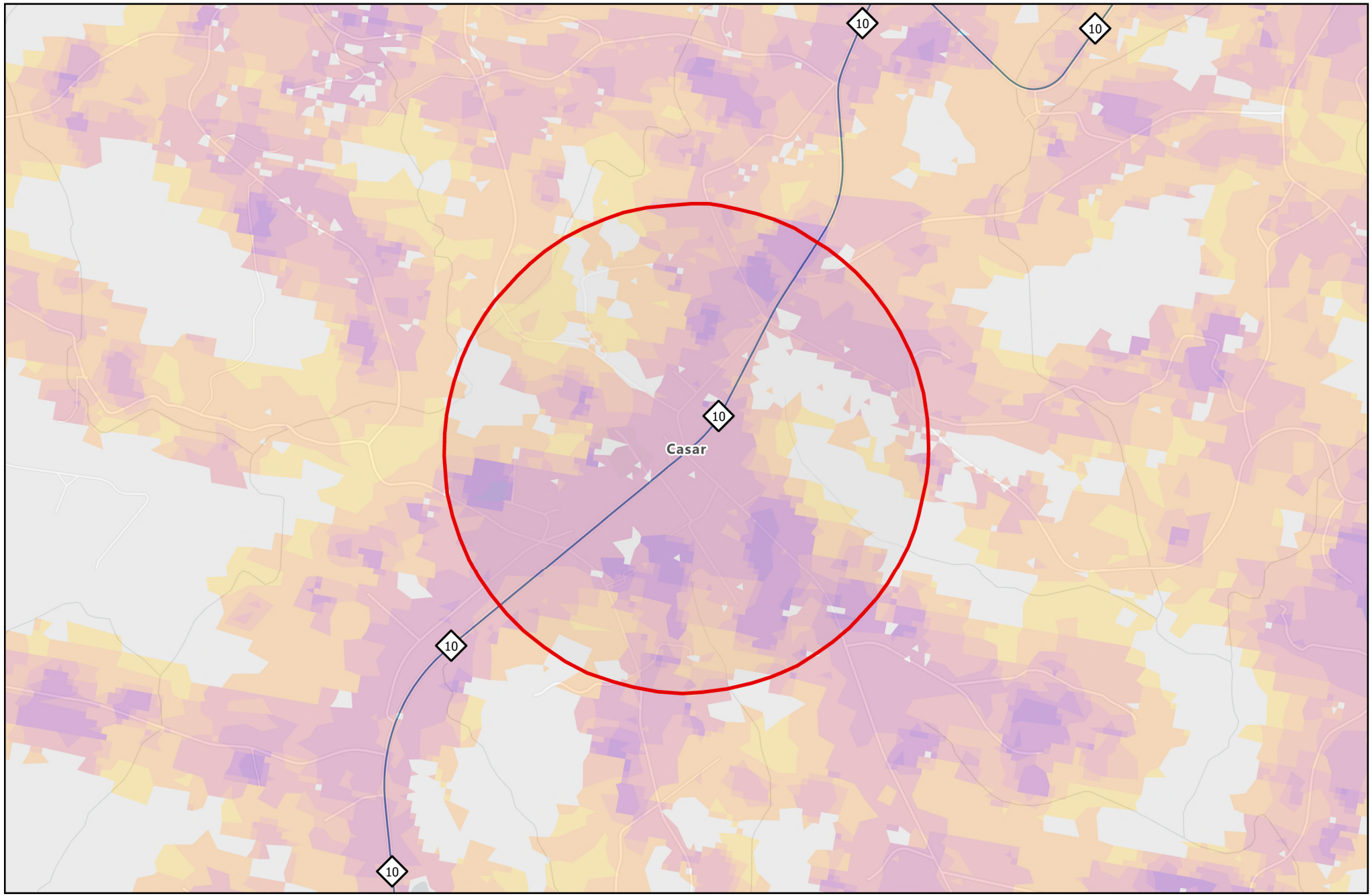
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Casar - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

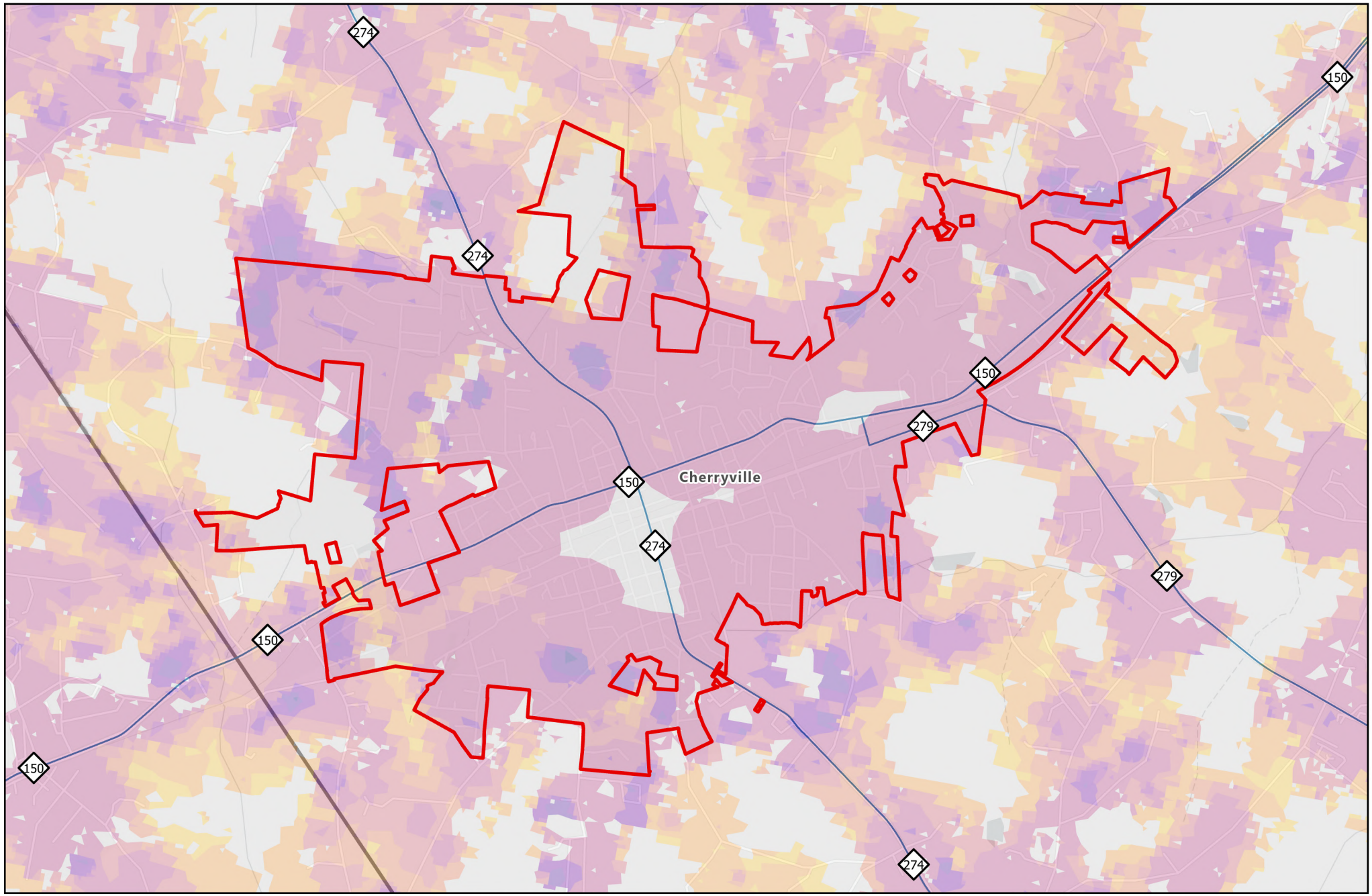
Low High

0 0.33 0.65 1.3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Cherryville - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

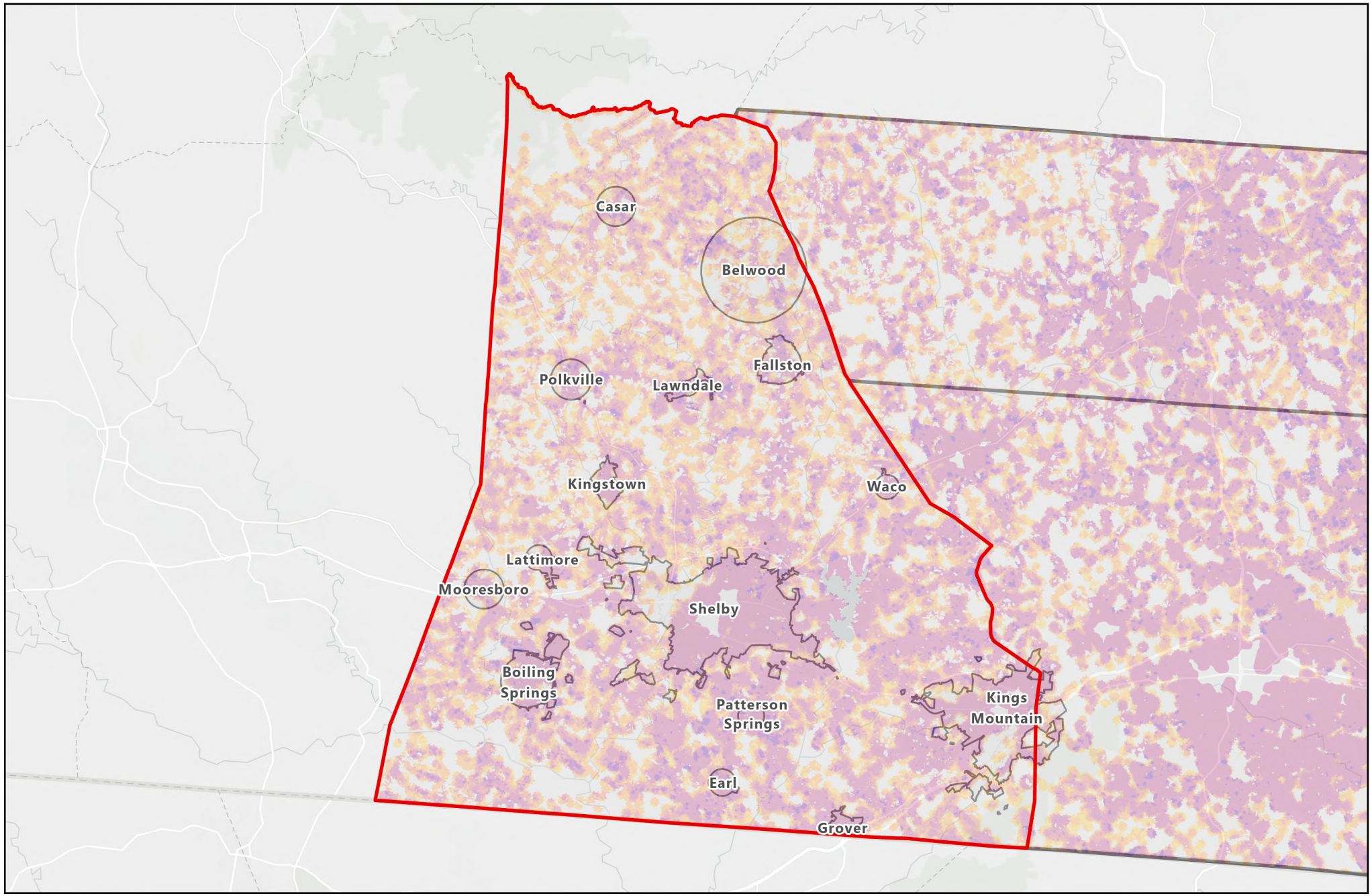
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Cleveland County - Wildland Urban Interface (WUI) Risk Areas



Legend

County Boundary

Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

Low High

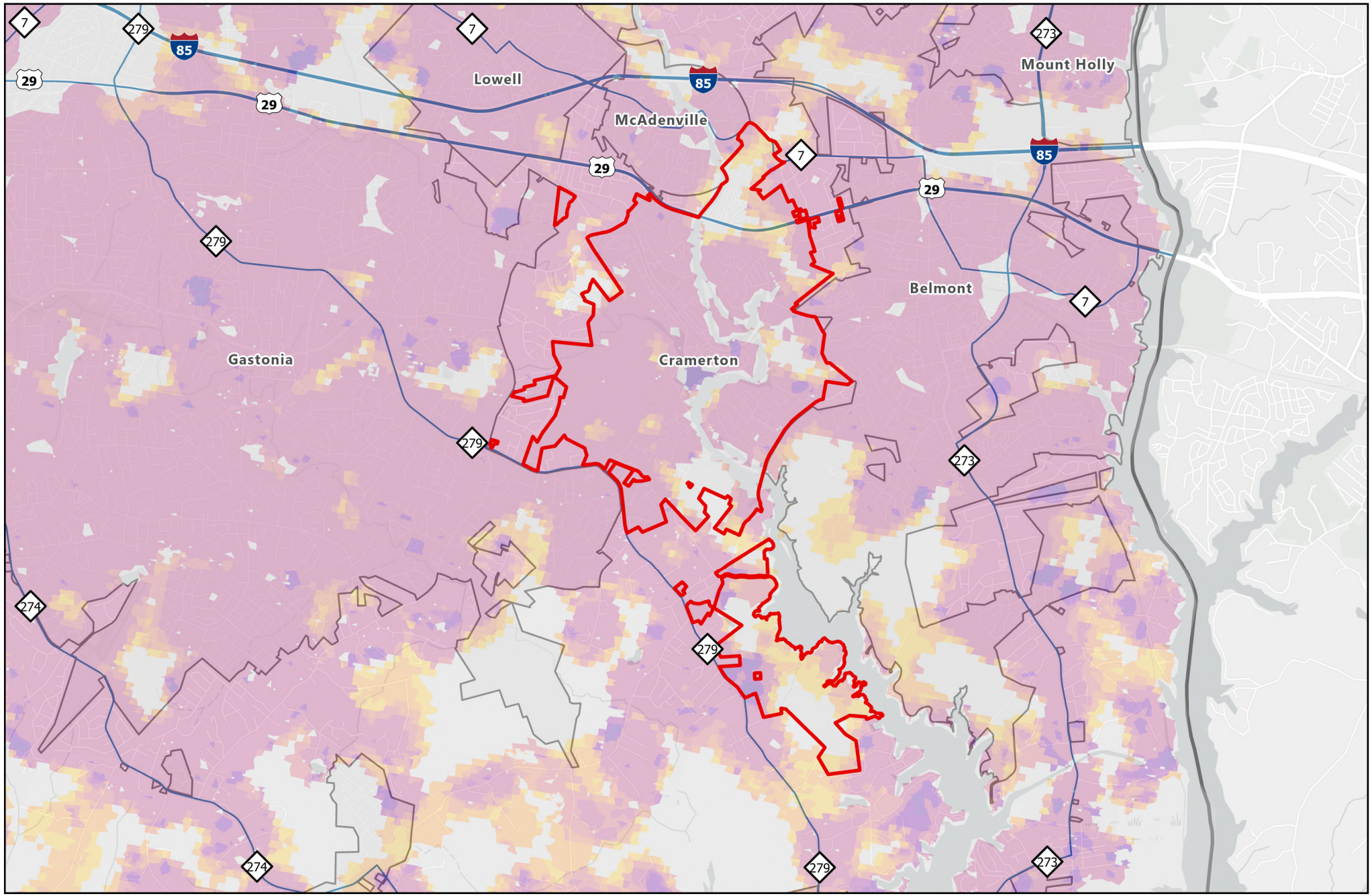
0 4 8 16 Miles

Data Source: Southern Wildfire Risk Assessment

Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Cramerton - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

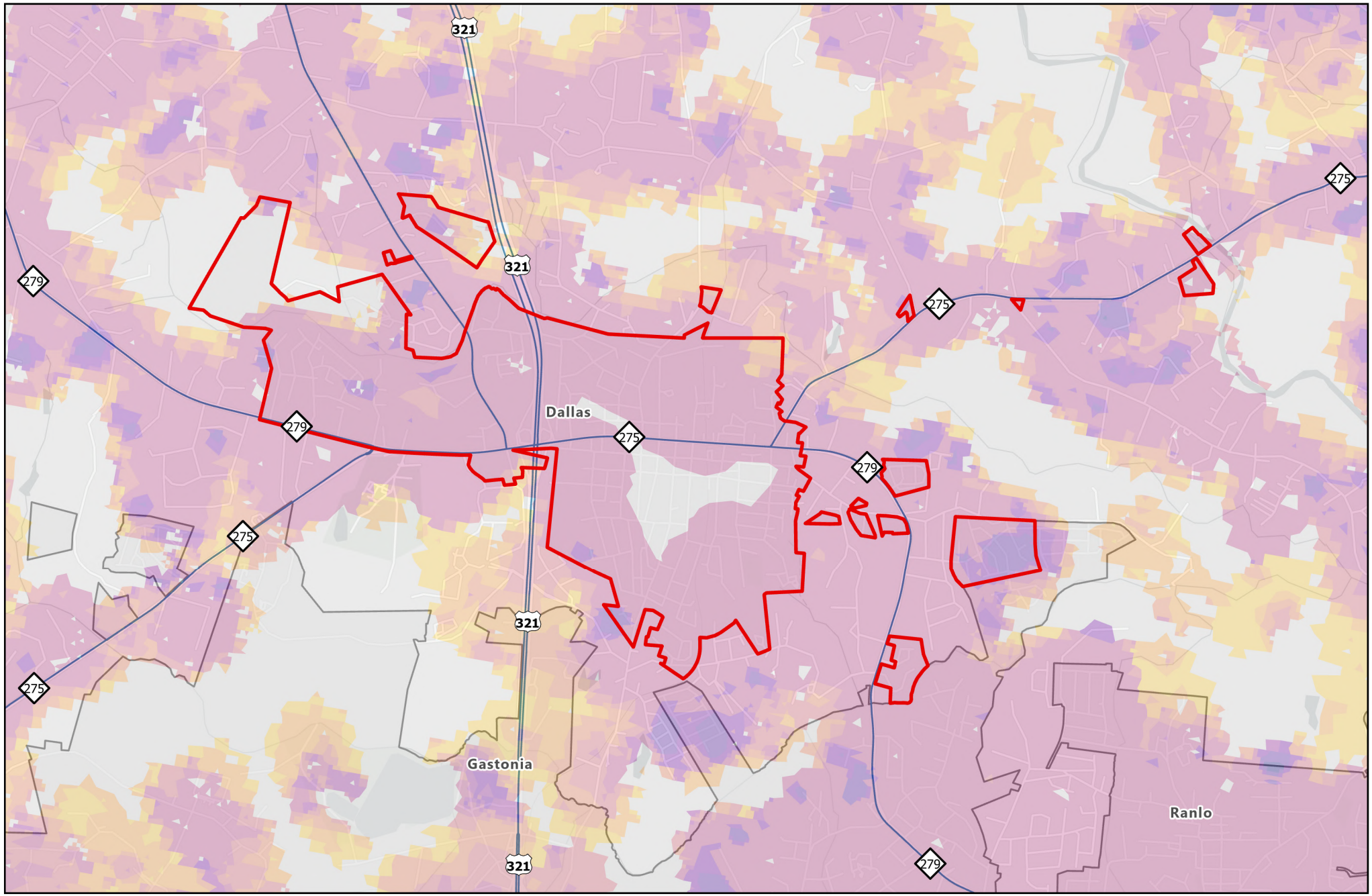
Low High

0 0.75 1.5 3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Dallas - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

