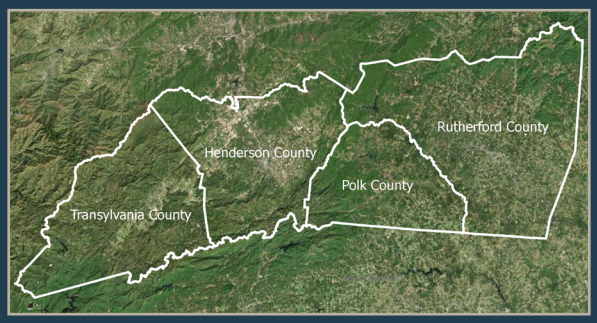


South Mountains
2025 Regional Hazard Mitigation Plan

DRAFT - MARCH 2025

TABLE OF CONTENTS

SECTION 1
INTRODUCTION

This section provides a general introduction to the South Mountains 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 landslides, 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 South Mountains Region is located in the south western part of North Carolina and includes Henderson, Polk, Transylvania, and Rutherford counties and the municipal governments within those counties. This area is vulnerable to a wide range of natural hazards, most notably winter storms, thunderstorms, floods, and landslides. It is also vulnerable to human-caused hazards, such as hazardous material spills. These hazards threaten the life and safety of residents in the South Mountains 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 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 as needed. 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 four counties participating in the development of the South Mountains 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.

The South Mountains Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region 4 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 South Mountains Regional Hazard Mitigation Plan is to:

- Completely update the existing South Mountains Regional Hazard Mitigation Plan to demonstrate progress and reflect current conditions
- Update the plan in accordance with Community Rating System (CRS) requirements;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions;
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the South Mountains Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the 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 Henderson, Polk, Transylvania, and Rutherford as well as their incorporated jurisdictions. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLAN

Henderson County	
Flat Rock	Laurel Park
Fletcher	Mills River
Hendersonville	Unincorporated Henderson County
Polk County	
Columbus	Tryon
Saluda	Unincorporated Polk County
Transylvania County	
Brevard	Unincorporated Transylvania County
Rosman	
Rutherford County	
Bostic	Lake Lure
Chimney Rock Village	Ruth
Ellenboro	Rutherfordton
Forest City	Spindale
Unincorporated Rutherford County	

1.4 AUTHORITY

The South Mountains Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard 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.

This plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007.

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 South Mountains 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 South Mountains Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the South Mountains 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 Floodplain 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 South Mountains 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 capacity of each County and municipal government in the South Mountains Region 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 South Mountains 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 South Mountains 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 communities in the South Mountains 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 South Mountains 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 South Mountains Regional Hazard Mitigation Plan. Copies of the 2020 plan can be obtained by contacting each county emergency management office or NCEM's Hazard Mitigation Planning Section.

This section consists of the following nine subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the South Mountains Region
- 2.3 Updating the Plan in 2025
- 2.4 The South Mountains 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 City of Brevard CRS Planning Process Documentation

---

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

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks and 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 10: *Plan Maintenance*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision-making process.

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

- Saving lives and property,

- Saving money,
- Speeding recovery following disasters,
- Reducing future vulnerability through wise development and post-disaster recovery and reconstruction,
- Expediting the receipt of pre-disaster and post-disaster grant funding, and
- Demonstrating a firm commitment to improving community health and safety.

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 SOUTH MOUNTAINS REGION

Prior to the development of the South Mountains Regional Hazard Mitigation Plan in 2014, each of the four counties and jurisdictions participating in the regional plan had previously adopted separate county-level hazard mitigation plans. Each of the county-level plans was developed using the multi-jurisdictional planning process recommended by FEMA. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below in **Table 2.1** below.

TABLE 2.1 FEMA APPROVED DATES OF PREVIOUS LOCAL AND COUNTY LEVEL HAZARD MITIGATION PLANS

Plan Name	Plan Date	Jurisdictions Included
Henderson County HMP	May 2011	City of Hendersonville; Towns of Fletcher, Mills River, and Laurel Park; Village of Flat Rock
Polk County HMP	March 2011	City of Saluda; Towns of Columbus and Tryon
Rutherford County HMP	June 2011	Towns of Bostic, Ellenboro, Forest City, Lake Lure, Ruth, Rutherfordton, Spindale; Village of Chimney Rock
Transylvania County HMP	September 2011	City of Brevard; Town of Rosman

The 2014 plan marked an important and successful beginning for regional hazard mitigation planning, and that success has continued into the 2020 and 2025 updates. For the development of the 2025 plan, all the jurisdictions that participated in the development of the 2020 plan participated in this plan's update. This approach streamlines planning for the jurisdictions in the South Mountains Region,

allowing resources to be shared among participants and reducing the administrative burdens on smaller, lower capacity communities.

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 South Mountains Regional Hazard Mitigation Plan, ESP Associates, Inc. was contracted by North Carolina Emergency Management 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 Underserved Populations* – 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 Estimate (SDE) Procedures* – Communities must now include summaries of their substantial damage estimating procedures in their capability assessment to better understand potential financial impacts and vulnerabilities.

The 2025 update incorporated requirements from the FEMA Community Rating System (CRS) and the Community Wildfire Protection Plan (CWPP). **Tables 2.2** and **2.3** below provide an overview of how the Community Rating System and Community Wildfire Protection Plan requirements were integrated into the updated plan.

TABLE 2.2 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

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6: Set Goals
§201.6(c)(3)(ii)	Step 7: Review Possible Activities
§201.6(c)(3)(iii)	Step 8: Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9: Adopt the Plan
§201.6(c)(4)	Step 10: Implement, Evaluate and Revise the Plan

TABLE 2.3 COMMUNITY WILDFIRE PROTECTION PLAN PROCESS INTEGRATION REFERENCE TABLE

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

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

The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Mitigation Planning Policy Guide (2022) and Local Mitigation Planning Handbook (2023) for reference as they completed the plan update.

The process used to prepare this plan included twelve major steps that were completed over the course of approximately eleven months beginning in February 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 SOUTH MOUNTAINS REGION

2.4 THE SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

To facilitate the initial development of the regional plan and its subsequent update, the participating jurisdictions established the South Mountains 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 March 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
- Support the adoption of the 2025 South Mountains Regional Hazard Mitigation Plan

Table 2.4 lists the members of the Regional Hazard Mitigation Planning Committee who were responsible for participating in the development of the Plan.

TABLE 2.4: MEMBERS OF THE SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT/AGENCY	Attended Internal Kickoff Meeting (2/21/24)	Attended Stakeholder Kickoff Meeting (4/2/24)	Attended HIRA/Mitigation Strategy Meeting (8/14/24)
HENDERSON COUNTY				
Bianculli, Janna	Henderson County, Senior Planner		X	X
Brissie, James	Henderson County, Public Safety Director	X	X	X
Christie, Patricia	Village of Flat Rock, Village/Zoning Administrator		X	X
Cortes, Victoria	Henderson County, EM Planner	X	X	X
Hoffman, Mike	City of Hendersonville, Stormwater Division Manager			X
Johnston, Deb	Henderson County, Site Development Director		X	X
Linville, Toby	Henderson County, Floodplain Administrator		X	X
Malecek, Mike	Town of Mills River, Planning Director		X	
McFalls, Tim	Henderson County, EM/Rescue Manager	X		
Miller, James	City of Hendersonville, Fire Chief		X	X
Moffitt, Dustin	City of Hendersonville, Stormwater Technician		X	
Morgan, Mike	Henderson County, Chief Communications Officer		X	X
Morrow, Tyler	City of Hendersonville, Planning Manager		X	
Myhand, Blair	City of Hendersonville, Police Chief		X	
Ward, Justin	City of Hendersonville, Deputy Fire Chief – Administration			X
Williams, Ted	City of Hendersonville, Deputy Fire Chief – Operations			X

NAME	DEPARTMENT/AGENCY	Attended Internal Kickoff Meeting (2/21/24)	Attended Stakeholder Kickoff Meeting (4/2/24)	Attended HIRA/Mitigation Strategy Meeting (8/14/24)
Young, Nathan	City of Hendersonville, Fire Marshal			X
POLK COUNTY				
Arledge, Bobby	Polk County, EM Director/Fire Marshall	X	X	X
Kegley, Andrew	Polk County, Assistant Fire Marshal			X
RUTHERFORD COUNTY				
Hamrick, Frankie	Rutherford County, EM Director/Fire Marshal	X		
TRANSYLVANIA COUNTY				
Shook, Kevin	Transylvania County, EM Director/Addressing Coordinator	X	X	X
REGIONAL STAKEHOLDERS				
Atchley, Greg	NCEM, Western Area Branch Chief	X		
Baker, Carl	NCEM, Hazard Mitigation Planner	X	X	X
Crew, Chris	NCEM, State Hazard Mitigation Officer	X	X	X
Delude, Hannah	ESP Associates, Hazard Mitigation Planner	X	X	
Flores, John	ESP Associates, Hazard Mitigation Planner	X	X	X
Kudla, Kymberly	FEMA Region 4		X	
Mello, John	NCEM, Hazard Mitigation Planner	X	X	X
Roderick, Mary	Land of Sky Regional Council			X
Slaughter, Nathan	ESP Associates, Hazard Mitigation Dept. Manager	X	X	X
Webster, Andrea	NCORR, Resilience Policy Advisor			X

Table 2.5 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.

TABLE 2.5: MEMBERS DESIGNATING REPRESENTATIVES TO SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT/AGENCY
Henderson County	
Biberdorf, Mark	Manager, Town of Fletcher
Reeves, Cara	Manager, Town of Laurel Park
Polk County	
Barth, Timothy	Manager, Town of Columbus
Fatland, Jim	Manager, Town of Tryon
Orr, Steve	Manager, City of Saluda
Rutherford County	
Barrick, Doug	Manager, Town of Rutherfordton
Blanton, Elizabeth	Mayor, Town of Ellenboro
Guy, David	Mayor, Town of Ruth
Harrill, Mitchell	Mayor, Town of Bostic
Mason, Janet	Manager, Town of Forest City
O'Leary, Peter	Mayor, Village of Chimney Rock
Stewman, Olivia	Manager, Town of Lake Lure
Webber, Scott	Manager, Town of Spindale
Transylvania County	
Hooper, Wilson	Manager, City of Brevard
Shelton, Brian	Mayor, Town of Rosman

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 South Mountains Regional Multi-Jurisdictional Hazard Mitigation Plan includes four counties, and eighteen (18) 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,
- Provide implementation status updates on previously identified mitigation actions,
- Identify completed mitigation projects (if applicable); and
- Develop and adopt (or update) the local mitigation action plan.

Each participating jurisdiction has developed a local mitigation action plan unique to their jurisdiction. This provides the means for jurisdictions to implement, monitor and 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 conducted during the plan update process. Meeting minutes were recorded and are documented in **Appendix D.**

TABLE 2.6: SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLANNING COMMITTEE MEETINGS SUMMARY

MEETING	MEETING TOPIC	DATE	LOCATION
County Leads – Internal Kickoff	1. Introduction to project team and county leads 2. Review of mitigation, project scope, and tentative project schedule 3. Discussion on stakeholder engagement and citizen contacts	2/21/24	Virtual Microsoft Teams
HMPC Mtg #1 - Project Kick-Off	4. Introduction to DMA requirements and the planning process 5. Review HMPC responsibilities and project schedule	4/2/24	25 International Blvd. Mill Spring, NC 28756
HMPC Mtg #2 - HIRA/Mitigation Strategy Mtg (combined)	1. Review Draft Hazard Identification and Risk Assessment (HIRA) 2. Review asset inventory and discuss critical facilities 3. Review Capability Assessment and Mitigation Strategies 4. Solicit comments and feedback	8/14/24	2529 Asheville Hwy Hendersonville, NC 28791

Table 2.6 summarizes key meetings and workshops held by the HMPC during the development of the plan. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency. For example, seeking approval of specific mitigation actions for their department or agency to undertake and include in their mitigation action plan. These meetings were informal and are not documented here. Public involvement is summarized in the subsequent section.

2.6 INVOLVING THE PUBLIC

44 CFR Requirement

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

An important component of the mitigation planning process involved public participation. Individual

resident and community-based input provides a better understanding of local concerns, increases community buy-in and support, and heightens likelihood of mitigation action implementation. As residents become more involved in decisions that affect their safety, they are more likely to gain a greater awareness of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business or entire planning area safer from the potential effects of hazards.

Public involvement in the development of the South Mountains Regional Hazard Mitigation Plan was sought using several methods:

- Conducting open public meetings (virtual),
- Developing a project website to share project status and relevant resources,
- Providing online notices,
- Sharing the public participation survey online and in-person, and
- Making the draft plan available online for public review.

The public was provided multiple opportunities to be involved in the development of the regional plan at three distinct periods during the planning process: (1) during the drafting stage of the plan, (2) upon completion of a draft plan, but prior to official plan approval and adoption, and (3) just prior to plan adoption. **Table 2.7** summarizes public involvement efforts employed during the plan update process. Documentation of these efforts is provided in **Appendix D**.

TABLE 2.7: SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLAN UPDATE PUBLIC ENGAGEMENT OPPORTUNITIES AND MEASURES

OUTREACH TYPE	OUTREACH DESCRIPTION	DATE	LOCATION
Public Survey	• Shared online via municipal and county websites • Shared in-person at government and community facilities • Respondents could complete anonymously or provide name/email • Input used to inform potential mitigation strategies	-	Online Survey Planet
Project Website	• Provides general overview of mitigation and planning process • Summarizes project-specific timeline and tasks • Links to valuable resources including HMPC meeting minutes and presentations	-	Online ARCGIS Story Maps
Public Notices	• Project updates shared on municipal and county websites • Links provided to existing plan and draft plan	-	Online Municipal Websites

OUTREACH TYPE	OUTREACH DESCRIPTION	DATE	LOCATION
Plan Adoption Meetings	• Review, approval and local adoption of the final plan (see Appendix A).	Various	Each participating jurisdiction.

Note: *Tropical Storm Helene heavily impacted the South Mountains region on September 27, 2024, greatly impacting the planning process for the update of the regional hazard mitigation plan. It was decided to not hold physical public meetings in the region to not hinder response and recovery activities and to not confuse citizens in the region. The opportunities listed above provided ample opportunities for the public to weigh in on the plan update.*

2.6.1 Public Participation Survey

The Regional Hazard Mitigation Committee successfully engaged residents in the mitigation planning process through the Public Participation Survey. This survey was specifically designed to gather data and insights from residents of Henderson, Polk, Rutherford, and Transylvania Counties.

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 county and municipal websites. In total, 135 survey responses were received, providing valuable input for updating the plan. Selected survey results are presented below.

- Approximately 63 percent of survey respondents had been impacted by a disaster, mainly hurricanes and flooding, with most responses mentioning Hurricane Helene.
- Respondents ranked Flooding and Tornadoes/Thunderstorms as the highest threats to their neighborhood (43 percent and 18 percent, respectively) followed by Wildfire (14 percent), and Severe Winter Weather (10 percent).
- Approximately 62 percent of respondents have taken actions to make their homes more resistant to hazards and 91 percent are interested in making their homes more resistant to hazards.
- 63 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services and Natural Resource Protection were ranked as the most important activities for communities to pursue in reducing risks.

Full results 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, the project consultant collaborated with the emergency management leaders from each county to initiate stakeholder outreach. At this time, a list was distributed of recommended stakeholders derived from FEMA Publication 386-1, titled *Getting Started: Building Support for Mitigation Planning,* which highlights the diverse range of stakeholders considered for participation in plan development. County emergency management leaders referenced this list 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 reviewed to ensure all elements for participation were addressed.

The participating jurisdictions invited representatives from the emergency services, planning departments, and water resources to provide insight on their area of expertise with a focus on underserved and socially vulnerable populations in the region. Additionally, the participating jurisdictions invited representatives from the health departments, social services departments, and planning departments to advocate for and provide insight on underserved and socially vulnerable populations in the region. The Regional Hazard Mitigation Committee actively promoted open and widespread participation in the mitigation planning process by designing and distributing the Public Participation Survey. This initiative allowed local officials, residents, businesses, academics, and other private interests in the South Mountains Region to engage and provide input throughout the local mitigation planning process. Additional stakeholders involved in the process include North Carolina Division of Emergency Management (NCEM), North Carolina Office of Resilience and Recovery (NCORR), and Land of Sky Regional Council.

2.8 DOCUMENTATION OF PLAN PROGRESS

This plan update documents the progress made in hazard mitigation planning for the participating jurisdictions in the South Mountains 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 by reconvening every five years to update the plan and actively involving the public in the planning process.

SECTION 3
COMMUNITY PROFILE

This section of the plan provides a general overview of the South Mountains 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 South Mountains Region is situated in the southwestern part of North Carolina, bordered to the west by the Catawba River Valley, which divides it from the Appalachian Mountains. For the purposes of this plan, the South Mountains Region encompasses four (4) counties: Henderson, Polk, Rutherford, and Transylvania. The planning area includes incorporated and unincorporated portions of the four (4) identified counties along with 18 participating municipalities *(see Section 1: Introduction).*

The region comprises a total area of over 1,561 square miles. The land area, water area, and total area reported for each participating county is presented in **Table 3.1**.

TABLE 3.1: TOTAL LAND AREAS OF PARTICIPATING COUNTIES

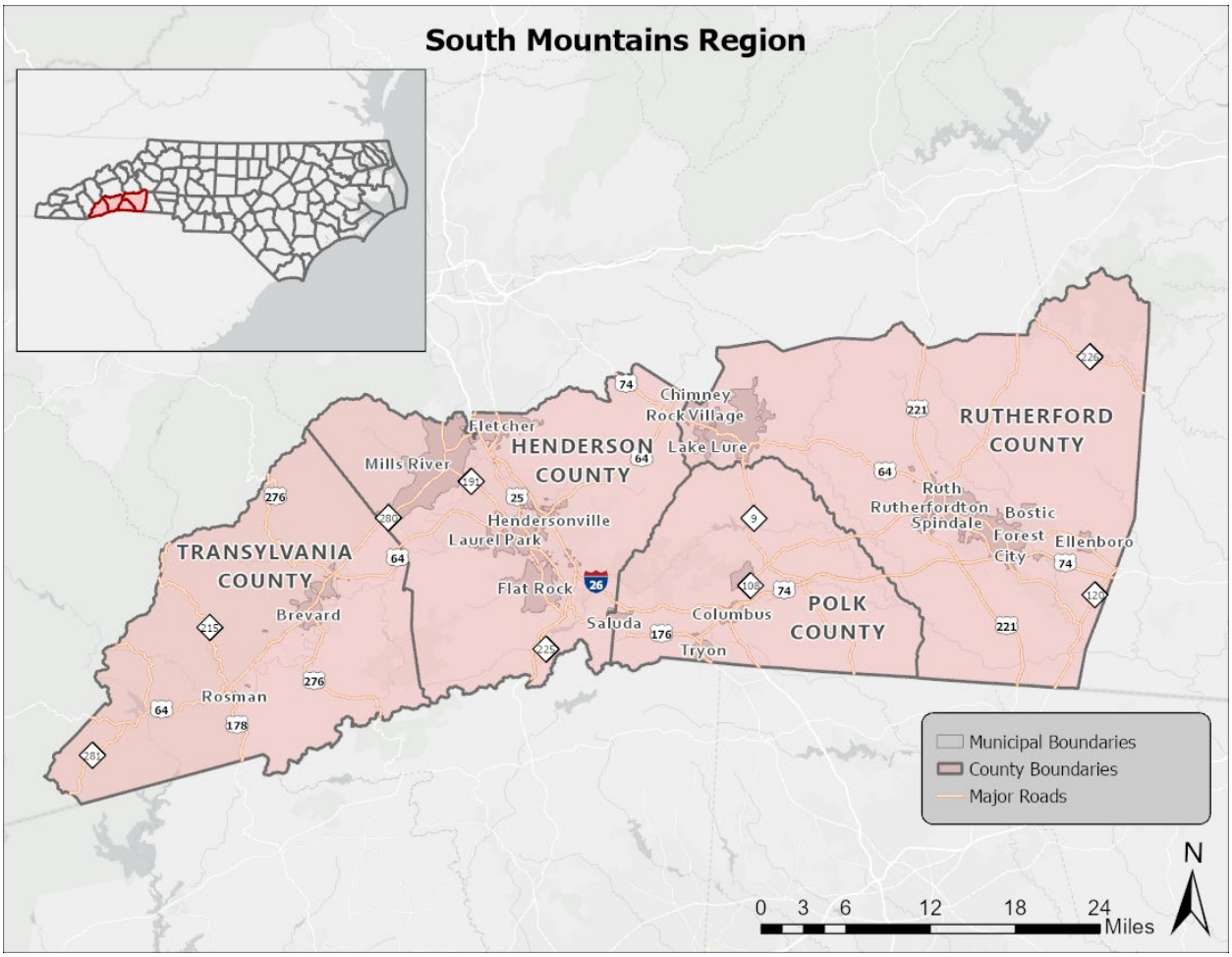
County	Land Area	Water Area	Total Area
Henderson County	372.95 sq mi	2.14 sq mi	375.09 sq mi
Polk County	237.69 sq mi	0.76 sq mi	238.45 sq mi
Rutherford County	565.44 sq mi	1.81 sq mi	567.25 sq mi
Transylvania County	378.36 sq mi	1.97 sq mi	380.33 sq mi
Region Total	**1,554.44 sq mi**	**6.68 sq mi**	**1,561.12 sq mi**

Source: US Census Bureau

Although primarily rural, the South Mountain Region is influenced by several statistical areas within and surrounding the region. The prevalence of these areas impacts population density and growth, resource allocation and availability, infrastructure and services, and economic characteristics, all of which directly correlate with hazard mitigation planning and community capacity. Relevant statistical areas are summarized below.

- Henderson County falls within the Asheville, NC Metropolitan Statistical Area (MeSA),
- Rutherford County falls within the Forest City, NC Micropolitan Statistical Area (MiSA),
- Transylvania County falls within the Brevard, NC MiSA,
- Henderson and Transylvania Counties fall within the Asheville-Waynesville-Brevard, NC Combined Statistical Area (CSA),
- All participating counties abut with the Greenville-Spartanburg-Anderson, SC CSA, and
- Rutherford County abuts with the Charlotte-Concord, NC CSA to the east.

FIGURE 3.1: SOUTH MOUNTAINS REGION ORIENTATION MAP



According to the Köppen climate classification system, the South Mountains Region is categorized as a humid subtropical climate like much of North Carolina. This climate zone is described as "Mild with no dry season, hot summers, average temperature of warmest months is over 72˚F, average temperature of coldest months is under 64˚F, and year-round rainfall but highly variable."[1] Based on the National Centers for Environmental Information (NCEI) data, the region exhibits a temperate climate with an average annual temperature of 57.8°F over the last ten years. The average temperatures and precipitation of each of the participating counties is presented in **Table 3.2**.

TABLE 3.2: ANNUAL AVERAGE TEMPERATURES AND PRECIPITATION OF PARTICIPATING COUNTIES

County	12-Month Avg Temp	January Annual Avg Min Temp	January Annual Avg Max Temp	June Annual Avg Min Temp	June Annual Avg Max Temp	12-Month Avg. Rainfall (2014-2024)

[1] *Köppen-Geiger Climate Subdivisions. National Oceanic and Atmospheric Administration*. https://www.noaa.gov/jetstream/global/climate-zones/jetstream-max-addition-k-ppen-geiger-climate-subdivisions

	(2014-2024)	(2014-2024)	(2014-2024)	(2014-2024)	(2014-2024)	
Henderson County	56.2˚F	27.2˚F	51.7˚F	59.7˚F	79.5˚F	62.02in
Polk County	59.9˚F	29.5˚F	50.4˚F	62.9˚F	85.3˚F	60.15in
Rutherford County	60.0˚F	29.0˚F	50.7˚F	63.0˚F	85.9˚F	53.17in
Transylvania County	55.2˚F	26.9˚F	45.6˚F	58.7˚F	77.7˚F	74.70in
Region Average	**57.8˚F**	**28.2˚F**	**49.6˚F**	**61.1˚F**	**82.1˚F**	**62.5in**

Source: National Centers for Environmental Information: Climate at a Glance (Time Series)

Winter is generally moderate in the region, with extremes occurring at higher elevations. In January, the region experiences an average minimum temperature of 28.2°F and an average maximum temperature of 49.6°F, respectively. These values indicate a moderate winter climate, which suggests that the region experiences conditions that can lead to freezing events and winter storms. Winter precipitation is typically results from low pressure storms, which pass through the area frequently, primarily in January.

Temperatures are moderately warm and very humid in summer months, but more temperate at higher elevations. During the month of June, the region experiences a significant increase in temperatures. Average minimum temperatures rise to approximately 61.1°F and average maximum temperatures reach 82.1°F, indicating a shift to a warm and humid summer. This not only affects human health, potentially increasing the incidence of heat-related illnesses, but also heightens the risk of wildfires and heatwaves.

Located in the eastern portion of the wettest area in North Carolina, the region averages about 62.5 inches of annual rainfall, equating to approximately five (5) inches per month. Rainfall in the region is generally well-distributed with heightened frequency during summer months and the drier conditions occurring in the fall. Summer precipitation is primarily attributed to thunderstorms, which can bring intense, localized rainfall.

3.1.1 Natural Features

Most of the South Mountains Region falls within the Upper Broad River Watershed, part of the Broad River Basin. This includes all of Polk County, all of Rutherford County, and eastern portions of Henderson County. The remaining portions of Henderson County and most of Transylvania County are in the Upper French Broad River Watershed, part of the French Broad River Basin. Southwestern Transylvania County is in the Seneca River Basin Watershed, part of the Savannah River Basin. Details on each of the three (3) river basins are described in greater detail below.

- Broad River Basin – The North Carolina section of the Broad River basin covers 1,513 square miles, spanning the southeastern corner of the Blue Ridge ecoregion and the southwestern part of the Piedmont ecoregion.
- French Broad River Basin – The North Carolina section of the French Broad River basin covers 2,830 square miles and is entirely within the Blue Ridge ecoregion. The river begins in Transylvania County and flows north for 210 miles through Western North Carolina into Tennessee.
- Savannah River Basin - The Savannah River Basin in North Carolina represents the northernmost headwaters of a 9,850-square-mile river system that flows along the South Carolina-Georgia border into the Atlantic Ocean near Savannah, GA. The North Carolina section covers about 171 square miles, making it the smallest river basin in the state.

The region is characterized by significant elevation variation, which is largely influenced by its proximity to the Blue Ridge Mountain Range and the Eastern Continental Divide. This area features diverse topography that ranges from valleys at less than 1,000 feet to peaks exceeding 3,000 feet. The Blue Mountains create steep slopes and high ridges that contribute to the region's drastic elevation changes. This variation impacts water flow and flooding, landslide risk, as well as microclimates and weather patterns.

3.1.2 Parks, Preserves, and Conservation

The South Mountains Region boasts a wealth of parks, forests, and campgrounds that showcase the region's abundant natural resources. These include the Blue Ridge Parkway, Carl Sandburg Home National Historic Site, Chimney Rock State Park, Gorges State Park, and Pisgah National Forest. Numerous U.S. designated historic districts and landmarks can be found throughout the region, enriching its cultural makeup.

The region also hosts a range of events and educational programs that emphasize its natural characteristics, fostering environmental stewardship. Additionally, the South Mountains Game Land, managed by the North Carolina Wildlife Resources Commission, provides excellent opportunities for wildlife observation and conservation efforts. Scenic driving tours are available, allowing travelers to experience the unique landscapes that define the area.

3.1.3 Threatened and Endangered Species

The U.S. Fish and Wildlife Service maintains a regular listing of threatened species, endangered species, species of concern, and candidate species for counties across the United States. As of 2024 records, the South Mountains Region has 51 species that are listed with the U.S. Fish and Wildlife Services as threatened, endangered, proposed endangered, proposed threatened, species of concern, or under review. **Table 3.3** summarizes these identified species below.

TABLE 3.3: THREATENED AND ENDANGERED SPECIES OF PARTICIPATING COUNTIES

Group	Common Name	Scientific Name	Federal Status	Counties
Amphibians	Eastern Hellbender	Crytobranchus Alleganiesnsis Alleganiesnsis	Proposed Endangered	H, T
Amphibians	Green Salamander	Aneides Aeneus	Status Undefined	H, P, R, T
Arachnids	Spruce-Fire Moss Spider	Microhexura Montivaga	Endangered	H, T
Birds	Golden-Binged Warbler	Vermivora Chrysoptera	Under Review	H, P, R, T
Birds	Red Crossbill	Loxia Curvirostra	Species of Concern	T
Birds	Northern Sawwhet Owl	Aegolius Acadicus	Species of Concern	T
Birds	Southern Appalachian Black-Capped Chickadee	Poecile Atricapillus	Species of Concern	T
Clams	Tennessee Clubshell	Pleurobema Oviforme	Proposed Endangered	H, T

Group	Common Name	Scientific Name	Federal Status	Counties
Clams	Appalachian Elktoe	Alasmidonta Raveneliana	Endangered	H, T
Clams	Longsolid	Fusconaia Subrotunda	Threatened	H, T
Conifers and Cycads	Carolina Hemlock	Tsuga Caroliniana	Under Review	R, T
Conifers and Cycads	Fraser Fir	Abies Fraseri	Species of Concern	T
Crustaceans	French Broad Crayfish	Cambarus Reburrus	Species of Concern	H, T
Ferns and Allies	Appalachian Fissidens Moss	Fissidens Appalachensis	Status Undefined	R
Ferns and Allies	Gorge Filmy Fern	Hymenophyllum Tayloriae	Species of Concern	T
Fishes	Olive Darter	Percina Squamata	Species of Concern	H,
Fishes	Wounded Darter	Etheostoma Vulneratum	Species of Concern	T
Flowering Plants	Virginia Spiraea	Spiraea Virginiana	Threatened	H, T
Flowering Plants	Spreading Avens	Geum Radiatum	Endangered	H, T
Flowering Plants	Blue Ridge Goldenrod	Solidago Spithamaea	Threatened	H, T
Flowering Plants	Mountain Sweet Pitcher-Plant	Sarracenia Rubra	Endangered	H, T
Flowering Plants	Bunched Arrowhead	Sagittaria Fasciculata	Endangered	H,
Flowering Plants	Piedmont Ragwort	Packera Millefolia	Species of Concern	H, P, R, T
Flowering Plants	Small Whorled Pogonia	Isotria Medeoloides	Threatened	H, R, T
Flowering Plants	Mountain Purple Pitcherplant	Sarracenia Purpurea	Under Review	H
Flowering Plants	White Irisette	Sisyrinchium Dichotomum	Endangered	H, P, R
Flowering Plants	Butternut	Juglans Cinerea	Species of Concern	H, P, R, T
Flowering Plants	French Broad Heartleaf	Hexastylis Rhombiformis	Species of Concern	H, P, T
Flowering Plants	New Jersey Rush	Juncus Caesariensis	Species of Concern	H
Flowering Plants	Swamp Pink	Helonias Bullata	Threatened	H, T
Flowering Plants	Dwarf-Flowered Heartleaf	Hexastylis Naniflora	Threatened	P, R
Flowering Plants	Fraser's Yellow Loosestrife	Lysimachia Fraseri	Species of Concern	P, T
Flowering Plants	Radford Sedge	Carex Radfordii	Species of Concern	P, T
Flowering Plants	Roundleaf Riverwort	Cephaloziella Obtusilobula	Species of Concern	R

Group	Common Name	Scientific Name	Federal Status	Counties
Flowering Plants	Granite Dome Goldenrod	Solidago Simulans	Species of Concern	R, T
Flowering Plants	Smoky Mountains Manna Grass	Glyceria Nubigena	Species of Concern	T
Flowering Plants	A Liverwort	Porella Wataugensis	Species of Concern	T
Flowering Plants	Balsam Mountain Gentain	Gentiana Latidens	Species of Concern	T
Flowering Plants	Gorge Leafy Liverwort	Plagiochila Caduciloba	Status Undefined	T
Flowering Plants	Southern Oconee Bells	Shortia Galacifolia	Species of Concern	T
Flowering Plants	Sharp's Leafy Liverwort	Plagiochila Sharpii	Status Undefined	T
Flowering Plants	Lobed Barren Strawberry	Geum Lobatum	Species of Concern	T
Insects	Monarch Butterfly	Danaus Plexippus	Proposed Threatened	H, P, R, T
Lichens	Rock Gnome Lichen	Gymnoderma Lineare	Endangered	R, T
Mammals	Tricolored Bat	Perimyotis Subflavus	Proposed Endangered	H, P, R, T
Mammals	Indiana Bat	Myotis Sodalis	Endangered	H, P, R, T
Mammals	Northern Long-Eared Bat	Myotis Septentrionalis	Endangered	H, P, R, T
Mammals	Gray Bat	Myotis Grisescens	Endangered	H, P, R, T
Mammals	Little Brown Bat	Myotis Lucifugus	Under Review	H, P, R, T
Mammals	Carolina Northern Flying Squirrel	Glaucomys Sabrinas Coloratus	Endangered	H, T
Reptiles	Bog Turtle	Glyptemys Muhlenbergii	Similarity of Appearance (Threatened)	H, P, R, T

H=Henderson, P=Polk, R=Rutherford, T=Transylvania
Source: US Fish & Wildlife Service, Environmental Conservation Online System (ECOS)

3.2 POPULATION AND DEMOGRAPHICS

According to Census data, the South Mountains Region experienced modest growth between 2000 and 2023, with a 3.1 percent population (or a 7,019 person) increase. Henderson County had the most rapid rate of growth in the region, with a ten percent increase during the same period. On the other hand, both Polk and Rutherford Counties experienced a shrinking population of roughly 4 percent. Population counts from the US Census Bureau for 2000, 2010, 2020, and 2023 for each of the participating counties are presented in **Table 3.4**.

TABLE 3.4: POPULATION COUNTS FOR PARTICIPATING COUNTIES

County	2000 Census Population	2010 Census Population	2020 Census Population	2023 ACS Estimates	Population Change 2010-2023 (%)

Henderson County	89,173	106,740	116,748	117,387	10.0%
Polk County	18,324	20,510	20,611	19,689	-4.0%
Rutherford County	62,899	67,810	66,826	64,850	-4.4%
Transylvania County	29,334	33,090	34,215	33,243	0.5%
Region Total	199,730	228,150	238,400	235,169	3.1%

Source: US Census Bureau, American Community Survey 5-Year Estimates (2019-2023)

According to American Community Survey, the median age in the South Mountain Region was 49.9. Of the population aged 25 years and over, 26.7 percent have a high school degree or higher and 31.8 percent have a bachelor's degree or higher. On average, approximately 6.8 percent of the region's residents speak a language other than English at home with Henderson County having the highest percentage of 11.6 percent (population five years and older). The racial demographics of the participating jurisdictions are presented in **Table 3.5.** Generally, white persons make up much of the population in the region, accounting for over 86 percent of the population. However, this may vary per jurisdiction.

TABLE 3.5: DEMOGRAPHICS OF PARTICIPATING COUNTIES

County	Caucasian (%)	African American (%)	Asian (%)	Other Race* (%)	Two or More Races (%)	Persons of Hispanic or Latino Origin** (%)
Henderson County	84.1%	3.3%	1.3%	5.4%	5.9%	12.8%
Polk County	87.7%	5.1%	0.1%	0.8%	6.3%	5.5%
Rutherford County	83.0%	8.1%	0.5%	2.8%	5.6%	5.4%
Transylvania County	89.3%	3.9%	0.5%	0.9%	5.5%	4.9%
Region Total	**86.0%**	**5.1%**	**0.6%**	**2.5%**	**5.8%**	**7.15%**

Source: US Census Bureau , American Community Survey 5-Year Estimates (2019-2023)
*Other races includes American Indian, Alaskan Native, Native Hawaiian, Pacific Islander, and Some Other Race.
**Persons of Hispanic or Latino Origin are classified regardless of race; therefore, this percentage is considered independent of the other race classifications listed.