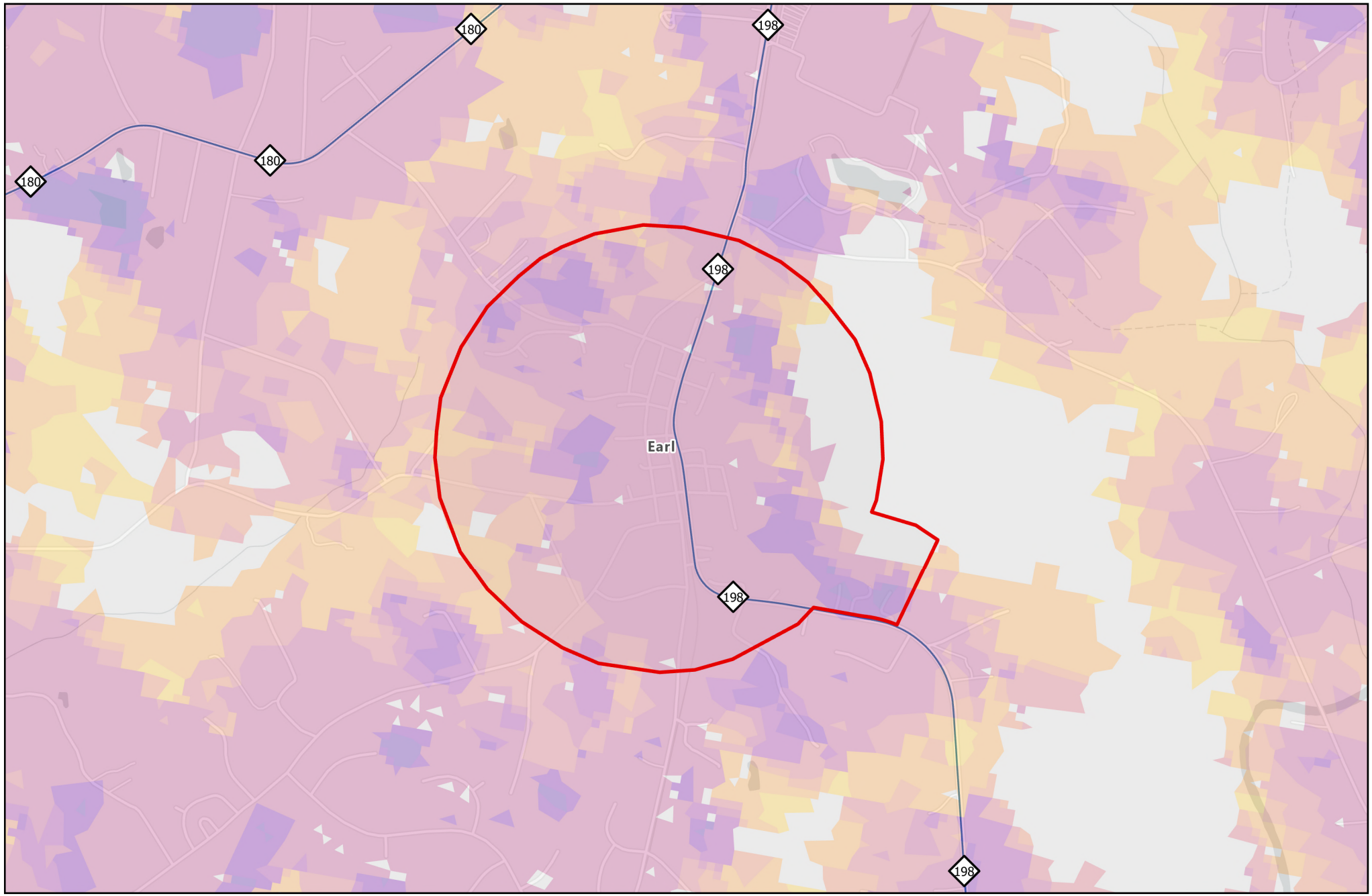
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Earl - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

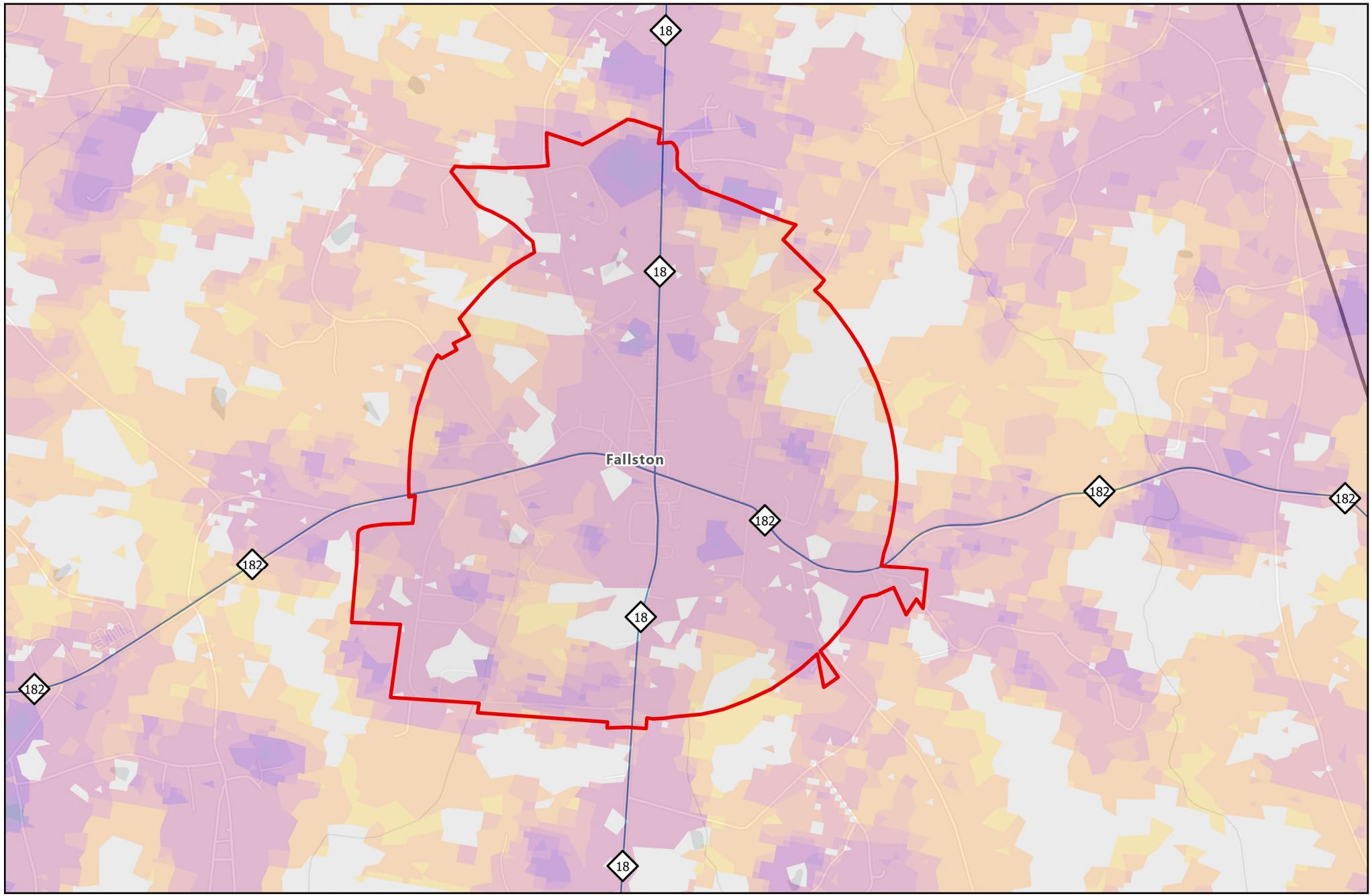
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Fallston - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

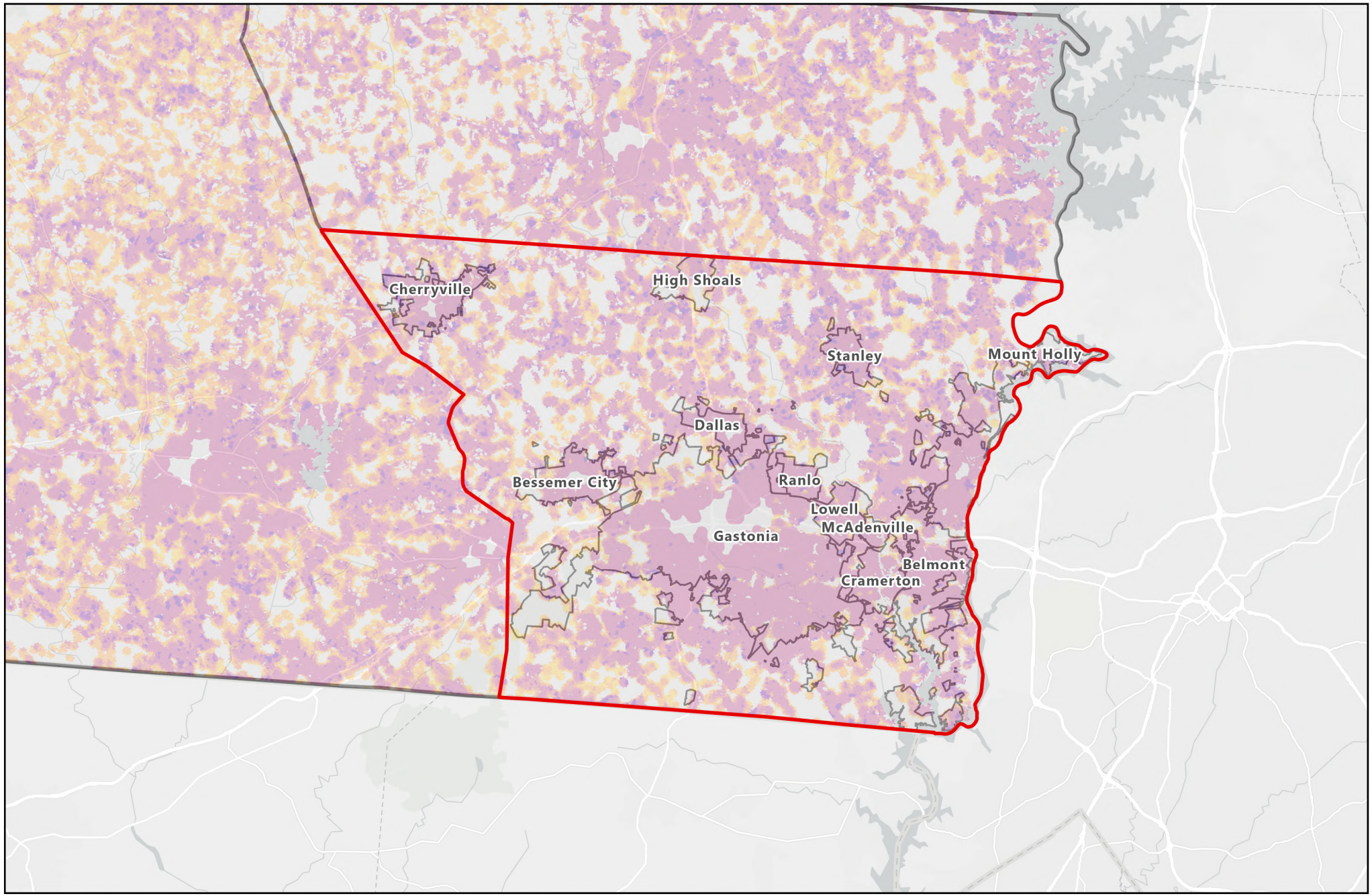
Low High

0 0.33 0.65 1.3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Gaston County - Wildland Urban Interface (WUI) Risk Areas



Legend

- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

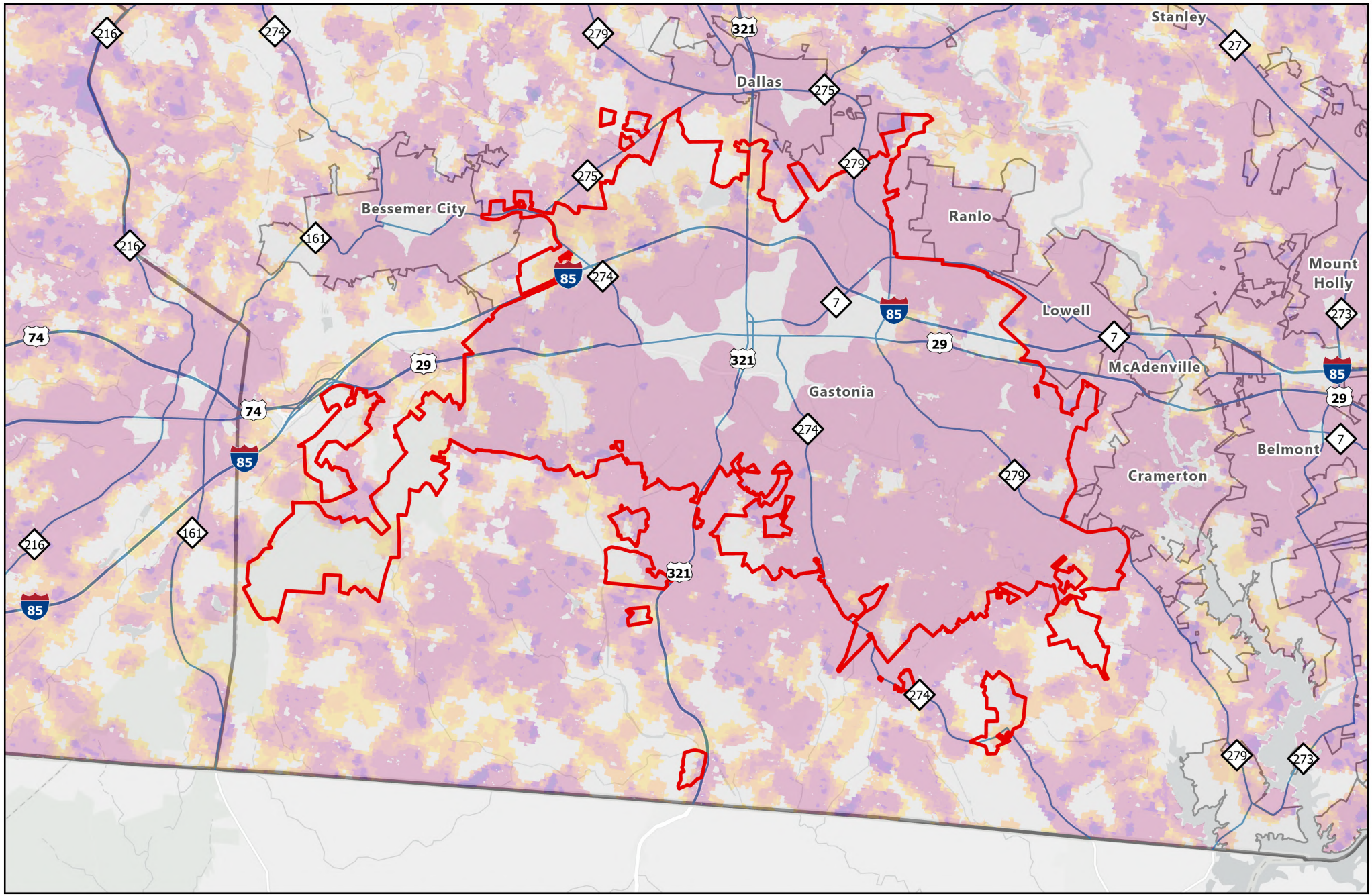
Low High

0 4 8 16 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Gastonia - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

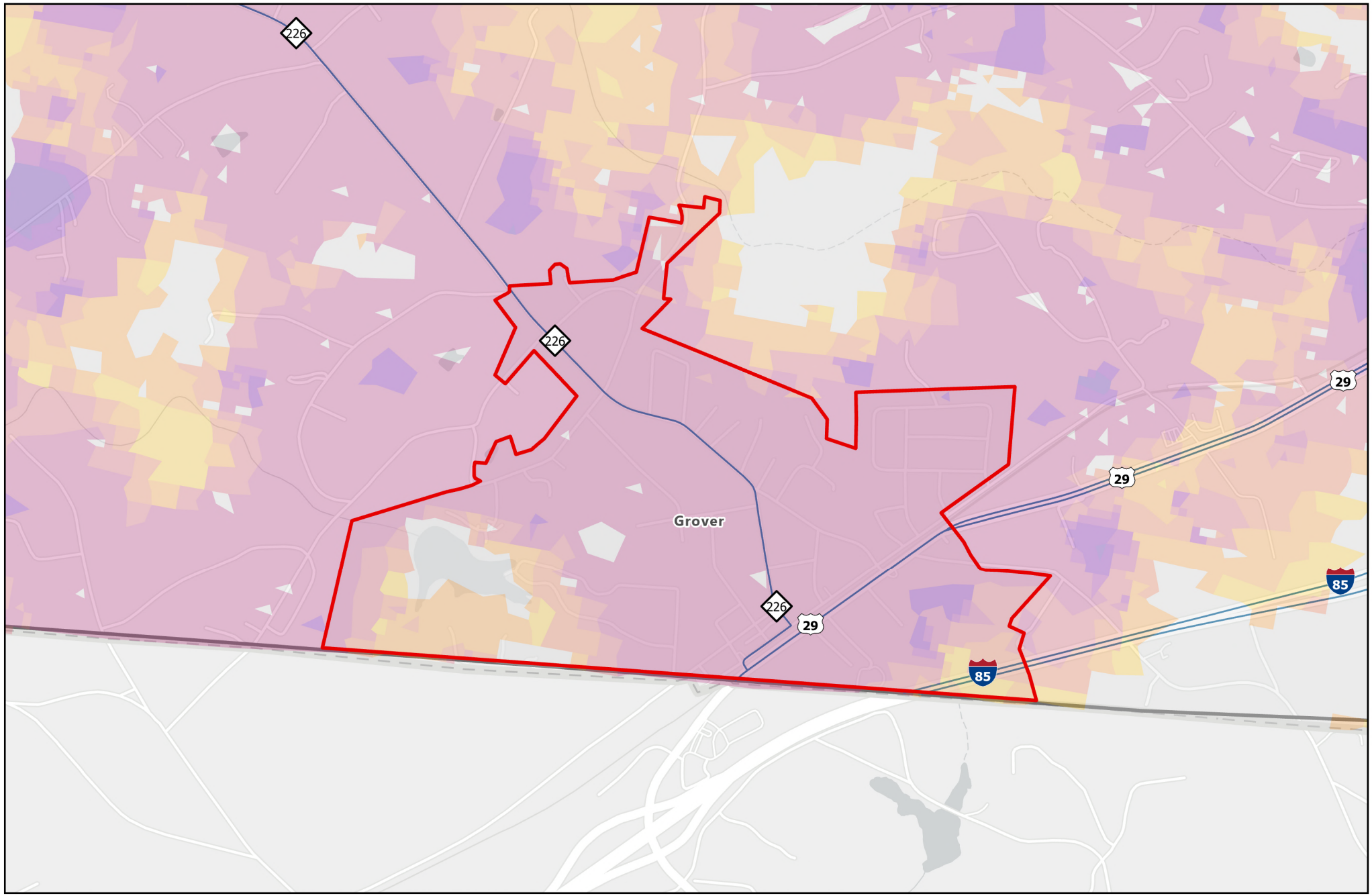
Low High

0 1.5 3 6 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Grover - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