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the US Census Bureau, in 2023 there were an estimated 120,117 housing units in the South Mountains Region, the majority of which are single family homes or mobile homes, respectively 75 percent and 15 percent. Housing information for the four participating counties is presented in **Table 3.6**. As shown in the table, Henderson County has a lower percentage of seasonal housing units compared to the other counties while Transylvania County has the highest percentage.

TABLE 3.6: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

County	2010 Housing Units	2023 Housing Units	2023 Owner-Occupied Housing Units (%)	2023 Vacant Housing Units (%)	2023 Median Home Value Owner-Occupied

Henderson County	54,710	57,339	74.2%	12.1%	$317,800
Polk County	11,432	10,949	76.6%	20.3%	$281,100
Rutherford County	33,878	32,682	74.1%	18.6%	$180,800
Transylvania County	19,163	19,147	75.1%	23.8%	$336,100
Region Total	119,183	120,117	75.0%	18.7%	$278,950

Source: US Census Bureau, American Community Survey 5-Year Estimates (2019-2023)

The housing trends across the South Mountains Region highlight the necessity for a nuanced approach to hazard mitigation planning. As the region continues to evolve, understanding the unique characteristics and needs of each county will be essential for hazard mitigation. Key findings and themes are summarized below:

- Growth in Housing Units – Henderson County was the only participating county that experienced an increase in the housing stock since 2010. This growth indicates a trend toward urbanization and population influx.
- Owner-Occupied Housing Rates – All participating counties have a relatively high owner-occupancy rate of roughly 75 percent. This suggests a demographic that may be better positioned to undertake projects and/or renovations to mitigate risk as well as recover from potential hazards.
- Financial Resilience and Vulnerability – The regional differences in median home values highlight disparities in financial resilience. Rutherford County has a lower median home value along with a higher percentage of manufactured homes (approximately 16.5 percent), making residents more vulnerable to hazards.
- Focus on Renters – Despite the predominance of homeowners, the presence of renters (roughly 25 percent in the region) points to a critical need for inclusive hazard mitigation strategies. Renters may face unique challenges in disaster recovery, necessitating targeted resources and support to ensure they are not overlooked in planning efforts.

3.3.2 Infrastructure

Transportation

The primary transportation artery traversing the Smoky Mountain Region is Interstate 26 (I-26), which runs north to south through Henderson County. US Route 74 (US 74) is an essential east-west highway that spans the state, moving approximately southeast to northwest through Henderson, Polk, and Rutherford Counties. US 74, with its alternating designations and overlaps with existing highways (including I-26), serves as the commercial backbone and principal freight route for Western North Carolina, and is essential for the movement of goods and resources.

Additionally, US Route 276 (US 276) provides a vital north-south corridor through Transylvania County into South Carolina, enhancing connectivity within the region.

In Henderson County, the Apple Country Public Transit system offers bus services throughout the City of Hendersonville, Town of Fletcher, and Town of Laurel Park, which provides transportation options for residents and visitors alike. The Asheville Regional/Hendersonville Airport is the largest airport in the South Mountains Region and serves as a critical hub for travel and emergency response.

The nearest major airport is Charlotte Douglas International Airport, which provides extensive non-stop commercial flights to various destinations across the eastern United States and Midwest, as well as several international locations. Other significant nearby airports include Hartsfield-Jackson Atlanta International Airport in Georgia and Nashville Metropolitan Airport in Tennessee.

Utilities

Electrical power in the South Mountains Region is supplied by two public utilities and several electricity cooperatives. Duke Energy Progress provides reliable energy access to communities across Henderson, Polk, Rutherford, and Transylvania Counties. Additionally, the region is supported by local cooperatives, including Haywood Electric in Transylvania County and Rutherford Electric in Rutherford and Polk Counties.

Water and sewer services in the South Mountains Region are primarily provided by various municipalities, however, municipal water systems are often limited in mountainous areas. Consequently, private or shared wells and septic systems are the norm. Henderson County operates a sewer system with providers including Metropolitan Sewerage District (MSD), Etowah Sewer, and the City of Hendersonville. The City of Hendersonville's Water and Sewer Department serves over 65,000 residents and businesses in Henderson County, providing sewer service to more than 21,000 of these users.

Community Facilities

The South Mountains Region of North Carolina is home to a diverse array of public buildings and community facilities. According to the data compiled in *Section 6: Vulnerability Assessment*, the region boasts 94 fire and emergency medical services (EMS) stations, 21 police stations, and 95 schools, all of which are vital for community safety and resilience.

In terms of healthcare infrastructure, the South Mountains Region is equipped with 208 medical facilities and five licensed hospitals. The largest facility is Margaret J. Pardee Memorial Hospital, a 201-bed community hospital situated in the City of Hendersonville. The Rutherford Regional Medical Center, located in the Town of Rutherfordton, offers 129 beds and provides essential healthcare services to residents of Rutherford County and Cleveland County, situated to the east.

The region also includes three smaller hospitals: Transylvania Regional Hospital in the City of Brevard, AdventHealth Hendersonville in Hendersonville, and AdventHealth Polk in the Town of Columbus. Each of these facilities plays a significant role in the overall health and safety of the community, particularly in times of crisis.

3.3.3 Land Use

Many areas within the South Mountains remain undeveloped or sparsely populated, largely due to the challenging mountainous terrain and the conservation efforts that protect state and national parks and forests. As illustrated in **Figure 3.1**, several small, incorporated municipalities are scattered throughout the planning area, serving as the primary hubs for population concentration. These incorporated areas host the majority of the region's residents and serve as the centers for various businesses, commercial enterprises, and institutional facilities. Some communities within the region have experienced an increase in residential development, particularly in the more urbanized areas such as Hendersonville and parts of Polk County.

In contrast, the remaining portions of the region predominantly feature rural residential development, agricultural land, recreational spaces, and extensive forestland. Agricultural land use remains a vital component of the South Mountains Region's identity, particularly in rural areas of Rutherford and Transylvania Counties. The region is known for its fertile soil and favorable climate, supporting a variety of crops and livestock.

In addition to residential and agricultural developments, the South Mountains Region has seen a surge in tourism-related land use. The area's landscapes, including the South Mountains State Park and numerous hiking trails, attract visitors. This has encouraged the establishment of lodging, restaurants, and recreational facilities, fostering a burgeoning tourism industry that supports local businesses and provides jobs.

3.4 EMPLOYMENT AND INDUSTRY

The 2023 American Community Survey indicates that the median household income for South Mountains Region was $60,730, which is lower than the state's median household income ($69,904). Henderson, Rutherford, and Transylvania Counties all have median household incomes exceeding $60,000 while Polk County has a median household income less than $50,000.

Within the region, approximately 54.2 percent of the population is in the labor force. This is generally characteristic of all participating counties as well. The percentage of the population currently employed in the region is 51.9 percent, with all four (4) counties exceeding an employment rate of over 50 percent. According to the American Community Survey, the unemployment rate for the South Mountain Region overall was 4.2 percent. **Table 3.7** provides a summary of key economic indicators for the region.

TABLE 3.7: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES

County	Population in Labor Force	Employed (%)	Unemployed (%)	Not in Labor Force (%)	Unemployment Rate (%)
Henderson County	55,977	55.3%	1.9%	42.8%	3.3%
Polk County	9,095	51.2%	2.3%	46.4%	4.3%
Rutherford County	28,652	50.9%	3.0%	46.1%	5.5%
Transylvania County	14,854	50.1%	1.9%	48.0%	3.6%
Region Total	**108,578**	**51.9%**	**2.3%**	**45.8%**	**4.2%**

Source: US Census Bureau, American Community Survey 5-Year Estimates (2019-2023)

County	Management, Business, Science & Arts (%)	Service (%)	Sales & Office (%)	Natural Resources, Construction & Maintenance (%)	Production, Transportation & Material Moving (%)
Henderson County	37.4%	19.9%	19.6%	10.3%	12.9%
Polk County	32.7%	19.7%	24.7%	13.6%	9.3%
Rutherford County	30.8%	21.2%	17.2%	12.2%	18.7%
Transylvania County	38.3%	20.4%	21.0%	11.1%	9.1%
Region Total	**34.8%**	**20.3%**	**20.6%**	**11.8%**	**12.5%**

Source: US Census Bureau, American Community Survey 5-Year Estimates (2019-2023)

The top industries in Henderson County are (1) Management, Business, Science and Arts, (2) Sales and Office, and (3) Service industries. Top employers across the County include:

- Henderson County Board of Public Education
- Henderson County Hospital Corporation
- Ingles Markets, Inc.
- Fletcher Hospital, Inc.
- County of Henderson

The top industries in Polk County are (1) Management, Business, Science and Arts, (2) Sales and Office, and (3) Service industries. Top employers across the County include:

- Polk County Public Schools
- County of Polk
- St. Lukes Hospital, Inc.
- Tryon Equestrian Properties, LLC.
- Adult Comm Total Services (A Corp)

The top industries in Rutherford County are (1) Management, Business, Science and Arts, (2) Sales and Office, and (3) Service industries. Top employers across the County include:

- Rutherford County Board of Education
- County of Rutherford
- Wal-Mart Associates, Inc.
- Isothermal Community College
- DLP Wilson Rutherford, LLC.

The top industries in Transylvania County are (1) Management, Business, Science and Arts, (2) Sales and Office, and (3) Service industries. Top employers across the County include:

- Transylvania County Schools
- Transylvania County
- Ingles Market, Inc.
- MH Transylvania Regional Hospital
- Brevard College Corp.

SECTION 4
HAZARD IDENTIFICATION

This section describes how the planning committee 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

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 South Mountains 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 South Mountains Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the South Mountains 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 South Mountains Regional Hazard Mitigation Planning 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 South Mountains Planning Committee agreed to assess the same hazards that were identified in the most recent update of the North Carolina State Hazard Mitigation Plan. A list of all previous hazards covered in the 2020 South Mountains 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 South Mountains Region can be found below in Section 4.2.

TABLE 4.1: 2025 SOUTH MOUNTAINS HAZARDS UPDATE

2020 South Mountains Identified Hazards		2025 South Mountains 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		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		

Next, **Table 4.2** lists the disaster declarations in the South Mountains Region. **Table 4.3** lists the hazard events that have impacted the South Mountains region over the last five years.

Table 4.4 documents the evaluation process used for determining which of the initially identified

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

Lastly, **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 "☑").

4.2 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the South Mountains Regional planning area. Since 1977, fifteen presidential disaster declarations have been reported in the South Mountains Region by FEMA, which can be seen in **Table 4.2** below. This includes four storms related to severe storms and flooding, three storms related to severe winter weather events, six storms related to hurricane and coastal hazards, one storm related to tornadoes, and an infectious disease pandemic (COVID-19).

TABLE 4.2: SOUTH MOUNTAINS REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Henderson County	Polk County	Rutherford County	Transylvania County
1977	542	Severe Storms & Flooding	X	X	X	
1989	827	Tornadoes			X	
1995	1073	Severe Storms, Flooding, High Winds				X
1996	1087	Blizzard of 96	X	X	X	X
1996	1103	Winter Storm	X	X	X	
1996	1134	Hurricane Fran	X	X	X	
1998	1200	Severe Storms and Flooding				X
2002	1448	Severe Ice Storm		X	X	
2004	1546	Tropical Storm Frances	X	X	X	X
2004	1553	Hurricane Ivan	X	X	X	X
2018	4393	Hurricane Florence		X		
2020	4487	COVID-19 Pandemic	X	X	X	X
2020	4543	Severe Storms, Tornadoes, and Flooding		X	X	
2021	4617	Tropical Storm Fred				X
2024	4827	Tropical Storm Helene	X	X	X	X

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous South Mountains Regional Hazard Mitigation Plan (7/20/2020 to 12/31/2023), there have been 126 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 Henderson County	Number of Reported Events in Polk County	Number of Reported Events in Rutherford County	Number of Reported Events in Transylvania County
Cold/Wind Chill	3	2	2	3
Debris Flow	0	0	0	0
Drought	0	0	0	0
Flash Flood	4	3	1	5
Flood	4	0	1	6
Hail	4	1	5	1
Heavy Rain	0	0	0	0
Heavy Snow	2	3	2	2
High Wind	0	0	0	0
Ice Storm	0	1	1	0
Lightning	1	0	0	0
Strong Wind	0	0	0	1
Thunderstorm Wind	9	12	22	2
Tornado	1	0	1	0
Tropical Storm	1	0	0	1
Winter Storm	1	0	1	0
Winter Weather	3a	5	5	4
TOTAL NUMBER OF REPORTED EVENTS	**33**	**27**	**41**	**25**

* 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 G includes more detailed information about all previous historical hazard occurrence events 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 addressed 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 FEMA's National Risk Index • Review of the NC State Hazard Mitigation Plan • Review of previous South Mountains Regional Hazard Mitigation Plan • Review of US Forest Service National Avalanche Center website	• The United States avalanche hazard is limited to mountainous western states including Alaska as well as some areas of low risk in New England. • Avalanche hazards are not discussed in the North Carolina State Hazard Mitigation Plan. • Avalanche is not included in the previous South Mountains Regional Hazard Mitigation Plan.
Drought	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of FEMA's National Risk Index	• There are reports of drought conditions in 22 of the last 24 years (2000-2024) in the South Mountains Region, according to the North Carolina Drought Monitor.

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 North Carolina Drought Monitor website • Review of previous South Mountains Regional Hazard Mitigation Plan	• Droughts are discussed in the NC State Hazard Mitigation Plan. • Drought is included in the previous South Mountains 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 • Review of previous South Mountains Regional Hazard Mitigation Plan	• Hailstorm events are discussed in the State Plan under the Tornadoes/Thunderstorms hazard. • NCEI reports 430 hailstorm events (0.75-inch size hail to 4.5 inches) for the South Mountains Region between 1962 and 2023. For these events there was over $5.5 million (2023 dollars) in property damages. • Although hail is not addressed as an individual hazard in the previous South Mountains 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 the NC State Hazard	• NCEI reports at least one extreme heat event for the South Mountains counties. • Excessive heat is discussed in the State Plan. • Excessive Heat was mentioned in the previous

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?
		Mitigation Plan • Review of FEMA's National Risk Index • Review of the previous South Mountains Regional Hazard Mitigation Plan	South Mountains 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 presidential disaster declarations • Review of the previous South Mountains Regional Hazard Mitigation Plan	• Hurricane and coastal hazard events are discussed in the State Plan. • NOAA historical records indicate roughly 53 hurricanes/coastal hazards have come within 75 miles of the South Mountains Region since 1850. • Four out of thirteen disaster declarations in the South Mountains Region are directly related to hurricane and costal hazard events. • The 50-year return period peak gust for hurricane and tropical storm events in the South Mountains Region is between 63-68 mph. • Hurricane and coastal hazards were addressed in the previous South Mountains plan.
Lightning	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of FEMA's National Risk	• Lightning events are discussed in the State Plan as part of the severe

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?
		Index • Review of NC State Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database, NOAA lightning statistics • Review of the previous South Mountains Regional Hazard Mitigation Plan	Tornadoes/Thunderstorms hazard. • NCEI reports 53 lightning events for the South Mountains Region since 1996. These events have resulted in a recorded 38 injuries and over $2.9 million (2023 dollars) in property damage. • Lightning is addressed under Tornadoes/Thunderstorms in the previous South Mountains 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 the previous South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Nor'easters are discussed in the State Plan under Severe Winter Weather. • NCEI does not report any nor'easter activity for the South Mountains 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 identified in the previous South Mountains plan.
Tornadoes/Thunderstorm	**YES**	• Review of FEMA's National Risk Index• Review of NC State Hazard Mitigation Plan	• Tornado events are discussed in the State Plan. • NCEI reports 21 tornado events in South Mountains Region counties since 1950. These events have

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 South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	resulted in no recorded deaths and have caused 10 injuries and over $4.1 million (2023 dollars) in property damage with the most severe being an F4. • Tornado events were addressed in the previous South Mountains plan.
Severe Thunderstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of FEMA's National Risk Index • Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	• Severe thunderstorm events are discussed in the State Plan. • NCEI reports 574 thunderstorm wind events in the South Mountains Region counties since 1950. These events have resulted in 4 deaths, 9 injuries and nearly $2.6 million (2023 dollars) in property damage. • Severe thunderstorm events were addressed in the previous South Mountains plan.
Severe Winter Weather	**YES**	• Review of FEMA's National Risk Index • Review of NC	• Severe winter weather events, including snow storms and ice storms, are discussed in the State Plan. • NCEI reports that 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?
		State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations	South Mountains counties have been affected by 554 winter weather events since 1993. These events resulted in over $14.3 million (2023 dollars) in property damages. • Three of the region's thirteen disaster declarations were directly related to winter storm events. • Winter storm events were addressed in the previous South Mountains plan.
Earthquakes	**YES**	• Review of FEMA's National Risk Index • Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI records • USGS Earthquake Hazards Program website	• Earthquake events are discussed in the State Plan and all of the participating counties in the South Mountains Region are considered to be at moderate risk of an earthquake event (no counties are high risk). • The previous South Mountains 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 Tennessee) Fault lines which have generated a magnitude 8.0 earthquake in the last 200 years. • 176 events are known to

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?
			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 South Mountains Region is approximately 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 the previous South Mountains Regional Hazard Mitigation Plan • Review of USDA Soil Conservation Service's Soil Survey	• Expansive soils are not identified in the State Plan. • According to FEMA and USDA sources, the South Mountains Region is located in an area that has a "little to no" clay swelling potential. • The previous South Mountains plan did not identify expansive soils as a potential hazard.
Geological/Landslides (Landslides, Sinkholes, Erosion)	**YES**	• Review of FEMA's National Risk Index • Review of NC State Hazard Mitigation Plan • Review of the previous	• 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 four counties.

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?
		South Mountains Regional Hazard Mitigation Plan • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides	All counties also have areas of moderate incidence with high susceptibility. • Data provided by NCGS indicate numerous recorded landslides in the South Mountains Region, but more areas are currently in the process of being mapped and warrant further consideration as well. • The previous South Mountains plan addressed landslides.
Land Subsidence	**NO**	• Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan	• The State Plandoes not discuss land subsidence hazards. • The previous South Mountains plan does not identify land subsidence as a potential hazard.
Tsunami	**NO**	• Review of FEMA's National Risk Index • Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of	• Tsunamis are not discussed as a hazard in the State Plan. • The previous South Mountains plan does not address tsunamis as a hazard. • No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not

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?
		FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses)	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 FEMA's National Risk Index • Review of NC State Hazard Mitigation Plan • 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 South Mountains Region.
Dam Failure	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of North Carolina Dam Safety Program's NC Dam Inventory as of July 2024	• Dam failure is discussed in the State Plan. • Per the NC Dam Inventory, there are 124 high hazard dams in the planning region. (High hazard is defined as "where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.") • The previous South Mountains plan addressed dam failure as a hazard.

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?
Erosion	**YES (Referenced in Geological Hazards)**	• Review of NC State Hazard Mitigation Plan • Review of previous South Mountains Regional Hazard Mitigation Plan	• Erosion is referenced as a geological hazard in the previous South Mountains plan. • Coastal erosion is discussed in the State Plan but only 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) • Review of the previous South Mountains Regional Hazard Mitigation Plan	• The flood hazard is thoroughly discussed in the State Plan. • Four of the thirteen Presidential Disaster Declarations were directly called flooding events, and hurricane/tropical storm events also caused severe flooding. • NCEI reports that South Mountains Region counties have been affected by 248 flood events since 1993. These events in total caused over $42 million (2023 dollars) in property damages. • A small percentage of the South Mountains Region is located in an identified floodplain (100 or 500-year). • Over 80% of the region's jurisdictions participate in the NFIP. • The previous South Mountains plan addressed the flood hazard.
Storm Surge	**NO**	• Review of NC State Hazard	• Storm surge is discussed in the State Plan under 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?
		Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	Hurricane hazard. • The previous South Mountains plan does not address storm surge. • No historical events were reported by NCEI. • Given the inland location of the South Mountains 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 South Mountains 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 South Mountains plan addressed wildfires as a hazard. • Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases.
Infectious Disease	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan	• Including infectious disease hazards to be consistent with the State Plan. • This hazard will assess foreign animal disease.

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?
TECHNOLOGICAL HAZARDS			
Hazardous Substances	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains Regional Hazard Mitigation Plan	• The previous South Mountains 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 South Mountains 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 South Mountains 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 region. • 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 natural hazards and deserve some attention in this plan due to some

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	areas of the region being located in the evacuation zone for the McGuire and Catawba Nuclear Power Stations.
Cyber	**YES**	• Review of NC State Hazard Mitigation Plan • Review of the previous South Mountains 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 South Mountains 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/Landslides	
☐ Expansive Soils	
☐ Land Subsidence	
☐ Tsunami	
☐ Volcano	
☐ Storm Surge	
☐ Erosion	
☑ Wildfires	
☑ Infectious Disease	

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

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

SECTION 5
HAZARD PROFILES

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

---

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 South Mountains 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 South Mountains Regional Hazard Mitigation Planning Committee as it relates to unique historical or anecdotal hazard information for the counties in the South Mountains Region, or a participating municipality within them.

After reviewing the list of assessed hazards from the previous update, the South Mountains Regional 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 create 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/LANDSLIDES (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 South Mountains 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 South Mountains 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 county included in this plan. In addition, **Figure 5.1** provides a base map, for reference, of the South Mountains Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE SOUTH MOUNTAINS REGIONAL HAZARD MITIGATION PLAN

Henderson County	
Flat Rock	Laurel Park
Fletcher	Mills River
Hendersonville	Unincorporated Henderson County
Polk County	
Columbus	Tryon
Saluda	Unincorporated Polk County
Rutherford County	
Bostic	Lake Lure
Chimney Rock Village	Ruth
Ellenboro	Rutherfordton
Forest City	Spindale
Unincorporated Rutherford County	
Transylvania County	
Brevard	Rosman
Unincorporated Transylvania County	

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

FIGURE 5.1: SOUTH MOUNTAINS REGION BASE MAP

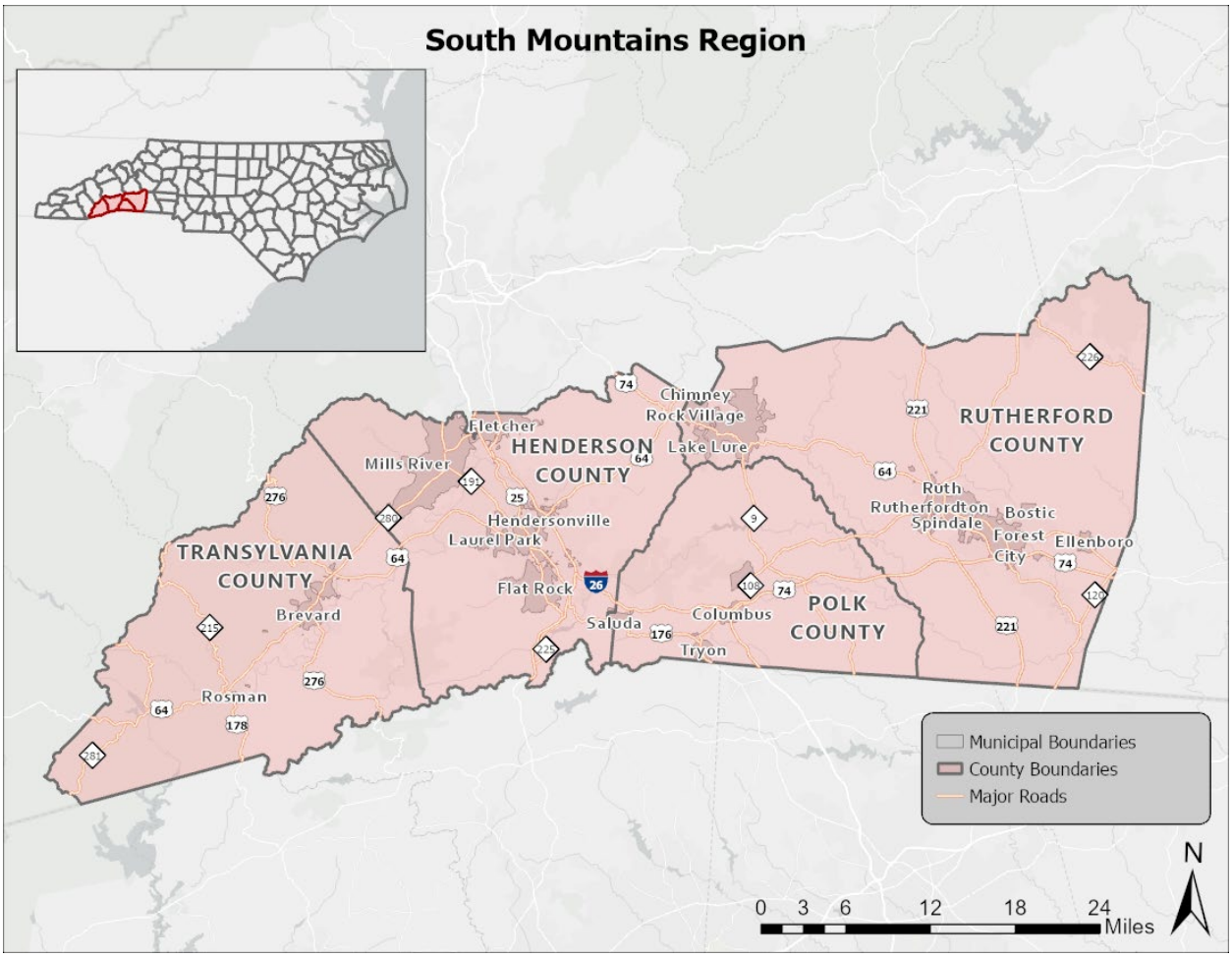


Table 5.2 lists each significant hazard for the South Mountains Region and identifies whether or not it has been determined to be a specific hazard of concern for the 18 municipal jurisdictions and each of the countywide unincorporated areas. This is based on the best available data and information from the South Mountains Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS

Jurisdiction	Drought	Excessive Heat	Hurricane and Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological/Landslides	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cyber	Electromagnetic Pulse	Civil Disturbance	Food Emergency
Henderson County																		
Flat Rock	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fletcher	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Hendersonville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Laurel Park	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mills River	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Polk County																		
Columbus	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Saluda	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tryon	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rutherford County																		
Bostic	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Chimney Rock Village	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ellenboro	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Forest City	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Lake Lure	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Ruth	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rutherfordton	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Spindale	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Transylvania County																		
Brevard	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Rosman	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts. Drought may also lead to more severe wildfires.

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

TABLE 5.3 DROUGHT CLASSIFICATION DEFINITIONS

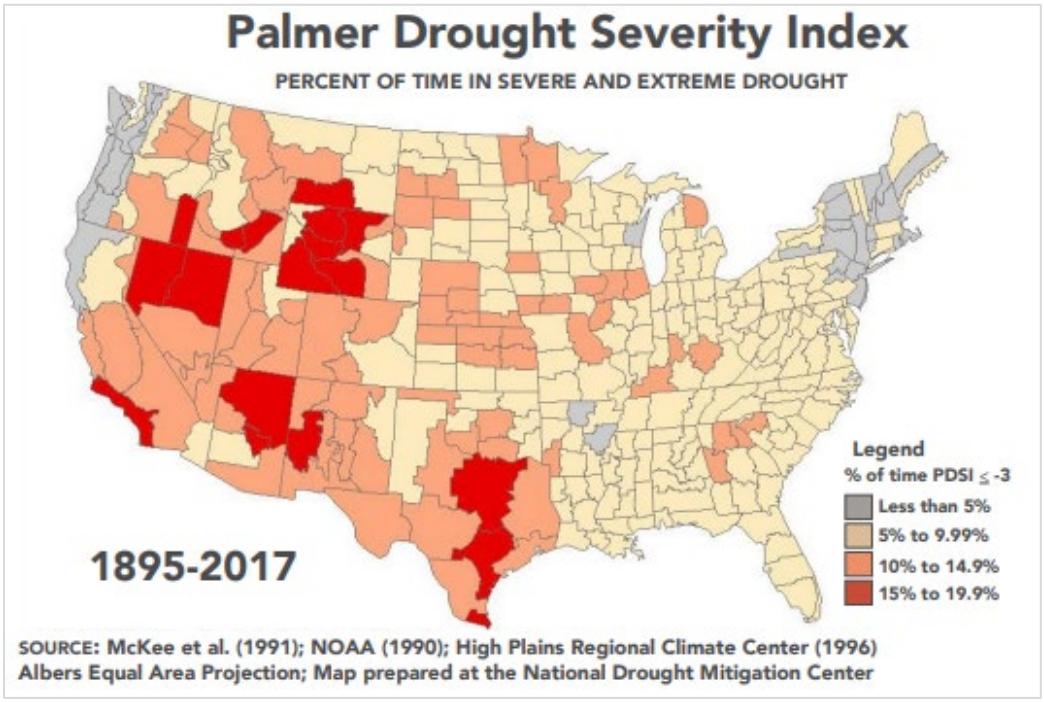
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural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

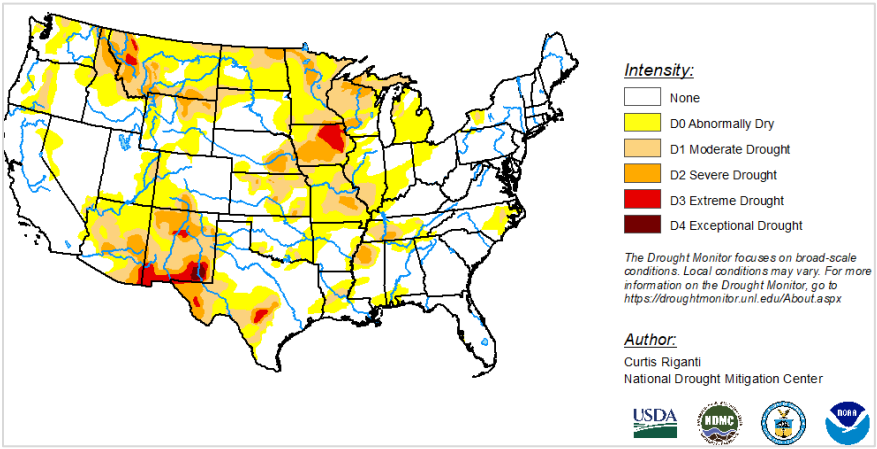
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP



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 South Mountains 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

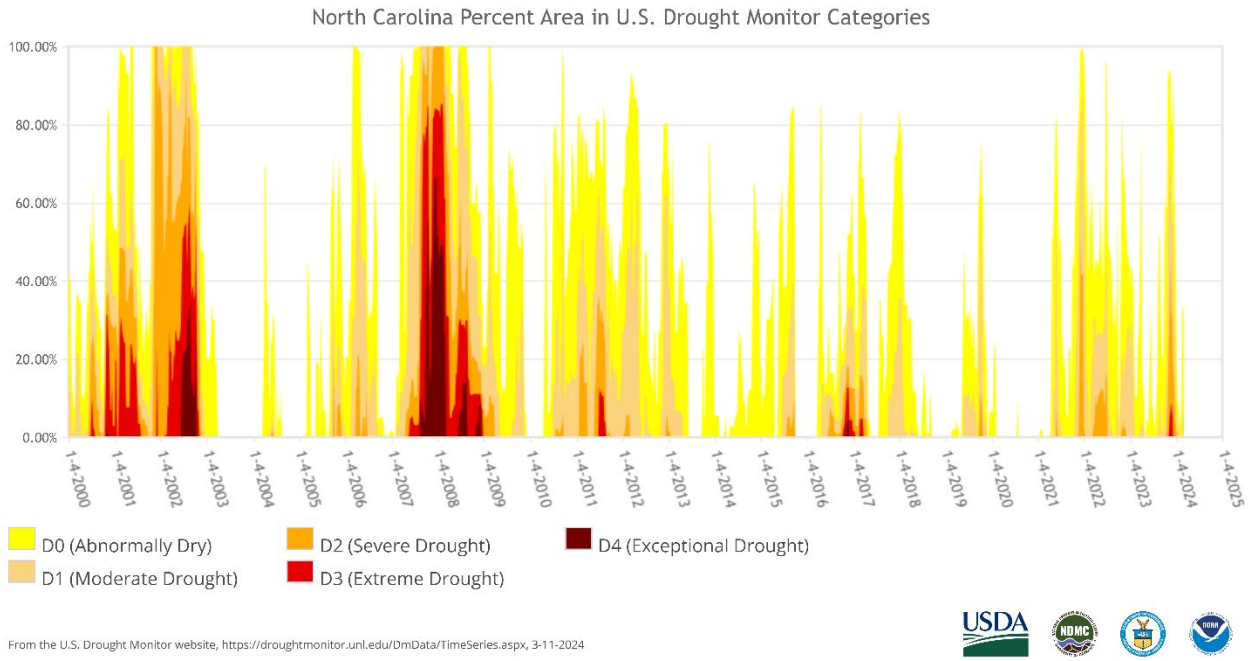
The North Carolina Drought Management Advisory Council also reports data on North Carolina drought conditions from 2000 to 2024 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor (USDM), which classifies conditions on a scale of 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 South Mountains 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, at least one or more of the counties in the South Mountains Region has had drought occurrences (including abnormally dry) in nearly all of the last 20+ years (2000-2024) (**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

Location	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Henderson County	**21**	**2**
Polk County	**22**	**3**
Rutherford County	**23**	**3**
Transylvania County	**23**	**3**

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 South Mountains 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 Polk County, Rutherford County, and Transylvania County compared to "relatively low" in Henderson County.

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

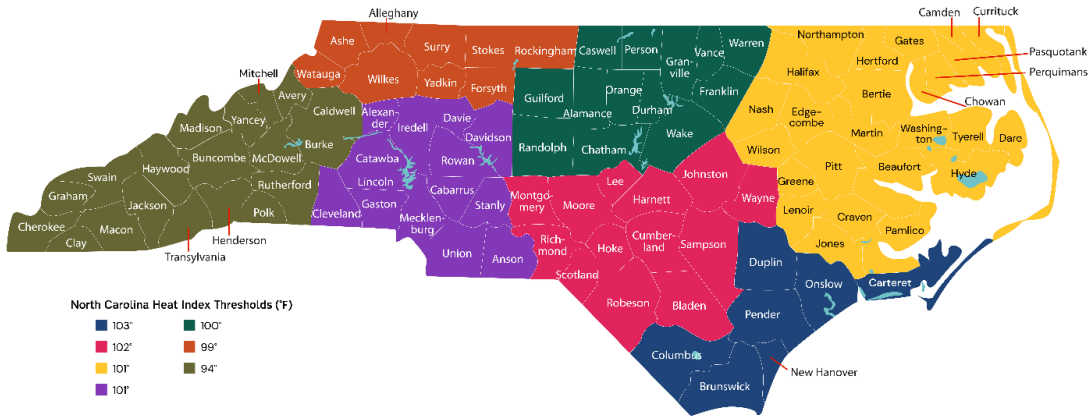
5.4 EXCESSIVE HEAT

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 South Mountains Region, that threshold is 94°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°	Heatstroke/sunstroke, heat cramps, and heat exhaustion likely, with prolonged exposure and/or physical activity
130° or higher	Heatstroke/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 South Mountains 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 South Mountains Region[7]. There were no events reported.