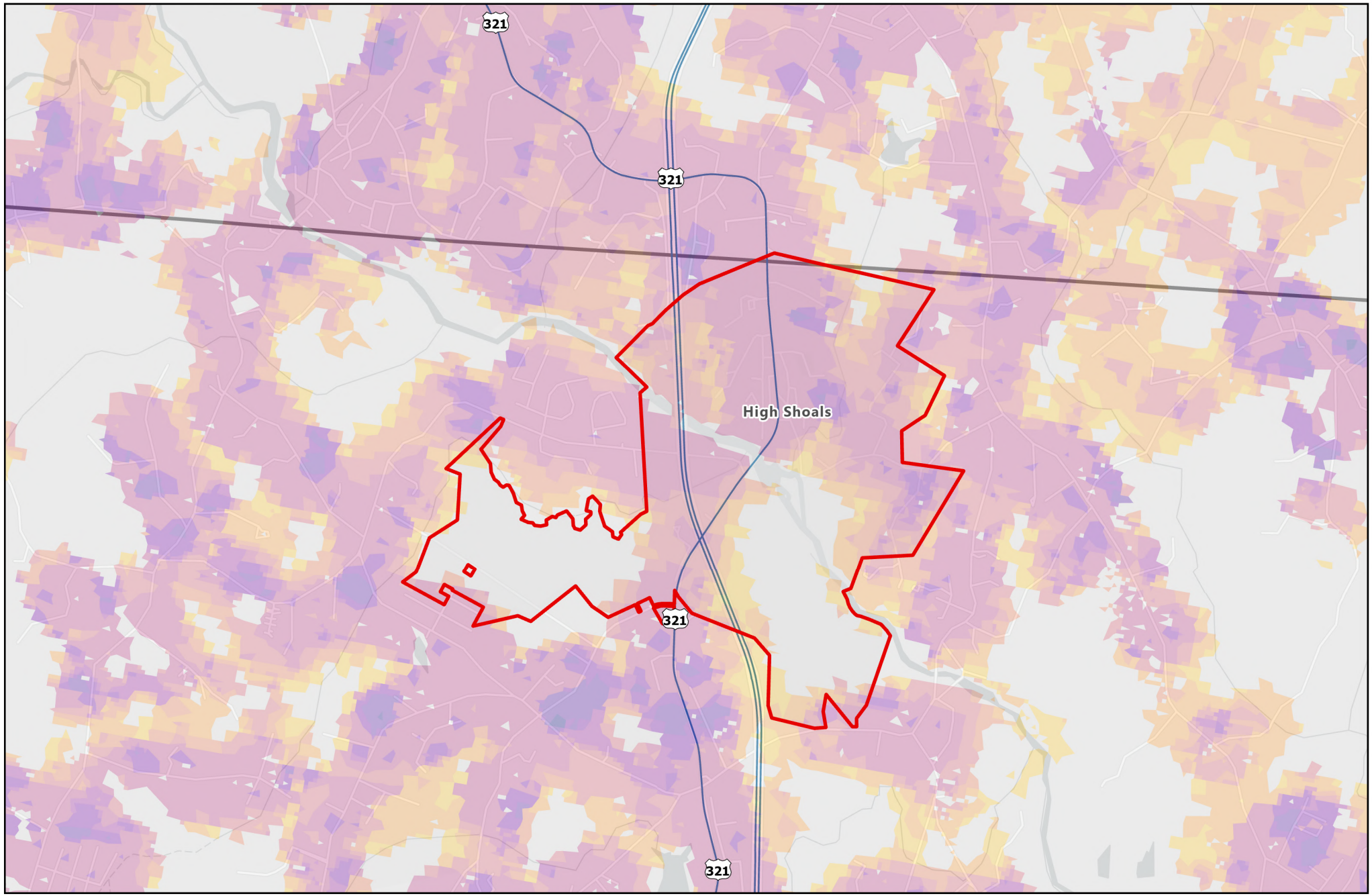
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

High Shoals - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

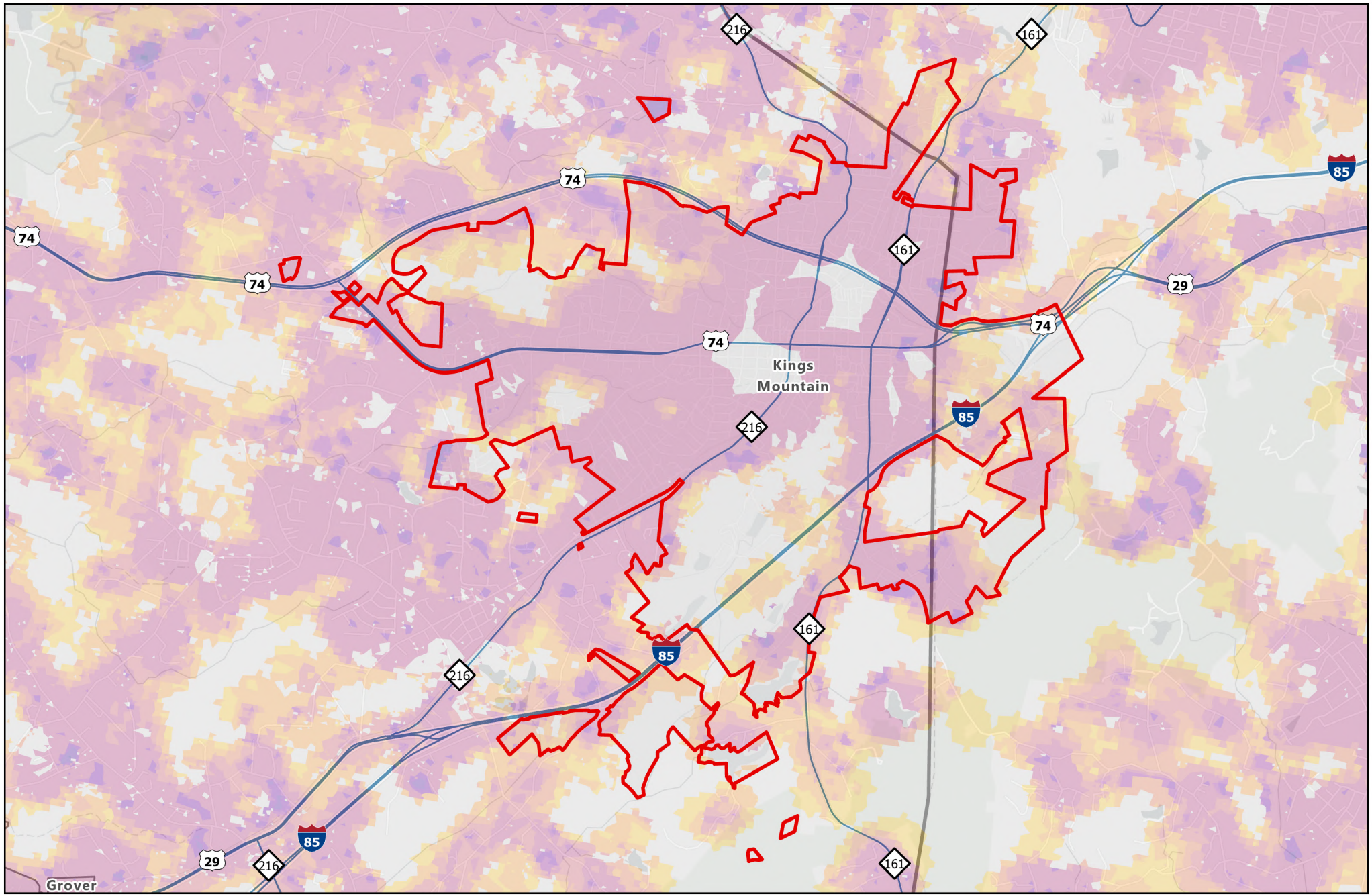
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Kings Mountain - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

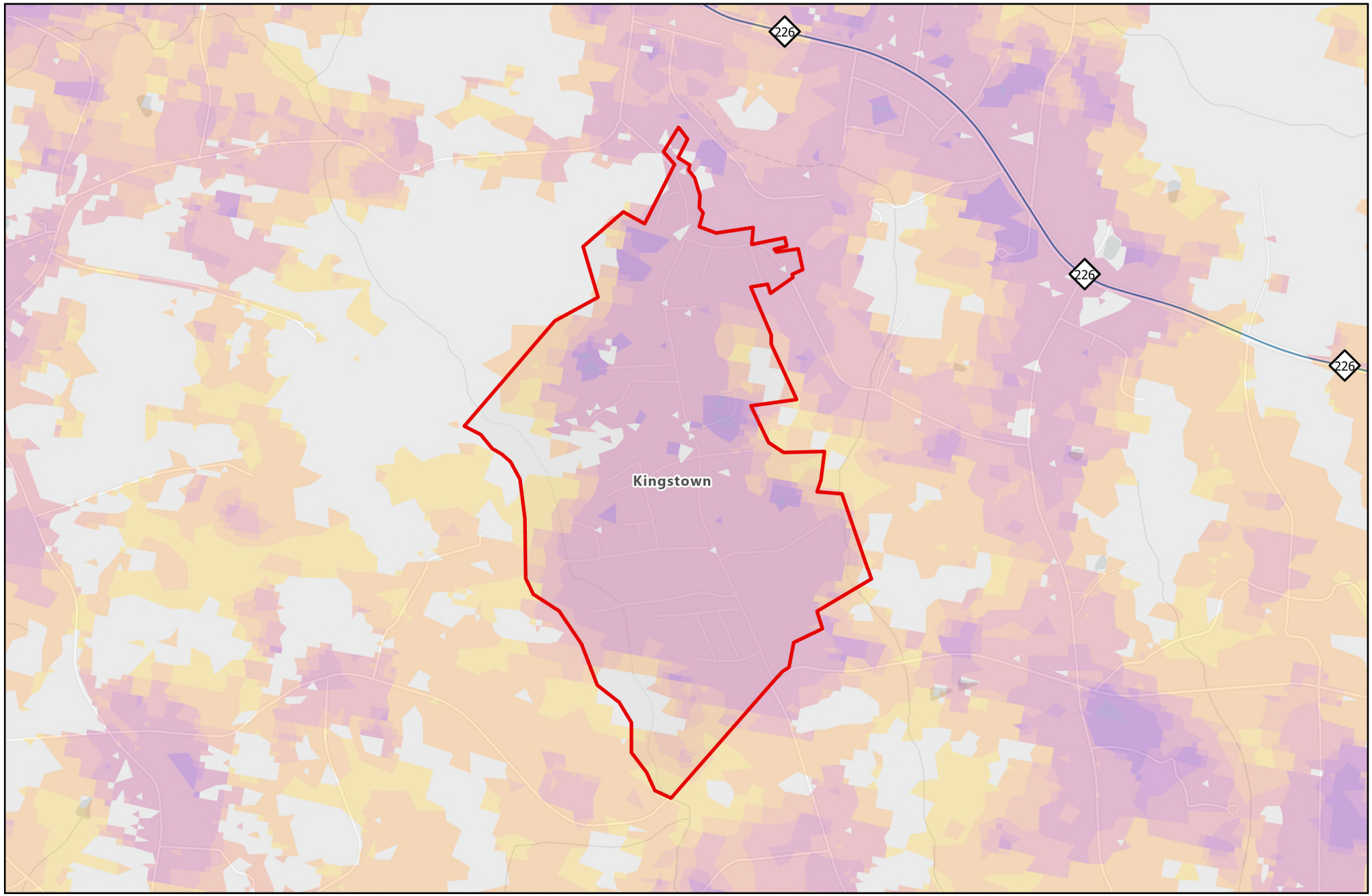
Low High

0 0.75 1.5 3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Kingstown - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

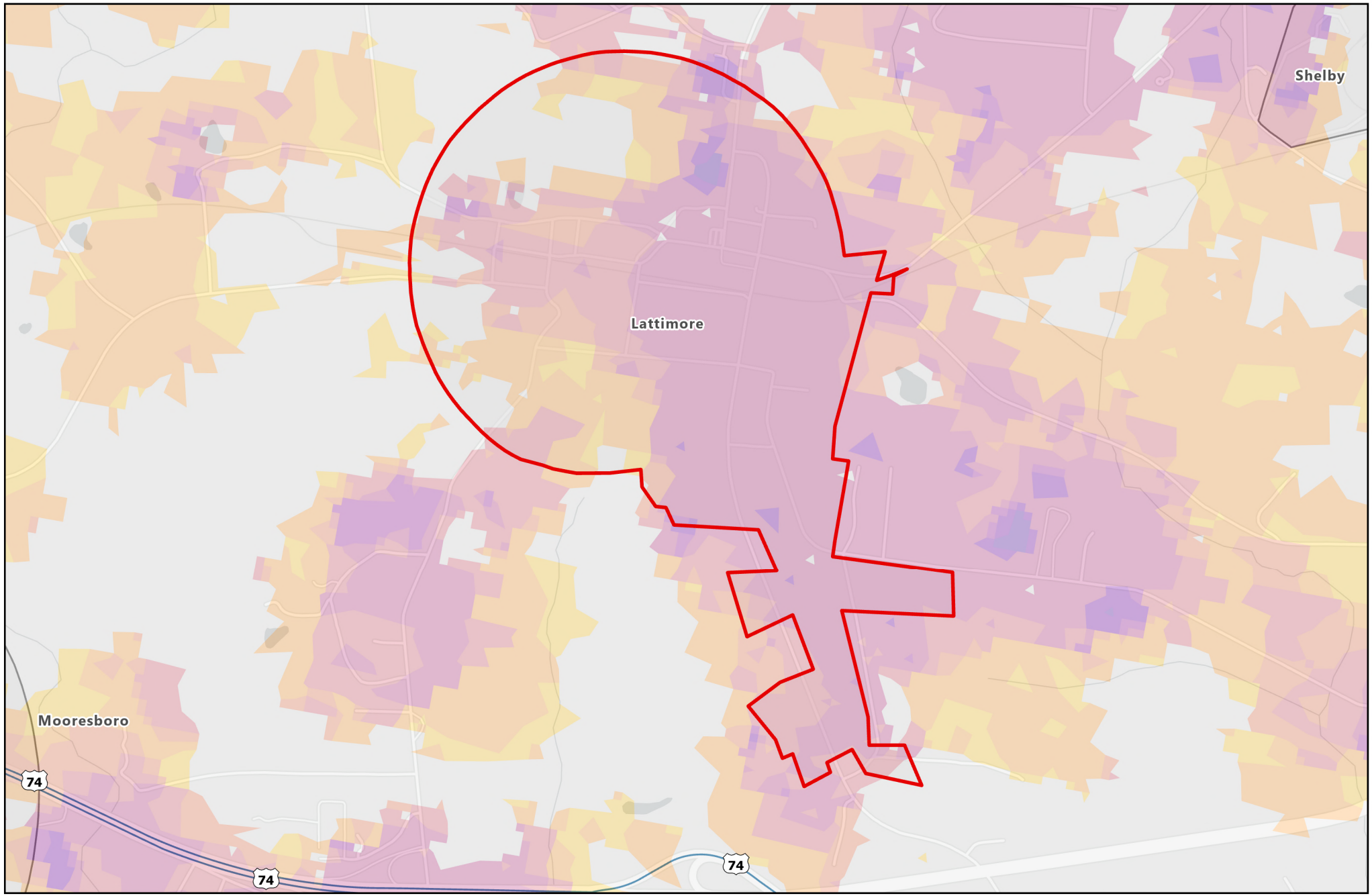
Low High

0 0.33 0.65 1.3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lattimore - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

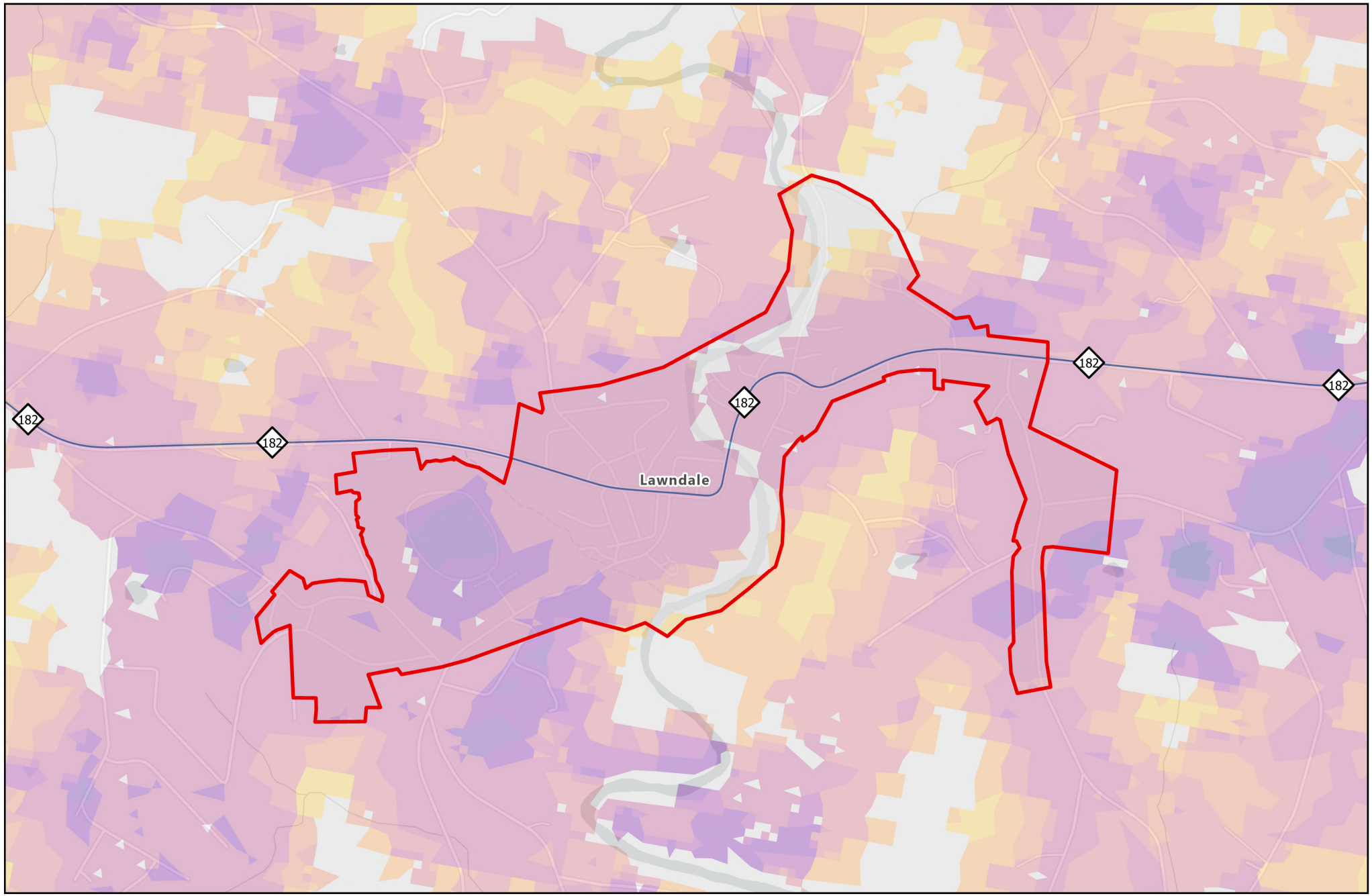
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lawndale - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

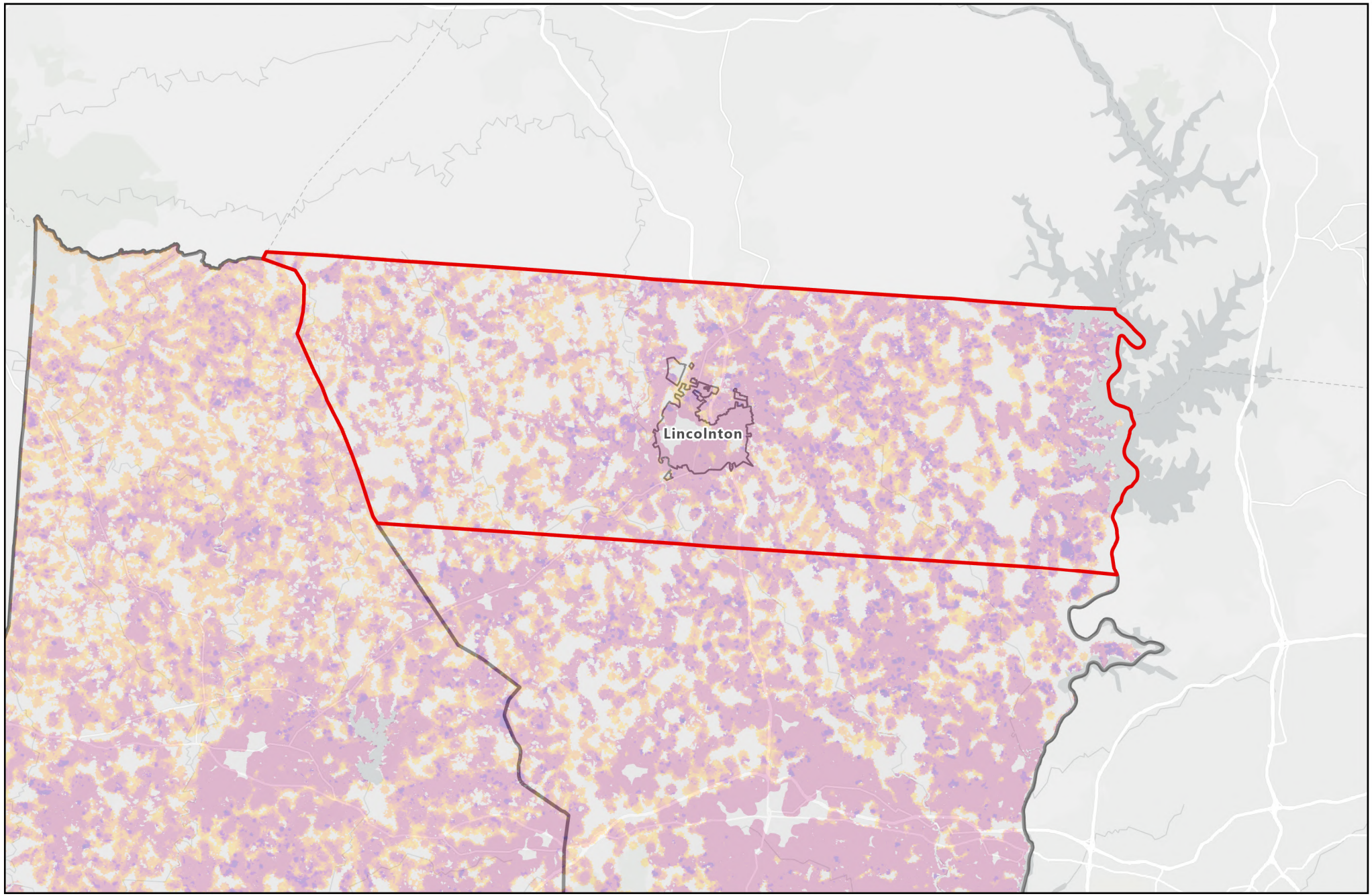
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lincoln County - Wildland Urban Interface (WUI) Risk Areas



Legend

County Boundary

Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

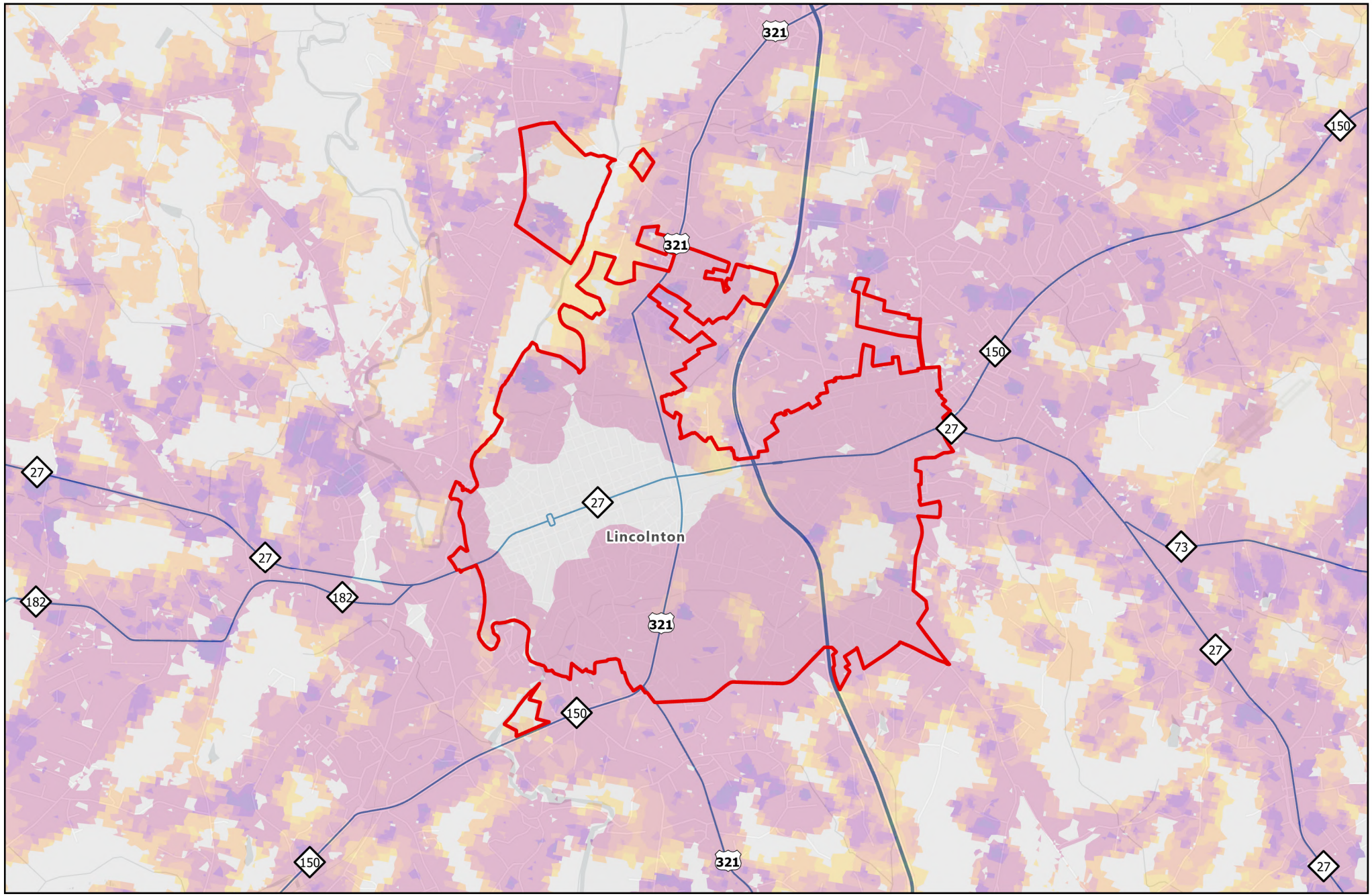
Low High

0 4 8 16 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lincolnton - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

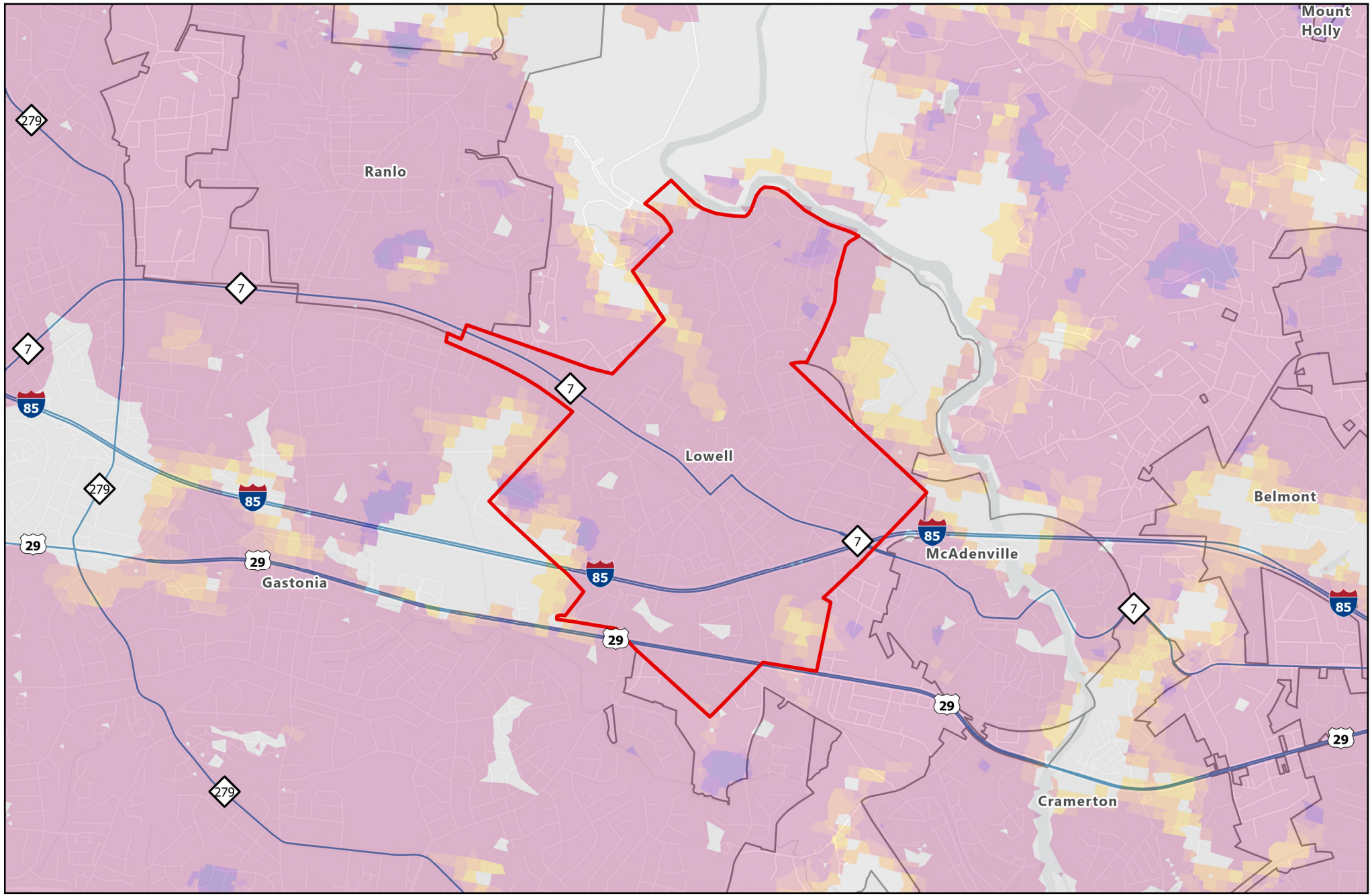
Low High

0 0.75 1.5 3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lowell - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

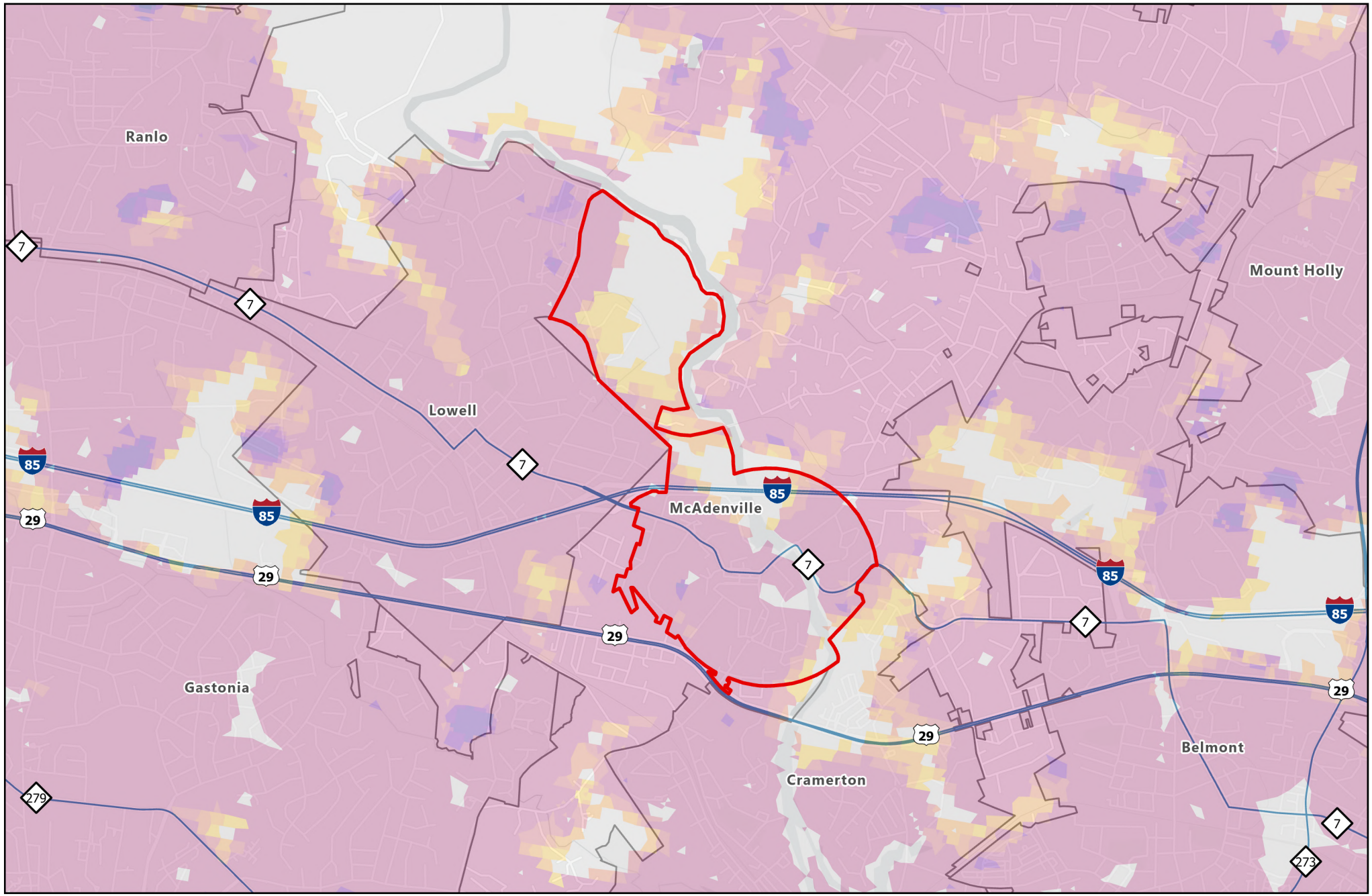
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

McAdenville - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

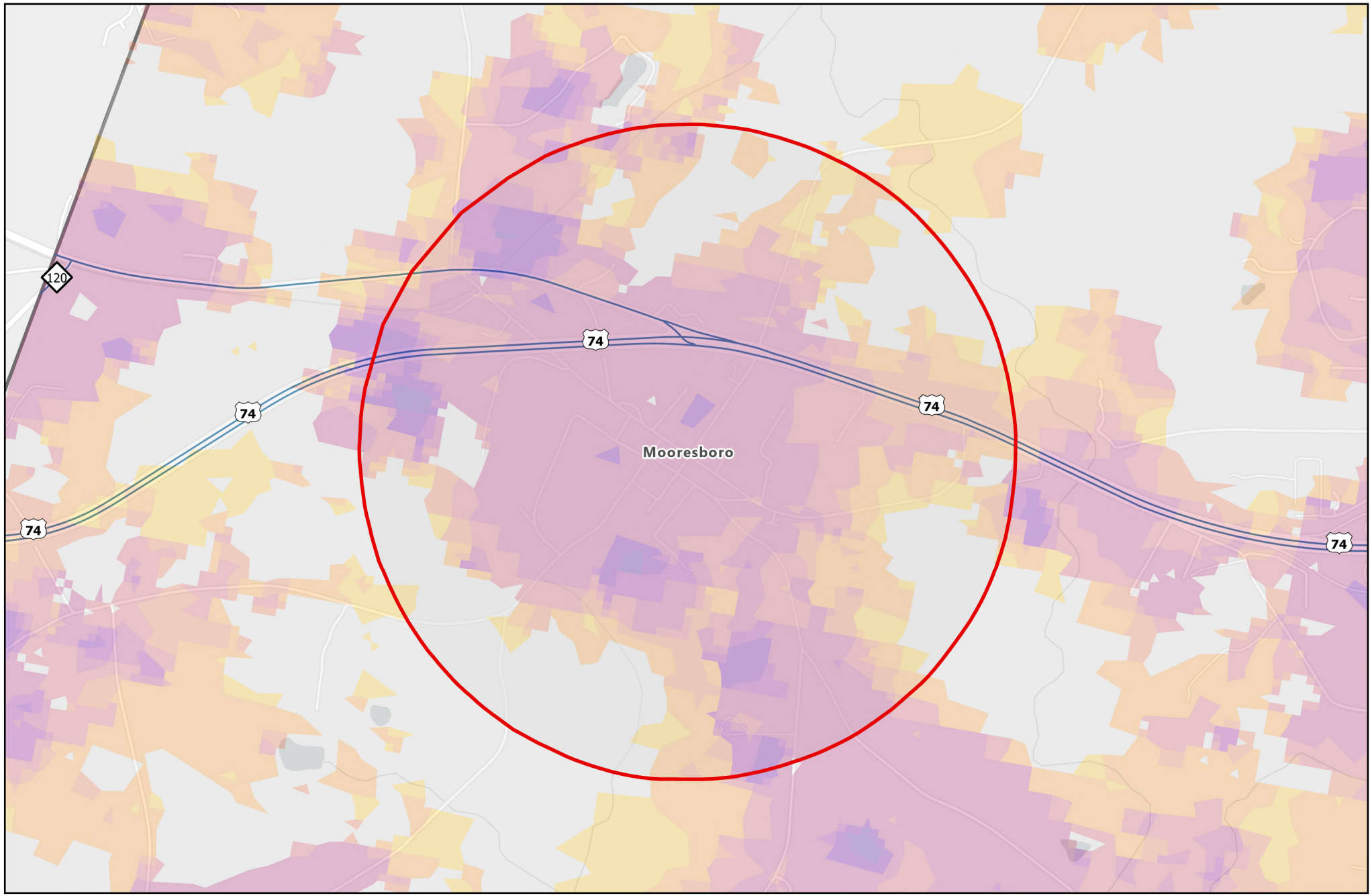
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Mooresboro - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