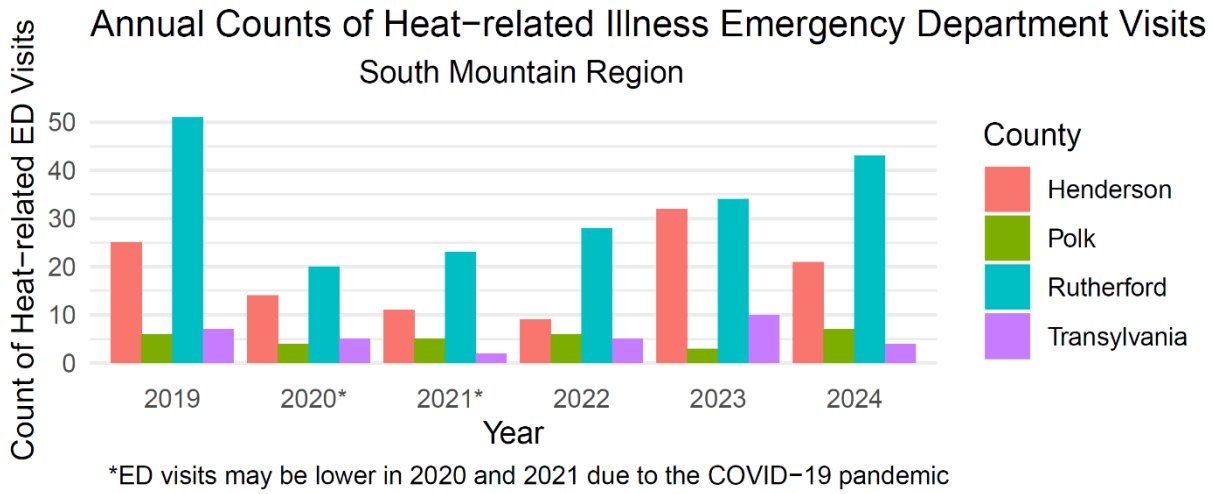
Although there were no deaths or property damage reported by NCEI, residents experienced heat-related illnesses. **Figure 5.6** shows the annual count of emergency department visits for heat-related illness in the South Mountains Region, using public health syndromic surveillance system data from the

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

[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.

North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT). The annual count of emergency department visits for heat-related illness in Henderson County ranged from 9 visits in 2022 to 32 visits in 2023. The annual count of emergency department visits for heat-related illness in Polk County ranged from 3 in 2023 to 7 in 2024. The annual count of emergency department visits for heat related illness in Rutherford County ranged from 20 in 2020 to 51 in 2019 (with approximately 43 visits recently noted in 2024). The annual count of emergency department visits for heat related illness in Transylvania County ranged from 2 in 2021 to 10 in 2023.

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 1898. The recorded maximum for each county can be found below in **Table 5.7**.

TABLE 5.7: HIGHEST RECORDED TEMPERATURE IN THE SOUTH MOUNTAINS REGION

Location	Date	Temperature (°F)
Henderson County	8/23/1983	101
Polk County	6/22/1964	105
Rutherford County	8/10/2007	103
Transylvania County	7/21/1926	99
South Mountains Regional Maximum	**6/22/1964**	**105**

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 Hendersonville (Henderson County). **Table 5.8** shows the average maximum temperatures from 1899 to 2023 at the Hendersonville observation station, which can be used as a general comparison for the region.

TABLE 5.8: AVERAGE MAXIMUM TEMPERATURE IN HENDERSONVILLE, HENDERSON COUNTY

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	66.8	69.4	76.9	83.5	86.9	90.5	92.1	90.9	88.1	81.6	73.9	67.1

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 5.9**. The number of days above 95°F are anticipated to increase substantially by the 2060s – as much as several times greater than the amount that counties in the South Mountains Region currently experience. The same dataset shows that nighttime temperatures, which have historically surpassed 70°F for 12 nights per year in Polk County, will surpass 70°F between 42 to 59 nights per year, on average. The data for nighttime temperatures projections is just as stark in other counties of the region[9].

TABLE 5.9: EXTREME HEAT PROJECTIONS IN THE SOUTH MOUNTAINS 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
Henderson County	5	26-38
Polk County	34	70-84
Rutherford County	36	70-83
Transylvania County	2	13-21
	Average Number of Days each Year with Daytime Temperatures Over 95°F	
	Historical Number of Days	Projected Number of Days by the 2060s
Henderson County	0	4-9
Polk County	7	25-36
Rutherford County	8	26-36
Transylvania County	0	2-4
	Average Number of Days each Year with Nighttime Lows Over 70°F	
	Historical Number of Nights	Projected Number of Nights by the 2060s
Henderson County	1	9-18

[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)

Polk County	12	42-59
Rutherford County	7	30-44
Transylvania County	0	2-6

Source: North Carolina State Climate Office

Nights that do not go below 70°F make it increasingly difficult for the human body 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, it is assumed that all of the South Mountains Region has a probability level of likely (10 to 100 percent annual probability) for future excessive heat events to impact the region.

5.5 HURRICANE AND COASTAL HAZARDS

5.5.1 Background and Description

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

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

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (**Table 5.10**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

TABLE 5.10: SAFFIR-SIMPSON SCALE

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

Source: National Hurricane Center (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 5.11** describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.11: HURRICANE DAMAGE CLASSIFICATIONS

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

Source: National Hurricane Center; Federal Emergency Management Agency

5.5.2 Location and Spatial Extent

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

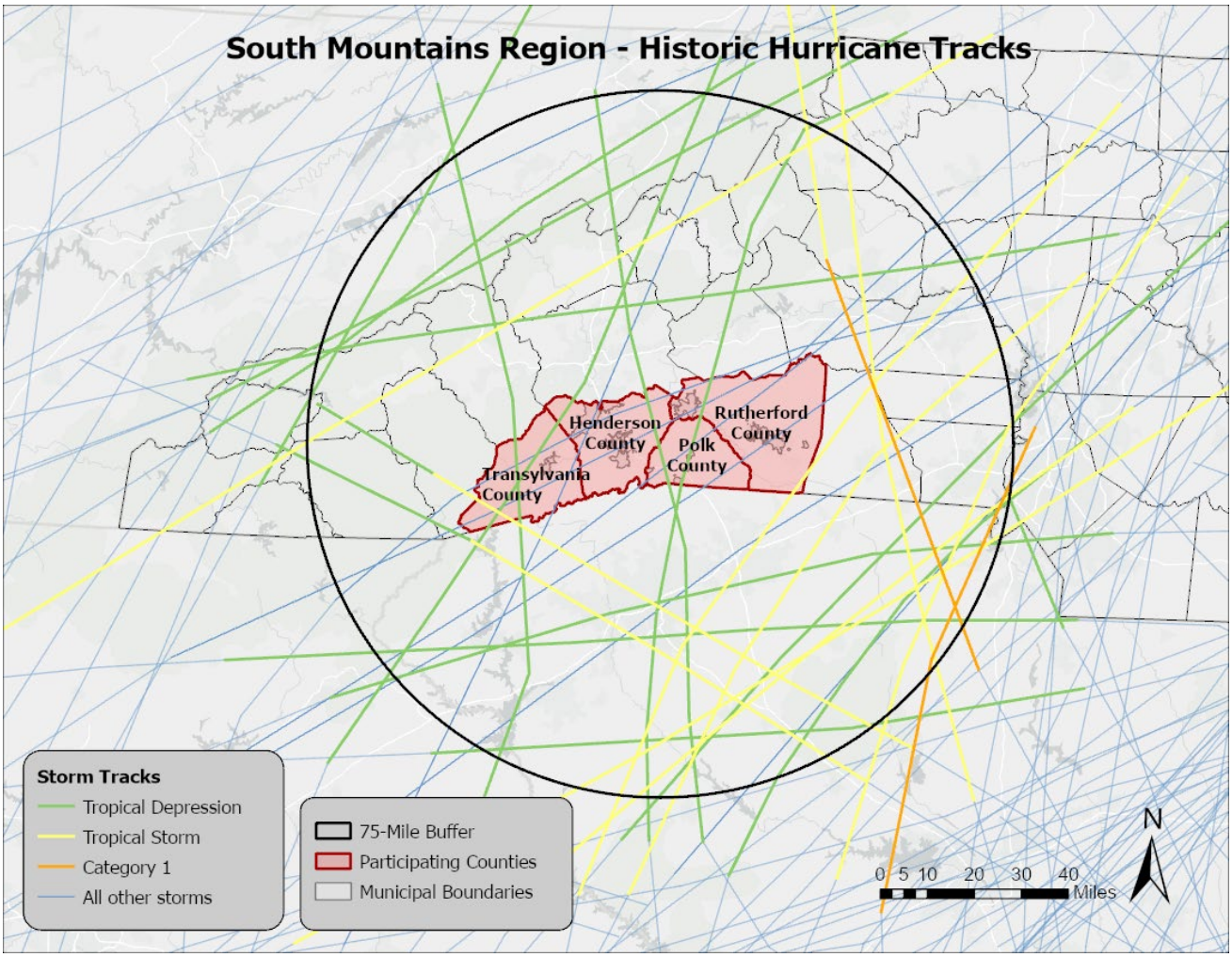
5.5.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 45hurricane or tropical storm tracks have passed within 75 miles of the South Mountains Region since 1850[10].

Of the recorded storm events, nine storms traversed directly through the South Mountains Region as shown in **Figure 5.**7 and **Table 5.12** 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



Source: National Oceanic and Atmospheric Administration; National Hurricane Center

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF SOUTH MOUNTAINS REGION (1850–2024)

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
HELENE	9/27/2024	86	TS
NICOLE 2022	11/6/2022	65	H1
CLAUDETTE 2021	6/17/2021	40	TS
FRED 2021	8/9/2021	55	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
CINDY 2005	7/3/2005	65	H1
JEANNE 2004	9/13/2004	105	H3
IVAN 2004	9/2/2004	145	H5
FRANCES 2004	8/25/2004	125	H4
BILL 2003	6/28/2003	50	TS
DANNY 1997	7/16/1997	70	H1

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category
BERYL 1994	8/14/1994	50	TS
UNNAMED 1994	7/20/1994	30	TD
ANDREW 1992	8/16/1992	150	H5
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
ELOISE 1975	9/13/1975	110	H3
ABBY 1968	6/1/1968	65	H1
CLEO 1964	8/20/1964	130	H4
IRENE 1959	10/6/1959	40	TS
GRACIE 1959	9/20/1959	115	H4
UNNAMED 1952	8/27/1952	45	TS
ABLE 1952	8/18/1952	85	H2
UNNAMED 1949	8/23/1949	115	H4
UNNAMED 1947	10/5/1947	50	TS
UNNAMED 1928	8/7/1928	80	H1
UNNAMED 1927	9/30/1927	50	TS
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 1903	9/9/1903	80	H1
UNNAMED 1900	9/11/1900	45	TS
UNNAMED 1896	7/4/1896	85	H2
UNNAMED 1893	8/15/1893	105	H3
UNNAMED 1889	9/12/1889	95	H2
UNNAMED 1886	6/17/1886	85	H2
UNNAMED 1882	9/2/1882	110	H3
UNNAMED 1859	9/15/1859	70	H1

Source: National Hurricane Center

The National Centers for Environmental Information reported two events associated with a hurricane or tropical storm in the South Mountains Region between 1950 and 2023. However, federal records indicate that six disaster declarations were made in 1996 (Hurricane Fran), 2004 (2 declarations for Tropical Storm Frances and Hurricane Ivan), 2018 (Hurricane Florence), 2021 (Tropical Storm Fred), 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 South Mountains Region. Most events do not carry winds that are above that of the winter storms and straight line winds received by the South Mountains counties. Some anecdotal information is available for the major storms that have impacted that area as found below:

Hurricane Fran – September 5, 1996
Just prior to landfall of Hurricane Fran, a small portion of the region, in the Bat Cave (Henderson County), Chimney Rock (Rutherford County), Lake Lure (Rutherford County) areas, received up to 11

[11] Not all of the participating counties were declared disaster areas for these storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

inches of rain in a 3 hour period. The rains were the result of nearly stationary, very heavy thunderstorms. Severe damage to property in the immediate area resulted, with about 70 homes and businesses destroyed or significantly damaged. As Hurricane Fran moved inland, it dropped an additional 5 to 10 inches of rain over the area resulting in significant flooding throughout the region.

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 the North Carolina Mountains 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 along the Appalachian Mountains and thousands of trees were downed. Trees fell on structures, vehicles, and power lines. Additionally, the downed trees led to the death of an elderly man in Hendersonville when a tree fell through the resident's structure. Flooding also led to numerous landslides in the area which added to the damage of infrastructure and residential and commercial structures. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm.

Hurricane Ivan – September 16-17, 2004
Just a week and a half following Tropical Storm Frances, the remnants of Hurricane Ivan hit western North Carolina when many streams and rivers were already well above flood stage. The widespread flooding forced many roads to be closed and landslides were common across the mountain region. Wind gusts reached between 40 and 60 mph across the higher elevations of the Appalachian Mountains resulting in numerous downed trees. More than $13.8 million of federal aid was dispersed across North Carolina following Ivan.

The Hurricane Frances/Ivan combination of events resulted in widespread road closures (including Highways 64, 280, 25, and 276) as well as infrastructure damages (many bridges and roads were completely washed out), residential structure damages, and commercial structure damages due to massive flooding. Trees were blown down and fell on structures, vehicles, and powerlines, adding to the already widespread debris buildup and power outages.

Hurricane Florence – September 14-17, 2018
After peaking as a Category 4, Hurricane Florence made landfall on the coast of North Carolina as a Category 1 storm. However, it slowed to only 3mph while on land and dumped massive amounts of rain throughout the Carolinas. It quickly weakened to a tropical storm as it made its way inward, but some areas experienced record rainfall and widespread flooding. Approximately 1,200 roads were closed in North Carolina. As of June 2019, $1.3 billion in federal funds were granted for Hurricane Florence in North Carolina, and $185.8 million of that was given in the form of Public Assistance grants, which Polk County received.

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

Based on historical occurrence information, it is assumed that all of the South Mountains Region has a probability level of possible (1 to 10 percent annual probability) for future hurricanes and coastal hazards to impact the region. 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” for Henderson County and Rutherford County compared to “very low” for Transylvania County and Polk County.

[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/)

5.6 TORNADOES/THUNDERSTORMS

For the purposes 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.

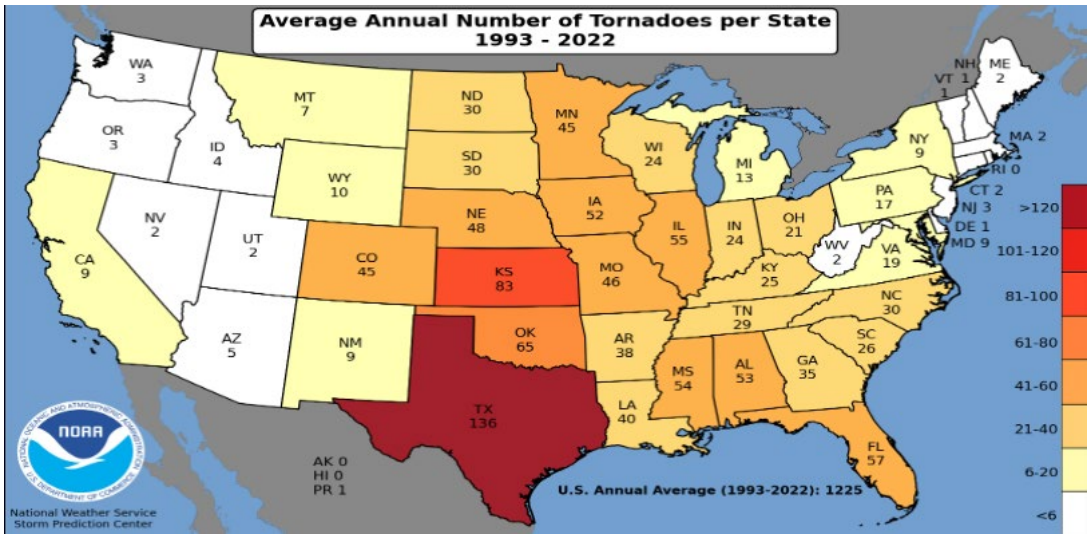
5.6.1 Background and Description

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

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

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

Source: National Weather Service

TABLE 5.14 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
0	Gale	65-85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
1	Moderate	86-110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
2	Significant	111-135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
3	Severe	136-165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
4	Devastating	166-200	Well-constructed houses leveled; structures with weak foundations

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
			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 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 South Mountains 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 (thunderstorms are discussed separately in Section 5.8). Early in the developmental stages of a hailstorm, ice crystals form within a low-

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

pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.15** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.15: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 – 0.2	No damage
H1	Potentially Damaging	5-15	>20	0.2 – 0.6	Slight general damage to plants, crops
H2	Significant	10-20	>100	0.4 – 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	0.8 – 1.2	Severe damage to 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

Source: Tornado and Storm Research Organisation (TORRO)

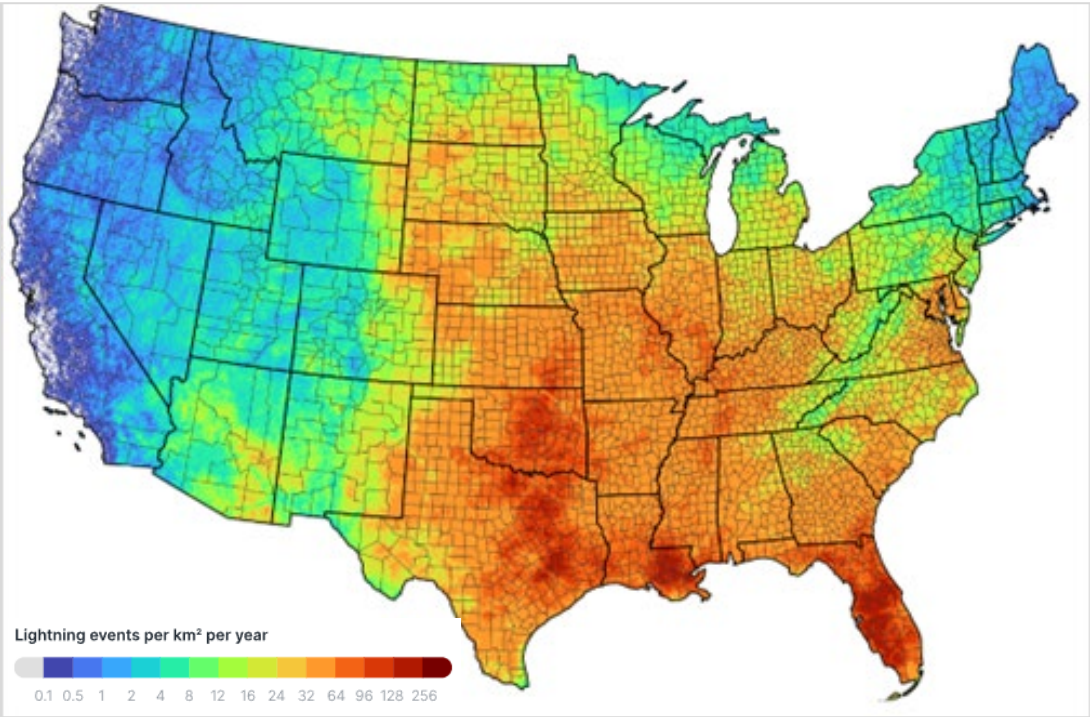
Lightning

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.

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

Figure 5.9 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

5.6.2 Location and Spatial Extent

Tornadoes

Tornadoes occur throughout the state of North Carolina, and thus in the South Mountains 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 South Mountains 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 South Mountains Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage.

It is assumed that the South Mountains 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 South Mountains 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 South Mountains Region is uniformly exposed to lightning.

5.6.3. Historical Occurrences

Tornadoes

Tornadoes are a somewhat rare occurrence; however, they have and do occur in the South Mountains Region. Tornadoes resulted in two disaster declarations in the South Mountains Region in 1989 and 2020[16]. According to the National Centers for Environmental Information, there have been a total of 21 recorded tornado events in the South Mountains Region since 1950 (**Table 5.16**), resulting in over $4.1 million (2023 dollars) in property damages[17]. In addition, 10 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 5.16: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)[18]
Henderson County	**4**	**0/0**	**$1,614,444**
Unincorporated Area	4	0/0	$1,614,444
Polk County	**3**	**0/0**	**$514,274**
Tryon	1	0/0	$248,717
Unincorporated Area	2	0/0	$265,557
Rutherford County	**11**	**0/10**	**$1,000,620**
Rutherfordton	1	0/0	$0
Forest City	2	0/0	$92,517
Ellenboro	2	0/0	$0
Unincorporated Area	6	0/10	$908,103
Transylvania County	**3**	**0/0**	**$1,046,458**
Unincorporated Area	3	0/0	$1,046,458
South Mountains Regional Total	**21**	**0/10**	**$4,175,796**

Source: National Centers for Environmental Information

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

[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 South Mountains 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.

Thunderstorms

Severe storms have resulted in 4 disaster declarations in the South Mountains Region including years 1977, 1995, 1998, and 2020.[19] According to NCEI, there have been 680 reported thunderstorm and high wind events since 1950 in the South Mountains region[20]. These events caused over $9.3 million (2023 dollars) in damages. There were reports of six deaths and thirteen injuries. **Table 5.17** summarizes this information.

TABLE 5.17: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2023)
Henderson County	**189**	**2/8**	**$2,733,917**
Flat Rock	3	0/0	$0
Fletcher	7	0/0	$110,447
Hendersonville	21	0/3	$81,815
Laurel Park	3	0/0	$26,627
Mills River	12	0/0	$52,762
Unincorporated Area	143	2/5	$2,462,266
Polk County	**123**	**0/2**	**$1,628,904**
Columbus	22	0/2	$72,271
Saluda	4	0/0	$0
Tryon	15	0/0	$50,054
Unincorporated Area	82	0/0	$1,506,579
Rutherford County	**258**	**4/3**	**$3,524,304**
Bostic	10	0/0	$0
Chimney Rock Village	10	0/0	$0
Ellenboro	8	0/0	$1,672
Forest City	26	0/0	$680,559
Lake Lure	18	0/0	$3,378
Ruth	4	0/0	$0
Rutherfordton	52	1/0	$527,234
Spindale	5	0/0	$0
Unincorporated Area	125	3/3	$2,311,461
Transylvania County	**110**	**0/0**	**$1,435,391**
Brevard	23	0/0	$151,528
Rosman	6	0/0	$0
Unincorporated Area	81	0/0	$1,283,863
South Mountains Regional Total	**680**	**6/13**	**$9,322,516**

Source: National Centers for Environmental Information

[19] Not all of the participating counties were declared disaster areas for these events. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: *Hazard Identification*.

[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 South Mountains Region. As additional local data becomes available, this hazard profile will be amended.

43Hailstorms

According to the National Centers for Environmental Information, 430recorded hailstorm events have affected the South Mountains Region since 1963[21]. **Table 5.18** is a summary of the hail events in the South Mountains Region. In all, hail occurrences resulted in over $5.5 million (2023 dollars) in property damages, most of which were reported in Henderson County. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Centers for Environmental Information. Furthermore, high losses in Henderson County indicate that neighboring counties may also be subject to additional, unreported losses. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

TABLE 5.18: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2023)
Henderson County	**142**	**0/0**	**$5,329,572**
Flat Rock	8	0/0	$0
Fletcher	10	0/0	$0
Hendersonville	27	0/0	$3,343,281
Laurel Park	0	0/0	$0
Mills River	15	0/0	$0
Unincorporated Area	82	0/0	$1,986,291
Polk County	**74**	0/0	**$5,147**
Columbus	15	0/0	$5,147
Saluda	11	0/0	$0
Tryon	5	0/0	$0
Unincorporated Area	43	0/0	$0
Rutherford County	**123**	**0/0**	**$41,791**
Bostic	2	0/0	$0
Chimney Rock Village	3	0/0	$0
Ellenboro	7	0/0	$0
Forest City	15	0/0	$0
Lake Lure	9	0/0	$41,791
Ruth	0	0/0	$0
Rutherfordton	22	0/0	$0
Spindale	2	0/0	$0
Unincorporated Area	63	0/0	$0
Transylvania County	**91**	**0/0**	**$132,191**
Brevard	19	0/0	$98,127
Rosman	7	0/0	$34,064
Unincorporated Area	65	0/0	$0
South Mountains Regional Total	**430**	**0/0**	**$5,508,701**

Source: National Centers for Environmental Information

[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 South Mountains Region. As additional local data becomes available, this hazard profile will be amended.

Lightning

According to the National Centers for Environmental Information, there have been a total of 53 recorded lightning events in the South Mountains Region since 1995[22]. These events resulted in more than $2.9 million (2023 dollars) in damages, as listed in summary **Table 5.19**. Furthermore, lightning caused 38 injuries throughout the South Mountains Region.

It is certain that more than 53 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

TABLE 5.19: SUMMARY OF LIGHTNING OCCURRENCES

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2023)
Henderson County	**19**	**0/19**	**$731,577**
Flat Rock	0	0/0	$0
Fletcher	0	0/0	$0
Hendersonville	3	0/0	$80,125
Laurel Park	0	0/0	$0
Mills River	1	0/0	$12,727
Unincorporated Area	15	0/19	$638,725
Polk County	**6**	**0/6**	**$364,628**
Columbus	0	0/0	$0
Saluda	1	0/0	$84,877
Tryon	2	0/0	$191,357
Unincorporated Area	3	0/6	$88,394
Rutherford County	**15**	**0/7**	**$549,058**
Bostic	2	0/0	$1,779
Chimney Rock Village	1	0/1	$0
Ellenboro	2	0/0	$94,085
Forest City	2	0/1	$94,051
Lake Lure	2	0/0	$86,782
Ruth	0	0/0	$0
Rutherfordton	2	0/0	$83,400
Spindale	0	0/0	$0
Unincorporated Area	4	0/5	$188,961
Transylvania County	**13**	**0/6**	**$1,299,679**
Brevard	5	0/5	$375,813
Rosman	0	0/0	$0
Unincorporated Area	8	0/1	$923,866
South Mountains Regional Total	**53**	**0/38**	**$2,944,942**

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

[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 South Mountains Region. As additional local data becomes available, this hazard profile will be amended.

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 South Mountains 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, in recent years, the southeastern United States, including North Carolina, has experienced a number of tornado events. 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 South Mountains Region experience a direct tornado strike. The probability of future tornado occurrences affecting the South Mountains Region is likely (10 to 100 percent annual probability). As of 2024, the FEMA National Risk Index rates the tornado hazard as “relatively low” in Polk County, Rutherford County, and Transylvania County compared to “relatively moderate” in Henderson 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 low” in Polk County and Transylvania County compared to “relatively moderate” in Rutherford County and “relatively high” in Henderson 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 South Mountains 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 “very low” in Polk County and Transylvania County compared to “relatively low” in Rutherford County and “relatively moderate” in Henderson County.

Lightning

Since there were a moderate number of historical lightning events reported throughout the South Mountains Region via NCEI data, it is considered a fairly regular occurrence that often accompanies thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events

[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/)

will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN) data from 2016 to 2023, the South Mountains Region experiences anywhere from 4 to 16 lightning events per square kilometer each 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" in Henderson County, Rutherford County, and Transylvania County compared to "relatively low" in Polk 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 winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

5.7.2 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 South Mountains 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 South Mountains Region. This includes the Blizzard of 1996, one subsequent 1996 winter storm, and an ice storm in 2002[25]. According to the National Centers for Environmental Information, there have been a total of 554 recorded winter storm

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

events in the South Mountains region since 1993 (**Table 5.20**)[26]. These events resulted in over $14.3 million (2023 dollars) in damages.

TABLE 5.20: SUMMARY OF WINTER STORM EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Henderson County	169	2/0	$2,171,743
Polk County	110	0/0	$0
Rutherford County	109	0/0	$0
Transylvania County	166	1/0	$12,179,938
South Mountains Regional Total	**554**	**3/0**	**$14,351,681**

Source: National Centers for Environmental Information

There have been several severe winter weather events in the South Mountains Region. The text below describes three of the major events and associated impacts on the Region. Similar impacts can be expected with severe winter weather.

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

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

2018 Winter Storm – December 8-9, 2018
This storm developed shortly after midnight on December 9, 2018 and continued into the afternoon. Snowfall was moderate to heavy and both sleet and rain were incorporated. Driving conditions were heavily disrupted and snowfall amounts reached up to 8 inches.

Winter storms throughout the planning area have several negative externalities including hypothermia for those individuals having to remain outdoors for a certain length of time and likely increased impact for the need of medical services, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could lead to fire or an accumulation of toxic fumes.

[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 South Mountains Region. In addition, the events are reported by the county, so many of these storms likely affected all of the counties.

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 South Mountains Region due to its location in the western and more mountainous part of the state. According to historical information, the South Mountains Region often 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 Polk County, Rutherford County, and Transylvania County compared to “relatively low” in Henderson County.

[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

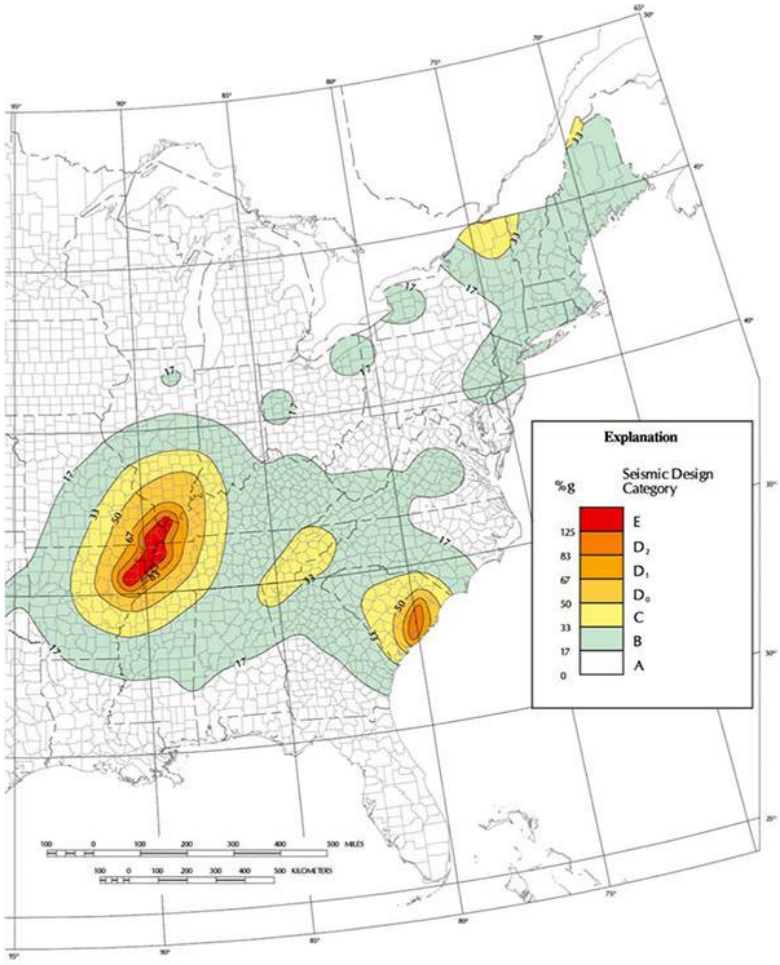
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured 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 5.21**). 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 5.22**.

TABLE 5.21: RICHTER SCALE

Richter Magnitudes	Earthquake Effects
< 3.5	Generally, not felt but recorded.
3.5 – 5.3	Often felt, but rarely causes damage.
5.4 – 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 – 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 – 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

TABLE 5.22: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Not felt	Not felt except by a very few under especially favorable conditions.	
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.	< 4.2
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.	
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.	< 4.8
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.	< 5.4
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.	< 6.1
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.	
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.	< 6.9
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.	< 7.3
I	Not felt	Not felt except by a very few under especially favorable conditions.	< 8.1
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.	> 8.1

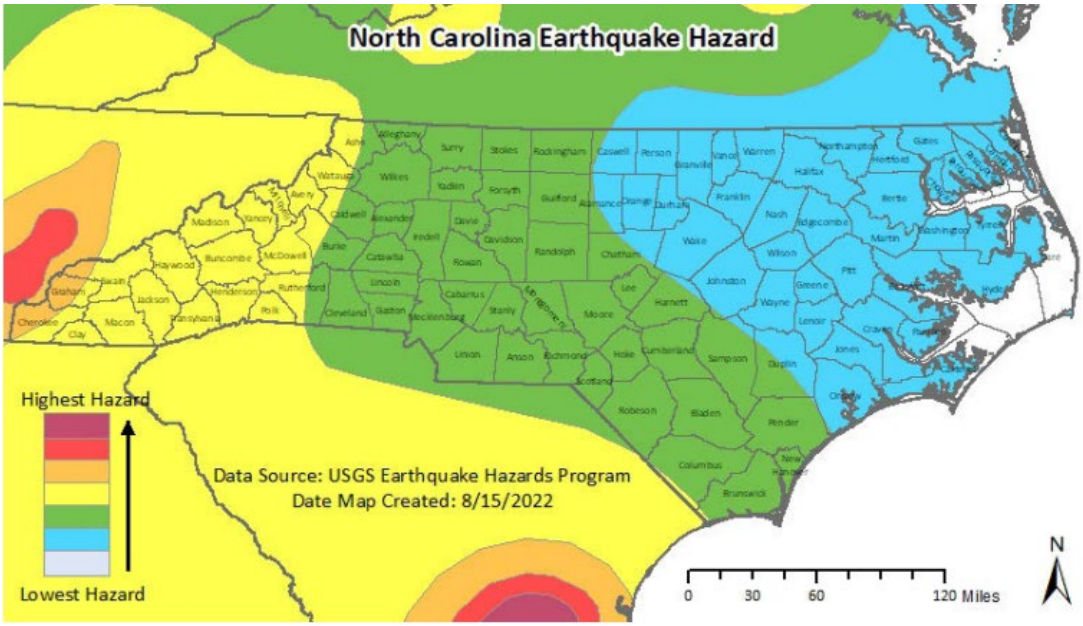
Source: Federal Emergency Management Agency

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.

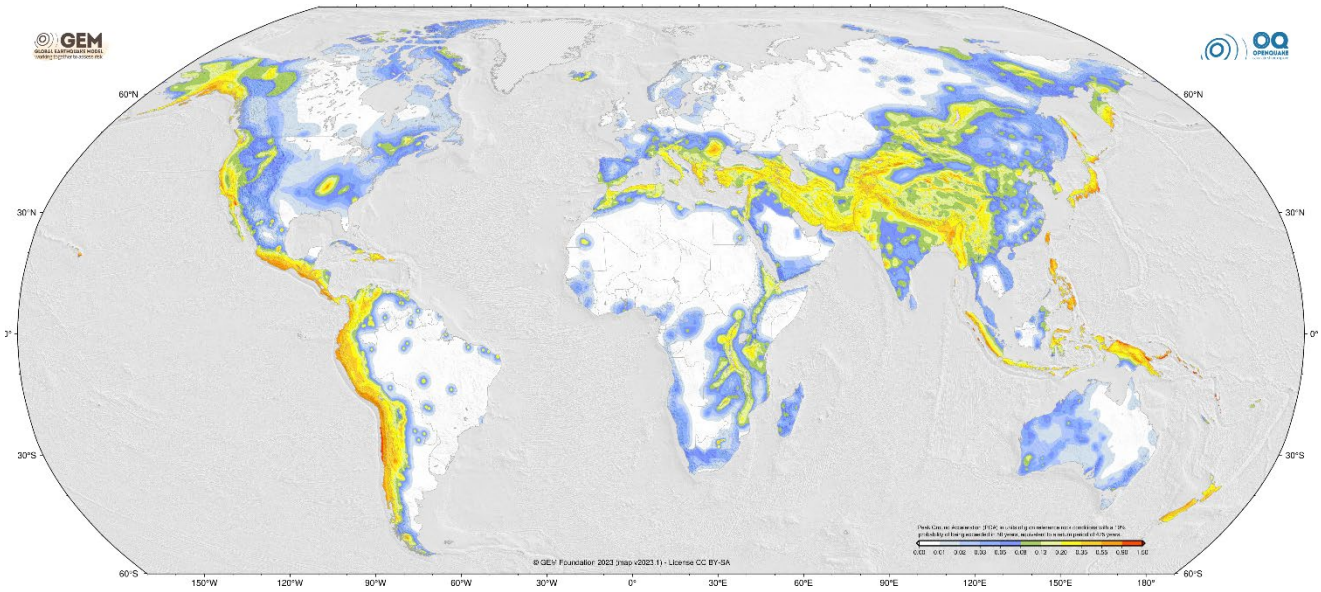
FIGURE 5.11: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.12 shows the intensity level associated with the world and the South Mountains 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 140 earthquakes are known to have affected the South Mountains Region since 1886. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.23** provides a summary of earthquake events reported by the USGS and NOAA between 1638 and 2024.

TABLE 5.23: SUMMARY OF SEISMIC ACTIVITY IN THE SOUTH MOUNTAINS REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Henderson County	**64**	**VI**	**< 5.4**
Flat Rock	**6**	**VI**	**< 5.4**
Fletcher	**5**	**IV**	**< 4.8**
Hendersonville	**10**	**VI**	**< 5.4**
Laurel Park	**0**	**--**	**--**
Mills River	**1**	**IV**	**< 4.8**
Unincorporated Area	**42**	**VI**	**< 5.4**
Polk County	**18**	**V**	**< 4.8**
Columbus	**3**	**IV**	**< 4.8**
Saluda	**5**	**V**	**< 4.8**
Tryon	**4**	**IV**	**< 4.8**
Unincorporated Area	**6**	**VI**	**< 4.8**
Rutherford County	**23**	**V**	**< 4.8**
Bostic	**0**	**--**	**--**
Chimney Rock Village	**3**	**V**	**< 4.8**
Ellenboro	**1**	**IV**	**< 4.8**
Forest City	**2**	**IV**	**< 4.8**
Lake Lure	**2**	**IV**	**< 4.8**
Ruth	**0**	**--**	**--**

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Rutherfordton	**5**	**V**	**< 4.8**
Spindale	**3**	**IV**	**< 4.8**
Unincorporated Area	**7**	**V**	**< 4.8**
Transylvania County	**35**	**V**	**< 4.8**
Brevard	**11**	**V**	**< 4.8**
Rosman	**5**	**V**	**< 4.8**
Unincorporated Area	**19**	**V**	**< 4.8**
South Mountains Regional Total	**140**	**VI**	**< 5.4**

Source: NOAA, USGS

In addition to those earthquakes specifically affecting the South Mountains Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.24.**

TABLE 5.24: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

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

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

[29] NCDEQ Earthquakes (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/north-carolina-geological-survey/geologic-hazards/earthquakes-north-carolina)

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 South Mountains 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 10 and 100 percent (likely). 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, 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 “very low” in Polk County and Transylvania County compared to “relatively low” in Henderson County and Rutherford County.

[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/LANDSLIDES

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.

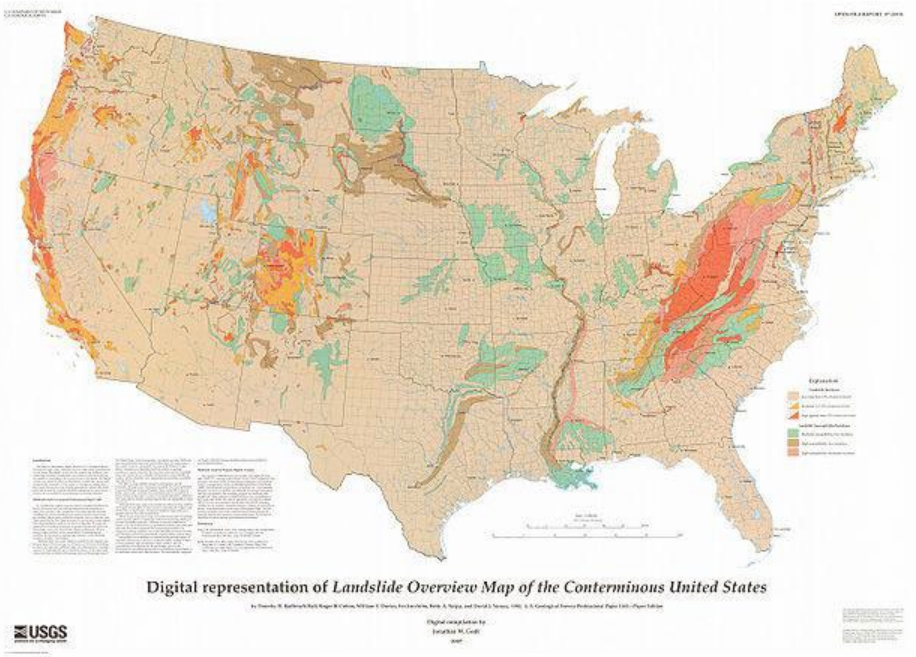
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved 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

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

numbers of landslides have occurred and areas that are susceptible to landsliding in the conterminous United States[33].

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



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

Source: USGS

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,

[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 areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact 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 fines and 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

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

erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion. Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

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

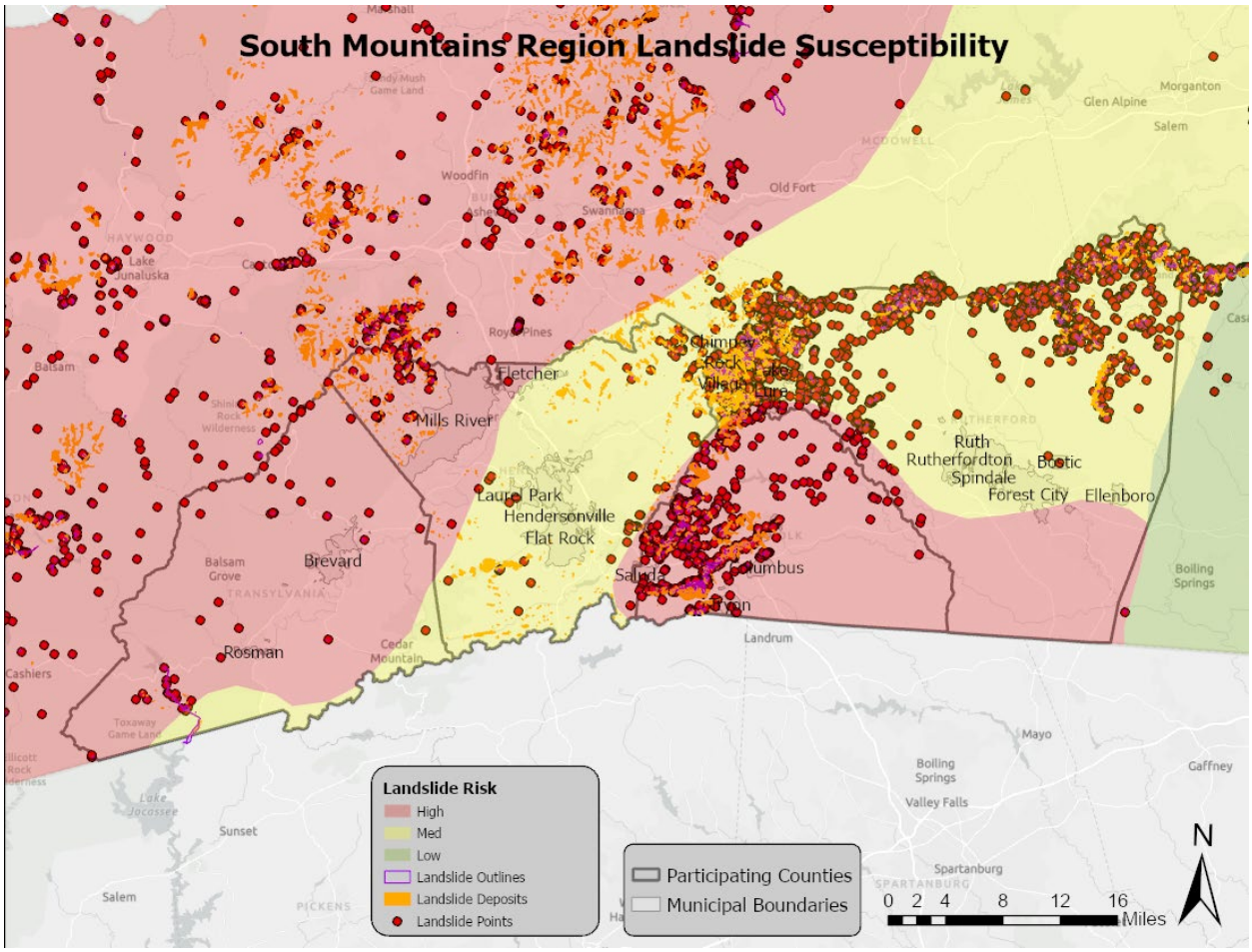
5.9.2 Location and Spatial Extent

Landslides

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain throughout the region). 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 South Mountains Region.

According to **Figure 5.15** below, some of the region has high landslide activity, especially in Polk and Rutherford Counties based on existing North Carolina Geological Survey inventories. There are over 2,800 total events recorded in these inventories for the South Mountains Region with 105 events recorded in Henderson County, 925 events recorded in Polk County, 1,754 events recorded in Rutherford County, and 46 events recorded in Transylvania County as per 2024 data. Previous mapping from the USGS has identified areas of a moderate incidence occurrence rate across most of the region in addition to high susceptibility throughout the region.

FIGURE 5.15: LANDSLIDE SUSCEPTIBILITY IN THE SOUTH MOUNTAINS REGION

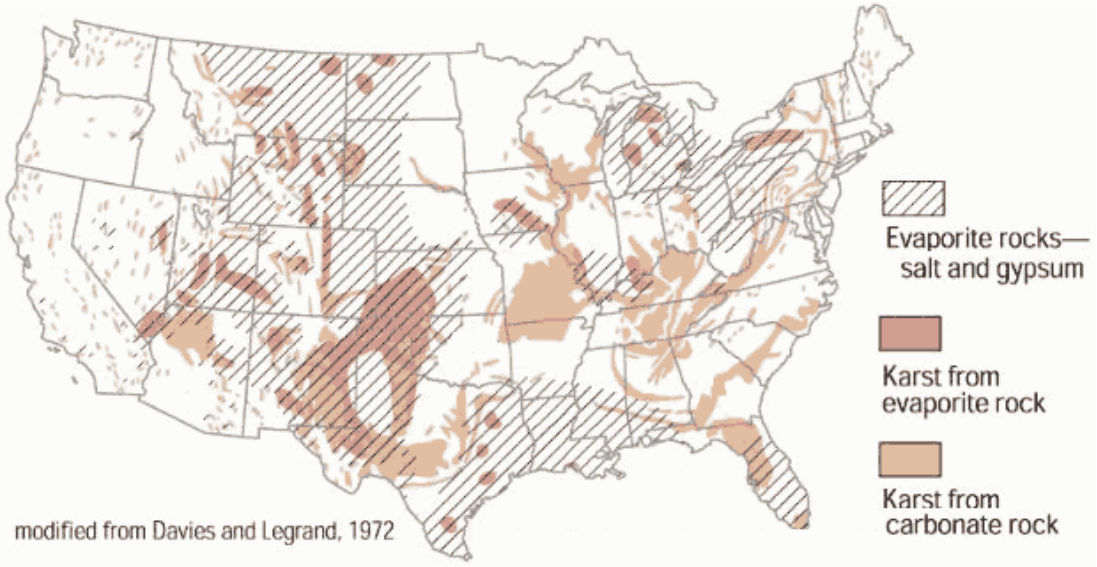


Source: United States Geological Survey, North Carolina Geological Survey

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

5.9.3 Historical Occurrences

Landslides

Steep topography in some areas of the South Mountains Region makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. The locations of landslide events in and around the South Mountains region as provided by the North Carolina Geological Survey demonstrate that most reports (roughly 2,800 in the region) in the Western North Carolina Landslide Hazard Database[36] have happened in the northern and western areas of Polk County and in the northern areas of Rutherford County. Thorough incidence mapping is in the process of being 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 the South Mountains region. Furthermore, in the next update, a more accurate analysis should be performed.

The National Centers for Environmental Information also reported four landslide events in the South

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

Mountains Region. Information from each county is presented below.

- **Henderson and Transylvania County — September 8, 2004 -** The remnants of Hurricane Frances brought very heavy rainfall to western North Carolina, resulting in widespread severe flooding across the mountains and foothills (Haywood, Transylvania, and Henderson Counties). Flooding developed along Shaws Creek in Henderson County. Flooding was widespread and severe across much of the area, with most creeks and streams in flood. Hundreds of homes and businesses were damaged or destroyed across the area, necessitating a number of evacuations and rescues. Numerous roads and bridges were washed out as well. Resulting landslides caused $1,626,841 (2018 dollars) of property damage in Henderson County and $406,710 (2018 dollars) of property damage in Transylvania County.
- **Transylvania County — July 14, 2005 -** A mudslide off of highway 64 between Rosman and Lake Toxaway moved a mobile home from its foundation, rendering it uninhabitable. There was a total of $65,563 (2018 dollars) of property damage.
- **Henderson County — December 1, 2010 -** After 6 to 10 inches of rain fell in around 24 hours, a landslide developed near the Holiday Drive area, pushing a small house off its foundation. There was a total of $81,955 (2018 dollars) of property damage.
- **Polk County – May 18, 2018 -** EM reported numerous small to large slope failures developed along the Highway 176 corridor in Polk County after as much as 8 inches of rain fell across the western part of the county in just a few hours. Around 30 homes were damaged, with a couple destroyed. One 59-year-old woman died when her garage collapsed as she was trying to flee her home. Her husband was swept into Highway 176 but survived with mostly minor injuries.
- **All Counties – September 27, 2024 –** Catastrophic flooding from Hurricane Helene broke many historical records and caused widespread landslide events, road washouts, and erosion across the counties of Western North Carolina. Henderson County recorded a landslide death in Bat Cave off Highway 9.

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

- **Henderson County**
  - In the past, there has been damage to property and infrastructure with associated loss of utilities. This damage has often been concentrated within a small portion of the county known as Bat Cave. The Town of Laurel Park also has areas identified as having landslide events and areas prone to landslides. Other hotspots for landslides include the Green River Gamelands, Pisgah National Forest, and areas along the Big Hungry River.
  - During September 2004 when Hurricane Frances and Tropical Storm Ivan moved through Henderson County, landslides caused significant infrastructure damage and the rerouting of neighborhood access. The most significant of the sections identified is the area near US Highway 74 and NC Highway 9 (Bat Cave). Bear Rock Estates was also heavily damaged by a 1,200-foot landslide that resulted from Hurricane Frances. $2.3 million in federal and state funding was used to repair approximately 130 sites across the county, including the Bear Rock Estates.
  - In 1995, excessive rains from a severe thunderstorm/windstorm caused a mudslide which led to the destruction of a home that was not built to county code according

to emergency officials. Two people received minor injuries during this incident. Additionally, there was mud and debris that covered parts of US Highway 74 and NC Highway 9 as well as the bridge that led to Chimney Rock. According to the utility company, debris from the slide and storm downed power lines and led to power outages. The storm and slide caused a total of approximately $2 million in property and infrastructure damage in the area.

- **Polk County**
  - In 2002 and 2003, heavy rains combined with development on and along steep slopes caused landslides on Hogback Mountain, White Oak Mountain, Holbert's Cove, Green River Cove, and Highway 176. These landslides closed down portions of state roads and cost approximately $210,000 to repair.
- **Rutherford County**
  - In Rutherford County most landslide incidents have occurred along road cuts and have been caused during periods of severe storms.
- **Transylvania County**
  - The county has received significant damage to its infrastructure because of landslides, especially during the 2004 hurricane season.
  - The most significant issues the county faces with landslides are road closures, as was seen during Hurricane Frances and Tropical Storm Ivan. These storms spawned numerous slides in the unincorporated areas of Transylvania County; however, two slides were considered significant events. First, a slide covered portions of Sky Drive causing the road to give-way, resulting in over $400,000 in damage. The second major event was on Cardinal Drive West where a slide caused $300,000 in damage to infrastructure. The slide not only resulted in road damage, but the debris from the slide flowed into Cardinal Lake causing debris blockage issues.

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 South Mountains region. According to a search of local media outlets across the state, the western area has experienced more than 40 sinkholes over the past 20 years. There are no historical occurrences of sinkholes in the region.

Erosion

Most historical occurrences of erosion are seen near the coast of North Carolina, but the South Mountains Region is still susceptible to the hazard. Several sources were vetted to identify areas of erosion in the South Mountains 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 South Mountains Regional Hazard Mitigation Plan, but it was found to be a relatively low-risk hazard. The information below identifies historical information presented in the plans.

- **Henderson County** - There is no recorded history of injuries, deaths, or critical facilities loss due to erosion.

- **Polk County** - Most recent erosion concerns in Polk County have stemmed from clear-cutting on steep slopes. Heavy erosion from stormwater can lead to large amounts of sedimentation being carried down slopes, causing flooding, property damage, road blockage, or mudslides.
- **Rutherford County** - Erosion was deemed an insignificant hazard.
- **Transylvania County** - There is no recorded history of losses from past erosion.

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 likely (10 to 100 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 South Mountains 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 high” in Henderson County, Rutherford County, and Transylvania County compared to “relatively moderate” in Polk 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 South Mountains region. While many sinkholes have been relatively small, it is still possible (between 1 and 10 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 South Mountains 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*.

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,

[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)

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.

5.10.2 Location and Spatial Extent

The North Carolina Division of Energy, Mineral, and Land Resources provides information on dams, including a hazard potential classification. There are three hazard classifications—high, intermediate, and low—that correspond to qualitative descriptions and quantitative guidelines. **Table 5.25** explains these classifications.

TABLE 5.25: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

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

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

According to the North Carolina Division of Energy, Mineral, and Land Resources Dam Safety Program as of July 2024, there are 364 dams in the South Mountains Region[39]. **Figures 5.17** to **5.20** show the dam location and the corresponding hazard ranking for each. Of these dams, 124 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.26.**

TABLE 5.26: SUMMARY OF HIGH HAZARD DAM LOCATIONS

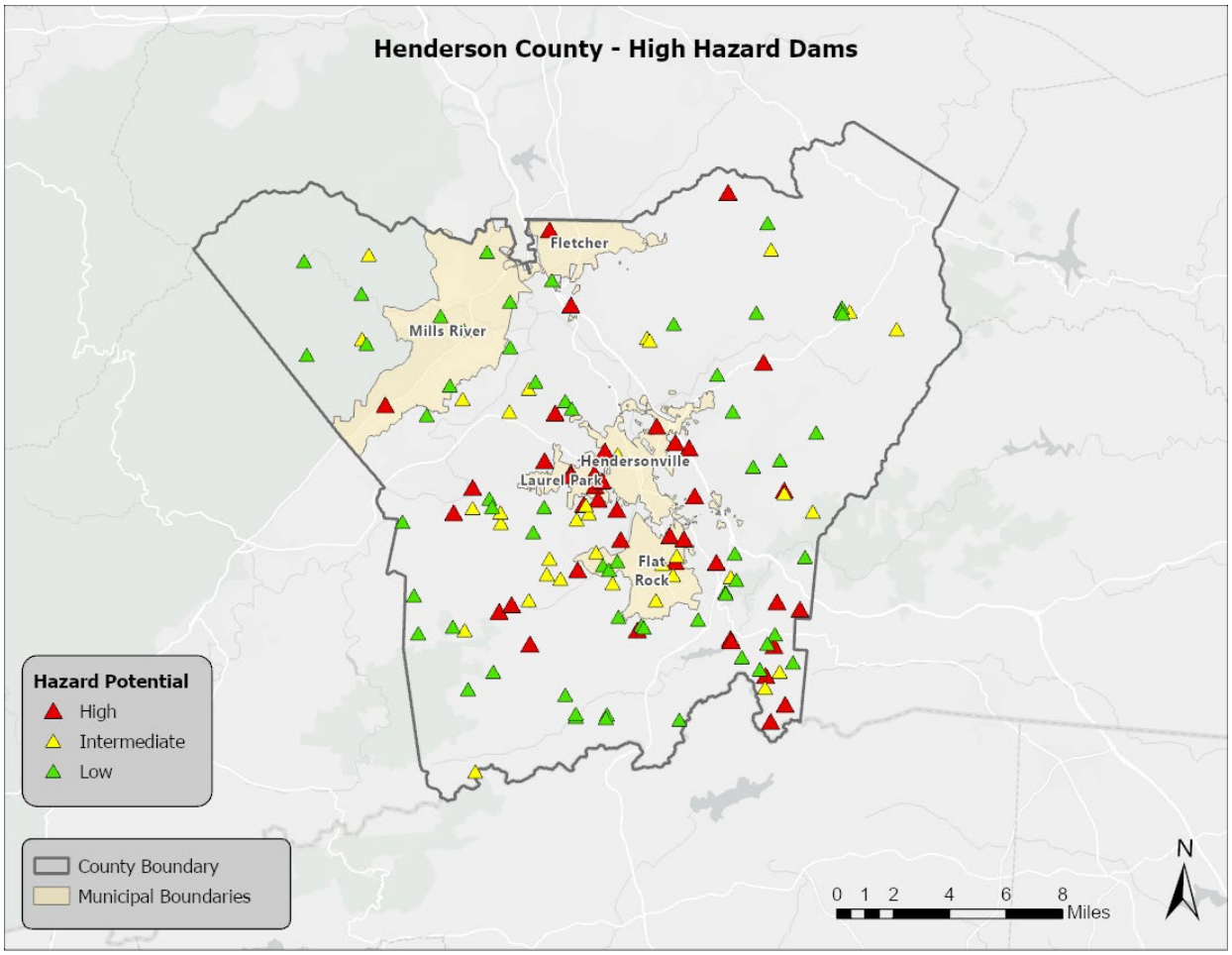
Location	Number High Hazard Dams
Henderson County	39

[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).

Polk County	15
Rutherford County	24
Transylvania County	46
South Mountains Regional Total	**124**

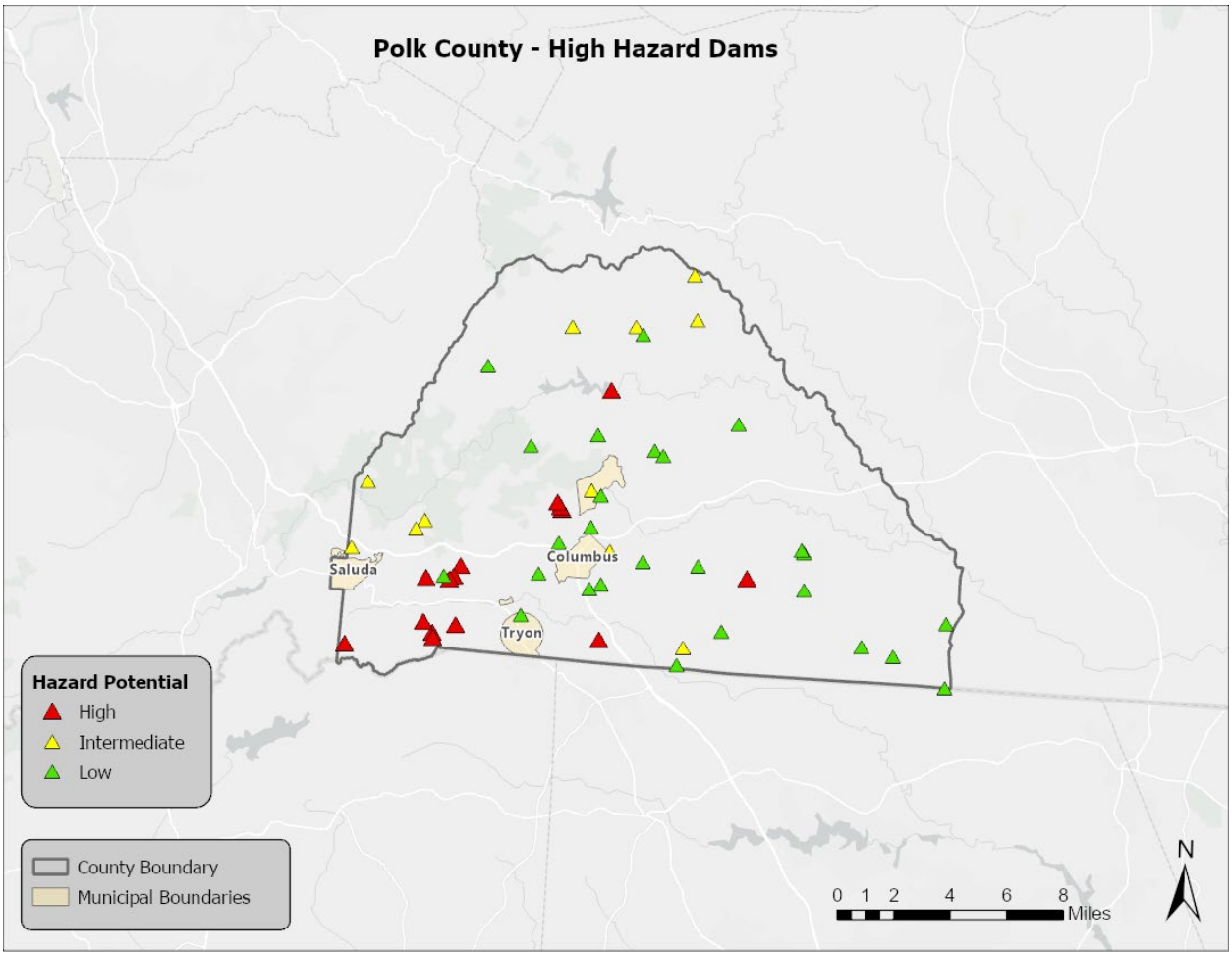
Source: North Carolina Division of Energy, Mineral, and Land Resources

FIGURE 5.17: HIGH HAZARD DAMS IN THE SOUTH MOUNTAINS REGION



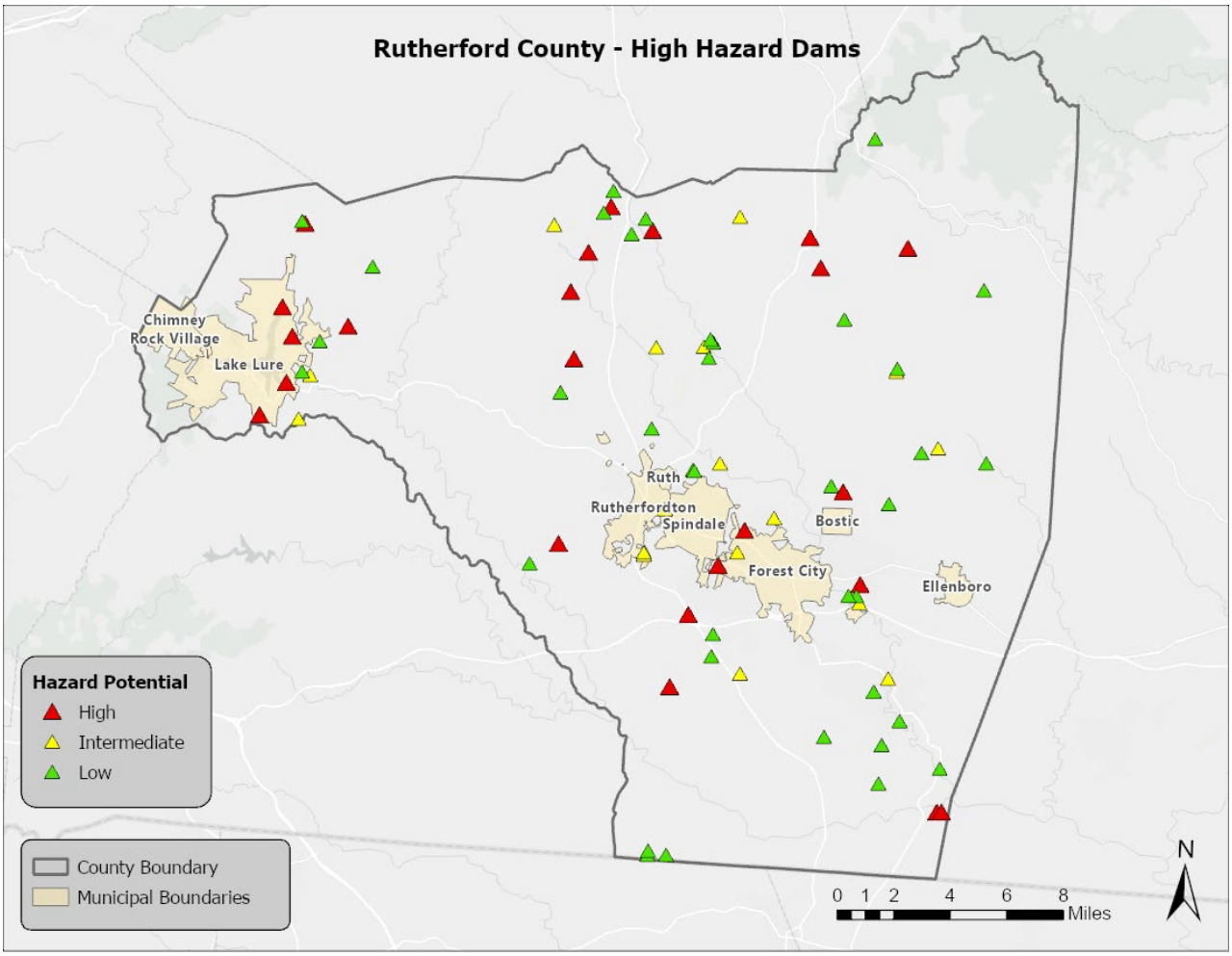
Source: North Carolina Division of Energy, Mineral, and Land Resources

FIGURE 5.18: HIGH HAZARD DAMS IN THE SOUTH MOUNTAINS REGION



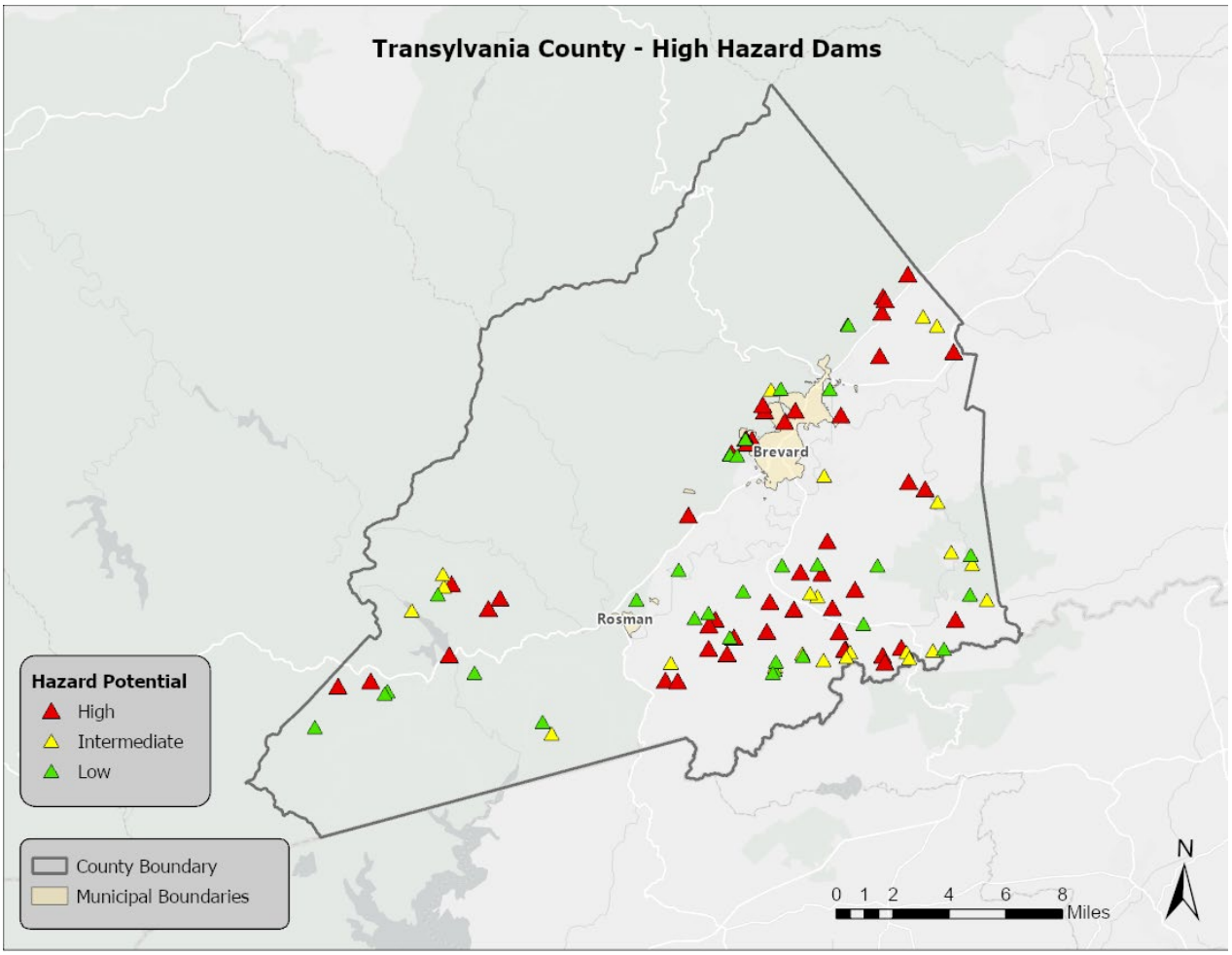
Source: North Carolina Division of Energy, Mineral, and Land Resources

FIGURE 5.19: HIGH HAZARD DAMS IN THE SOUTH MOUNTAINS REGION



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

FIGURE 5.20: HIGH HAZARD DAMS IN THE SOUTH MOUNTAINS REGION



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

It should also 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 14 dams with a breach status reported in the South Mountains Region, including five in Henderson County, none in Polk County, three in Rutherford County, and six in Transylvania County. All breached dams are considered low risk. Additionally, several potential future breach scenarios in the region could be catastrophic.

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 South Mountains 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. No further analysis beyond information 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.

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

chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.11.2 Location and Spatial Extent

There are areas in the South Mountains 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 South Mountains 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 1,554 square miles that make up the South Mountains Region, there are approximately 78 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 4.45 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.27**.

TABLE 5.27: SUMMARY OF FLOODPLAIN AREAS

Location	100-year area (square miles)	500-year area (square miles)
Henderson County	22.69	1.96
Polk County	9.94	0.75
Rutherford County	28.34	0.25
Transylvania County	16.59	1.49
South Mountains Regional Total	**77.56**	**4.45**

These flood zone values account for 5.3 percent of the total land area in the South Mountains 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 5.21** to **5.24** illustrate the location and extent of currently mapped Special Flood Hazard Areas for the South Mountains Region based on best available FEMA DFIRM data from 2024.