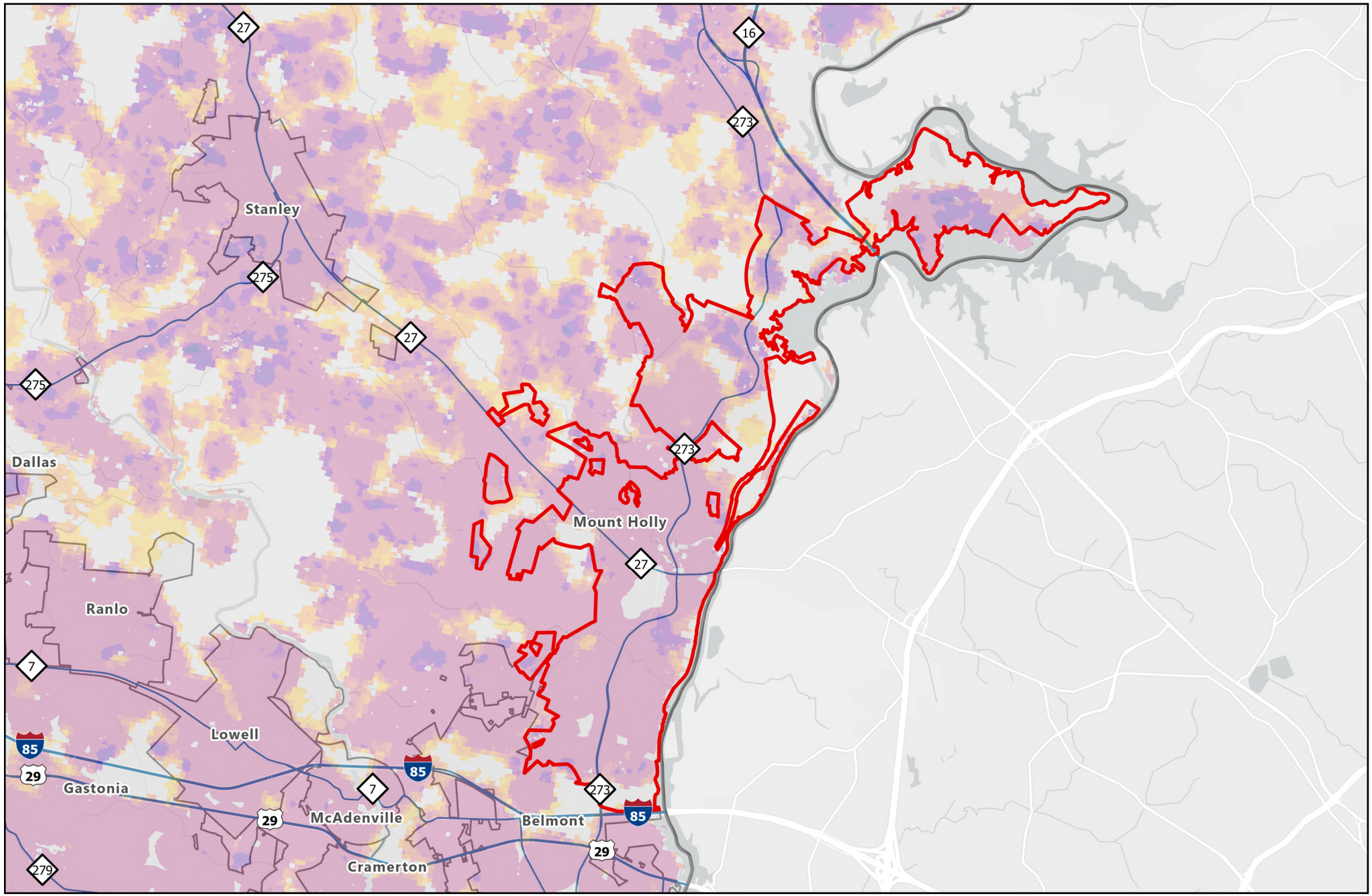
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Mount Holly - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

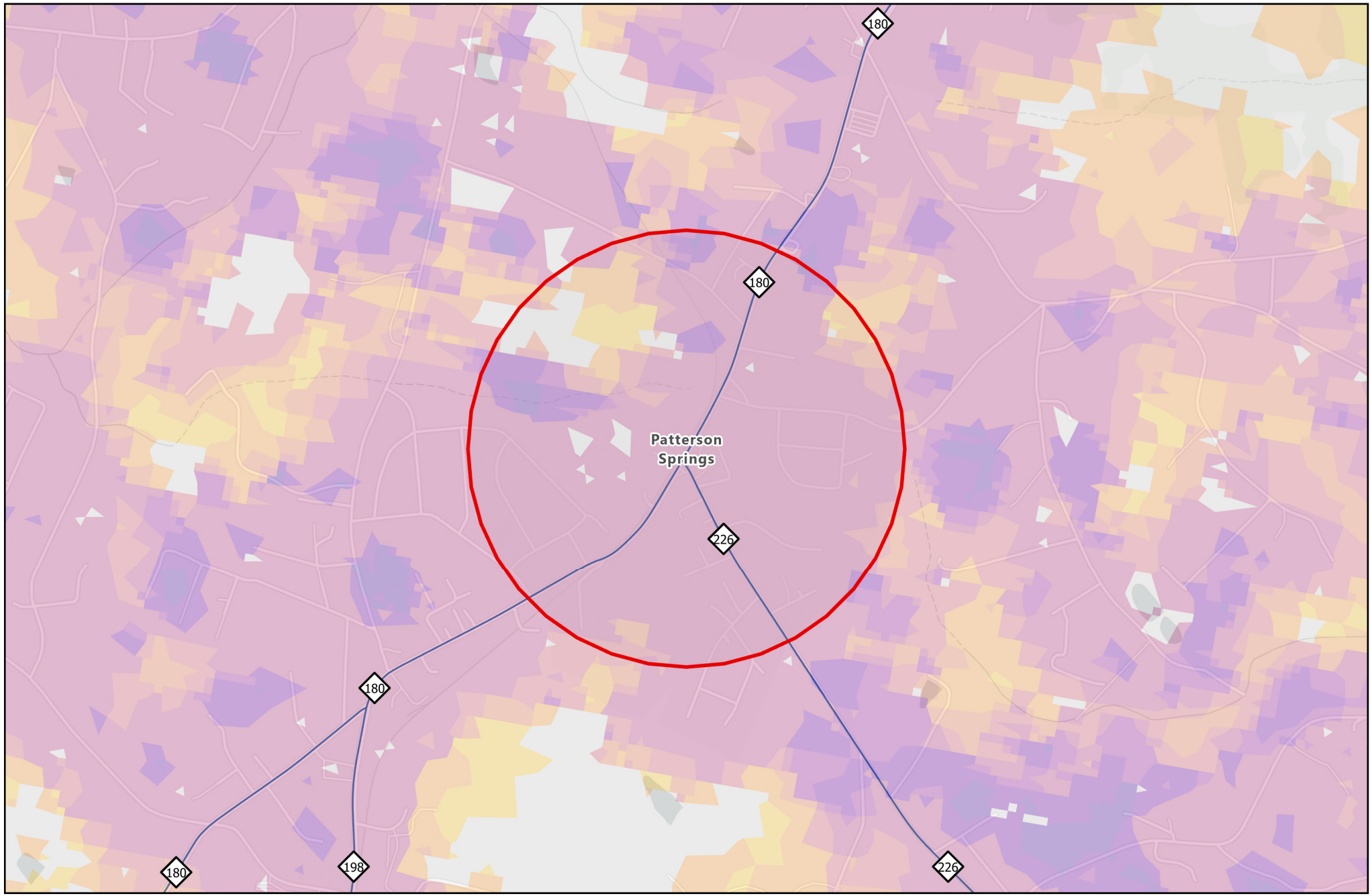
Low High

0 1.25 2.5 5 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Patterson Springs - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

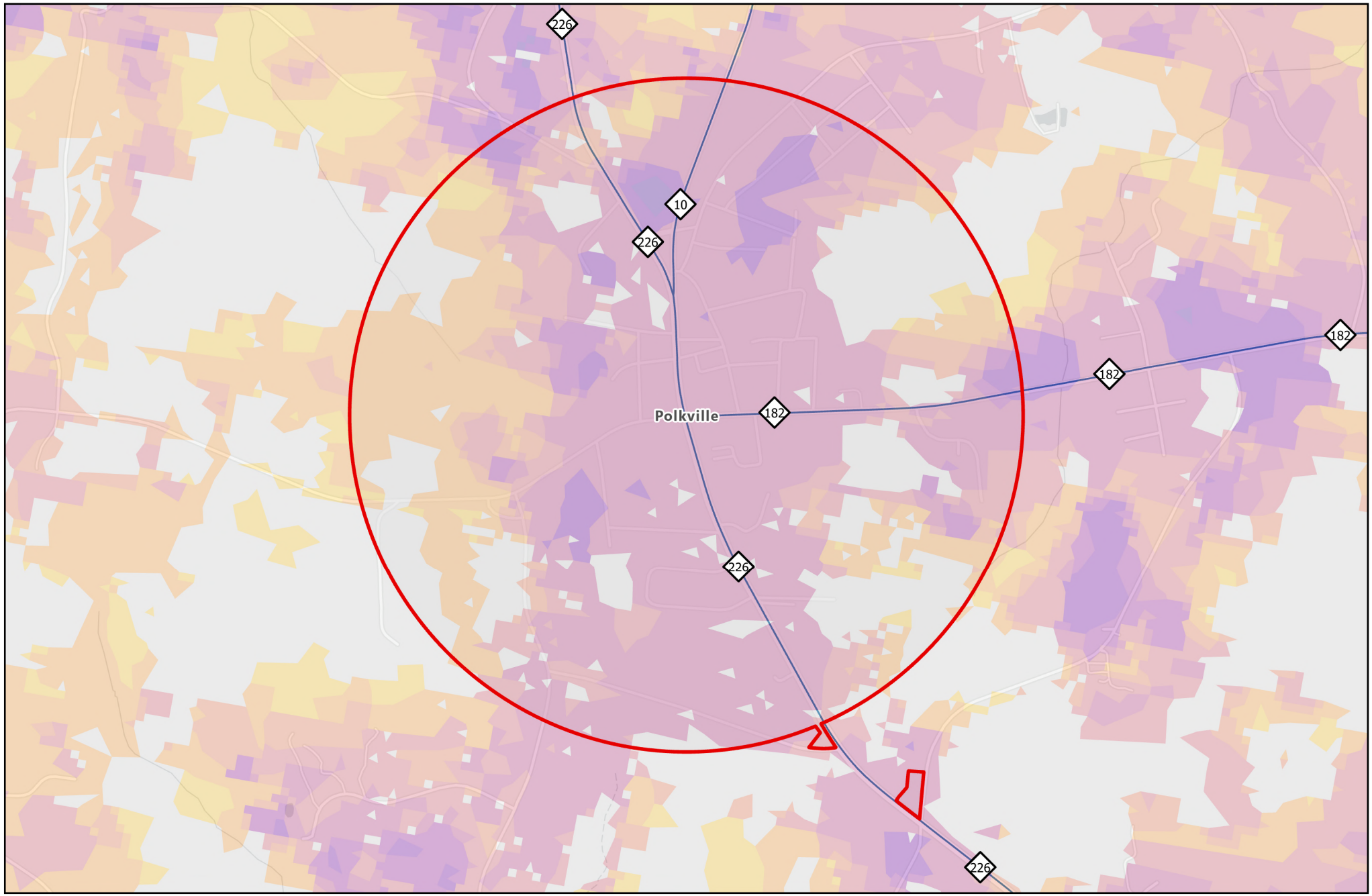
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Polkville - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

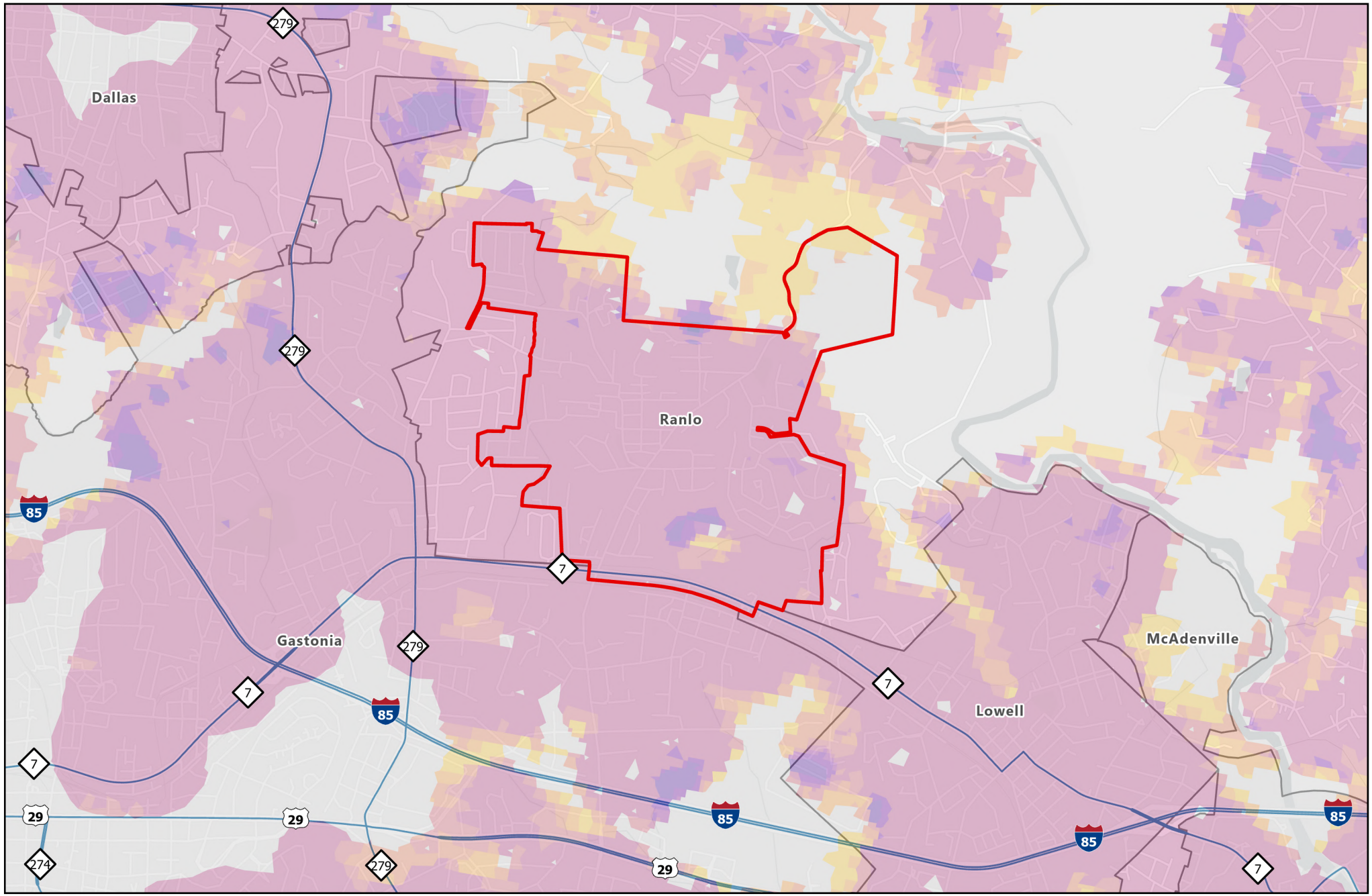
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Ranlo - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

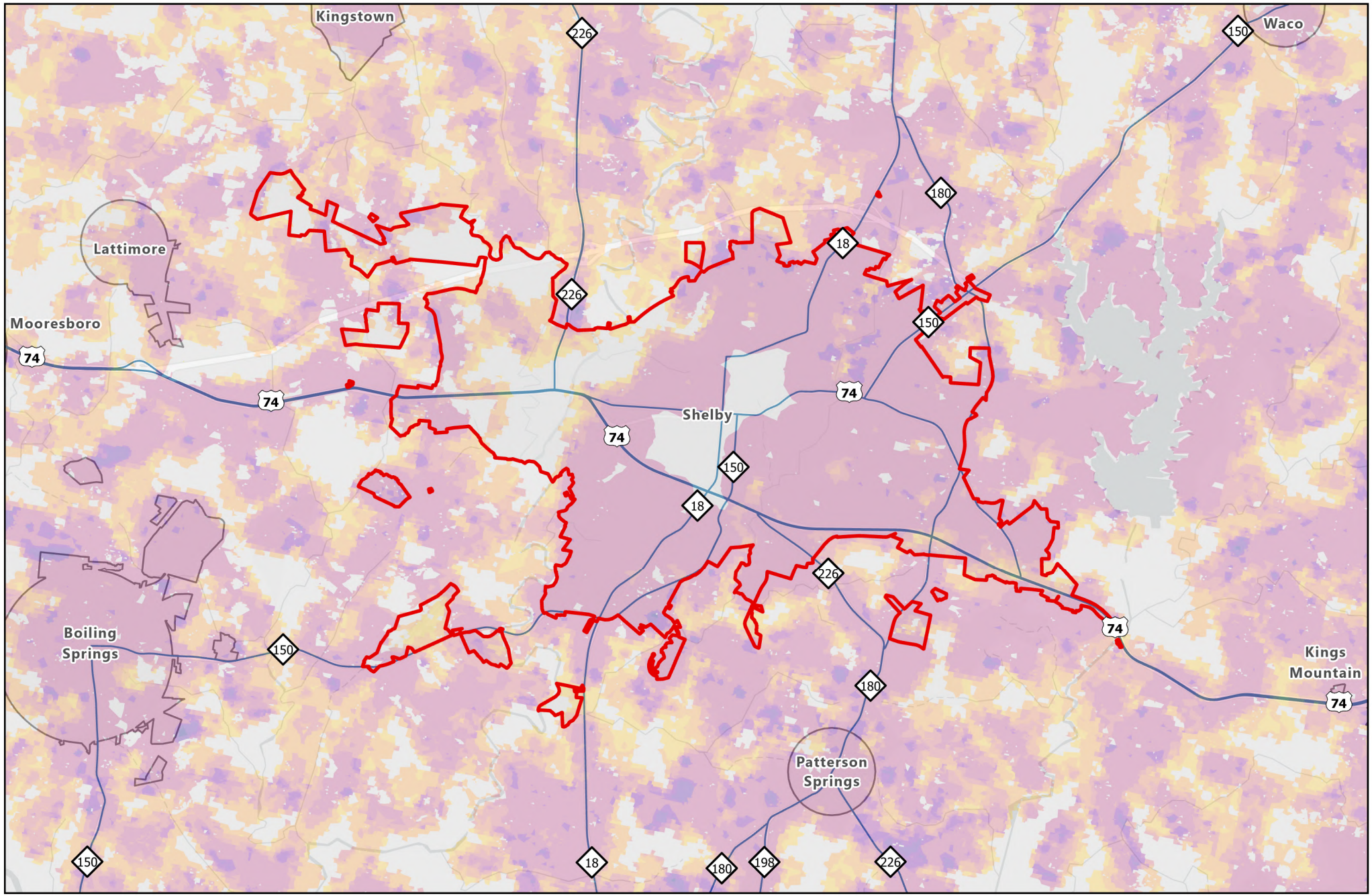
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Shelby - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