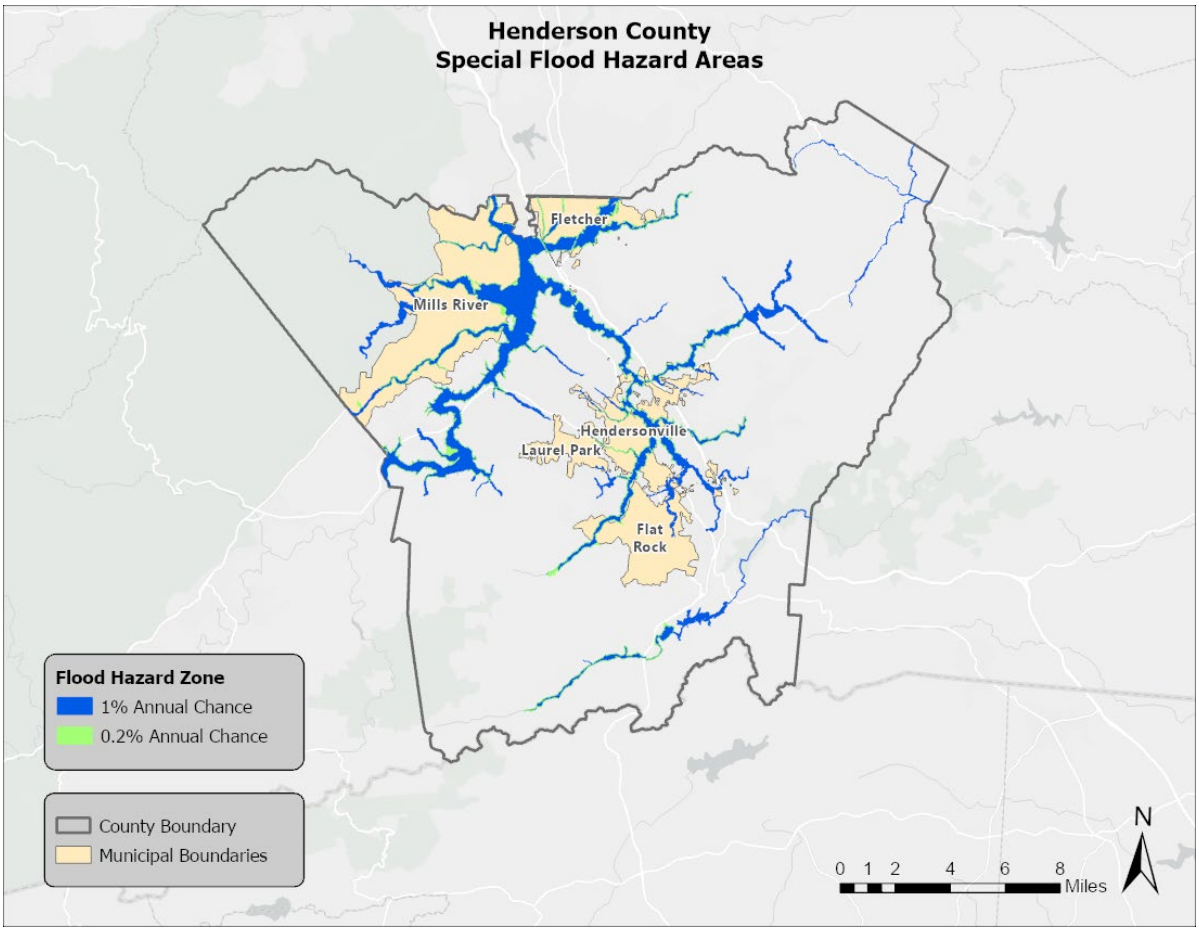
5.11.3 Historical Occurrences

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 248 events throughout the South Mountains Region since 1993[41]. A summary of these events is presented in **Table 5.28**. These events accounted for over $42 million (2023 dollars) in property damage throughout the region.

[40] The county-level DFIRM map data used for Henderson County was updated in 2023, Polk County in 2008, Rutherford County in 2014, and Transylvania County in 2017.

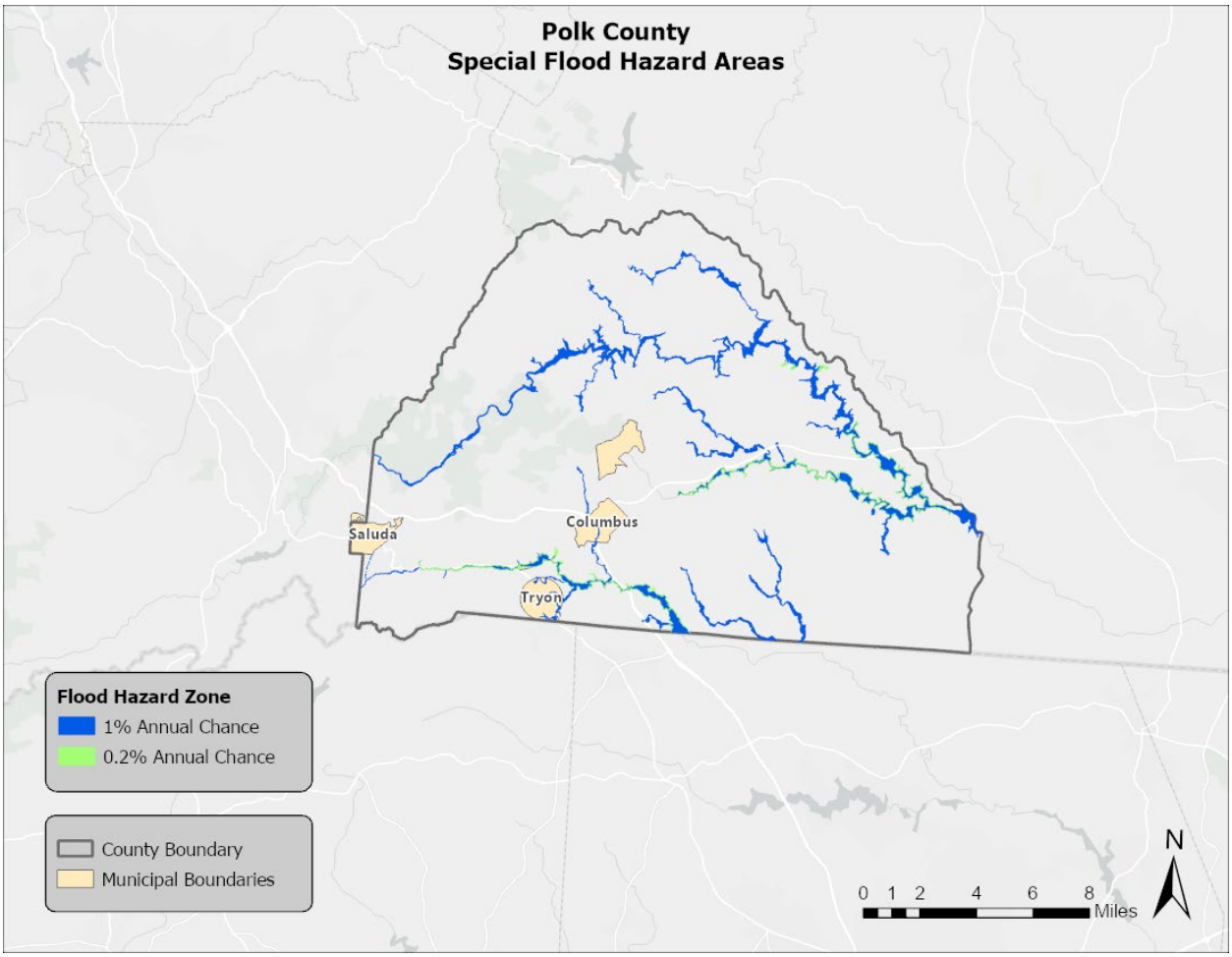
[41] These events (flooding and flash flooding) are only inclusive of those reported by NCEI. It is likely that additional occurrences have occurred and have gone unreported.

FIGURE 5.21: SPECIAL FLOOD HAZARD AREAS



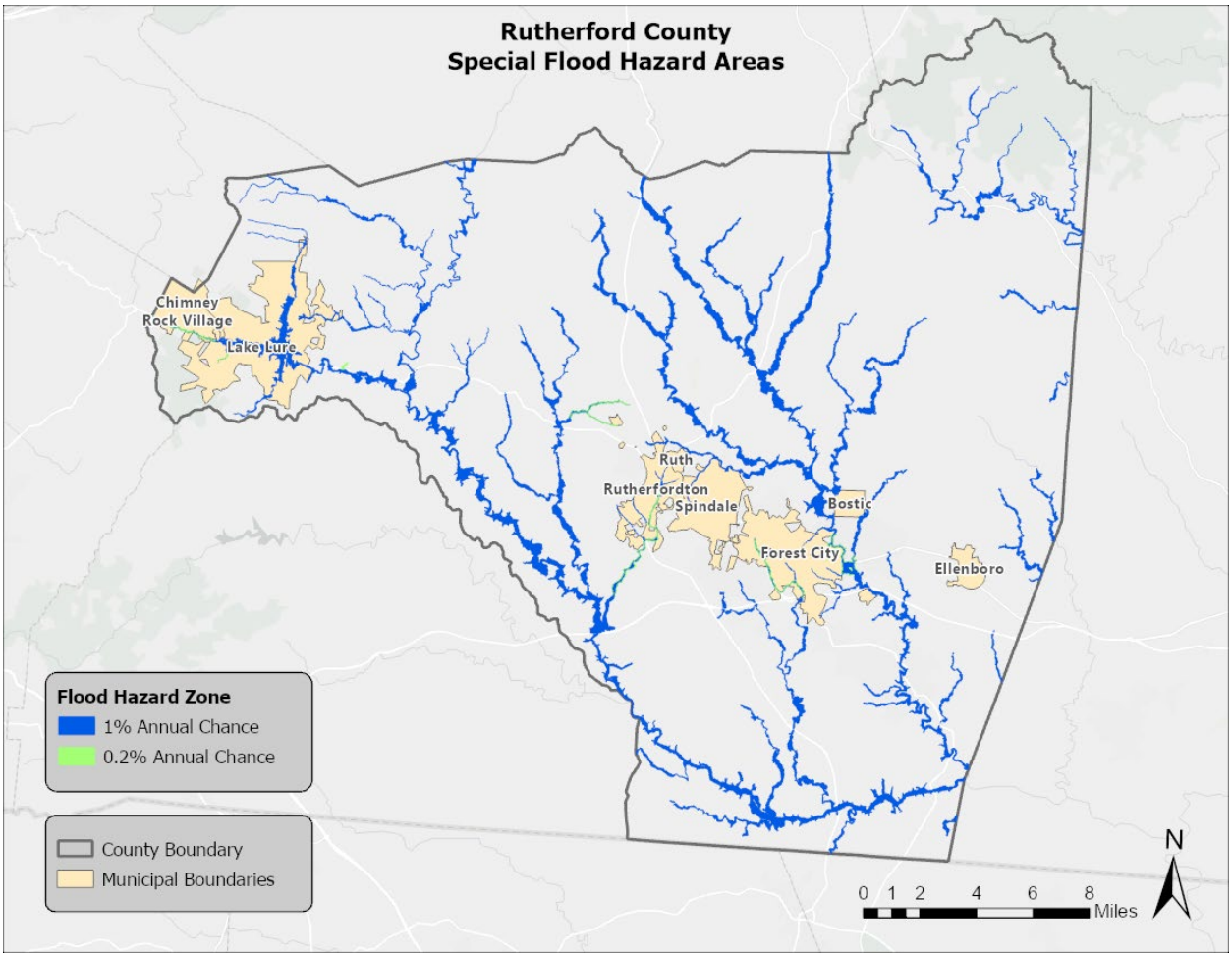
Source: Federal Emergency Management Agency

FIGURE 5.22: SPECIAL FLOOD HAZARD AREAS



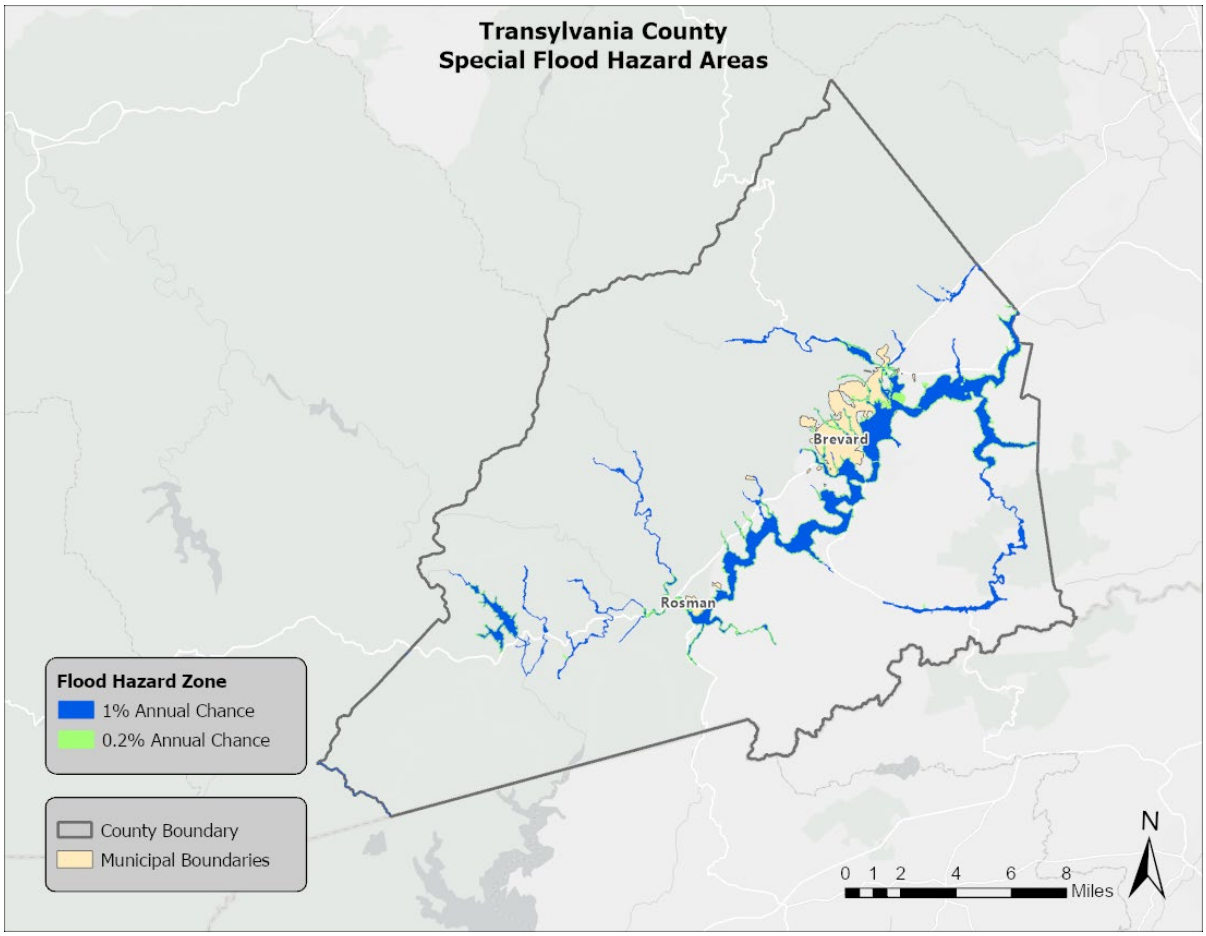
Source: Federal Emergency Management Agency

FIGURE 5.23: SPECIAL FLOOD HAZARD AREAS



Source: Federal Emergency Management Agency

FIGURE 5.24: SPECIAL FLOOD HAZARD AREAS



Source: Federal Emergency Management Agency

TABLE 5.28: SUMMARY OF FLOOD OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Henderson County	**96**	**0/1**	**$9,960,690**
Flat Rock	1	0/0	$2,487
Fletcher	6	0/0	$0
Hendersonville	5	0/0	$204,712
Laurel Park	15	0/0	$23,505
Mills River	10	0/0	$32,496
Unincorporated Area	59	0/1	$9,697,490
Polk County	**29**	**0/0**	**$747,772**
Columbus	4	0/0	$525,259
Saluda	4	0/0	$32,888
Tryon	1	0/0	$0
Unincorporated Area	20	0/0	$189,625
Rutherford County	**31**	**0/2**	**$11,687,829**
Bostic	0	0/0	$0
Chimney Rock Village	9	0/0	$6,771,312
Ellenboro	0	0/0	$0
Forest City	5	0/2	$172,815

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Lake Lure	3	0/0	$4,492,506
Ruth	0	0/0	$0
Rutherfordton	4	0/0	$8,516
Spindale	0	0/0	$0
Unincorporated Area	10	0/0	$242,680
Transylvania County	**92**	**0/10**	**$19,689,201**
Brevard	4	0/0	$153,336
Rosman	15	0/10	$4,071,158
Unincorporated Area	73	0/0	$15,464,707
South Mountains Regional Total	**248**	**0/13**	**$42,085,492**

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 421 flood losses reported in the South Mountains Region through the National Flood Insurance Program (NFIP) since 1978, totaling approximately $6.6 million in claims payments (2023 dollars). A summary of these figures for each South Mountains jurisdiction is provided in **Table 5.29**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the South Mountains Region were either uninsured, denied claims payment, or not reported.

TABLE 5.29: SUMMARY OF INSURED FLOOD LOSSES

Location	Flood Losses	Claims Payments (2023 dollars)
Henderson County	**218**	**$2,598,433**
Flat Rock	3	$13,944
Fletcher	11	$305,778
Hendersonville	163	$1,788,634
Laurel Park	6	$18,925
Mills River*	--	--
Unincorporated Area	35	$471,152
Polk County	**46**	**$1,048,141**
Columbus	0	$0
Saluda	0	$0
Tryon	3	$41,720
Unincorporated Area	43	$1,006,421
Rutherford County	**68**	**$1,349,282**
Bostic	0	$0
Chimney Rock Village	3	$23,360
Ellenboro*	--	--
Forest City	2	$75,276
Lake Lure	2	$28,746
Ruth	0	$0
Rutherfordton	4	$11,833
Spindale	0	$0
Unincorporated Area	57	$1,210,067
Transylvania County	**89**	**$1,589,644**
Brevard	17	$151,991

Location	Flood Losses	Claims Payments (2023 dollars)
Rosman	19	$207,401
Unincorporated Area	53	$1,230,252
South Mountains Regional Total	**421**	**$6,585,499**

**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 40 non-mitigated repetitive loss properties located in the South Mountains Region (plus 2 mitigated), which accounted for 147 losses (with over $1.8 million in claims payments last recorded across 30 properties in 2018). Additionally, 8 of the properties are considered severe repetitive loss properties. Many of the 42 properties are single-family residences or residential buildings (23), and the remaining are other residential, commercial, or government-owned buildings. Without mitigation, these properties will likely continue to experience flood losses. **Table 5.30** presents a summary of these figures for the South Mountains Region.

TABLE 5.30: SUMMARY OF REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Henderson County	**23**	**95**
Flat Rock	0	0
Fletcher	1	2
Hendersonville	22	93
Laurel Park	0	0
Mills River*	--	--
Unincorporated Area	0	0
Polk County	**5**	**10**
Columbus	2	4
Saluda	0	0
Tryon	2	4
Unincorporated Area	1	2
Rutherford County	**10**	**29**
Bostic	0	0
Chimney Rock Village	3	7
Ellenboro*	--	--
Forest City	2	7
Lake Lure	3	10
Ruth	0	0
Rutherfordton	2	5
Spindale	0	0
Unincorporated Area	0	0
Transylvania County	**4**	**13**

Location	Number of Properties	Number of Losses
Brevard	1	3
Rosman	2	8
Unincorporated Area	1	2
South Mountains Regional Total	**42**	**147**

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

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 South Mountains 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 “very low” in Polk County, “relatively low” in Rutherford County and Transylvania County, and “relatively moderate” in Henderson 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.

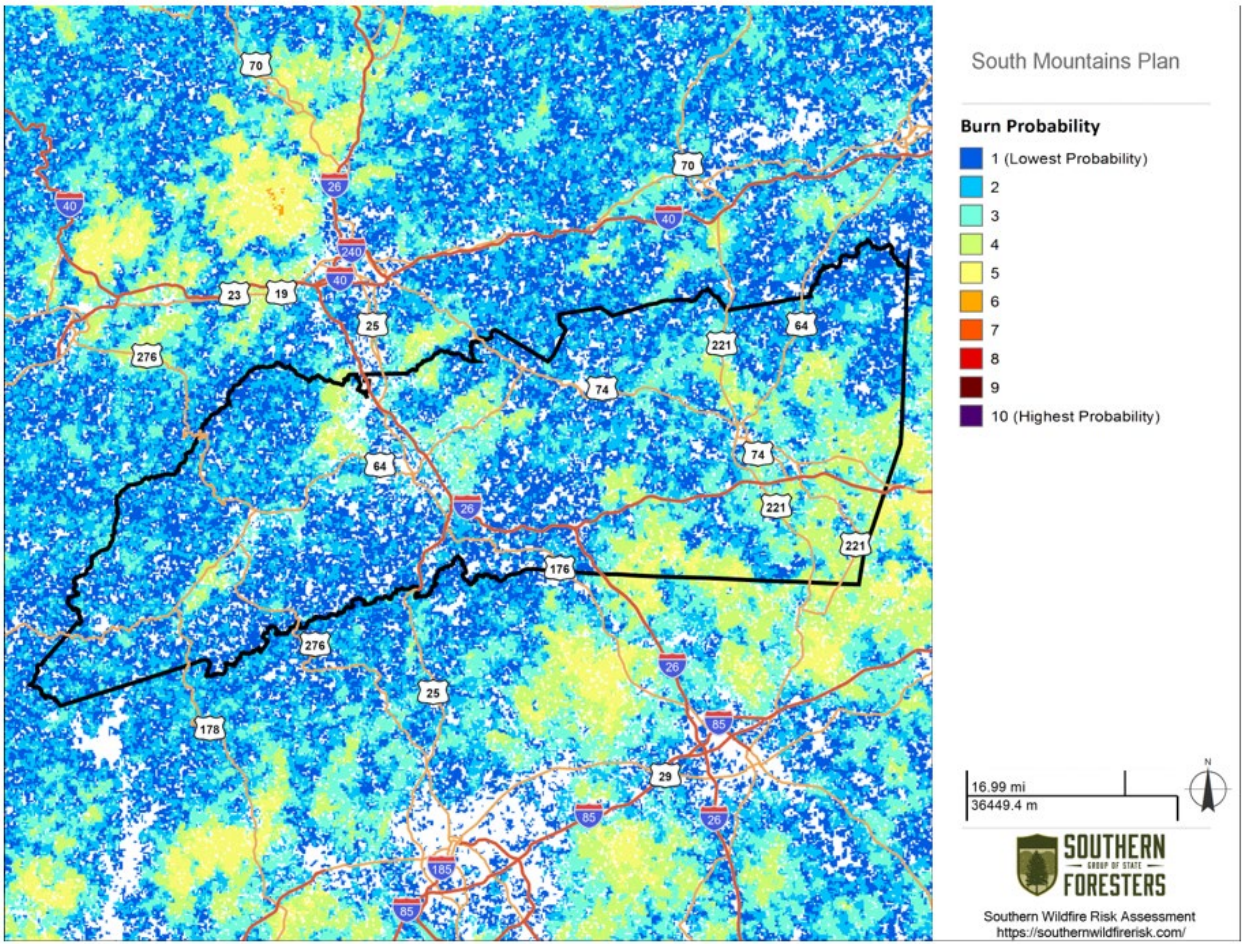
5.12.2 Location and Spatial Extent

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 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 abut formerly undeveloped areas.

[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.

Figure 5.25 shows the burn probability throughout the South Mountains 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 5.25: BURN PROBABILITY IN THE SOUTH MOUNTAINS REGION

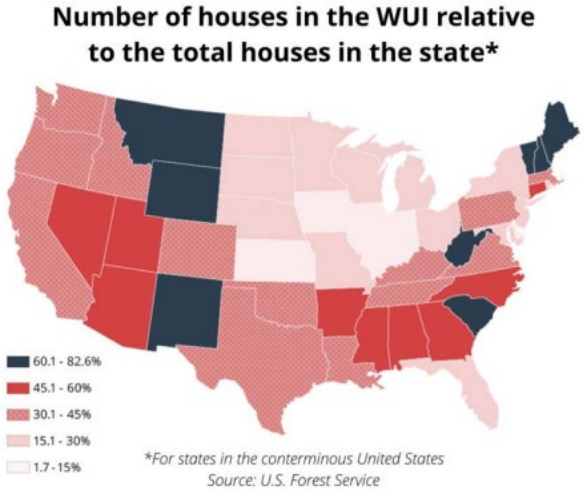


Source: Southern Wildfire Risk Assessment

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 5.26** 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)

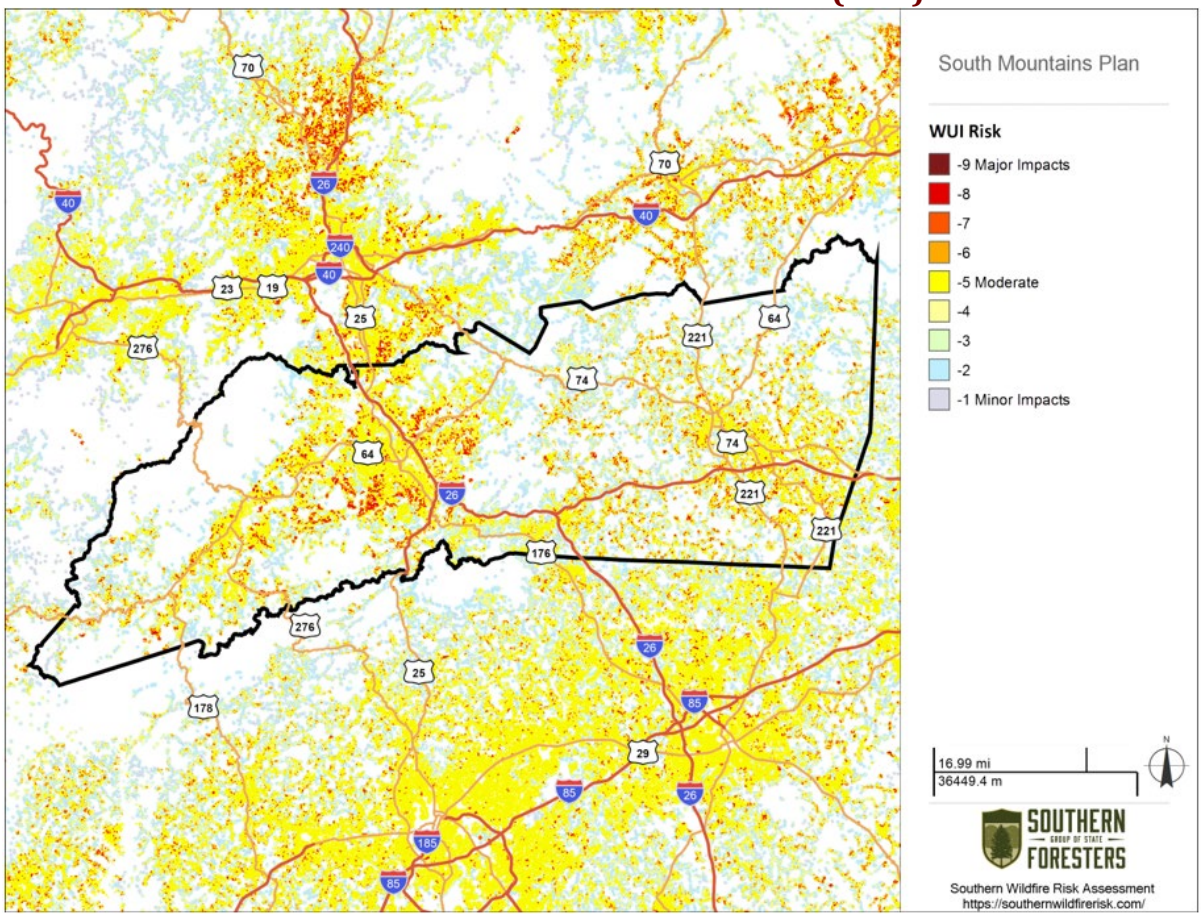
FIGURE 5.26: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: US Fire Administration

Below, **Figure 5.27** displays the WUI Risk Index specifically for the South Mountains Region.

FIGURE 5.27: WILDLAND URBAN INTERFACE (WUI) RISK INDEX



Source: Southern Wildfire Risk Assessment

Based on data from the North Carolina Division of Forest Resources from 2003 to 2018, the South Mountains Region experiences an average of 140 wildfires annually which burn a combined 686 acres, on average. The data indicates that most of these fires are small, averaging about four acre per fire. Although it is certain that more wildfires have occurred in the region, NCEI reports that only three have taken place in recent history. No deaths, injuries, nor property damage were reported. Those occurrences are documented in **Table 5.31** below, followed by a narrative of the most recent occurrence. 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.

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 779 events that impacted an area greater than 1 acre have occurred throughout the South Mountains Region since 2001[44]. A summary of these events is presented in **Table 5.31**. The largest of these events was the Party Rock Fire which occurred in Rutherford County in 2016 and impacted 7,913 acres.

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

Location	Number of Events	Number of Acres Burned
Henderson County	**226**	**1,367.55**
Flat Rock	3	31.7
Fletcher	2	4.8
Hendersonville	4	10.7
Laurel Park	0	0
Mills River*	12	26.03
Unincorporated Area	205	1,294.32
Polk County	**157**	**2,622**
Columbus	1	18
Saluda	0	0
Tryon	1	4
Unincorporated Area	155	2,600
Rutherford County	**297**	**22,633.13**
Bostic	0	0
Chimney Rock Village	5	62.53
Ellenboro*	0	0
Forest City	3	5.5
Lake Lure	11	54.85
Ruth	1	3
Rutherfordton	0	0
Spindale	1	5
Unincorporated Area	276	22,502.25
Transylvania County	**99**	**968.65**
Brevard	7	39.62
Rosman	0	0

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

Unincorporated Area	92	929.03
South Mountains Regional Total	**779**	**27,591.33**

Chimney Rock State Park Fire – February 12, 2011
A wildfire that began in the Chimney Rock State Park area on the 12th quickly spread during a period of windy and very dry conditions. The fire burned almost 1500 acres near the Polk and Rutherford County line south of Chimney Rock before being contained on the 20th.

Party Rock Fire – November 5-30, 2016
An extended period of abnormally dry weather and drought conditions that began in late winter of 2016, and continued through the year resulted in very dry vegetation across western North Carolina by mid-autumn. This was exacerbated by an unusually warm late summer and fall, when temperatures averaged as much as 5 degrees above normal. In these conditions, multiple wildfires ignited and spread during the first week of November, culminating in one of the worst wildfire episodes in recent western North Carolina history. Multiple large fires burned, mainly across the southern mountains, and most of these fires were not completely contained until a cold front brought much-needed rain to the area at the end of the month. The Party Rock fire burned more than 7,000 acres in the Lake Lure/Chimney Rock/Bat Cave area. Chimney Rock State Park was closed throughout much of the month, while Chimney Rock Village was evacuated multiple times during adverse fire weather conditions.

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 South Mountains Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due 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 urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the South Mountains Region for future wildfire

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

events is likely (10 to 100 percent annual probability). As of 2024, the FEMA National Risk Index rates the wildfire hazard as “relatively low” in Rutherford County compared to “very low” in Henderson County, Polk County, and Transylvania County.

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 South Mountains 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 South Mountains 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 South Mountains 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 South Mountains 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 South Mountains Region is part of Flu Surveillance Region 6 (see regional map in NCDHHS annual surveillance summaries) in the state, with 0-3% 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 33,775 total cases and 384 total deaths in Henderson County, 5,112 total cases and 73 total deaths in Polk County, 21,828 total cases and 439 total deaths in Rutherford County, and 8,503 total cases and 88 total deaths in Transylvania 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.

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

[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)

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 South Mountains 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.

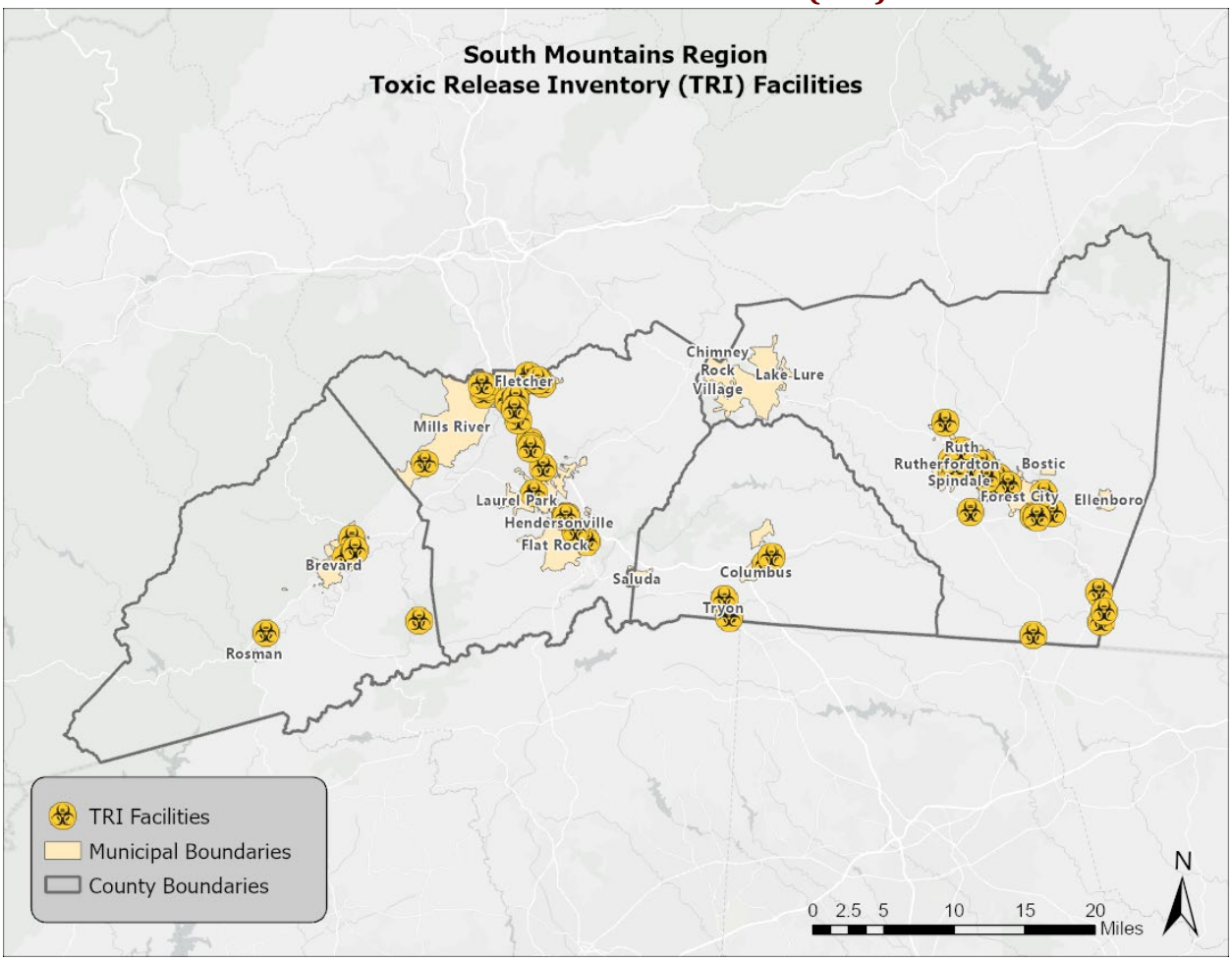
5.14.2 Location and Spatial Extent

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 South Mountains Region has 61 reported TRI facilities . These sites are shown in **Figure 5.28.**

FIGURE 5.28: TOXIC RELEASE INVENTORY (TRI) FACILITIES



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 or winding, making hazardous material transport in the area 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 material "serious incident" was defined as follows:

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

Table 5.32 summarizes the serious HAZMAT incidents reported in the South Mountains Region.