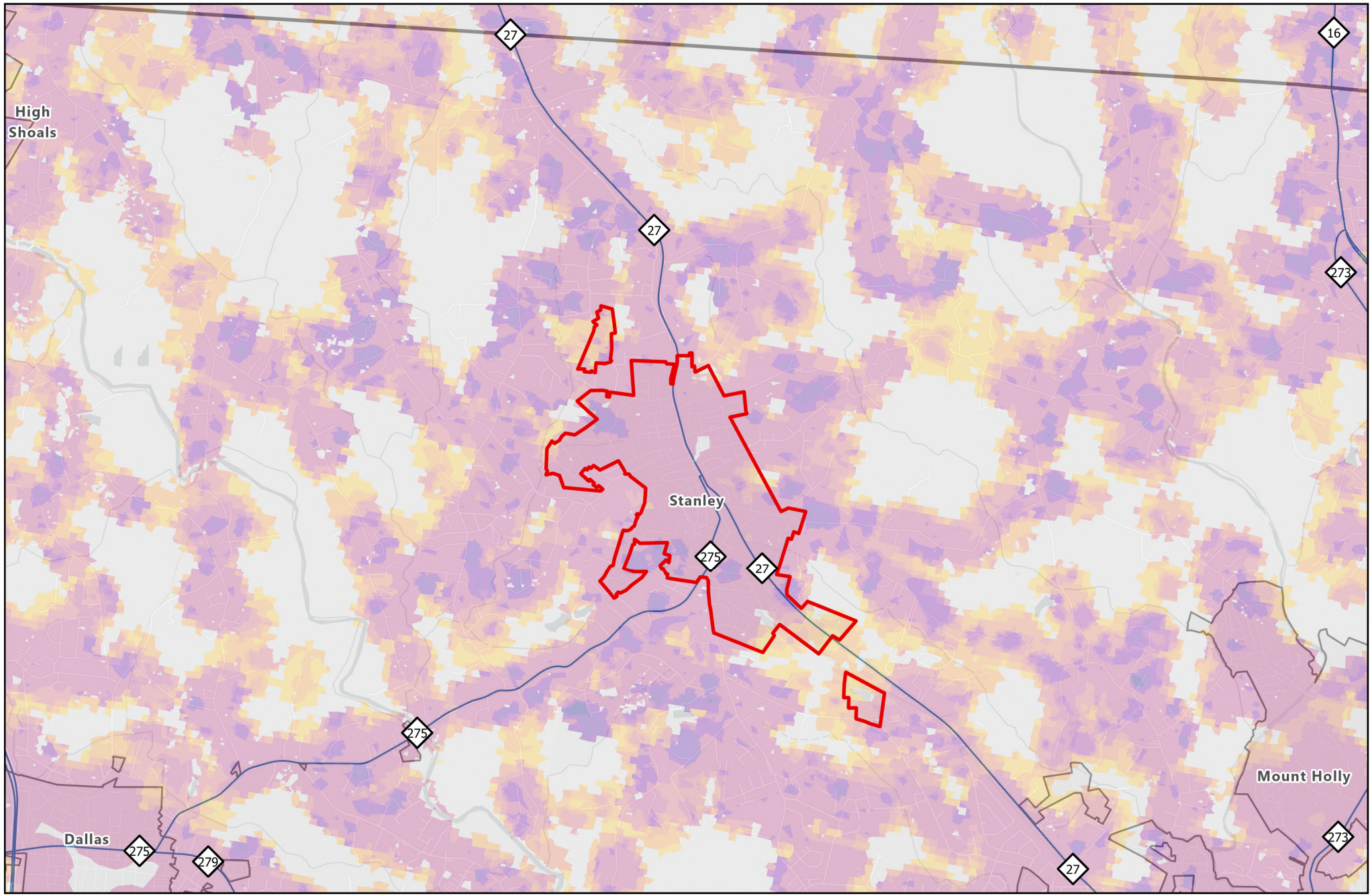
Low High

0 1.25 2.5 5 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Stanley - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

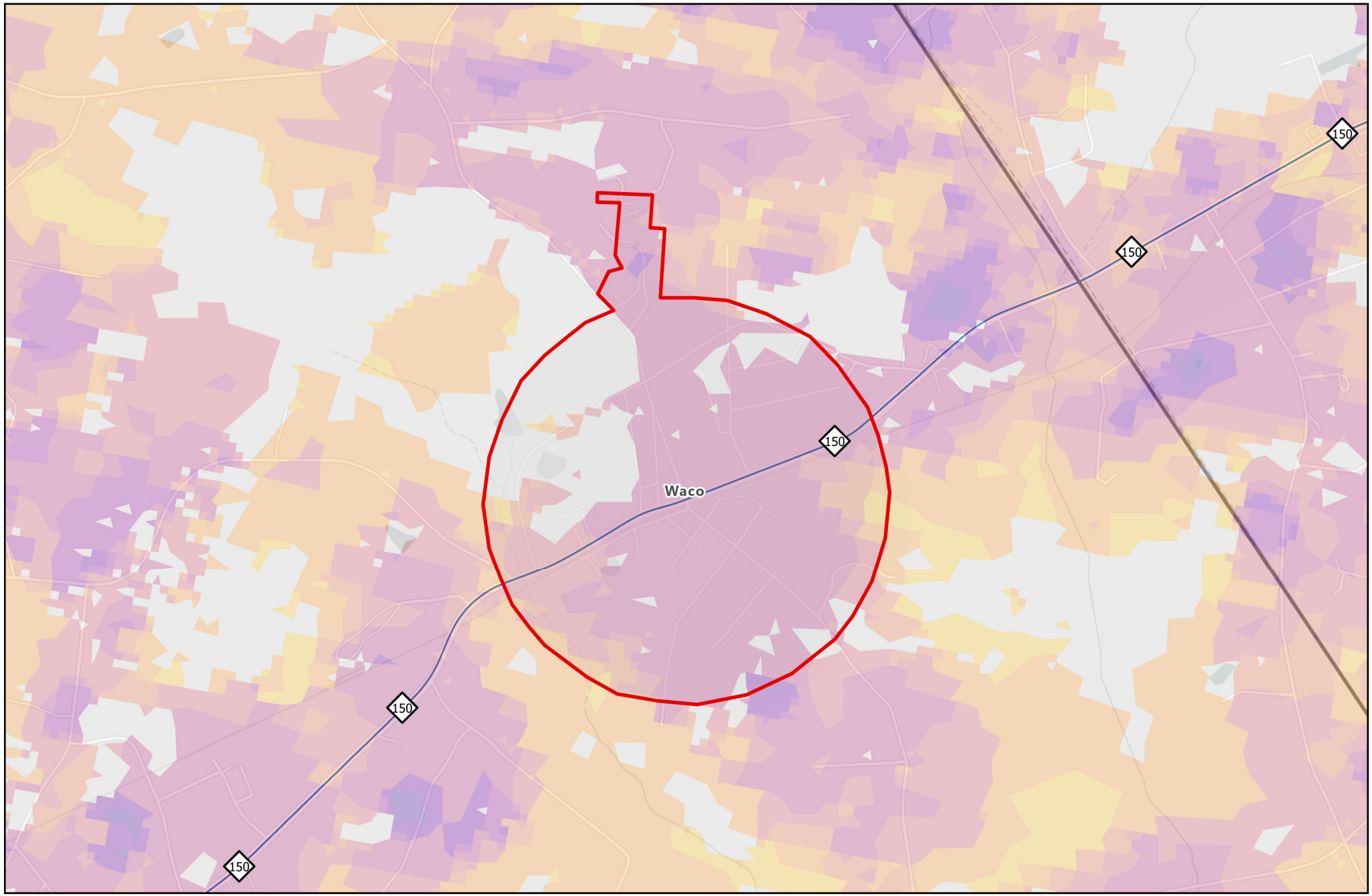
Low High

0 0.75 1.5 3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Waco - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Appendix H:
NCEI Storm Event Data

This section of the plan includes the historic storm event data as reported to the National Centers for Environmental Information (NCEI)[1].

- H.1 – Cold/Wind Chill
- H.2 – Drought
- H.3 – Extreme Heat
- H.4 – Flood
- H.5 – Hail
- H.6 – Heavy Rain
- H.7 – Heavy Snow
- H.8 – High Wind
- H.9 – Ice Storm
- H.10 – Lightning
- H.11 – Sleet
- H.12 – Tornado
- H.13 – Thunderstorm Wind
- H.14 – Winter Storm

[1] NCEI Storm Events Database (https://www.ncdc.noaa.gov/stormevents/). Events recorded as of 2024. **Per the database disclaimer**: "*due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. NCEI has performed data reformatting and standardization of event types but has not changed any data values for locations, fatalities, injuries, damage, narratives and any other event specific information*."

TABLE H.1: COLD/WIND CHILL EVENTS (2014-2024)

Location	Date	Description
Cleveland, Gaston, Lincoln Counties	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 Counties	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 Counties	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 Counties	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.
Cleveland, Gaston, Lincoln Counties	12/23/2022	An arctic cold front swept across the foothills and Piedmont of western North Carolina during the morning of the 23rd and introduced the coldest air mass in more than 5 years. Temperatures in the single digits and lower teens combined with 10 to 20 mph winds to produce wind chill values in the 0 to -15 range from the evening of the 23rd through Christmas Eve morning. While winds abated throughout Christmas Eve into Christmas Day, unseasonably cold weather persisted for the better part of four days. There were numerous reports of frozen and burst pipes along with mostly minor damage to infrastructure throughout the area.

Source: NOAA, NCEI

TABLE H.2: DROUGHT EVENTS (2000-2024)

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 H.3: EXCESSIVE HEAT EVENTS (2012-2024)

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 H.4: FLOOD EVENTS (2001-2024)

Date	Description
6/24/2001	"Severe urban flooding in Shelby, with water up to car hoods and many streets flooded. One bridge was washed out in a rural part of Cleveland County. 290,000 gallons of raw sewage spilled into the First Broad River during the heavy rain; trees and power lines down also. Two people rescued from cars. An apartment building flooded. Creeks in the city of Shelby flooded."
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.
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.

Date	Description
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.
3/26/2010	Widespread heavy rain showers and scattered thunderstorms developed north of a warm front across western North Carolina throughout the 25th into the 26th. Widespread totals rainfall of 3 to 6 inches, with locally higher amounts resulted in minor to moderate flooding along several mainstem rivers and some tributaries.
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 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.
2/6/2020	Unusually high levels of moisture for early February combined with a slow-moving frontal system to produce an extended period of moderate to heavy rainfall across western North Carolina from the morning of the 5th until the early morning hours of the 7th. Intense rain rates associated with bands of heavy rain showers and embedded thunderstorms developing along the front during the morning and afternoon of the 7th resulted in rather widespread flash flooding. Isolated tornadoes

Date	Description
	also developed during this time across Piedmont. Total rainfall of 3 to 6 inches resulted in flooding persisting along some main stem rivers and larger streams well into the 7th.
11/12/2020	Moderate flooding as a result of TS Eta developed along the South Fork Catawba River after 3 to 5 inches of rain fell throughout the watershed throughout the 12th. Flooding of multiple structures occurred, particularly along Riverside Dr and 8th Ave in Cramerton. Otherwise, multiple roads were inundated, including some due to backwater effects along tributaries of the South Fork Catawba.
3/26/2021	Moderate flooding developed along the Broad River near Boiling Springs after 3.5 to 4.5 inches of rain fell throughout the basin, mostly in a 12-hour period from the 25th into the early part of the 26th. Multiple roads were inundated along the river, as were the crawl spaces of several homes, particularly in the Abes Mountain Rd area.
1/9/2024	A stream gauge on the Broad River indicated flash flooding developed along the stream near Boiling Springs after 3 to 5 inches of rain fell throughout the basin in about 12 hours. Moderate flooding eventually developed, with multiple roads inundated along the river, as were the crawl spaces of several homes, particularly in the Abes Mountain Rd area. While rapid stream rises came to an end with cessation of heavy rain during the late afternoon and evening, the river remained in moderate flood stage through the overnight hours and much of the 10th.
7/20/2024	County comms reported severe urban and small stream flooding developed in the city of Gastonia after a series of slow-moving thunderstorms dumped 3 to 4 inches of rain across the city in just a couple of hours. Floodwaters caused water rescues to become necessary on Franklin Blvd, on Caldwell St, and on North Firestone St. Additionally, a stream gauge on Catawba Creek at East Hudson Blvd exceeded its established flood stage by a couple of feet.
9/27/2024	Stream gauges indicated flash flooding developed along the South Fork Catawba River and at least one tributary (Catawba Creek in Gastonia) after 5 to 9 inches fell across the western Piedmont over three days. The South Fork Catawba inundated greenways and parks along the river, as well as parking lots and several roads, including Riverside Dr. Backwater effects resulted in Hoyle Creek inundating Old Willis Rd in the Dallas area. In addition, New Hope Road at Robinwood Rd in Gastonia was flooded and impassable due to poor drainage. While heavy rain and flash flooding ended across the area by early afternoon, moderate river flooding persisted until the afternoon of the 29th and the South Fork didn't fall below flood stage until the early morning of the 30th.

TABLE H.5: HAIL EVENTS (2000-2024)

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.
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.

Location	Date	Mag.	Description
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.
Polkville	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.
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.

Location	Date	Mag.	Description
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.
Cleveland County	4/25/2020	2	Trained spotter reported 2-inch diameter hail on I-85 at the NC/SC state line.
Cleveland County	8/17/2020	1	Multiple social media/public reports of nickel to quarter size hail in the Waco area including on Enola Dr.
Mooresboro, Shelby	5/6/2022	2.5	Public measured (via social media) 2.5 inch diameter hail near Mooresboro.
Casar, Fallston	5/26/2023	1.75	Public and emergency manager reported quarter to golf ball sized hail in Casar. Media and public reported quarter to half dollar size hail in the Fallston area.
Mooresboro, Boiling Springs	7/3/2023	1.75	Public reported (via Social Media) half dollar size hail in Mooresboro. Public reported golf ball size hail in Boiling Springs.
Shelby	5/8/2024	1	Public reported dime to quarter size hail.
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	

Location	Date	Mag.	Description
Belmont	7/16/2003	0.75	
Gastonia	7/16/2003	1	
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.

Location	Date	Mag.	Description
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.
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.

Location	Date	Mag.	Description
Cramerton	8/11/2011	1	Quarter size hail fell along Hickory Grove Rd.
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.
Gaston County	5/4/2019	0.75	Spotter reported penny size hail.
Gastonia	8/1/2019	0.75	Public reported penny size hail fell briefly.
Gastonia	6/6/2021	0.75	Hail up to 3/4 inch was reported near the intersection of Highway 74 and Myrtle School Rd.
McAdenville	5/4/2022	0.75	Ham radio operator reported 3/4 inch hail.
Gaston County	5/6/2022	1	Spotter reported quarter size hail.
Gastonia	6/17/2022	1	Public reported quarter size hail.
Spencer Mountain, Ranlo	5/16/2023	1	Public reported (via Social Media) quarter size hail in the Spencer Mountain area and nickel sized hail along Court Dr.
Gaston County	9/7/2023	1	Public reported quarter size hail outside of Bessemer City.
Spencer Mountain	4/20/2024	0.75	Ham radio operator reported 3/4 inch hail.
Bessemer City	5/8/2024	1	Public reported quarter size hail in the Bessemer City area.
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

Location	Date	Mag.	Description
			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	
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.
Lincoln County	8/21/19	0.75	Public reported a brief period of 3/4 inch hail at the intersection of Highways 10 and 18.
Lincoln County	5/6/2022	1.75	Public reported quarter to golf ball size hail in multiple locations across western Lincoln County.

Location	Date	Mag.	Description
Lincoln County	5/26/2022	1	Ham radio operator reported quarter size hail.
Lincoln County	4/22/2023	0.75	Public reported 3/4 inch hail in the Crouse area.
Lincoln County	5/16/2023	1	Emergency management reported quarter size hail in the North Brook community.
Lincoln County	6/3/2023	1	Spotter reported quarter size hail in the Westport community.

TABLE H.6: HEAVY RAIN EVENTS (2003-2024)

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.
Lincoln County	9/1/2020	Spotter reported that poor drainage caused water to enter and damage a home on Dale Ave after 2 to 3 inches of rain fell across central Lincoln County in just a couple of hours.

TABLE H.7: HEAVY SNOW EVENTS (2000-2024)

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.

1/16/2022	Moisture overspread the North Carolina foothills and far western Piedmont early on the 16th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow across much of the foothills. Snow continued into the overnight, becoming moderate to occasionally heavy, with snowfall rates of up to an inch per hour reported. Heavy snowfall criteria of 2 to 4 inches was reached in many areas by sunrise, with accumulating snow continuing through the morning hours before tapering off to occasional snow showers during the afternoon and evening. Total snow accumulations ranged from 5 to 10 inches across much of the area, with locally higher amounts along the eastern Blue Ridge escarpment. Travel was difficult to nearly impossible throughout the 16th and much of the 17th.

TABLE H.8: HIGH WIND EVENTS (2000-2024)

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 H.9: ICE STORM EVENTS (2000-2024)

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 H.10: LIGHTNING EVENTS (2000-2024)

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.
Crowders	8/19/2014	HAM Radio operator reported lightning struck and damaged a structure at Unity Church Rd and Cedar Creek Ln.
Lincoln County		
Vale	6/26/2002	Lightning struck a business and ignited a fire, which destroyed the building and its contents.
Lincolnton	8/31/2003	Lightning ignited a fire at a church, causing significant damage.
Lincolnton	5/9/2004	Lightning ignited fires at several homes.
Denver	7/7/2005	Lightning ignited a house fire, which caused significant damage to the structure.
Denver	5/13/2006	Lightning ignited a fire which caused significant damage to a vacant home.
Lincolnton	6/2/2006	Lightning struck a church, igniting a fire that almost completely destroyed the building and its contents.
Lincolnton	6/22/2006	
Mariposa	5/28/2010	A father and son were injured when struck by lightning on Old Plank Rd.
Boger City	7/13/2010	Lightning struck and injured a man on Bethel Church Rd.
Crouse	4/18/2012	Lightning struck a home on Oakdale Rd, starting a fire that destroyed the structure.
Henry	8/7/2023	Emergency manager reported a person was struck and injured by lightning in the Vale area.

TABLE H.11: SLEET EVENTS (1999-2024)

Date	Description
3/9/1999	Light snow and sleet fell during the morning, associated with a strong low pressure area moving north through the Mississippi River Valley. Accumulations by noon ranged between 1 and 3 inches. Some light freezing rain mixed in from time to time as well.
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 H.12: TORNADO EVENTS (1956-2024)

Date	Scale	Description
Cleveland County		
5/27/1973	F3	
5/15/1975	F1	
6/24/1979	F1	
5/5/1989	F4	
2/10/1990	F2	
4/10/1990	F0	
6/4/1992	F0	
11/22/1992	F1	
8/16/1994	F1	At approximately 630 PM EDT, a tornado touched down in southern Cleveland County near the town of Earl, which is south of Shelby. The tornado affected areas off of route 18. One mobile home was completely destroyed on John Crawford Road. Extensive damage was done to a home off Mt. Sinai road. Several trees and power lines were also downed.
9/16/1996	F0	A weak tornado touched down very briefly causing minor damage to one home. Shingles were removed and a minivan was tipped up but not blown over by the wind.
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

Date	Scale	Description
		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 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.
2/6/2020	EF2	NWS storm survey found the path of an EF1 tornado that first developed west of Lawndale in the area around W Stage Coach Trail and Church View Dr. The tornado tracked northeast from there, crossing Hicks Hill Rd, Casar Lawndale Rd, and New Bethel Church Rd. Damage was primarily limited to snapped and uprooted trees in this area, although one mobile home received minor roof damage off New Bethel Church Rd while an outbuilding was destroyed on Hicks Hill Rd. The tornado continued to snap and uproot numerous trees and tree limbs as it tracked northeast, crossing Will Dixon Rd, Warlick Rd, and Highway 18 just north of Fallston. The tornado weakened from that point as it passed into Lincoln County in the Hull Rd area.
5/26/2022	EF0	NWS storm survey found a small short-track tornado touched down just southeast of Lattimore near Towery Rd. A shed was damaged along with a few trees. The tornado Moved north-northeast, lifting just short of Artee Rd. Public shared video of funnel cloud with some debris lofted in the air northwest of Kingstown.
5/8/2024	EF1	NWS storm survey found the path of an EF1 tornado that touched down along Polkville Rd, just north of Polkville proper, where several trees were uprooted. The tornado moved southeast across Casar Rd, where additional trees were uprooted and snapped. Tree damage continued along W Stage Coach Trail in the Lawndale area and south of

Date	Scale	Description
		Fallston, where the tornado crossed Fallston Rd and Fallston-Waco Rd before crossing into Gaston County between Baxter Rd and Highway 150.
Gaston County		
4/6/1956	F1	
5/28/1973	F0	
4/2/1974	F1	
5/15/1975	F1	
2/21/1997	F1	
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.
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

Date	Scale	Description
		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.
2/6/2020	EF1	NWS storm survey found a tornado that began in southeast Cleveland County moved into Gaston County in the Crowders Mountain State Park area. Numerous snapped trees were found as the tornado moved east crossing Pinnacle Rd and Sparrow Springs Rd. The damage ended near Freedom Mill Rd with snapped and broken large branches.
5/22/2020	EF0	NWS storm survey found tornado damage in southern Gaston County right around the time that another tornado was apparently dissipating just over the state line in York County South Carolina. Damage began along Crowders Creek Rd near the Sparrow Spring Rd intersection and continued E/NE across Ferguson Ridge Rd Highway 321 and Robinson Rd before ending in the area surrounding the Gastonia Municipal Airport. Damage was limited to many uprooted trees snapped limbs and minor structural damage along the length of the path.
1/12/2023	EF0	NWS storm survey found the path of an EF1 tornado that began over western Cleveland County moved into Gaston County just west of Cherryville, where the tornado reached peak intensity as it approached and skirted the western and southern part of town. Damage was primarily limited to numerous uprooted and snapped trees. The most consequential damage was observed near the intersection of Helton Road and Greenway Ave, where dozens of trees were uprooted or snapped. The tornado continued southeast, continuing to down trees near Tryon School Rd and Dameron Rd before lifting in a wooded area along Abel Rd.
5/8/2024	EF1	NWS storm survey found the path of an EF1 tornado that touched down near West Davidson Ave, snapping several trees. The tornado quickly moved east, crossing Highway 321 near I-85, where the tornado reached peak intensity. Several buildings sustained minor roof damage, multiple power poles were snapped, and numerous trees were uprooted or snapped in a wooded area around Sims Legion Park. Two people were injured by falling trees in this area. The tornado snapped additional trees as it crossed I-85 and moved through east Gastonia. Numerous trees were uprooted or snapped in this area, while a warehouse sustained minor-to-moderate roof damage. The tornado continued to produce tree damage as it moved through the Lowell area, where it crossed the South Fork Catawba River. Several more trees were downed in Belmont before the tornado lifted near Oak St in the Springwood community.
Lincoln County		
3/12/1968	F1	
5/27/1973	F0	
8/3/1974	F0	
10/2/1988	F0	
5/5/1989	F4	
3/7/1992	F1	

Date	Scale	Description
5/7/1998	F2	The same supercell that produced the tornado in McDowell County spawned a strong tornado in the Vale and Cat Square area. Four homes were destroyed, 50 homes were damaged, a church roof was partially blown off and numerous trees were downed.
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 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

Date	Scale	Description
		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.
2/6/2020	EF0	NWS storm survey found the path of a weakening tornado that moved into Lincoln County from Cleveland County in the Hull Rd area before dissipating. Damage was primarily limited to snapped tree limbs and a few downed trees in Lincoln County.

TABLE H.13: THUNDERSTORM WIND EVENTS (2000-2024)

Location	Date	Description
Cleveland County		
Belwood, Polkville	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.
Polkville	7/22/2008	Several trees were blown down in and around Polkville.
Belwood	7/23/2008	Numerous trees and power lines were blown down.
Polkville	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.
Polkville	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.
Polkville	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.
Polkville	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.
Polkville	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.
Polkville	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.
Lattimore, Shelby	5/31/2019	Public reported a few trees snapped along Pleasant Ridge Church Rd and also along Bradley Rd. Newspaper reported a steeple blown off a church on Marion St
Cleveland County	7/22/2019	Fire dept reported two trees blown down near the intersection of Whit-Mar Lake Road and Polkville Road.
Earl	8/22/2019	County comms reported two trees blown down on Cemetery Rd.
Cleveland County	1/11/2020	County comms reported multiple trees and power lines down across Cleveland County, especially northern sections.
Shelby	7/20/2020	Public reported trees blown down on a home on 3 Lakes Rd. Ham radio operator reported trees blown down and blocking Chatfield Rd and Farmville Rd.
Polkville	8/13/2020	Trained spotter reported trees blown down on Oak Grove-Clover Hill Church Rd county comms reported trees down on Polkville Rd and spotter reported trees down on Washburn Switch Rd.
Cleveland County	8/17/2020	County comm reported at least three trees blown down near Stoney Point Rd.
Belwood	7/26/2021	Amateur radio reported trees blown down along Casar-Lawndale Rd. Public reported a tree blown down on Caleb Rd blocking the roadway. County comms reported additional trees blown down across southern Cleveland County.
Boiling Springs	8/11/2021	Public reported multiple trees blown down on Maple Springs Church Rd.
Shelby	5/26/2022	Public reported multiple trees blown down in the Shelby area, with one down on a house.
Patterson Springs	7/5/2022	County comms reported multiple trees and power lines blown down in Patterson Springs and vicinity. Some trees blocked roads and another tree fell on a house. Another tree falling on a road caused a vehicle accident, with four resultant injuries. The people inside the vehicles were trapped for a while.
Cleveland County	7/6/2022	County comms reported trees and power lines blown down on Woodrow Hoyle Rd, Shuford Lake Rd, Tobe Bridge Rd, Oak Grove Rd, Bethlehem Rd, and El Bethel Rd.
Polkville	7/26/22	Spotter reported trees and power lines blown down in Polkville.
Shelby	8/2/2022	Public reported multiple trees and large limbs blown down and blocking roads on the north side of Shelby.
Shelby	8/4/2022	Ham radio operator reported trees and power lines blown down along Charles Rd.
Belwood, Polkville	8/15/2022	Ham radio reported two trees blown down across Warlick Rd. Spotter reported trees blown down along Charlie Elliott Rd and at least one tree down along Highway 182.
Boiling Springs, Shelby	1/12/2023	County comms reported numerous trees and power lines blown down across Cleveland, including in downtown Shelby. A tree fell on a vehicle near the intersection of Skinner Rd and Winners Circle in Boiling Springs, injuring an occupant.
Casar	5/16/2023	Emergency manager reported the tops blown out of 9 trees.
Earl	7/3/2023	Spotter reported several trees blown down across roads near Earl, including on South Post Rd and S Lafayette St.
Lattimore	7/13/2023	Spotter reported multiple trees blown down across Cleveland County.
Earl	8/6/2023	Public reported (via Social Media) a tree blown down on a home.
Boiling Springs	8/7/2023	Fire dept reported a few trees blown down in the Boiling Springs area.

Location	Date	Description
Lawndale, Waco, Kings Mountain	8/12/2023	County comms reported multiple trees blown down in the Lawndale, Kings Mountain and Waco areas.
Cleveland County	5/8/2024	NWS employee and public reported multiple trees and large limbs blown down in Shelby, Earl and vicinity.
Lawndale	7/15/2024	County comms reported several trees blown down in Lawndale and vicinity.
Shelby	7/16/2024	County comms reported several trees and power lines down blown across Shelby and vicinity.
Casar	7/30/2024	County comms reported numerous trees and power lines blown down across the Casar area, with public reporting additional trees down near Belwood. Utility company reported trees blown down on power lines on Blackburn Dr.
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.

Location	Date	Description
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.
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.

Location	Date	Description
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.
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.

Location	Date	Description
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.
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.

Location	Date	Description
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.
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	7/6/2/018	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.

Location	Date	Description
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.
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.
Belmont	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.
Gaston County	4/14/2019	Media relayed Social Media reports of trees blown down in the area around Highway 321 and Hardin Rd. County comms reported additional trees down nearby on Bob Friday Rd.
Cramerton, Dallas	6/20/2019	Fire dept/rescue reported a tree blown down on a house on Joe Cloninger Rd. Fire dept/rescue reported a tree blown down on a house on Union New Hope Rd.
Spencer Mountain	7/19/2019	Fire dept reported multiple trees blown down along Dallas Stanley Highway.
Belmont, Gastonia	5/22/2020	Law enforcement reported numerous trees blown down from the South Point community to Belmont. Amateur radio reported trees blown down along Queens and Stagecoach roads.
Gaston County	7/5/2020	County comms reported a tree fell on and killed a 34-year-old woman at a boat ramp off Eddie Nichols Dr.
Gaston County	7/21/2020	County comms reported trees blown down on Forbes Rd and Belwood Dr.
Cherryville	7/9/2021	Ham radio operator reported trees blown down across the road on Kenwood Rd and Pine Ave.
Gaston County	7/26/2021	County comms reported a tree blown down on a home on Brentwood Cir.
Gastonia	5/6/2022	Public reported a large tree fell on a vehicle in Gastonia.
Gaston County	6/17/2022	Public and ham radio operators reported multiple trees and power lines blown down from Bessemer City to the Crowders Mountain area.
Gastonia	7/6/2022	County comms reported a couple of trees blown down with one on a structure on W 5th Ave.
Dallas	7/19/2022	County comms reported multiple trees blown down in Dallas and vicinity.
Mt Holly	8/12/2022	County comms reported multiple trees and power lines blown down throughout the city of Mount Holly.
Gaston County	8/15/2022	County comms reported trees and power lines blown down on Old NC 27 Highway and on South Main St and Forest Hills Dr in Mount Holly.
Bessemer City	1/12/2023	County comms reported numerous tress and power lines blown down, with a few blown transformers across Gaston County.
Cherryville	5/16/2023	NWS storm survey determined intense straight-line winds associated with a supercell thunderstorm winds caused a broad swath of damage through the city of Cherryville. Trees were uprooted, and large branches broken, along NC Highway 274 north of the city limits. The winds progressed southeast through Cherryville proper, and most of the damage was concentrated within the city. Numerous trees were uprooted, with a few falling on other trees, snapping their trunks. One home had a portion of its roof ripped

Location	Date	Description
		off, and another metal building lost roof and/or wall panels. One known injury occurred when an individual tried to help people trapped in a car, and was thrown into the air as a tree fell, and suffered a laceration and a broken jaw. Winds associated with the damage were believed to be in the range of 65 to 85 mph. No indication of rotation or a tornado was observed by the survey team, with all damage attributed to straight-line winds. The damage swath ended along NC Highway 279 southeast of Cherryville.
Gaston County	6/26/2023	Fire dept reported a few trees along with numerous large limbs blown down in the Lucia community.
Gastonia	8/6/2023	Public reported (via Social Media) a snapped power pole southwest of Cramerton. Spotter reported multiple trees blown down southwest of Mount Holly.
Gaston County	8/15/2023	Utility company reported trees blown down on power lines near the intersection of Noles Dr and Goodson Rd.
Cramerton	8/26/2023	County comms reported trees and power lines blown down near Cramerton.
Stanley	4/11/2024	Ham radio operator reported a tree blown down on a structure on Chestnut St.
Spencer Mountain	4/20/2024	Fire dept reported a tree blown down on a structure on Dallas-Spencer Mountain Rd.
Gaston County	5/8/2024	Public reported a tree blown down on a house and an automobile in Dallas. County comms reported widespread straight-line wind damage to trees and power lines from the Kings Mountain and Bessemer City areas, across Gastonia to McAdenville. A 62-year-old woman was killed and another person injured when a tree fell on a parked vehicle at South New Hope Rd and Dixon Rd in Gastonia. The screen of an outdoor theater was destroyed in McAdenville.
Gastonia	5/25/2024	Ham radio operator and a spotter reported multiple trees blown down in Gastonia, with some trees down on power lines, and another tree on a structure.
Belmont	7/17/2023	County comms reported multiple trees blown down in the Belmont area.
Gastonia	7/30/2024	Ham radio operator reported a tree blown on a vehicle in the Gastonia area. Utility company reported trees blown down on power lines in southeast Gastonia.
Cramerton	8/19/2024	County comms reported large tree limbs blown down on King George Lane and a tree down on South Point 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

Location	Date	Description
		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.
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.

Location	Date	Description
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.
Lincoln County	5/31/2019	Spotter reported a few trees blown down on Highway 10. Law enforcement reported trees blown down across Frank Cline Rd and Gilbert Hilton Rd.
Lincoln County	6/17/2019	Public reported several trees blown down along Hipp Road near the Lincoln County border.
Lincoln County	6/24/2019	Ham radio operator reported multiple trees blown down in the Maiden area of Lincoln County. A tree was also blown down on a house on Buffalo Shoals Road closer to Lincolnton.
Lincoln County	8/13/2019	County comms reported numerous downed trees power lines across eastern Lincoln County.
Lincoln County	8/21/2019	Fire dept reported trees and power lines blown down in the Vale area.
Lincoln County	1/11/2020	Spotter and FD reported multiple trees blown down in the Vale area, with at least one tree down on a house. Law enforcement reported multiple trees blown down on North Pilot Knob Rd.
Lincoln County	2/6/2020	Spotter reported multiple trees blown down in Vale and surrounding areas.
Lincoln County	4/13/2020	Public reported (via Social Media) multiple trees blown down around western Lincoln County, including on Highway 182 and Howards Creek Rd.
Lincoln County	7/18/2020	County comms reported trees blown down on Oaklin Ln and a few large limbs down east of Boger City.
Lincoln County	8/13/2020	County comms reported multiple trees blown down across eastern Lincoln County including on Mundy Rd Beth Haven Church Rd Kidville Rd and at Highway 73 and Highway 16.
Lincoln County	9/1/2020	Amateur radio reported a tree blown and causing extensive damage to a house on Lands End Trail in the Alexis community.
Lincoln County	7/9/2021	Trained spotter and emergency manager reported multiple trees blown down from Schronce Rd to the area around East Lincoln High School. One tree fell on a house on North Ingleside Farm Rd. Trees and power lines were also blown down on Broadleaf Dr.
Lincoln County	8/14/2021	Public reported large trees blown down and a demolished shed on Eva Ct.
Lincoln County	8/25/2021	Amateur radio reported a tree blown down and blocking Highway 150 at McCorkle Rd. A few other trees were blown down in the area.

Location	Date	Description
Lincoln County	7/6/2022	County comms reported large trees blocking the road and damaging a bridge on Houser Farm Rd. Another large tree was blown down across Bess Chapel Church Rd.
Lincoln County	8/12/2022	Trees and power lines were blown down on the Lincoln County side town of Stanley.
Lincoln County	8/15/2022	Ham radio reported trees blown down and blocking Highway 27. Other trees were blown down on Love Memorial School Rd and Highway 150 near Crouse.
Lincoln County	1/12/2023	County comms reported of numerous trees and power lines blown down across Lincoln County.
Lincoln County	4/22/2023	Fire dept reported a tree blown down on Southside Church Rd and another tree down on Philadelphia Church Rd.
Lincoln County	5/16/2023	Public reported (via Social Media) a tree blown down across power lines in the Lincolnton area, with additional trees and lines down east of Iron Station.
Lincoln County	8/6/2023	Ham radio operator reported multiple trees and power lines blown down.
Lincoln County	8/7/2023	County comms reported around two dozen trees blown down across Lincoln County, with the highest concentration being in the Vale area. Some trees fell on and blocked roads.
Lincoln County	8/26/2023	Multiple sources reported reported multiple trees and large limbs blown down from Forney Hill Rd to the western shores of Lake Norman, including Unity Church Rd.
Lincoln County	5/8/2024	Emergency management reported numerous trees and power lines blown down in the southwestern portion of Lincoln County.
Lincolnton	7/30/2024	Fire dept reported multiple trees blown down in Lincolnton and vicinity, with some trees down on power lines, including on Royal Dr. Public reported the roof blown off a carport and a few trees blown down in the Vale area.
Lincolnton	8/2/2024	Spotter and fire dept reported multiple trees and power lines blown down in the Lincolnton area, with a couple of other trees down in the eastern part of the county.