TABLE 5.32: SUMMARY OF HAZMAT INCIDENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Henderson County	**6**	**0/0**	**$150,666**
Flat Rock	0	0/0	$0
Fletcher	1	0/0	$4,343
Hendersonville	5	0/0	$146,323
Laurel Park	0	0/0	$0
Mills River	0	0/0	$0
Unincorporated Area	0	0/0	$0
Polk County	**5**	**0/2**	**$1,246,500**
Columbus	2	0/1	$952,092
Saluda	1	0/0	$100,000
Tryon	0	0/0	$0
Unincorporated Area	2	0/1	$194,408
Rutherford County	**3**	**0/0**	**$433,874**
Bostic	0	0/0	$0
Chimney Rock Village	0	0/0	$0
Ellenboro	0	0/0	$0
Forest City	1	0/0	$329,824
Lake Lure	0	0/0	$0
Ruth	0	0/0	$0
Rutherfordton	0	0/0	$0
Spindale	1	0/0	$104,050
Unincorporated Area	1	0/0	$0
Transylvania County	**1**	**0/0**	**$35,796**
Brevard	1	0/0	$35,796
Rosman	0	0/0	$0
Unincorporated Area	0	0/0	$0
South Mountains Regional Total	**15**	**0/2**	**$1,866,836**

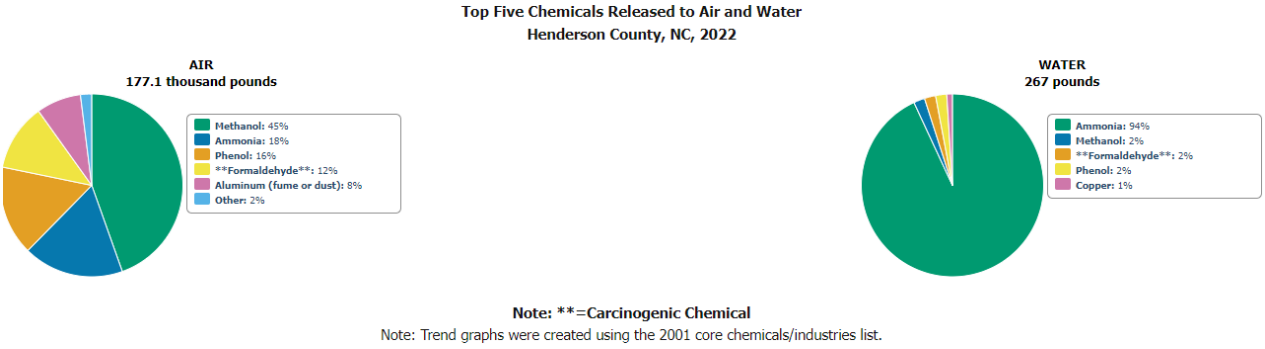
Source: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration

Updated information regarding county-specific chemical releases have been provided through 2021 and TRI facilities through 2023 by the EPA[51]. In Henderson County, there are 12 reported TRI facilities.

[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?)

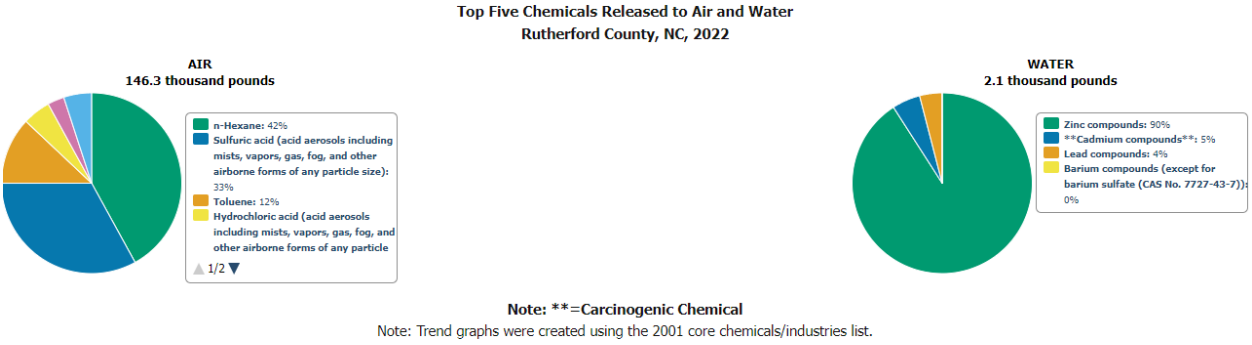
Releases have mostly been conducted by air with a smaller share of off-site disposals. No TRI facilities are reported in Polk County and no data is reported on chemical releases. In Rutherford County, there are 6 reported TRI facilities. Almost all releases have been conducted through off-site disposal. No TRI facilities are reported in Transylvania County and no data is reported on chemical releases. In the following two figures, the top five chemicals released through air and water are shown for each of the counties in the region with recorded data.

FIGURE 5.29: TOP CHEMICALS RELEASED IN HENDERSON COUNTY



Source: Environmental Protection Agency

FIGURE 5.30: TOP CHEMICALS RELEASED IN RUTHERFORD COUNTY



Source: Environmental Protection Agency

5.14.4 Changing Future Conditions

As the population of the South Mountains 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 61 TRI facilities in the South Mountains 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.

Oconee Nuclear Station, which is the plant located closest to the South Mountains Region, is a 2,568-megawatt power plant that began commercial operation in 1973. It is one of the first three nuclear stations built by Duke Energy and its reactor is a pressurized water reactor. The plant operates with a very high level of security.

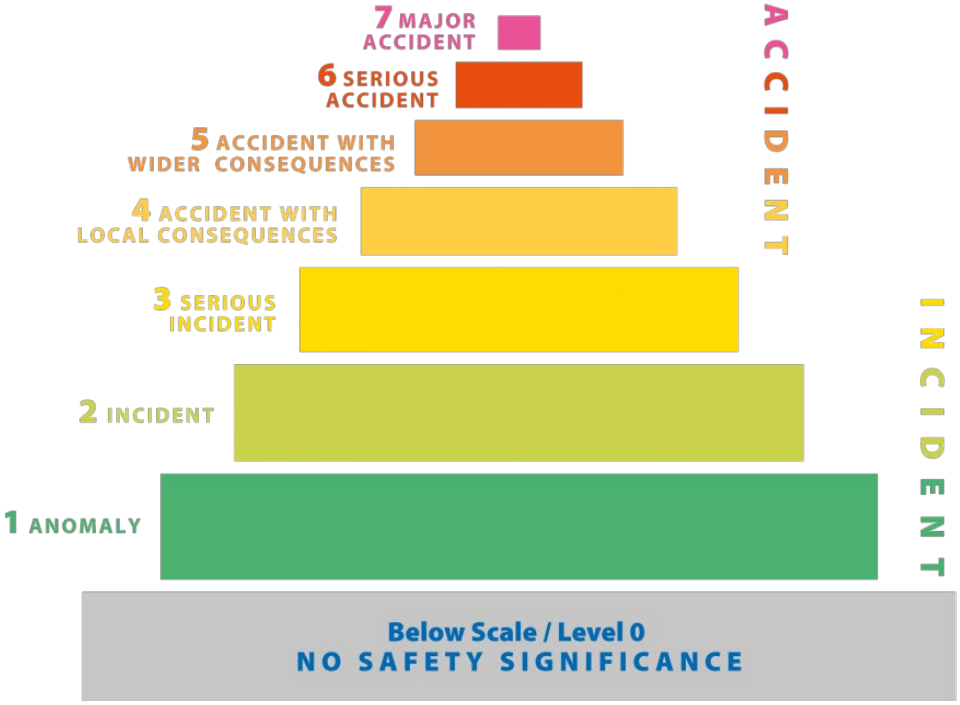
The region is also located within a close proximity to the Catawba Nuclear Station in South Carolina and the McGuire Nuclear Station in North Carolina. The Catawba plant was commissioned in 1985 and the second unit was added in 1986. It also operates with a very high level of security. It is jointly owned by North Carolina Municipal Power Agency Number One. 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 Oconee 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 5.31**).

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

FIGURE 5.31: INTERNATIONAL NUCLEAR EVENT SCALE

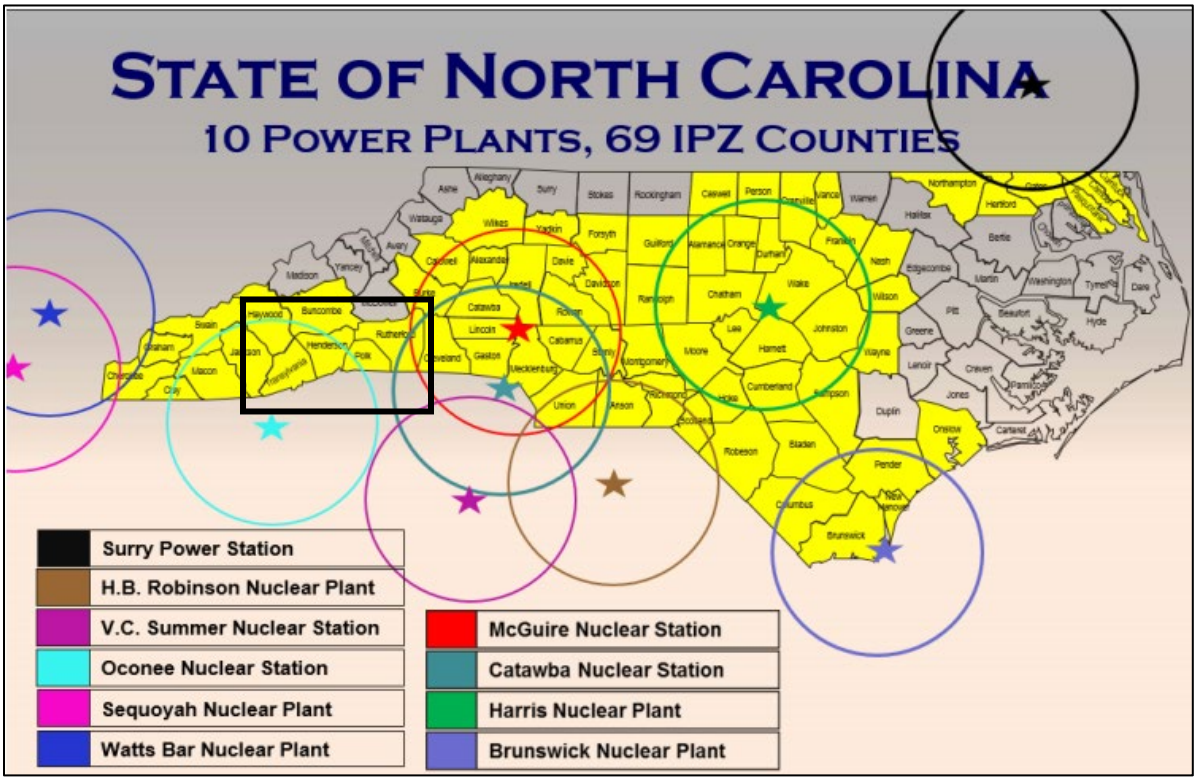


Source: International Atomic Energy Agency

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.

All of the aforementioned nuclear plants – Oconee Nuclear Station, McGuire Nuclear Station, and the Catawba Nuclear Station – are within fifty miles of the South Mountains counties. A map of all power plants in North Carolina can be seen below in **Figure 5.32**. Note that the South Mountains region is identified in the black box.

FIGURE 5.32: NORTH CAROLINA NUCLEAR POWER STATIONS INCIDENT HAZARD ZONES



Source: NC Emergency Management

5.15.3 Historical Occurrences

Although there have been no major nuclear events at either the Oconee, McGuire or Catawba Nuclear Stations, there is some possibility that one could occur as there have been incidents in the past in the United States at other facilities and at facilities around the world.

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.

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.

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.

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.

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.

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.

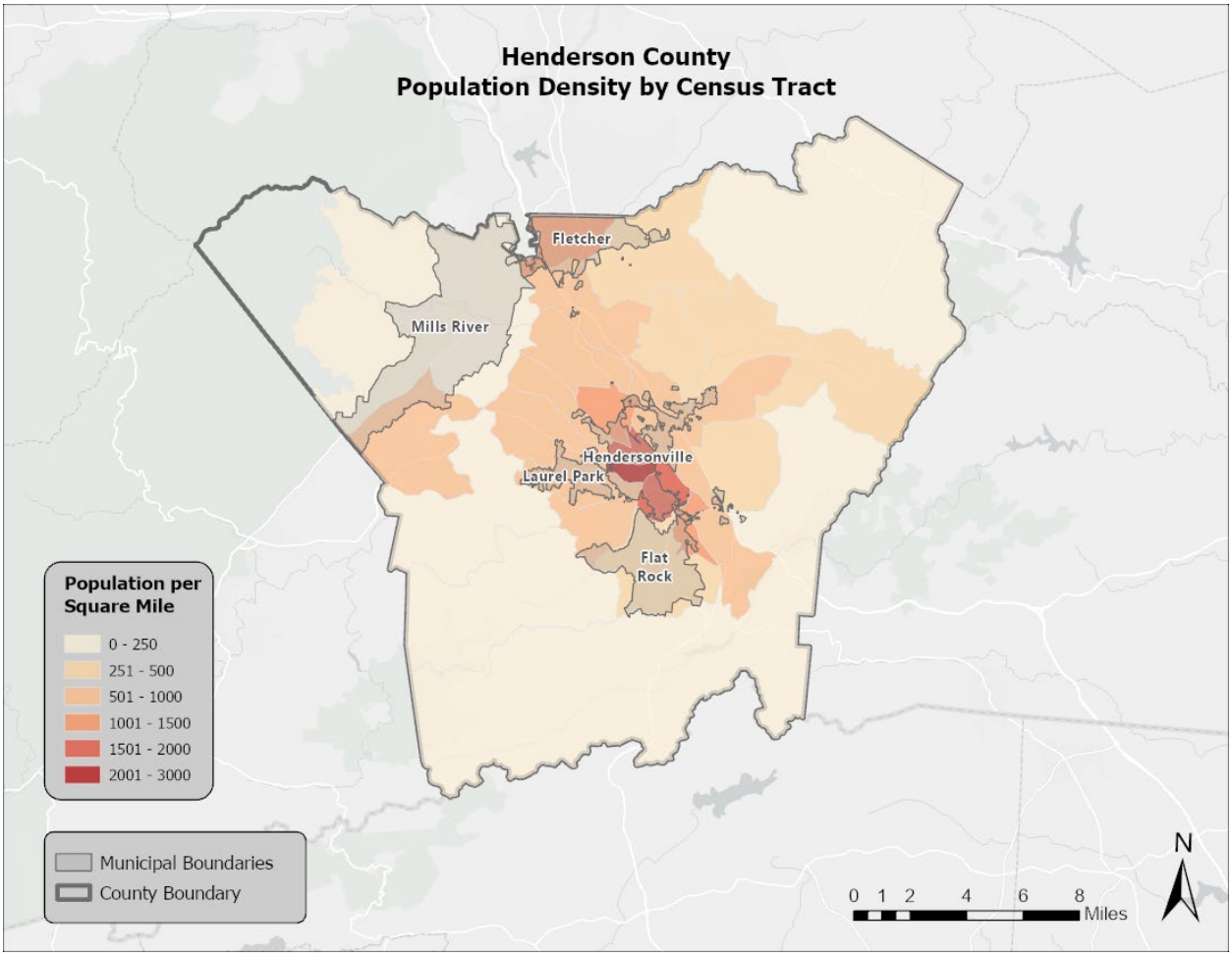
OTHER

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

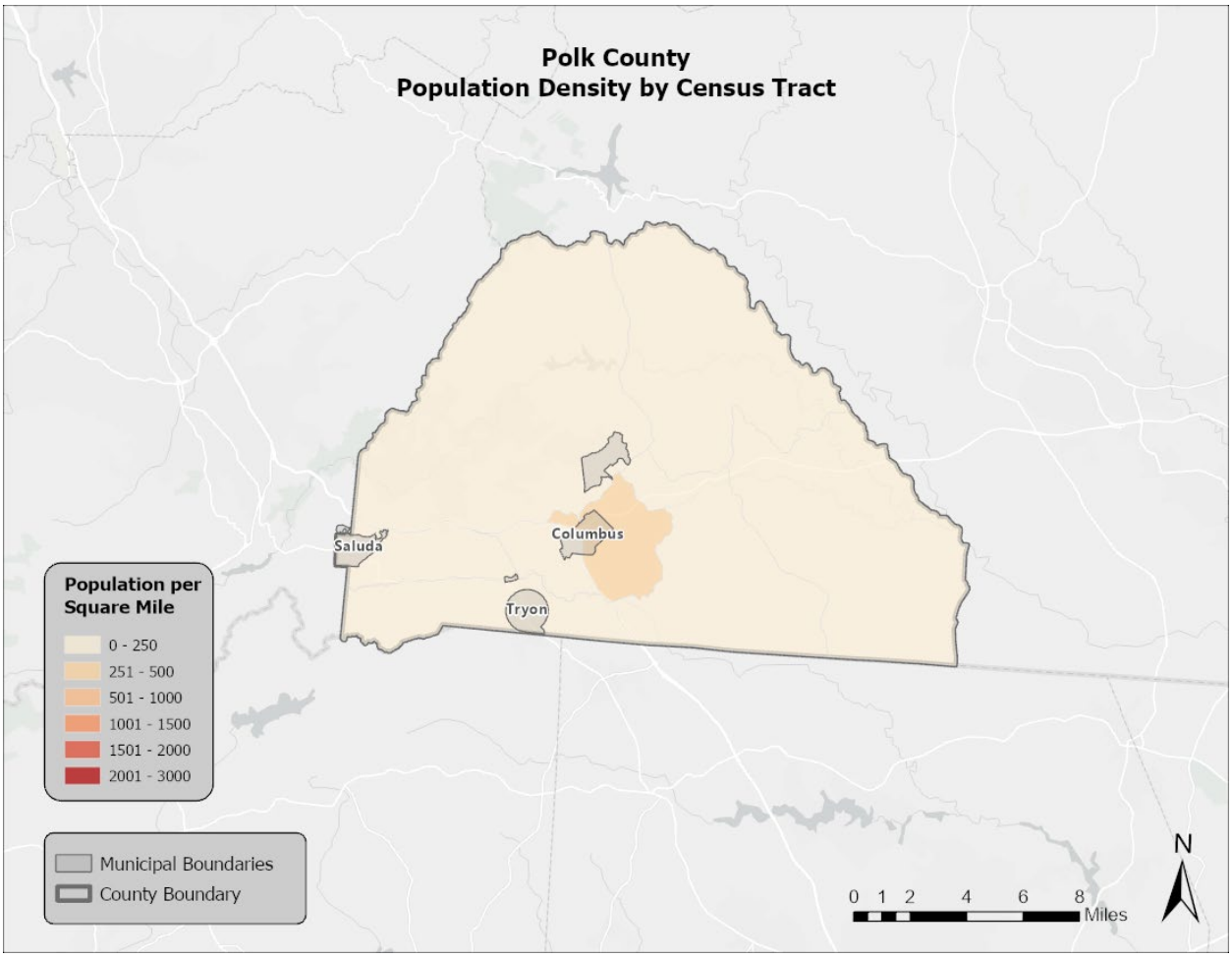
All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The maps in **Figures 5.33** to **5.36** display the population density in the South Mountains region using census tract levels.

FIGURE 5.33: POPULATION DENSITY IN HENDERSON COUNTY



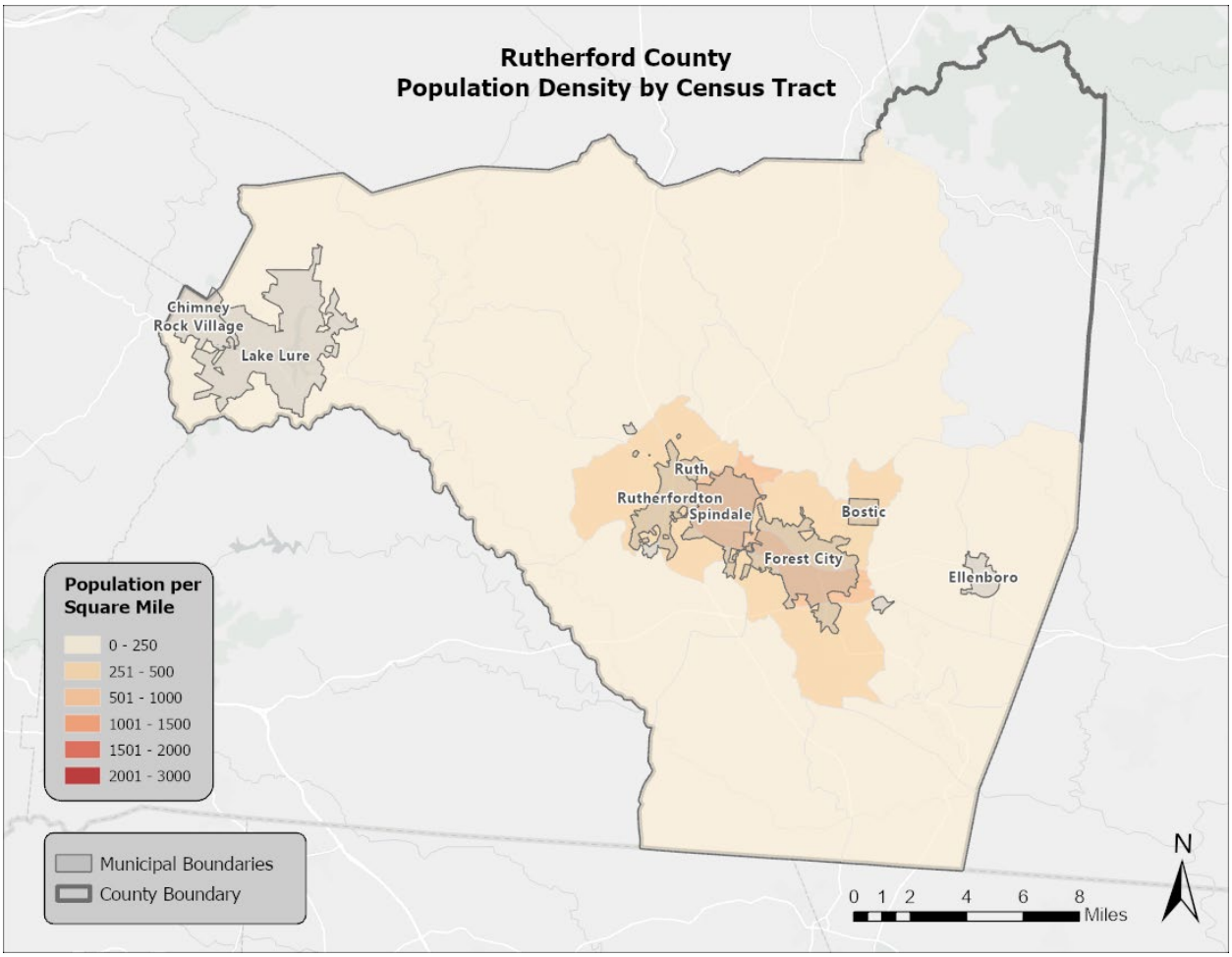
Source: US Census Bureau

FIGURE 5.34: POPULATION DENSITY IN POLK COUNTY



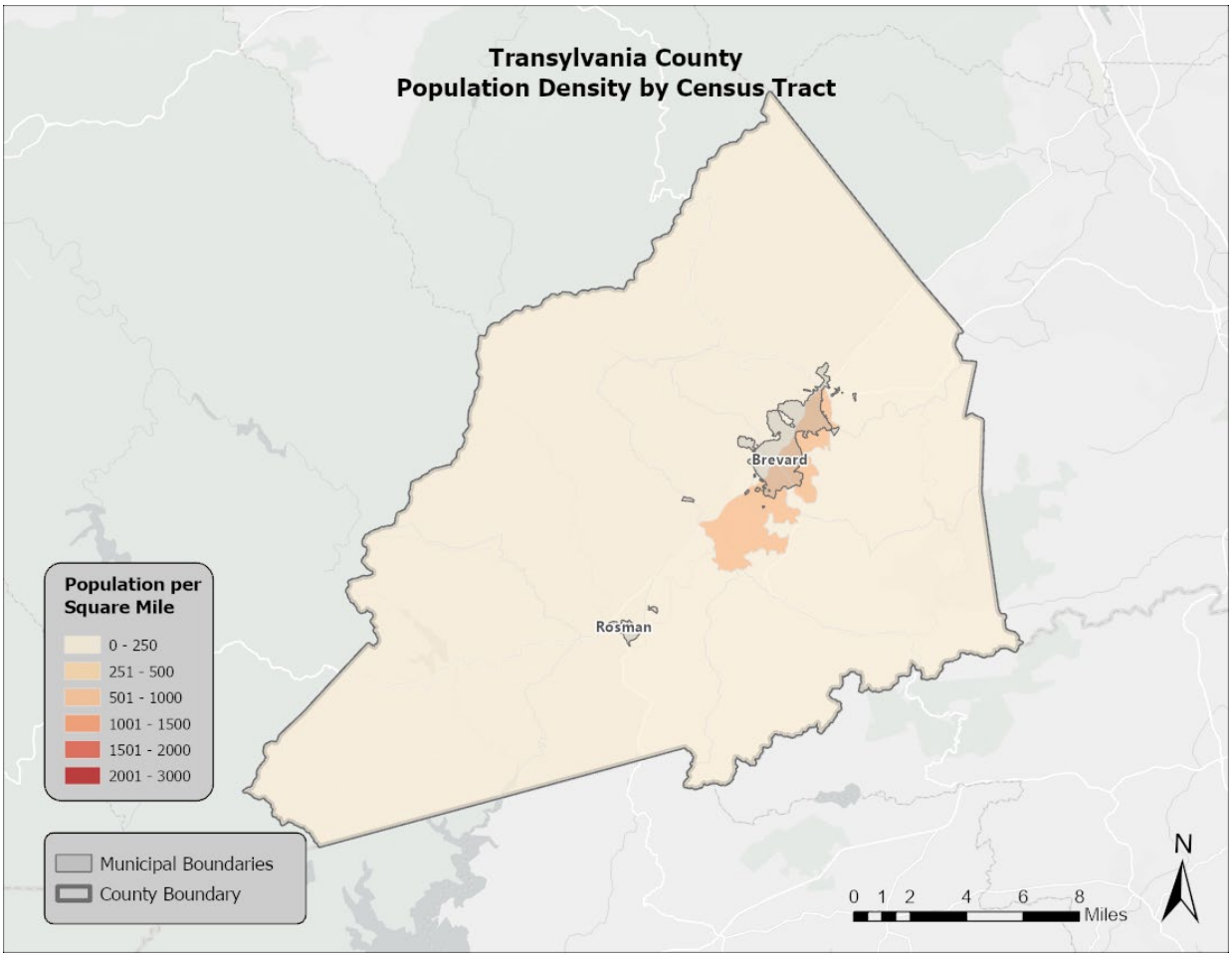
Source: US Census Bureau

FIGURE 5.35: POPULATION DENSITY IN RUTHERFORD COUNTY



Source: US Census Bureau

FIGURE 5.36: POPULATION DENSITY IN TRANSYLVANIA COUNTY



Source: US Census Bureau

Furthermore, the most recent population counts of each participating county and jurisdictions based on American Community Survey (ACS) 5-year estimates and population density measured in population per square mile as of 2020 can be seen in **Table 5.33** below.

TABLE 5.33: 2022 POPULATION ESTIMATES

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Henderson County	**116,469**	**311.8**
Flat Rock	3,483	430.3
Fletcher	8,000	1,248.9
Hendersonville	15,102	2,043.6
Laurel Park	2,615	803.3
Mills River	7,100	317.2
Unincorporated Area	80,169	--
Polk County	**19,538**	**81.3**
Columbus	1,087	282.1
Saluda	617	405.8

Location	2022 Population Estimate	2020 Population Density (sq. mi.)
Tryon	1,516	782.2
Unincorporated Area	16,318	--
Rutherford County	**64,680**	**114.0**
Bostic	304	380.5
Chimney Rock Village	220	41.7
Ellenboro	944	571.5
Forest City	7,357	860.9
Lake Lure	1,575	103.7
Ruth	621	818.4
Rutherfordton	3,671	878.6
Spindale	4,218	781.3
Unincorporated Area	45,770	--
Transylvania County	**33,131**	**87.2**
Brevard	7,777	1,445.6
Rosman	642	1,283.9
Unincorporated Area	24,712	--
South Mountains Regional Total	**233,818**	**149.0**

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 South Mountains 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 South Mountains Region has experienced no major terrorist attacks, but the area's population is continuing to rise in some jurisdictions. 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 South Mountains 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.

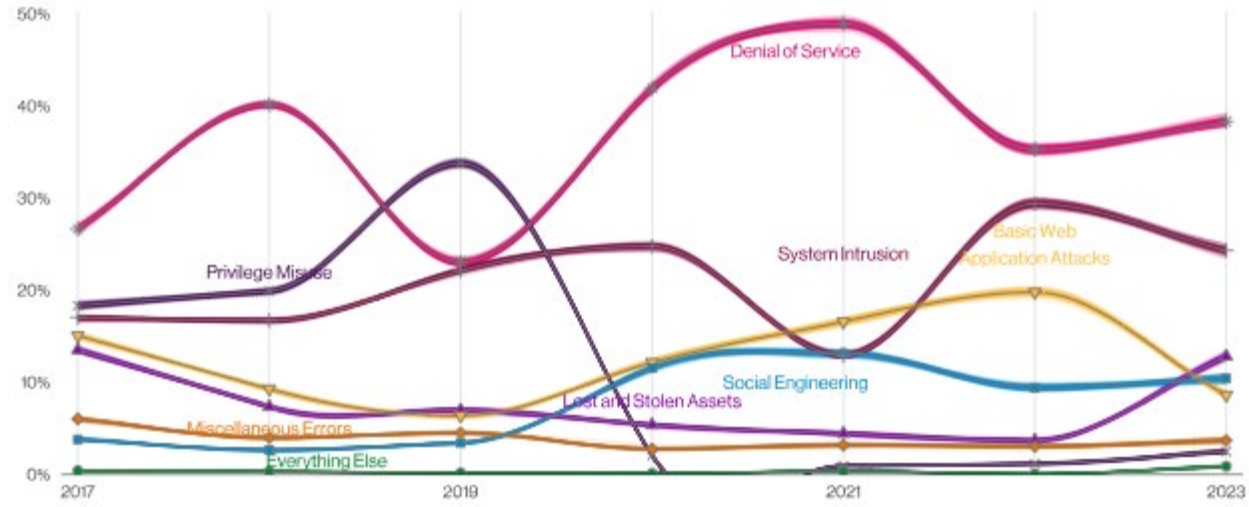
Cyberattacks can happen in both the public and private sector. They may be carried out by a specific individual, or by groups from afar. Many attacks attempt to steal money or to disturb normal operations. According to the 2023 Verizon Report of Data Breaching, 83% of breaches involved external actors, 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 5.37 below displays nationwide cyberattack incident patterns over time (2017 to 2023) from the 2023 Verizon Data Breach Investigations Report (DBIR).

FIGURE 5.37: 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 South Mountains 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 5.34** below.

TABLE 5.34: 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 South Mountains 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 South Mountains region may be more susceptible.

5.18.3 Historical Occurrences

There have been no reports of EMP occurrences in the South Mountains 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

No notable examples of this hazard were found for the South Mountains Region.

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 South Mountains 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 South Mountains 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 South Mountains Region, the future probability of civil disturbance incidents is considered possible (between 1 and 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

No notable examples of this hazard were found for the South Mountains Region.

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

No past occurrences of this hazard in the form of foodborne illness or contamination have been documented. 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 lack of previous occurrences of food emergencies in the South Mountains Region, the future probability of food emergency incidents is considered possible (between 1 and 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 5.35 describes the extent of each natural hazard identified for the South Mountains Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.35 EXTENT OF SOUTH MOUNTAINS 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 South Mountains Region is 105 degrees Fahrenheit (reported on June 22, 1964). • Henderson County: 101°F • Polk County: 105°F • Rutherford County: 103°F • Transylvania County: 99°F
Hurricane and Coastal Hazards	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Tables 5.9 and 5.10). The greatest classification of hurricane to traverse directly through the South Mountains Region was Hurricane Celeste which carried tropical force winds of 53 knots upon arrival. The following list the greatest extent of hurricane winds to pass through the area, though it should be noted that stronger storms could impact the region without a direct hit: • Henderson County: Unnamed 1902 Storm, Category 2 Hurricane (31 knots) • Polk County: Unnamed 1902 Storm, Category 2 Hurricane (31 knots) • Rutherford County: Unnamed 1902 Storm, Category 2 Hurricane (31 knots) • Transylvania County: Unnamed 1916 Storm, Tropical Storm (40 knots)
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

	5.12 and 5.13). The greatest magnitude reported in the region was an F4 (reported on May 5, 1989). • Henderson County: F1 • Polk County: F1 • Rutherford County: F4 • Transylvania County: F2 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 South Mountains Region was reported on April 15, 2007, at 70 knots (approximately 81 mph). It should be noted that future events may exceed these historical occurrences. • Henderson County: 70 knots • Polk County: 70 knots • Rutherford County: 70 knots • Transylvania County: 70 knots Lightning: According to the Vaisala flash density map (Figure 5.9), the South Mountains Region is located in an area that experiences 4 to 16 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 South Mountains Region was 2.75 inches (reported on June 24, 1986). It should be noted that future events may exceed this. • Henderson County: 2.5 inches • Polk County: 2.75 inches • Rutherford County: 2.0 inches • Transylvania County: 2.75 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 was reported in the region was 22 inches reported on March 2, 1942. Due to variations in elevation throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available. • Henderson County: 22 inches • Polk County: 15 inches • Rutherford County: 16 inches • Transylvania County: 20 inches
Earthquakes	Earthquake extent can be measured by the Richter Scale (Table 5.20) and the Modified Mercalli Intensity (MMI) scale (Table 5.21) and the distance of the epicenter from the South Mountains Region. According to data provided by the USGS and NOAA NCEI records , the greatest MMI to impact the region was VI (strong) with a correlating Richter Scale measurement of approximately 5.4 (reported on May 5, 1981). The epicenter of this earthquake was located 10.0 km away. • Henderson County: VI, 10.0 km to epicenter • Polk County: V, 31.0 km to epicenter • Rutherford County: V, 241.0 km to epicenter • Transylvania County: V, 26.0 km to epicenter
Geological/Landslides	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 high throughout most of the South Mountain counties. Sinkhole: The western part of North Carolina and the South Mountains 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 South Mountains Region.
Dam Failure	Dam failure extent is defined using the North Carolina Division of Energy, Mineral, and Land Resources criteria (Table 5.24). Of the 362 dams in South Mountains Region, 125 are classified as high hazard. • Henderson County: 41 high hazard dams • Polk County: 15 high hazard dams • Rutherford County: 23 high hazard dams • Transylvania County: 46 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 5.3 percent of the total land area in the South Mountains 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 area was reported on October 5, 1964. Water reached a discharge of 30,000 cubic feet per second and the stream gage height was recorded at 25.50 feet. Additional peak discharge readings and gage heights are in the table below.

Location/Jurisdiction	Date	Peak Discharge (cfs)	Gage Height (ft)
Henderson County			
French Broad River near Fletcher	9/8/2004	25,500	20.13
Rutherford County			
Cove Creek near Lake Lure	6/5/1957	7,050	18.53
Transylvania County			
French Broad River at Blantyre	10/5/1964	30,000	25.50

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.

Flood extents by jurisdiction are found in Appendix F.

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. • Henderson County: The greatest number of fires to occur in any year was 77 in 2006. • Polk County: The greatest number of fires to occur in any year was 34 in 2006.

	• Rutherford County: The greatest number of fires to occur in any year was 95 in 2011. • Transylvania County: The greatest number of fires to occur in any year was 35 in 2006. 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 South Mountains 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 is 8,612 LGA released on the highway on October 21, 2020. It should be noted that larger events are possible. • Henderson County: 3,550 LGA • Polk County: 8,612 LGA • Rutherford County: 5,723 LGA • Transylvania County: 10 LGA
Radiological Emergency – Fixed Nuclear Facilities	Although there is no history of a nuclear accident at the Oconee, 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 Oconee, McGuire, or Catawba is possible.
Terrorism	Although no severe terrorism attacks have been reported in the South Mountains 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 South Mountains 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 South Mountains 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	No major instances of civil disturbances have been identified in the South Mountains 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	No instances of food emergencies have been identified in the South Mountains 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 South Mountains 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 South Mountains Regional Hazard Mitigation Planning Committee in gaining consensus on the determination of those hazards that pose the most significant threat to the South Mountains 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 South Mountains 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 5.36**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

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

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the South Mountains 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.