TABLE H.14: WINTER STORM EVENTS (2005-2024)

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

Appendix I
FEMA National Risk Index Report

National Risk Index

June 27, 2024

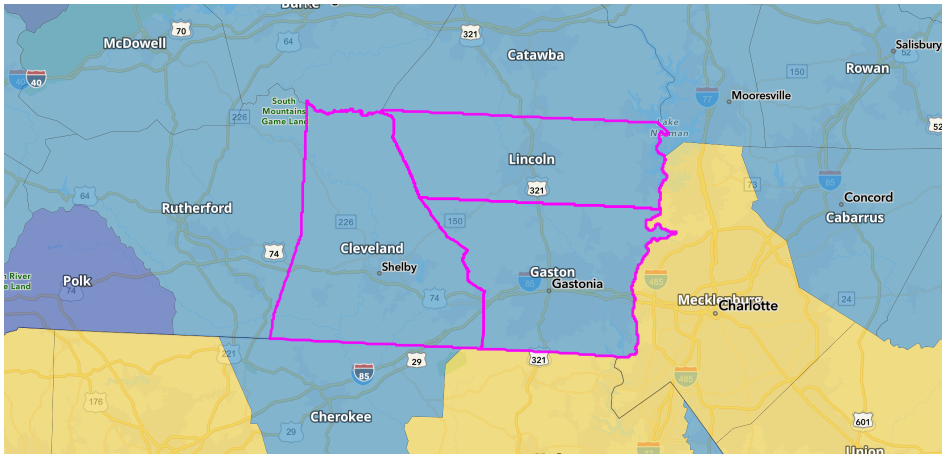
Risk Comparison Report

Use this report to determine how risk factors in selected communities compare to each other. Click a community name in any table below to open an individual risk profile report for that community and review its risk factors in more detail.

While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Risk Index



Risk Index Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Low	81.55	0 — 100
2	Cleveland County	NC	Relatively Low	70.57	0 — 100
3	Lincoln County	NC	Relatively Low	64.94	0 — 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$18,939,996	Relatively High	Relatively Moderate	1.17	$22,086,585	81.55

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
2	**Cleveland County**	NC	$9,071,107	Very High	Relatively Low	1.35	$12,242,360	70.57
3	**Lincoln County**	NC	$9,662,174	Relatively Low	Relatively Moderate	1.06	$10,201,556	64.94

Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's relative risk for only that hazard type.

Avalanche

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Cleveland County	NC	Not Applicable		
	Gaston County	NC	Not Applicable		
	Lincoln County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Cleveland County	NC	N/A	Very High	Relatively Low	1.35	N/A	N/A
	Gaston County	NC	N/A	Relatively High	Relatively Moderate	1.17	N/A	N/A
	Lincoln County	NC	N/A	Relatively Low	Relatively Moderate	1.06	N/A	N/A

Coastal Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Cleveland County	NC	Not Applicable		
	Gaston County	NC	Not Applicable		
	Lincoln County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Cleveland County	NC	N/A	Very High	Relatively Low	1.35	N/A	N/A
	Gaston County	NC	N/A	Relatively High	Relatively Moderate	1.17	N/A	N/A
	Lincoln County	NC	N/A	Relatively Low	Relatively Moderate	1.06	N/A	N/A

Cold Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Cleveland County	NC	No Rating	0	0 100
	Gaston County	NC	No Rating	0	0 100
	Lincoln County	NC	No Rating	0	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Cleveland County	NC	$0	Very High	Relatively Low	1.35	$0	0
	Gaston County	NC	$0	Relatively High	Relatively Moderate	1.17	$0	0
	Lincoln County	NC	$0	Relatively Low	Relatively Moderate	1.06	$0	0

Drought

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Lincoln County	NC	Relatively Low	72.89	0 100
2	Cleveland County	NC	Very Low	38.05	0 100
3	Gaston County	NC	Very Low	26.82	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Lincoln County	NC	$147,937	Relatively Low	Relatively Moderate	1.06	$166,434	72.89
2	Cleveland County	NC	$7,095	Very High	Relatively Low	1.35	$8,810	38.05
3	Gaston County	NC	$2,389	Relatively High	Relatively Moderate	1.17	$2,585	26.82

Earthquake

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Low	84.03	0 100
2	Cleveland County	NC	Relatively Low	77.12	0 100
3	Lincoln County	NC	Relatively Low	71.49	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$1,302,228	Relatively High	Relatively Moderate	1.17	$1,592,796	84.03
2	Cleveland County	NC	$609,027	Very High	Relatively Low	1.35	$826,884	77.12
3	Lincoln County	NC	$498,442	Relatively Low	Relatively Moderate	1.06	$542,932	71.49

Hail

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Lincoln County	NC	Relatively Moderate	83.71	0 100
2	Cleveland County	NC	Relatively Low	79.54	0 100
3	Gaston County	NC	Relatively Low	69.42	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Lincoln County	NC	$612,355	Relatively Low	Relatively Moderate	1.06	$657,670	83.71
2	Cleveland County	NC	$364,589	Very High	Relatively Low	1.35	$487,150	79.54
3	Gaston County	NC	$243,645	Relatively High	Relatively Moderate	1.17	$281,137	69.42

Heat Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Moderate	80.18	0 100
2	Cleveland County	NC	Relatively Low	69.68	0 100
3	Lincoln County	NC	Relatively Low	42.35	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$479,519	Relatively High	Relatively Moderate	1.17	$554,400	80.18
2	Cleveland County	NC	$209,515	Very High	Relatively Low	1.35	$281,740	69.68
3	Lincoln County	NC	$48,274	Relatively Low	Relatively Moderate	1.06	$53,718	42.35

Hurricane

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Low	76.99	0 100
2	Cleveland County	NC	Relatively Low	74.65	0 100
3	Lincoln County	NC	Relatively Low	70.48	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$2,614,678	Relatively High	Relatively Moderate	1.17	$3,040,305	76.99
2	Cleveland County	NC	$1,684,332	Very High	Relatively Low	1.35	$2,261,016	74.65
3	Lincoln County	NC	$1,323,156	Relatively Low	Relatively Moderate	1.06	$1,319,317	70.48

Ice Storm

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Very High	99.13	0 100
2	Cleveland County	NC	Very High	97.73	0 100

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
3	Lincoln County	NC	Very High	97.34	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$3,174,147	Relatively High	Relatively Moderate	1.17	$3,699,944	99.13
2	Cleveland County	NC	$1,708,104	Very High	Relatively Low	1.35	$2,314,936	97.73
3	Lincoln County	NC	$2,016,612	Relatively Low	Relatively Moderate	1.06	$2,097,501	97.34

Landslide

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Moderate	84.9	0 100
2	Lincoln County	NC	Relatively Moderate	84.71	0 100
3	Cleveland County	NC	Relatively Low	60.91	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$122,400	Relatively High	Relatively Moderate	1.17	$135,968	84.9
2	Lincoln County	NC	$122,400	Relatively Low	Relatively Moderate	1.06	$135,525	84.71
3	Cleveland County	NC	$21,900	Very High	Relatively Low	1.35	$29,230	60.91

Lightning

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Moderate	87.23	0 100
2	Cleveland County	NC	Relatively Moderate	85.39	0 100
3	Lincoln County	NC	Relatively Moderate	79.44	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$452,592	Relatively High	Relatively Moderate	1.17	$527,172	87.23
2	Cleveland County	NC	$353,416	Very High	Relatively Low	1.35	$476,541	85.39
3	Lincoln County	NC	$294,241	Relatively Low	Relatively Moderate	1.06	$319,152	79.44

Riverine Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Low	50.08	0 100
2	Lincoln County	NC	Relatively Low	34.62	0 100
3	Cleveland County	NC	Very Low	17.31	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$392,933	Relatively High	Relatively Moderate	1.17	$465,123	50.08
2	Lincoln County	NC	$197,432	Relatively Low	Relatively Moderate	1.06	$219,322	34.62
3	Cleveland County	NC	$44,151	Very High	Relatively Low	1.35	$58,972	17.31

Strong Wind

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively High	95.86	0 100
2	Lincoln County	NC	Relatively Moderate	83.65	0 100
3	Cleveland County	NC	Relatively Moderate	78.68	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$2,651,047	Relatively High	Relatively Moderate	1.17	$3,072,685	95.86
2	Lincoln County	NC	$1,087,783	Relatively Low	Relatively Moderate	1.06	$1,188,497	83.65
3	Cleveland County	NC	$708,762	Very High	Relatively Low	1.35	$956,010	78.68

Tornado

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Gaston County	NC	Relatively Moderate	92.43	0 100
2	Cleveland County	NC	Relatively Moderate	82.79	0 100
3	Lincoln County	NC	Relatively Moderate	77.7	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Gaston County	NC	$7,421,002	Relatively High	Relatively Moderate	1.17	$8,623,088	92.43
2	Cleveland County	NC	$3,293,970	Very High	Relatively Low	1.35	$4,455,494	82.79

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
3	**Lincoln County**	NC	$3,217,334	Relatively Low	Relatively Moderate	1.06	$3,398,779	77.7

Tsunami

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Cleveland County	NC	Not Applicable		
	Gaston County	NC	Not Applicable		
	Lincoln County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Cleveland County	NC	N/A	Very High	Relatively Low	1.35	N/A	N/A
	Gaston County	NC	N/A	Relatively High	Relatively Moderate	1.17	N/A	N/A
	Lincoln County	NC	N/A	Relatively Low	Relatively Moderate	1.06	N/A	N/A

Volcanic Activity

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Cleveland County	NC	Not Applicable		
	Gaston County	NC	Not Applicable		
	Lincoln County	NC	Not Applicable		

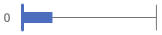
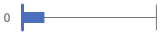
Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Cleveland County	NC	N/A	Very High	Relatively Low	1.35	N/A	N/A
	Gaston County	NC	N/A	Relatively High	Relatively Moderate	1.17	N/A	N/A
	Lincoln County	NC	N/A	Relatively Low	Relatively Moderate	1.06	N/A	N/A

Wildfire

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	**Cleveland County**	NC	Very Low	58.92	
2	**Gaston County**	NC	Very Low	58.7	
3	**Lincoln County**	NC	Very Low	53.93	

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Cleveland County	NC	$57,179	Very High	Relatively Low	1.35	$73,398	58.92
2	Gaston County	NC	$67,361	Relatively High	Relatively Moderate	1.17	$72,745	58.7
3	Lincoln County	NC	$50,099	Relatively Low	Relatively Moderate	1.06	$51,887	53.93

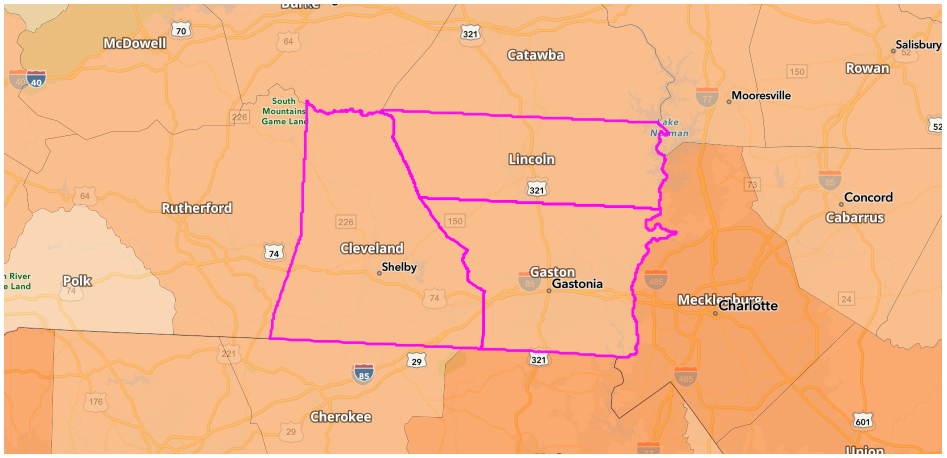
Winter Weather

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Lincoln County	NC	Relatively Low	46.23	
2	Gaston County	NC	Very Low	22.94	
3	Cleveland County	NC	Very Low	16.32	

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Lincoln County	NC	$46,108	Relatively Low	Relatively Moderate	1.06	$50,821	46.23
2	Gaston County	NC	$16,058	Relatively High	Relatively Moderate	1.17	$18,635	22.94
3	Cleveland County	NC	$9,067	Very High	Relatively Low	1.35	$12,179	16.32

Expected Annual Loss

Expected Annual Loss measures the expected loss each year due to natural hazards.



Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Expected Annual Losses | Not Applicable | Insufficient Data

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$18,939,996	80.5
2	Lincoln County	NC	$9,662,174	66.51
3	Cleveland County	NC	$9,071,107	65.15

Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

Avalanche

Rank	Community	State	EAL Value	Score
	Cleveland County	NC	N/A	--
	Gaston County	NC	N/A	--
	Lincoln County	NC	N/A	--

Coastal Flooding

Rank	Community	State	EAL Value	Score
	Cleveland County	NC	N/A	--
	Gaston County	NC	N/A	--
	Lincoln County	NC	N/A	--

Cold Wave

Rank	Community	State	EAL Value	Score
	Cleveland County	NC	$0	0.0
	Gaston County	NC	$0	0.0
	Lincoln County	NC	$0	0.0

Drought

Rank	Community	State	EAL Value	Score
1	Lincoln County	NC	$147,937	73.9
2	Cleveland County	NC	$7,095	38.3
3	Gaston County	NC	$2,389	28.7

Earthquake

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$1,302,228	81.8
2	Cleveland County	NC	$609,027	73.8
3	Lincoln County	NC	$498,442	71.5

Hail

Rank	Community	State	EAL Value	Score
1	Lincoln County	NC	$612,355	84.6
2	Cleveland County	NC	$364,589	78.2
3	Gaston County	NC	$243,645	70.7

Heat Wave

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$479,519	81.3
2	Cleveland County	NC	$209,515	68.6
3	Lincoln County	NC	$48,274	44.8

Hurricane

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$2,614,678	74.7
2	Cleveland County	NC	$1,684,332	71.6
3	Lincoln County	NC	$1,323,156	70.0

Ice Storm

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$3,174,147	99.0
2	Lincoln County	NC	$2,016,612	97.7
3	Cleveland County	NC	$1,708,104	97.1

Landslide

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$122,400	86.8
2	Lincoln County	NC	$122,400	83.3
3	Cleveland County	NC	$21,900	48.0

Lightning

Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$452,592	86.6
2	Cleveland County	NC	$353,416	83.6

Rank	Community	State	EAL Value	Score
3	**Lincoln County**	NC	$294,241	80.6

Riverine Flooding

Rank	Community	State	EAL Value	Score
1	**Gaston County**	NC	$392,933	50.1
2	**Lincoln County**	NC	$197,432	36.1
3	**Cleveland County**	NC	$44,151	16.7

Strong Wind

Rank	Community	State	EAL Value	Score
1	**Gaston County**	NC	$2,651,047	95.8
2	**Lincoln County**	NC	$1,087,783	84.2
3	**Cleveland County**	NC	$708,762	75.5

Tornado

Rank	Community	State	EAL Value	Score
1	**Gaston County**	NC	$7,421,002	92.0
2	**Cleveland County**	NC	$3,293,970	81.0
3	**Lincoln County**	NC	$3,217,334	80.6

Tsunami

Rank	Community	State	EAL Value	Score
	Cleveland County	NC	N/A	--
	Gaston County	NC	N/A	--
	Lincoln County	NC	N/A	--

Volcanic Activity

Rank	Community	State	EAL Value	Score
	Cleveland County	NC	N/A	--
	Gaston County	NC	N/A	--
	Lincoln County	NC	N/A	--

Wildfire

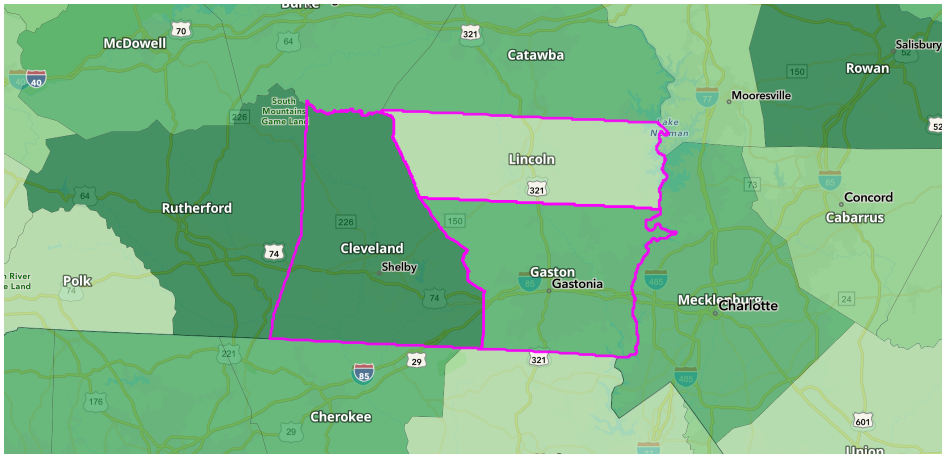
Rank	Community	State	EAL Value	Score
1	Gaston County	NC	$67,361	59.2
2	Cleveland County	NC	$57,179	56.5
3	Lincoln County	NC	$50,099	54.4

Winter Weather

Rank	Community	State	EAL Value	Score
1	Lincoln County	NC	$46,108	49.3
2	Gaston County	NC	$16,058	25.9
3	Cleveland County	NC	$9,067	17.5

Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.



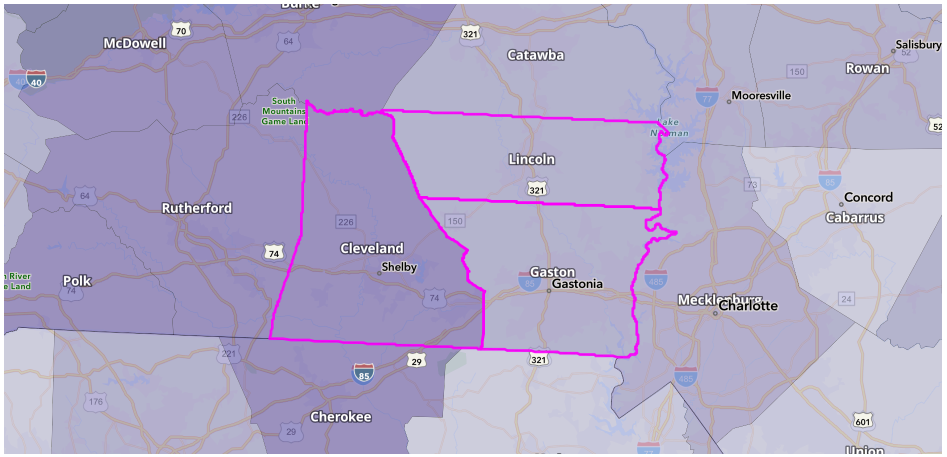
Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Rank	Community	State	Rating	Score
1	Cleveland County	NC	Very High	87.6
2	Gaston County	NC	Relatively High	71.7
3	Lincoln County	NC	Relatively Low	33.7

Community Resilience

Community Resilience measures a County's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.



Community Resilience Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Rank	Community	State	Rating	Score
1	Gaston County	NC	Relatively Moderate	52.8
2	Lincoln County	NC	Relatively Moderate	52.6
3	Cleveland County	NC	Relatively Low	35.0

About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at **hazards.fema.gov/nri/map**.

Visit the National Risk Index website at **hazards.fema.gov/nri/learn-more** to access supporting documentation and links.

Calculating the Risk Index

Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Social Vulnerability} \div \text{Community Resilience}$$

Risk Index scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/determining-risk**.

Calculating Expected Annual Loss

Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

Expected Annual Loss scores are presented as a composite score for all 18 hazard types, as well as individual scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/expected-annual-loss**.

Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).

For more information, visit **hazards.fema.gov/nri/social-vulnerability**.

Calculating Community Resilience

Community Resilience is measured at the County level using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/community-resilience**.

How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit **hazards.fema.gov/nri/take-action**.

Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should

consider substituting the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the **Contact Us** page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.