TABLE 5.36: PRIORITY RISK INDEX FOR THE SOUTH MOUNTAINS 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%

[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	
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

5.21.3 Priority Risk Index Results

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

TABLE 5.37: SUMMARY OF PRI RESULTS FOR THE SOUTH MOUNTAINS 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	Hailstorm, 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		Likely	Limited	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Geological/Land slides	Landslide, Sinkholes, Erosion	Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**2.7**
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Flooding		Likely	Critical	Moderate	6 to 12 hours	More than 1 week	**3.1**
Wildfires		Likely	Critical	Large	12 to 24 hours	More than 1 week	**3.2**
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,	Possible	Critical	Small	Less than 6 hours	Less than 24 hours	**2.5**

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
	Radiological, Biological, Nuclear						
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 South Mountains 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 South Mountains Region. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

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

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

TABLE 5.38: 2025 CONCLUSIONS ON HAZARD RISK FOR THE SOUTH MOUNTAINS REGION

HIGH RISK	Wildfires Cyber Excessive Heat Tornadoes/Thunderstorms Flooding Infectious Disease
MODERATE RISK	Drought Hurricanes and Coastal Hazards Severe Winter Weather Earthquakes Geological/Landslides Dam Failure 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 South Mountains 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 South Mountains 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 South Mountains 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 atmospheric and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides information about all improved property in the South Mountains 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 South Mountains 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 6.26**.

6.2.2 GIS-Based Analysis

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

- Flooding
- Hazardous Substances
- Geological (Landslide)

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

- Wildfires

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the South Mountains 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.

With all information combined in the system, a hazard mitigation plan can then be exported into

[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.

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 the Hurricane and Coastal Hazards. For this assessment, vulnerable buildings and populations were analyzed against damages provoked 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 such an analysis does not account for building elevation.

Wildfires

The data used to determine vulnerability to wildfires in the South Mountains 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 the South Mountains 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 assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.2.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

1. Improved Property: Includes all improved properties in the South Mountains Region according to local parcel data provided by counties and tribes. The information has been expressed in terms of the number of parcels and total assessed value of improvements

[3] While potentially not all-inclusive for the jurisdictions in the South Mountains 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.

(buildings) that may be exposed to the identified hazards.

2. Critical Facilities: Critical facilities vary by jurisdiction. When provided, the critical facilities provided by the jurisdiction are used in this section. Identified critical facilities are fire stations, police stations, medical care facilities, schools, and emergency operation centers. It should be noted that this listing is not all-inclusive for assets located in the region, but it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

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

Table 6.1 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the South Mountains Region (study area of vulnerability assessment)[4]. For reference, the total area of the South Mountains Region is approximately 998,472 acres, or 1,560 square miles. The U.S. Census Bureau also notes the following information for each county as of vintage year 2023:

- **Henderson County**
  - Land area in square miles (2020): 372.95
  - Population per square mile (2020): 311.8
  - Building permits (2023): 775
  - Total employer establishments (2022): 3,029

- **Polk County**
  - Land area in square miles (2020): 237.69
  - Population per square mile (2020): 81.3
  - Building permits (2023): 153
  - Total employer establishments (2022): 520

- **Rutherford County**
  - Land area in square miles (2020): 565.44
  - Population per square mile (2020): 114.0
  - Building permits (2023): 244
  - Total employer establishments (2022): 1,272

- **Transylvania County**
  - Land area in square miles (2020): 378.36
  - Population per square mile (2020): 87.2
  - Building permits (2023): 213
  - Total employer establishments (2022): 983

[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.

TABLE 6.1: IMPROVED PROPERTY IN THE SOUTH MOUNTAINS REGION

Location[5]	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Henderson County	**73,922**	**$52,170,024,082**	**52,536**	**$40,974,609,557**
Flat Rock	3,222	$2,389,682,000	2,071	$1,865,254,200
Fletcher	3,803	$2,278,956,000	2,887	$1,645,054,400
Hendersonville	8,237	$19,125,687,238	5,568	$16,521,129,100
Laurel Park	1,873	$871,368,100	1,017	$670,099,100
Mills River	4,433	$2,735,732,922	3,478	$1,812,748,200
Unincorporated Area	52,354	$24,768,597,822	37,515	$18,460,324,557
Polk County	**17,239**	**$3,648,945,187**	**11,152**	**$2,409,558,991**
Columbus	621	$223,571,557	505	$146,377,260
Saluda	779	$150,595,872	489	$102,932,166
Tryon	1,243	$245,490,299	892	$193,605,286
Unincorporated Area	14,596	$3,029,287,459	9,266	$1,966,644,279
Rutherford County	**57,361**	**$8,982,070,368**	**38,175**	**$6,644,094,900**
Bostic	302	$50,689,200	207	$45,211,800
Chimney Rock Village	524	$105,026,200	204	$49,063,700
Ellenboro	576	$52,098,100	503	$42,335,800
Forest City	4,772	$1,082,605,682	3,665	$902,060,900
Lake Lure	5,108	$1,309,048,172	1,705	$792,345,800
Ruth	269	$32,578,200	190	$26,455,900
Rutherfordton	2,648	$513,917,618	1,869	$442,154,700
Spindale	2,981	$370,476,996	2,080	$315,345,400
Unincorporated Area	40,181	$5,465,630,200	27,752	$4,029,120,900
Transylvania County	**32,155**	**$17,522,400,041**	**21,860**	**$12,142,585,388**
Brevard	4,639	$6,856,669,782	3,757	$5,578,608,012
Rosman	315	$125,528,750	331	$105,070,770
Unincorporated Area	27,201	$10,540,201,509	17,772	$6,458,906,606
South Mountains Regional Total	**180,677**	**$82,323,439,678**	**123,723**	**$62,170,848,836**

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 South Mountains 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 South Mountains 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.

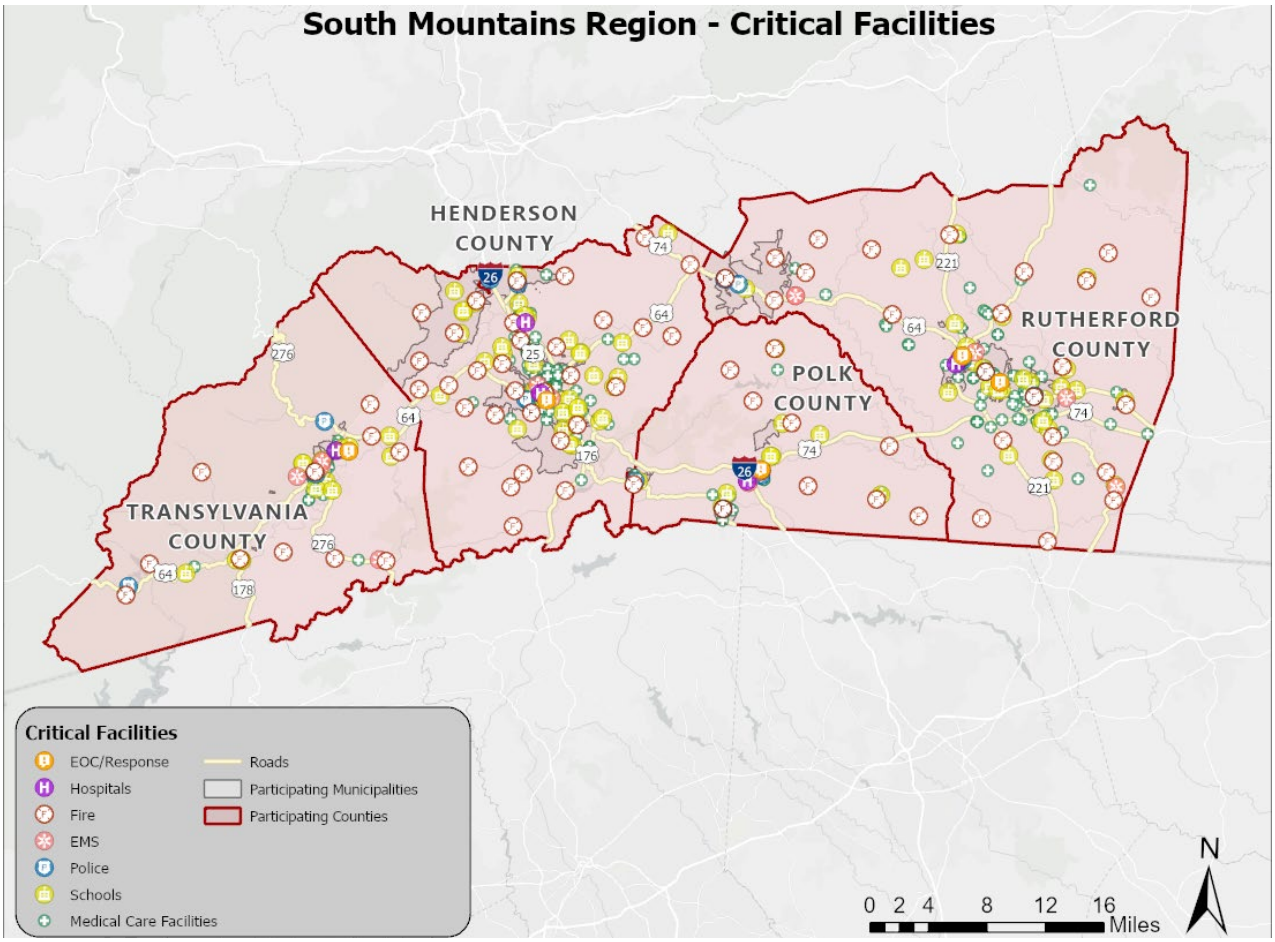
[5] Number of buildings for each jurisdiction is based on the approximate number of building footprints.
[6] NC OneMap: https://www.nconemap.gov/

TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE SOUTH MOUNTAINS REGION

Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	EOCs	Schools	Other
Henderson County	**35**	**6**	**91**	**1**	**42**	**12**
Flat Rock	1	0	1	0	2	0
Fletcher	1	2	2	0	1	1
Hendersonville	5	2	38	1	8	4
Laurel Park	2	1	3	0	0	3
Mills River	4	0	0	0	5	0
Unincorporated Area	22	1	47	0	26	4
Polk County	**13**	**5**	**16**	1	**9**	**0**
Columbus	3	3	5	1	0	0
Saluda	1	1	1	0	1	0
Tryon	1	1	4	0	1	0
Unincorporated Area	8	0	6	0	7	0
Rutherford County	**31**	**6**	**79**	**2**	**28**	**0**
Bostic	1	0	1	0	1	0
Chimney Rock Village	1	1	0	0	0	0
Ellenboro	1	0	3	0	1	0
Forest City	2	1	15	0	6	0
Lake Lure	4	1	1	0	1	0
Ruth	0	0	0	0	0	0
Rutherfordton	2	2	9	1	2	0
Spindale	2	1	10	1	1	0
Unincorporated Area	18	0	40	0	16	0
Transylvania County	**15**	**4**	**22**	**1**	**16**	**2**
Brevard	4	2	15	1	8	1
Rosman	1	0	0	0	3	0
Unincorporated Area	10	2	7	0	5	1
South Mountains Regional Total	**94**	**21**	**208**	**5**	**95**	**14**

Source: Local governments, NC OneMap

FIGURE 6.1: CRITICAL FACILITY LOCATIONS IN THE SOUTH MOUNTAINS 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 South Mountains 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 South Mountains Region according to Census data is 505,582. 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

[7] CDC/ATSDR Social Vulnerability Index: https://www.atsdr.cdc.gov/placeandhealth/svi/index.html

Prevention (CDC), 2022 findings are highly variable between the counties in the South Mountains Region. The overall SVI score for Henderson County is 0.4286 (low to medium level of vulnerability) compared to 0.3583 (low to medium) for Polk County, 0.8072 (high) for Rutherford County, and 0.4773 (low to medium) for Transylvania 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. Henderson County contains roughly 3 tracts ranked as high and 8 ranked as moderate to high, whereas Polk County contains 0 high and 4 moderate to high tracts, Rutherford County contains 9 high and 3 moderate to high tracts, and Transylvania County contains 0 high and 4 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 in the NRI tool.

For Henderson County, the risk index rating is relatively low (70.7 out of 100) and social vulnerability is rated as relatively low (38.32 out of 100) compared to relatively moderate community resilience (41.85 out of 100). The Polk County risk index rating is very low (19.31) and social vulnerability is rated as relatively low (36.47) compared to relatively low community resilience (25.75). The Rutherford County risk index rating is relatively low (59.37) and social vulnerability is rated as very high (84.21) compared to relatively low community resilience (26.48). The Transylvania County risk index rating is very low (41.78) and social vulnerability is rated as relatively moderate (52.23) compared to relatively low community resilience (32.08).

TABLE 6.3: TOTAL POPULATION IN THE SOUTH MOUNTAINS REGION

Location	2022 Population Estimates	% population speaking a language other than English	% population with a disability	% population below the poverty level
Henderson County	116,469	10.3%	14.8%	11.4%
Polk County	19,538	7.0%	18.1%	11.0%
Rutherford County	64,680	5.1%	21.2%	18.4%
Transylvania County	33,131	2.6%	14.9%	13.4%
South Mountains Regional Total	**233,818**	--	--	--

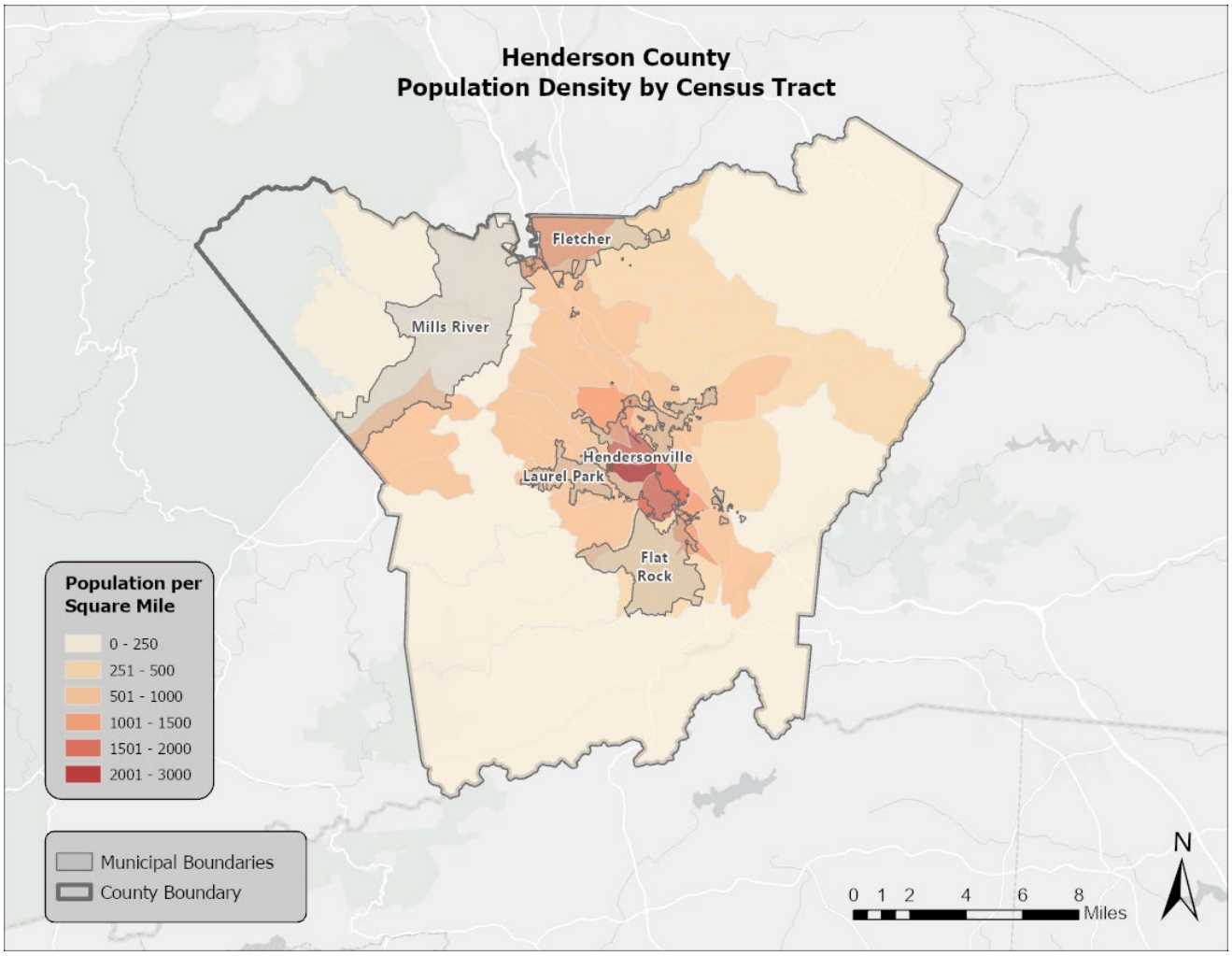
Source: U.S. Census Bureau, 2022 ACS 5-Year Estimates

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

In addition, **Figure 6.2 to 6.5** illustrates the population density by census tract as it was reported by the US Census Bureau in the 2020 Decennial Census.

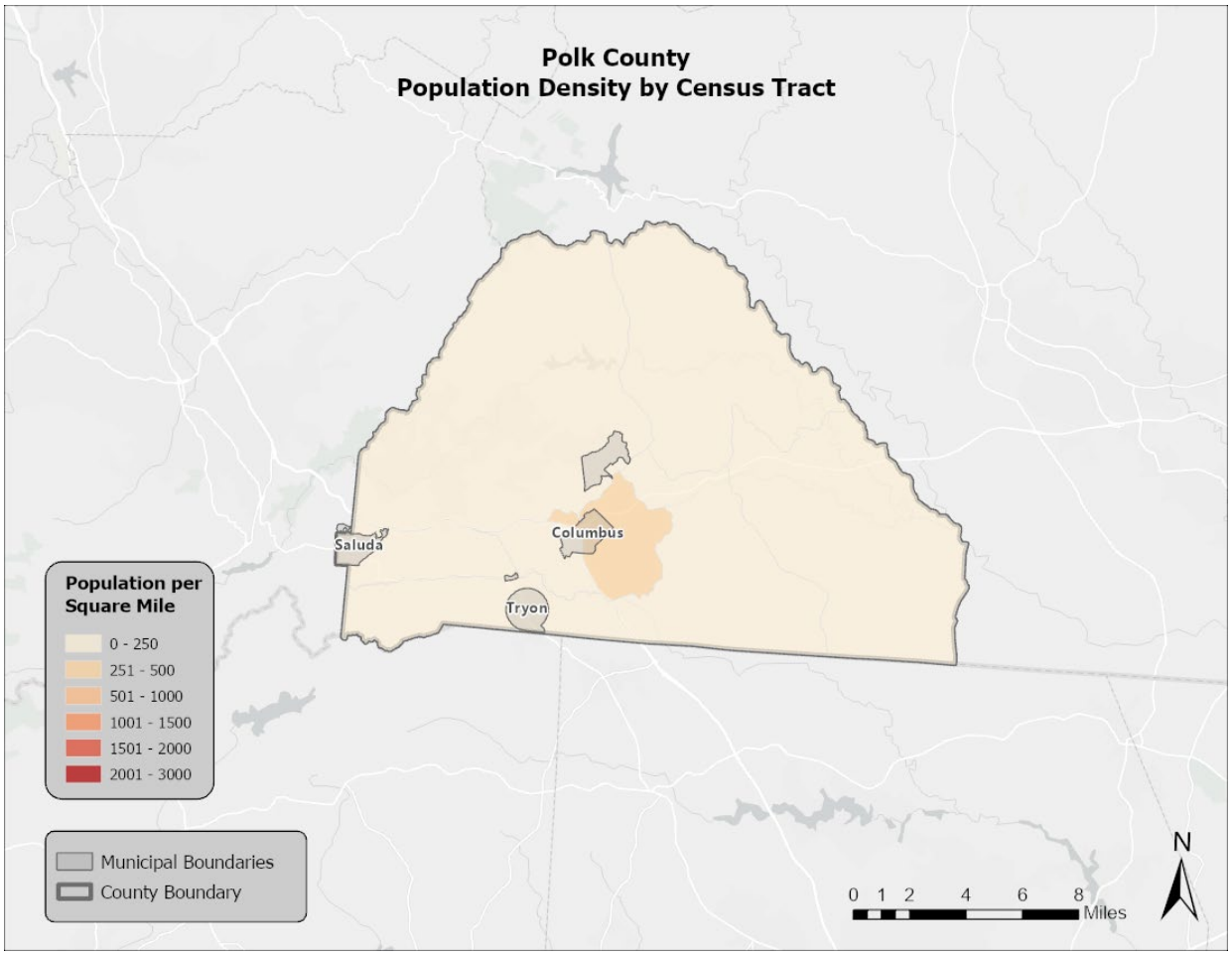
[8] CDC/ATSDR Environmental Justice Index: https://www.atsdr.cdc.gov/placeandhealth/eji/index.html
[9] FEMA National Risk Index: https://hazards.fema.gov/nri/

FIGURE 6.2: POPULATION DENSITY IN HENDERSON COUNTY



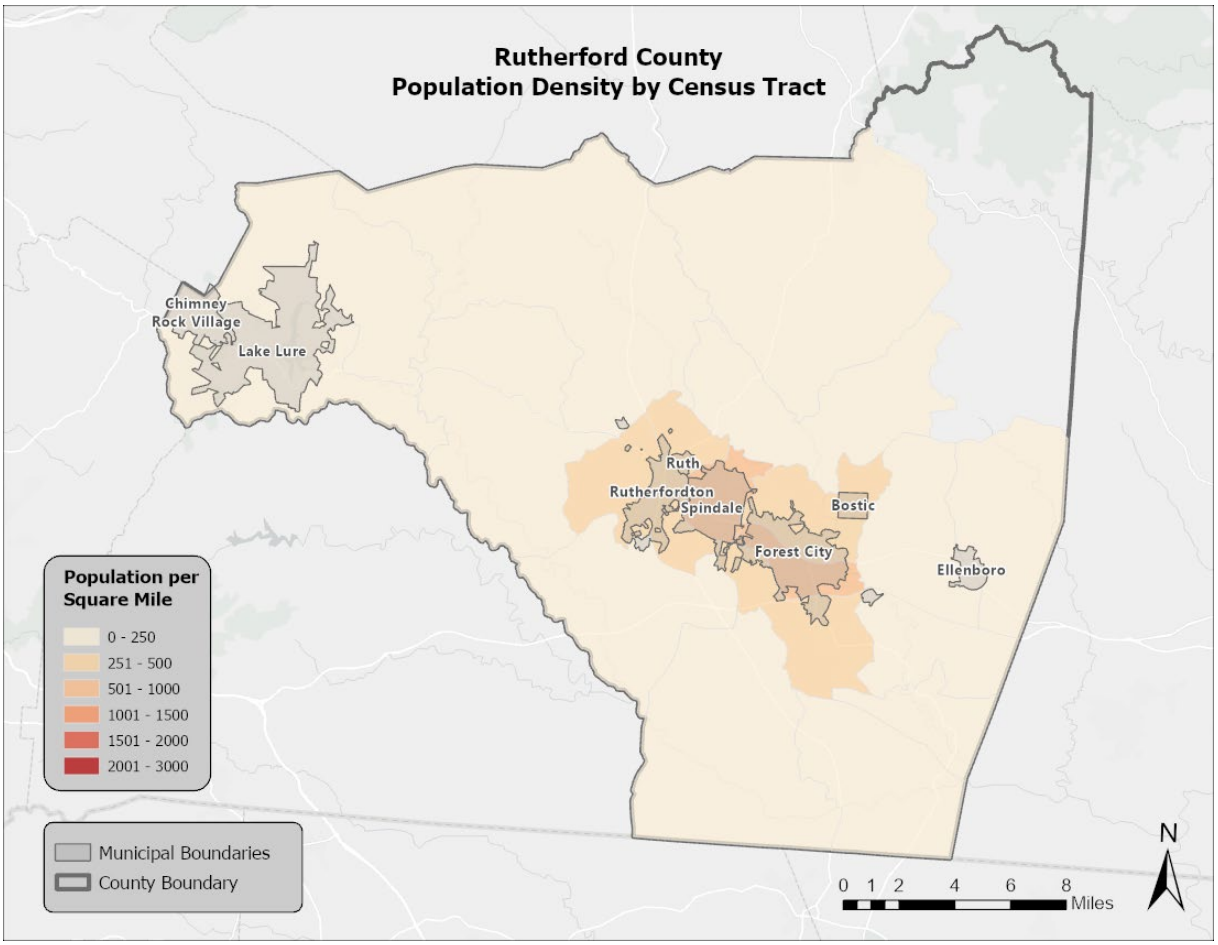
Source: U.S. Census Bureau

FIGURE 6.3: POPULATION DENSITY IN POLK COUNTY



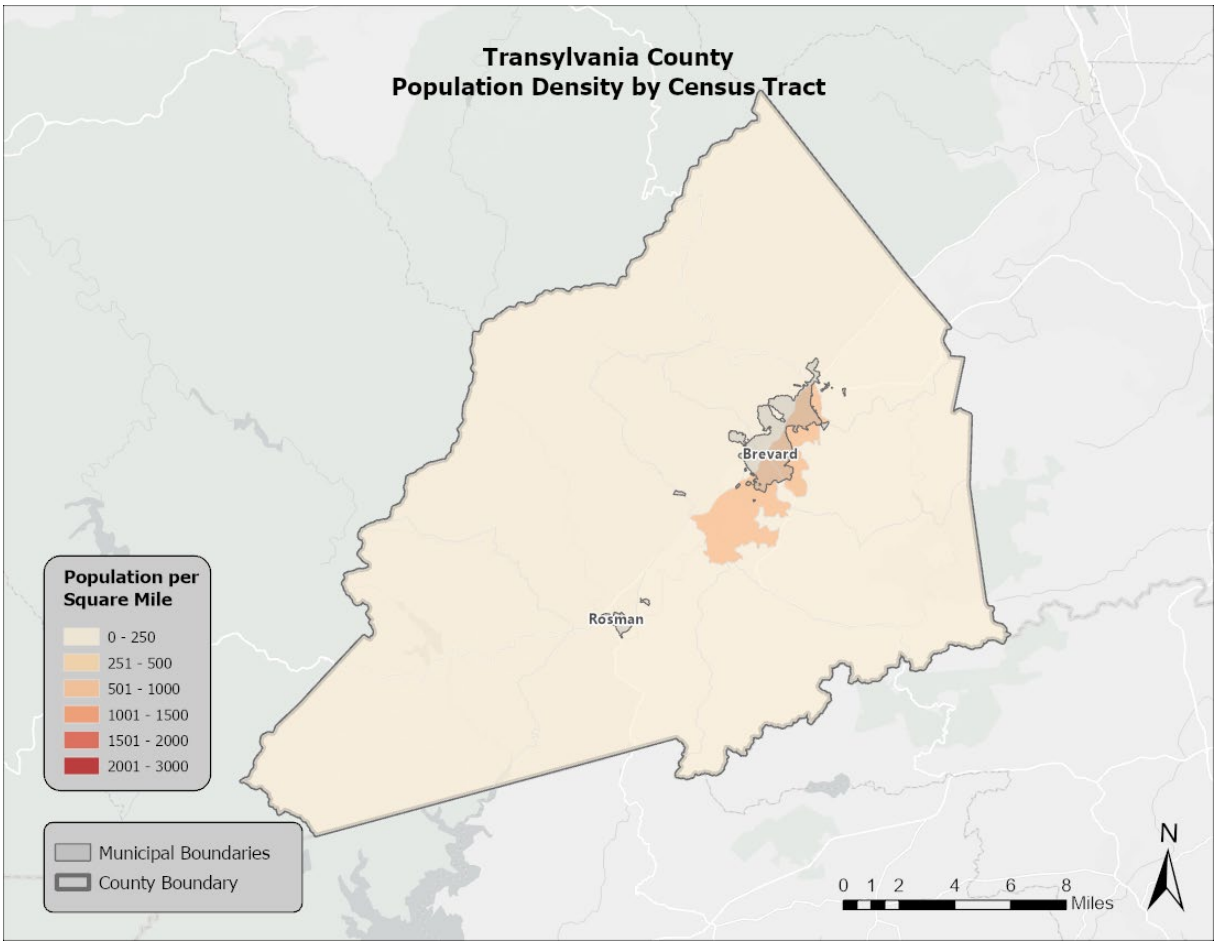
Source: U.S. Census Bureau

FIGURE 6.4: POPULATION DENSITY IN RUTHERFORD COUNTY



Source: U.S. Census Bureau

FIGURE 6.5: POPULATION DENSITY IN TRANSYLVANIA COUNTY



Source: U.S. Census Bureau

6.4.3 Development Trends and Changes in Vulnerability

Since the previous regional hazard mitigation plan was approved (in 2020), the South Mountains 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 SOUTH MOUNTAINS REGION

Location	Total Housing Units (2022)	Units Built 2010 or Later	% Building Stock Built Post-2010	Units Built 1970 or Later	% Building Stock Built Post-1970
Henderson County	**56,744**	**5,799**	**10.22%**	**46,791**	**82.46%**
Flat Rock	2,199	111	5.05%	1,734	78.85%
Fletcher	3,736	454	12.15%	3,564	95.40%
Hendersonville	8,290	1,042	12.57%	5,454	65.79%
Laurel Park	1,354	17	1.26%	880	64.99%
Mills River	3,019	516	17.09%	2,614	86.58%
Unincorporated Area	38,146	3,659	9.59%	32,545	85.32%
Polk County	**10,881**	**585**	**5.38%**	**7564**	**69.52%**

Location	Total Housing Units (2022)	Units Built 2010 or Later	% Building Stock Built Post-2010	Units Built 1970 or Later	% Building Stock Built Post-1970
Columbus	538	12	2.23%	288	53.53%
Saluda	513	54	10.53%	231	45.03%
Tryon	959	7	0.73%	518	54.01%
Unincorporated Area	8,871	512	5.77%	6,527	73.58%
Rutherford County	**32,640**	**1,551**	**4.75%**	**21,052**	**64.50%**
Bostic	172	8	4.65%	103	59.88%
Chimney Rock Village	194	4	2.06%	86	44.33%
Ellenboro	384	32	8.33%	217	56.51%
Forest City	3,235	8	0.25%	1,424	44.02%
Lake Lure	2,242	190	8.47%	1,872	83.50%
Ruth	276	19	6.88%	145	52.54%
Rutherfordton	1,664	95	5.71%	902	54.21%
Spindale	2,325	47	2.02%	758	32.60%
Unincorporated Area	22,148	1,148	5.18%	15,545	70.19%
Transylvania County	**19,072**	**992**	**5.20%**	**13,880**	**72.78%**
Brevard	4,258	227	5.33%	2,174	51.06%
Rosman	393	12	3.05%	354	90.08%
Unincorporated Area	14,421	753	5.22%	11,352	78.72%
South Mountains Regional Total	**119,337**	**8,927**	**7.48%**	**89,287**	**74.82%**

Source: US Census Bureau, Local governments

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 FOR THE SOUTH MOUNTAINS REGION

Location	2010	2020	2021	2022	% Change 2010-2020
Henderson County	**106,740**	**116,281**	**115,613**	**116,469**	**8.94%**
Flat Rock	3,114	3,486	3,460	3,483	11.95%
Fletcher	7,187	7,987	7,935	8,000	11.13%
Hendersonville	13,137	15,137	14,878	15,102	15.22%
Laurel Park	2,180	2,250	2,663	2,615	3.21%
Mills River	6,802	7,078	7,082	7,100	4.06%
Unincorporated Area	74,320	80,343	79,595	80,169	8.10%
Polk County	**20,510**	**19,328**	**19,413**	**19,538**	**-5.76%**
Columbus	999	1,060	1,139	1,087	6.11%
Saluda	719	631	646	617	-12.24%
Tryon	1,646	1,562	1,334	1,516	-5.10%
Unincorporated Area	17,146	16,075	16,294	16,318	-6.25%
Rutherford County	**67,810**	**64,444**	**64,592**	**64,680**	**-4.96%**
Bostic	386	355	296	304	-8.03%
Chimney Rock Village	113	140	131	220	23.89%
Ellenboro	873	723	746	944	-17.18%
Forest City	7,476	7,377	7,330	7,357	-1.32%
Lake Lure	1,192	1,365	1,500	1,575	14.51%
Ruth	440	347	525	621	-21.14%
Rutherfordton	4,213	3,640	3,668	3,671	-13.60%
Spindale	4,321	4,225	4,153	4,218	-2.22%
Unincorporated Area	48,796	46,272	46,243	45,770	-5.17%
Transylvania County	**33,090**	**32,986**	**32,979**	**33,131**	**-0.31%**
Brevard	7,609	7,744	7,712	7,777	1.77%
Rosman	576	701	700	642	21.70%
Unincorporated Area	24,905	24,541	24,567	24,712	-1.46%
South Mountains Regional Total	**228,150**	**233,039**	**232,597**	**233,818**	**2.14%**

Source: US Census Bureau

Based on the above data, the rate of residential development and population growth in the region since 2020 has slightly increased, most dramatically in Henderson County. All other counties in the region have experienced decreases in the overall population since 2010.. Changes in development may have had a minor impact on the region's vulnerability since the last update. The greater the population, the greater the risk is that many people are impacted by hazards. It should be noted that if future development occurs in vulnerable areas, 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). The total region exposure of critical facilities, and thus risk, was presented in **Table 6.28**.

The annualized loss estimates 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 South Mountains 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 six disaster declarations from hurricanes and tropical storms in the region (Hurricane Fran, Tropical Storm Frances, Hurricane Ivan, Hurricane Florence, Tropical Storm Fred, and Tropical Storm Helene). The most recent hurricane experienced by the region was Hurricane Florence in 2018. Many more storm tracks have come near or traversed through the region, as shown and discussed in **Section 5: Hazard Profiles**.

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

NCEM's Risk Management Tool analyzes hurricane winds and no other hazards often associated with hurricanes; therefore, only hurricane winds are analyzed in this section. Building and population vulnerabilities to hurricane winds in a 50-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

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
Henderson County	**27,544**	**48,731**	**$5,003,017**	**2,597**	**$957,665**	**686**	**$292,295**	**52,014**	**$6,252,978**
Flat Rock	651	1,894	$261,892	59	$15,120	33	$5,593	1,986	$282,604

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

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
Fletcher	961	2,689	$238,066	173	$169,810	18	$5,976	2,880	$413,853
Hendersonville	6,140	7,632	$881,693	1,168	$317,110	147	$54,366	8,947	$1,253,170
Laurel Park	997	957	$143,138	36	$32,653	6	$641	999	$176,432
Mills River	1,288	3,270	$318,008	139	$140,712	45	$20,797	3,454	$479,517
Unincorporated Area	17,507	32,289	$3,160,220	1,022	$282,260	437	$204,922	33,748	$3,647,402
Polk County	**11,074**	**10,137**	**$863,723**	**738**	**$192,501**	**194**	**$85,137**	**11,069**	**$1,141,362**
Columbus	499	358	$29,927	109	$9,940	32	$5,580	499	$45,447
Saluda	474	401	$46,428	57	$4,351	15	$1,325	473	$52,104
Tryon	1,527	1,277	$118,897	203	$14,300	44	$6,635	1,524	$139,832
Unincorporated Area	8,574	8,101	$668,471	369	$163,910	103	$71,597	8,573	$903,979
Rutherford County	**37,096**	**34,997**	**$3,121,496**	**2,503**	**$903,071**	**450**	**$178,793**	**37,950**	**$4,203,359**
Bostic	201	186	$9,712	7	$183	8	$3,796	201	$13,691
Chimney Rock Village	200	171	$8,386	26	$458	3	$370	200	$9,214
Ellenboro	499	472	$31,907	16	$2,896	11	$371	499	$35,174
Forest City	5,379	4,646	$431,408	634	$255,974	91	$22,671	5,371	$710,053
Lake Lure	1,687	1,549	$183,641	120	$59,893	18	$16,682	1,687	$260,215
Ruth	192	161	$12,304	19	$3,543	12	$1,033	192	$16,880
Rutherfordton	1,874	1,591	$164,604	233	$53,964	49	$4,445	1,873	$223,013
Spindale	2,095	1,878	$178,508	191	$113,922	25	$5,202	2,094	$297,632
Unincorporated Area	24,969	24,343	$2,101,026	1,257	$412,238	233	$124,223	25,833	$2,637,487
Transylvania County	**11,300**	**20,039**	**$1,366,370**	**1,114**	**$168,988**	**401**	**$71,485**	**21,554**	**$1,606,843**
Brevard	3,709	4,589	$304,874	508	$77,088	210	$39,008	5,307	$420,969
Rosman	175	279	$18,772	27	$472	16	$6,417	322	$25,661
Unincorporated Area	7,416	15,171	$1,042,724	579	$91,428	175	$26,060	15,925	$1,160,213
South Mountains Regional Total	**87,014**	**113,904**	**$10,354,606**	**6,952**	**$2,222,225**	**1,731**	**$627,710**	**122,587**	**$13,204,542**

Source: NCEM Risk Management Tool

TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS

Location	Elderly At Risk	Children At Risk	Total At Risk
Henderson County	**29,895**	**5,523**	**116,096**
Flat Rock	1,668	196	4,093
Fletcher	1,407	206	6,272
Hendersonville	4,229	899	17,039
Laurel Park	681	31	1,988
Mills River	1,257	260	4,925
Unincorporated Area	20,653	3,931	81,779
Polk County	**5,896**	**626**	**19,223**
Columbus	173	20	545

Location	Elderly At Risk	Children At Risk	Total At Risk
Saluda	82	10	241
Tryon	514	27	1,140
Unincorporated Area	5,127	569	17,297
Rutherford County	**13,907**	**3,216**	**64,223**
Bostic	66	12	337
Chimney Rock Village	53	3	143
Ellenboro	44	8	209
Forest City	1,505	750	9,248
Lake Lure	274	15	798
Ruth	49	13	198
Rutherfordton	413	71	1,572
Spindale	668	86	3,286
Unincorporated Area	10,835	2,258	48,432
Transylvania County	**9,792**	**1,308**	**32,731**
Brevard	1,800	98	6,321
Rosman	5	2	24
Unincorporated Area	7,987	1,208	26,386
South Mountains Regional Total	**59,490**	**10,673**	**232,273**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

Given some equal susceptibility across the entire South Mountains Region, it is assumed that the total 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 South Mountains 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 South Mountains 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 South Mountains 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

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
Henderson County	**27,754**	**49,207**	**$7,033,223,983**	**2,598**	**$2,918,054,342**	**686**	**$736,961,626**	**52,491**	**$10,688,239,951**
Flat Rock	665	1,936	$540,479,559	59	$40,874,353	33	$16,633,132	2,028	$597,987,044
Fletcher	963	2,705	$386,825,113	173	$512,116,039	18	$19,200,016	2,896	$918,141,168
Hendersonville	6,168	7,694	$1,069,496,576	1,169	$990,849,741	147	$182,329,163	9,010	$2,242,675,480
Laurel Park	1,007	968	$208,063,422	36	$63,535,450	6	$4,153,946	1,010	$275,752,818
Mills River	1,303	3,294	$454,832,759	139	$336,325,212	45	$50,363,068	3,478	$841,521,039
Unincorporated Area	17,648	32,610	$4,373,526,554	1,022	$974,353,547	437	$464,282,301	34,069	$5,812,162,402
Polk County	**11,147**	**10,208**	**$1,357,464,496**	**739**	**$551,302,686**	**195**	**$175,838,752**	**11,142**	**$2,084,605,932**
Columbus	499	358	$52,663,813	109	$66,291,396	32	$17,106,385	499	$136,061,593
Saluda	475	402	$51,341,700	57	$23,699,843	15	$8,009,102	474	$83,050,645
Tryon	1,546	1,295	$195,007,841	204	$97,190,785	44	$29,265,823	1,543	$321,464,449
Unincorporated Area	8,627	8,153	$1,058,451,142	369	$364,120,662	104	$121,457,442	8,626	$1,544,029,245
Rutherford County	**37,278**	**35,183**	**$4,096,226,618**	**2,504**	**$2,591,112,971**	**450**	**$376,334,811**	**38,137**	**$7,063,674,401**
Bostic	205	190	$16,620,098	7	$1,401,825	8	$14,278,300	205	$32,300,224
Chimney Rock Village	200	171	$19,187,815	26	$5,411,706	3	$2,417,973	200	$27,017,493
Ellenboro	499	472	$39,114,006	16	$8,868,406	11	$2,265,191	499	$50,247,603
Forest City	5,388	4,655	$602,649,515	634	$837,041,500	91	$59,949,819	5,380	$1,499,640,834
Lake Lure	1,699	1,561	$257,575,958	120	$70,466,271	18	$11,859,460	1,699	$339,901,689
Ruth	193	162	$20,466,441	19	$9,016,533	12	$4,887,834	193	$34,370,808
Rutherfordton	1,879	1,596	$202,898,001	233	$253,220,407	49	$19,885,448	1,878	$476,003,856
Spindale	2,102	1,885	$232,414,408	191	$300,402,124	25	$18,887,212	2,101	$551,703,744
Unincorporated Area	25,113	24,491	$2,705,300,376	1,258	$1,105,284,199	233	$241,903,574	25,982	$4,052,488,150
Transylvania County	**11,421**	**20,272**	**$2,545,804,474**	**1,115**	**$633,936,814**	**401**	**$233,799,734**	**21,788**	**$3,413,541,021**
Brevard	3,774	4,670	$518,159,768	508	$359,621,007	210	$156,310,103	5,388	$1,034,090,878
Rosman	175	279	$17,483,495	27	$3,813,522	16	$14,200,162	322	$35,497,179
Unincorporated Area	7,472	15,323	$2,010,161,211	580	$270,502,285	175	$63,289,469	16,078	$2,343,952,964
South Mountains Regional Total	**87,600**	**114,870**	**$15,032,719,571**	**6,956**	**$6,694,406,813**	**1,732**	**$1,522,934,923**	**123,558**	**$23,250,061,305**

Source: NCEM Risk Management Tool

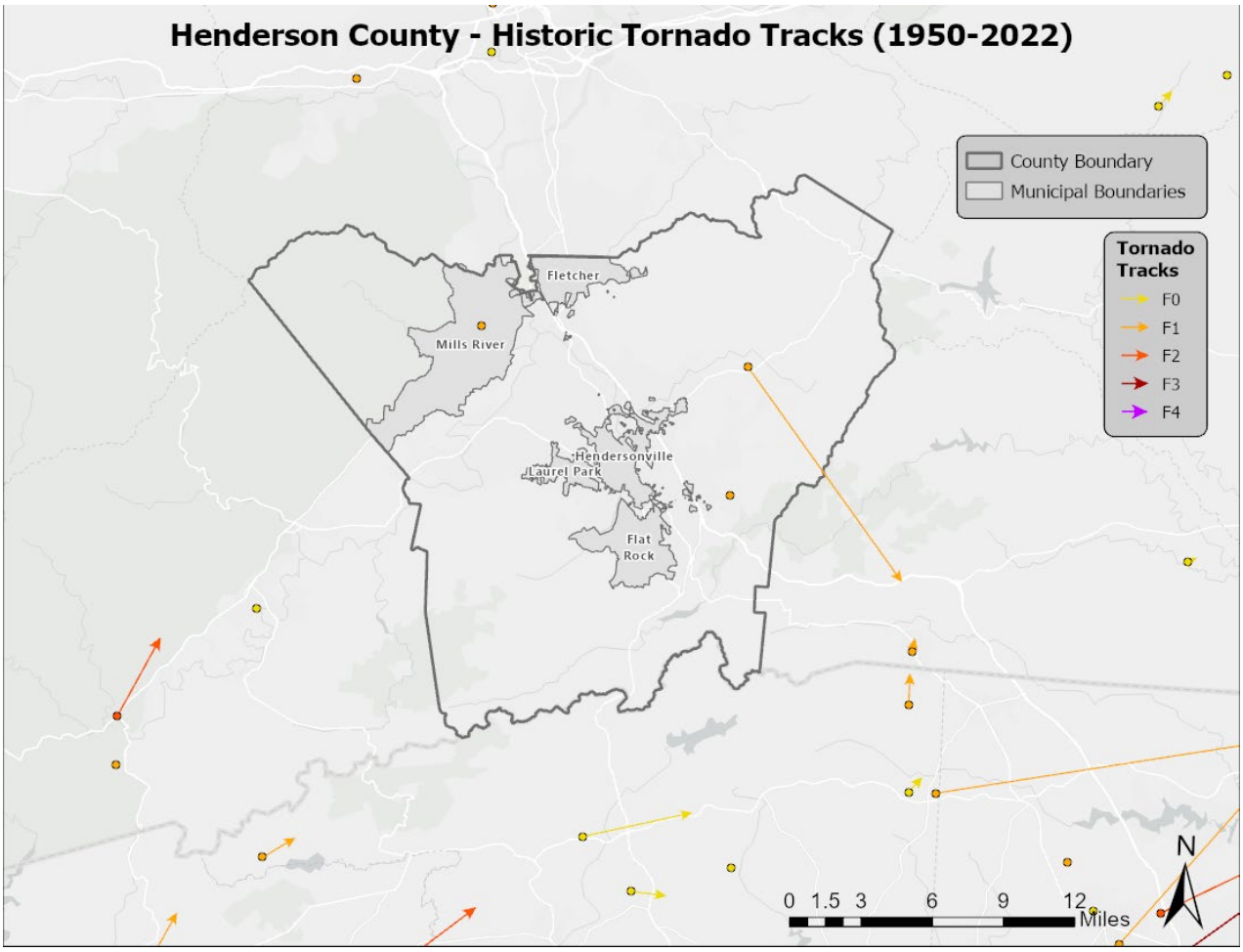
TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD

Location	Elderly at Risk	Children at Risk	Total at Risk
Henderson County	**30,196**	**5,576**	**117,230**
Flat Rock	1,705	200	4,183
Fletcher	1,415	207	6,309
Hendersonville	4,263	906	17,175
Laurel Park	689	31	2,011
Mills River	1,266	262	4,961
Unincorporated Area	20,858	3,970	82,591
Polk County	**5,936**	**630**	**19,350**
Columbus	173	20	545
Saluda	82	10	242
Tryon	521	27	1,156
Unincorporated Area	5,160	573	17,407
Rutherford County	**13,982**	**3,231**	**64,566**
Bostic	67	12	344
Chimney Rock Village	53	3	143
Ellenboro	44	8	209
Forest City	1,508	751	9,266
Lake Lure	276	15	804
Ruth	49	13	199
Rutherfordton	414	71	1,577
Spindale	670	86	3,298
Unincorporated Area	10,901	2,272	48,726
Transylvania County	**9,904**	**1,322**	**33,106**
Brevard	1,832	100	6,432
Rosman	5	2	24
Unincorporated Area	8,067	1,220	26,650
South Mountains Regional Total	**60,018**	**10,759**	**234,252**

Source: NCEM Risk Management Tool

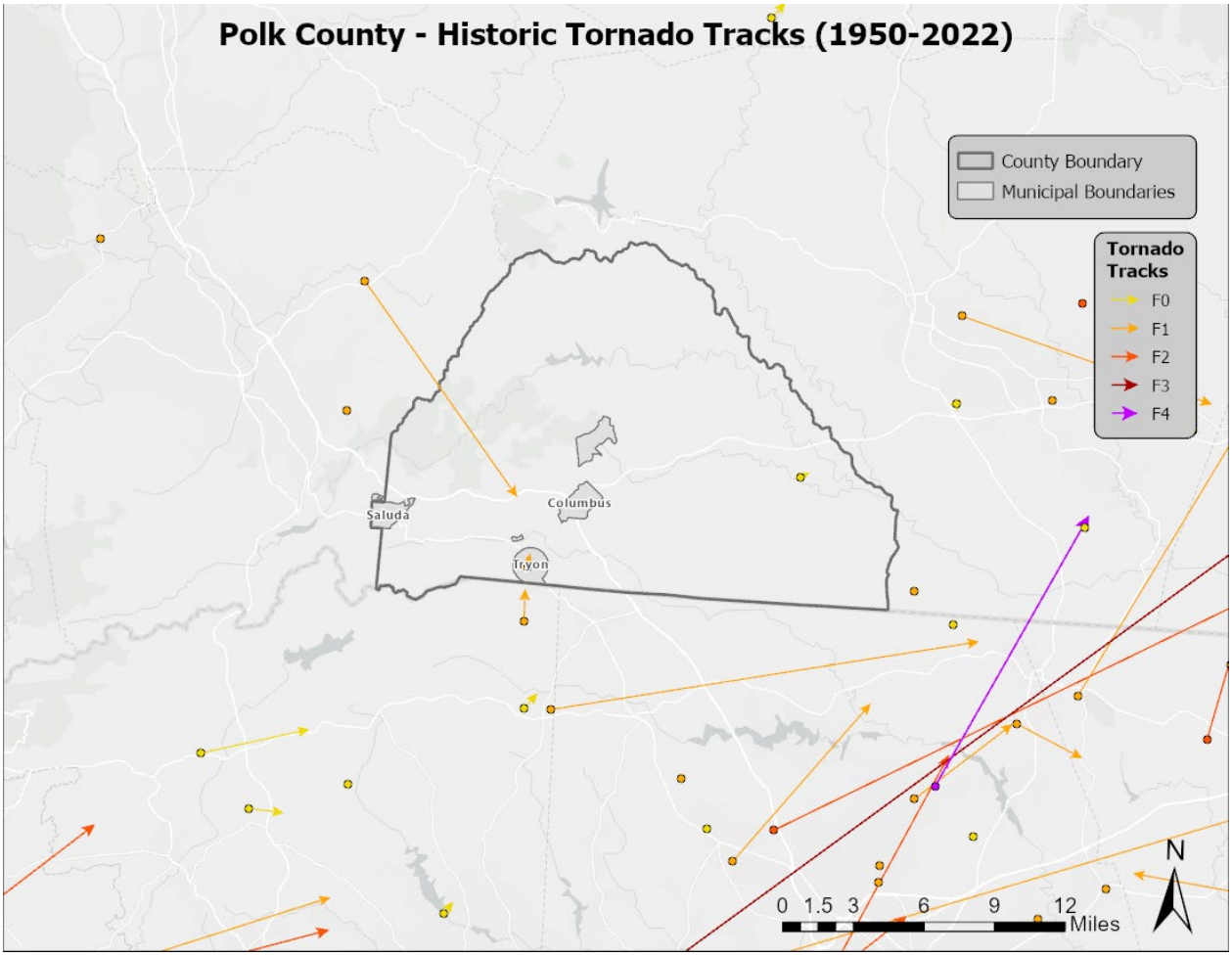
A map series of historical tornado points of origin and paths can be seen below in **Figures 6.6-6.9.**

FIGURE 6.6: HISTORICAL TORNADO TRACKS IN HENDERSON COUNTY



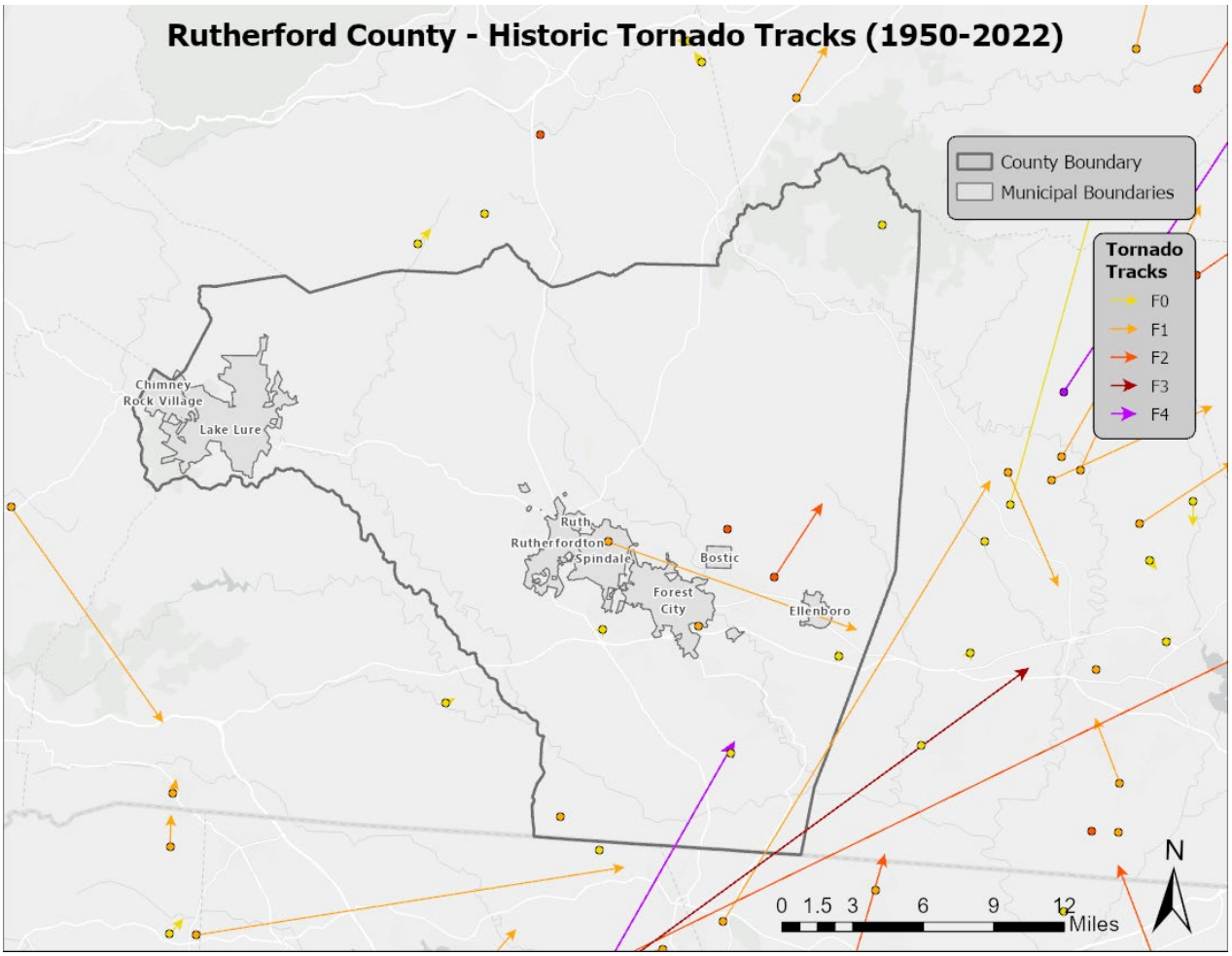
Source: NCEM Risk Management Tool

FIGURE 6.7: HISTORICAL TORNADO TRACKS IN POLK COUNTY



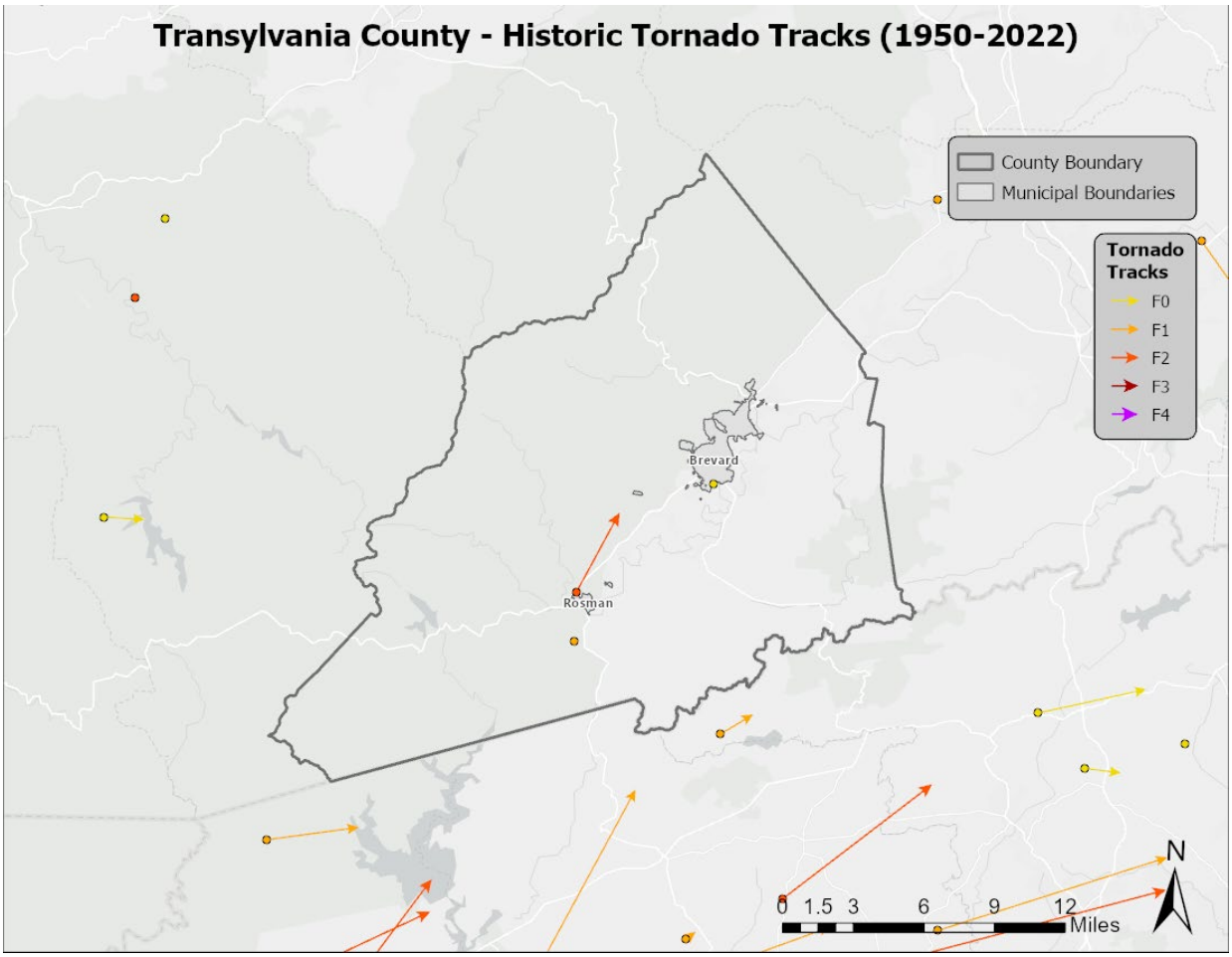
Source: NCEM Risk Management Tool

FIGURE 6.8: HISTORICAL TORNADO TRACKS IN RUTHERFORD COUNTY



Source: NCEM Risk Management Tool

FIGURE 6.9: HISTORICAL TORNADO TRACKS IN TRANSYLVANIA COUNTY



Source: NCEM Risk Management Tool

Thunderstorms

A probabilistic scenario was created to estimate building and population vulnerabilities in the South Mountains 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

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
Henderson County	**27,753**	**49,202**	**$17,998,530**	**2,598**	**$4,744,761**	**686**	**$1,464,593**	**52486**	**$24,207,886**
Flat Rock	665	1,936	$1,124,310	59	$75,668	33	$30,184	2,028	$1,230,163
Fletcher	963	2,705	$902,411	173	$861,304	18	$22,696	2,896	$1,786,411
Hendersonville	6,168	7,694	$2,890,313	1,169	$1,452,089	147	$248,143	9,010	$4,590,546
Laurel Park	1,007	968	$499,577	36	$173,529	6	$3,569	1,010	$676,675
Mills River	1,303	3,294	$1,214,485	139	$735,648	45	$97,008	3,478	$2,047,141
Unincorporated Area	17,647	32,605	$11,367,434	1,022	$1,446,523	437	$1,062,993	34,064	$13,876,950
Polk County	**11,125**	**10,188**	**$3,125,138**	**738**	**$961,063**	**194**	**$433,003**	**11,120**	**$4,519,203**
Columbus	499	358	$121,772	109	$41,640	32	$26,436	499	$189,848
Saluda	475	402	$142,140	57	$19,777	15	$5,878	474	$167,795
Tryon	1,545	1,295	$408,744	203	$53,704	44	$28,351	1,542	$490,799
Unincorporated Area	8,606	8,133	$2,452,482	369	$845,942	103	$372,338	8,605	$3,670,761
Rutherford County	**37,255**	**35,161**	**$10,637,649**	**2503**	**$4,112,474**	**450**	**$840,432**	**38,114**	**$15,590,553**
Bostic	205	190	$39,112	7	$538	8	$24,987	205	$64,637
Chimney Rock Village	200	171	$33,580	26	$1,953	3	$2,706	200	$38,238
Ellenboro	499	472	$111,629	16	$13,112	11	$1,050	499	$125,791
Forest City	5,388	4,655	$1,471,494	634	$1,138,224	91	$102,191	5,380	$2,711,908
Lake Lure	1,699	1,561	$633,468	120	$236,180	18	$82,875	1,699	$952,523
Ruth	193	162	$51,548	19	$18,032	12	$4,790	193	$74,370
Rutherfordton	1,879	1,596	$555,295	233	$195,183	49	$15,139	1,878	$765,617
Spindale	2,102	1,885	$599,384	191	$535,321	25	$19,939	2,101	$1,154,644
Unincorporated Area	25,090	24,469	$7,142,139	1,257	$1,973,931	233	$586,755	25,959	$9,702,825
Transylvania County	**11,420**	**20,262**	**$5,221,984**	**1,114**	**$755,744**	**401**	**$311,362**	**21,777**	**$6,289,090**
Brevard	3,774	4,670	$1,164,601	508	$337,777	210	$167,037	5,388	$1,669,415
Rosman	175	279	$56,755	27	$1,065	16	$27,660	322	$85,480
Unincorporated Area	7,471	15,313	$4,000,628	579	$416,902	175	$116,665	16,067	$4,534,195
South Mountains Regional Total	**87,553**	**114,813**	**$36,983,301**	**6,953**	**$10,574,042**	**1,731**	**$3,049,390**	**123,497**	**$50,606,732**

Source: NCEM Risk Management Tool

TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS

Location	Elderly at Risk	Children at Risk	Total at Risk
Henderson County	**30,193**	**5,575**	**117,217**
Flat Rock	1,705	200	4,183
Fletcher	1,415	207	6,309
Hendersonville	4,263	906	17,175
Laurel Park	689	31	2,011
Mills River	1,266	262	4,961
Unincorporated Area	20,855	3,969	82,578
Polk County	**5,923**	**629**	**19,308**
Columbus	173	20	545
Saluda	82	10	242
Tryon	521	27	1,156
Unincorporated Area	5,147	572	17,365
Rutherford County	**13,972**	**3,229**	**64,522**
Bostic	67	12	344
Chimney Rock Village	53	3	143
Ellenboro	44	8	209
Forest City	1,508	751	9,266
Lake Lure	276	15	804
Ruth	49	13	199
Rutherfordton	414	71	1,577
Spindale	670	86	3,298
Unincorporated Area	10,891	2,270	48,682
Transylvania County	**9,899**	**1,321**	**33,089**
Brevard	1,832	100	6,432
Rosman	5	2	24
Unincorporated Area	8,062	1,219	26,633
South Mountains Regional Total	**59,987**	**10,754**	**234,136**

Source: NCEM Risk Management Tool

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 South Mountains 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 VULNERABILITY TO THE EARTHQUAKE HAZARD

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
Henderson County	**27,754**	**49,207**	**$16,940,804**	**2,598**	**$13,795,673**	**686**	**$3,791,487**	**52491**	**$34,527,965**
Flat Rock	665	1,936	$1,180,074	59	$173,512	33	$91,667	2,028	$1,445,253
Fletcher	963	2,705	$953,024	173	$2,486,804	18	$102,165	2,896	$3,541,993
Hendersonville	6,168	7,694	$2,783,479	1,169	$5,289,907	147	$1,060,198	9,010	$9,133,585
Laurel Park	1,007	968	$541,280	36	$280,888	6	$24,683	1,010	$846,851
Mills River	1,303	3,294	$1,099,660	139	$1,144,919	45	$287,056	3,478	$2,531,635
Unincorporated Area	17,648	32,610	$10,383,287	1,022	$4,419,643	437	$2,225,718	34,069	$17,028,648
Polk County	**11,147**	**10,208**	**$3,212,331**	**739**	**$2,589,208**	**195**	**$903,671**	**11,142**	**$6,705,208**
Columbus	499	358	$142,701	109	$355,692	32	$100,031	499	$598,424
Saluda	475	402	$128,404	57	$117,508	15	$44,495	474	$290,406
Tryon	1,546	1,295	$535,631	204	$493,465	44	$168,951	1,543	$1,198,046
Unincorporated Area	8,627	8,153	$2,405,595	369	$1,622,543	104	$590,194	8,626	$4,618,332
Rutherford County	**37,278**	**35,183**	**$9,115,408**	**2504**	**$11,467,660**	**450**	**$1,893,739**	**38,137**	**$22,476,806**
Bostic	205	190	$37,888	7	$6,900	8	$56,314	205	$101,101
Chimney Rock Village	200	171	$53,671	26	$27,157	3	$13,272	200	$94,100
Ellenboro	499	472	$91,439	16	$38,834	11	$13,708	499	$143,981
Forest City	5,388	4,655	$1,540,267	634	$3,593,664	91	$320,043	5,380	$5,453,974
Lake Lure	1,699	1,561	$639,926	120	$313,336	18	$49,301	1,699	$1,002,563
Ruth	193	162	$44,226	19	$35,365	12	$25,236	193	$104,827
Rutherfordton	1,879	1,596	$487,521	233	$1,223,695	49	$116,615	1,878	$1,827,831
Spindale	2,102	1,885	$540,618	191	$1,480,464	25	$124,000	2,101	$2,145,082
Unincorporated Area	25,113	24,491	$5,679,852	1,258	$4,748,245	233	$1,175,250	25,982	$11,603,347
Transylvania County	**11,421**	**20,272**	**$6,895,114**	**1,115**	**$3,254,634**	**401**	**$1,421,547**	**21,788**	**$11,571,295**
Brevard	3,774	4,670	$1,580,825	508	$1,766,662	210	$926,903	5,388	$4,274,390
Rosman	175	279	$49,796	27	$23,464	16	$89,446	322	$162,706
Unincorporated Area	7,472	15,323	$5,264,493	580	$1,464,508	175	$405,198	16,078	$7,134,199
South Mountains Regional Total	**87,600**	**114,870**	**$36,163,657**	**6,956**	**$31,107,175**	**1,732**	**$8,010,444**	**123,558**	**$75,281,274**

Source: NCEM Risk Management Tool

TABLE 6.13: POPULATION VULNERABILITY TO THE EARTHQUAKE HAZARD

Location	Elderly At Risk	Children At Risk	Total At Risk
Henderson County	**30,196**	**5,576**	**117,230**
Flat Rock	1,705	200	4,183
Fletcher	1,415	207	6,309
Hendersonville	4,263	906	17,175
Laurel Park	689	31	2,011
Mills River	1,266	262	4,961
Unincorporated Area	20,858	3,970	82,591
Polk County	**5,936**	**630**	**19,350**
Columbus	173	20	545
Saluda	82	10	242
Tryon	521	27	1,156
Unincorporated Area	5,160	573	17,407
Rutherford County	**13,982**	**3,231**	**64,566**
Bostic	67	12	344
Chimney Rock Village	53	3	143
Ellenboro	44	8	209
Forest City	1,508	751	9,266
Lake Lure	276	15	804
Ruth	49	13	199
Rutherfordton	414	71	1,577
Spindale	670	86	3,298
Unincorporated Area	10,901	2,272	48,726
Transylvania County	**9,904**	**1,322**	**33,106**
Brevard	1,832	100	6,432
Rosman	5	2	24
Unincorporated Area	8,067	1,220	26,650
South Mountains Regional Total	**60,018**	**10,759**	**234,252**

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 South Mountains 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 South Mountains 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 South Mountains 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 GEOLOGICAL (LANDSLIDE) HAZARD

Location	Number of Parcels at Risk		Number of Improvements at Risk		Total Value of Improvements at Risk ($)	
	Moderate	High	Moderate	High	Moderate	High
Henderson County	**0**	**73,922**	**0**	**55,607**	**$0**	**$40,974,609,557**
Flat Rock	0	3,222	0	2,619	$0	$1,865,254,200
Fletcher	0	3,803	0	3,439	$0	$1,645,054,400
Hendersonville	0	8,237	0	7,192	$0	$16,521,129,100
Laurel Park	0	1,873	0	1,413	$0	$670,099,100
Mills River	0	4,433	0	3,426	$0	$1,812,748,200
Unincorporated Area	0	52,354	0	37,518	$0	$18,460,324,557
Polk County	**0**	**17,239**	**0**	**10,885**	**$0**	**$2,409,558,991**
Columbus	0	621	0	493	$0	$146,377,260
Saluda	0	779	0	532	$0	$102,932,166
Tryon	0	1,243	0	953	$0	$193,605,286
Unincorporated Area	0	14,596	0	8,907	$0	$1,966,644,279
Rutherford County	**294**	**57,140**	**189**	**33,957**	**$26,483,800**	**$6,624,684,200**
Bostic	0	302	0	210	$0	$45,211,800
Chimney Rock Village	0	524	0	265	$0	$49,063,700
Ellenboro	0	576	0	440	$0	$42,335,800
Forest City	0	4,772	0	3,451	$0	$902,060,900
Lake Lure	0	5,108	0	2,243	$0	$792,345,800
Ruth	0	269	0	175	$0	$26,455,900
Rutherfordton	0	2,648	0	1,796	$0	$442,154,700
Spindale	0	2,981	0	2,049	$0	$315,345,400
Unincorporated Area	294	39,960	189	23,328	$26,483,800	$4,009,710,200
Transylvania County	**0**	**32,155**	**0**	**20,284**	**$0**	**$12,142,585,388**
Brevard	0	4,639	0	3,918	$0	$5,578,608,012
Rosman	0	315	0	190	$0	$105,070,770
Unincorporated Area	0	27,201	0	16,176	$0	$6,458,906,606
South Mountains Regional Total	**294**	**180,456**	**189**	**120,733**	**$26,483,800**	**$62,151,438,136**

Source: United States Geological Survey, Local governments

SOCIAL VULNERABILITY
Given moderate to high susceptibility across the entire South Mountains Region, it is assumed that the total population is at risk.

CRITICAL FACILITIES
Virtually all critical facilities of the region are located in an area of high landslide risk based on susceptibility and incidence mapping. . 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 many existing and future buildings, facilities, and populations in the South Mountains Region, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for South Mountains 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 South Mountains Region is susceptible to flood events. A total of 248 flood events have been reported by the National Centers for Environmental Information since 1993, resulting in over $42 million dollars in damages, but no fatalities.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the South Mountains counties. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table 6.15** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

Location	1.0-percent ACF			0.2-percent ACF		
	6,057	**4,648**	**$15,979,386,400**	**4,228**	**3,451**	**$14,475,878,200**
Henderson County	295	250	$478,076,700	58	38	$23,690,000
Flat Rock	645	577	$548,163,700	663	613	$553,693,000
Fletcher	1,214	1,069	$12,785,294,800	1,046	949	$12,504,578,700
Hendersonville	81	71	$41,218,100	104	91	$24,874,000
Laurel Park	424	287	$429,719,600	389	280	$453,295,000
Mills River	3,398	2,394	$1,696,913,500	1,968	1,480	$915,747,500
Unincorporated Area	**1,665**	**928**	**$293,321,035**	**484**	**284**	**$108,547,651**
Polk County	4	2	$726,433	0	0	$0
Columbus	2	1	$96,947	0	0	$0
Saluda	139	95	$20,457,060	6	4	$1,987,805
Tryon	1,520	830	$272,040,595	478	280	$106,559,846
Unincorporated Area	**5,145**	**2,864**	**$1,041,784,900**	**499**	**255**	**$68,913,400**
Rutherford County	15	7	$1,250,500	1	0	$0
Bostic	106	59	$13,009,900	115	67	$14,615,100
Chimney Rock Village	1	0	$0	0	0	$0
Ellenboro	208	98	$304,979,700	105	49	$14,297,000
Forest City	956	734	$285,946,500	19	16	$4,251,800
Lake Lure	21	8	$761,700	0	0	$0
Ruth	255	159	$46,023,900	66	41	$18,921,300
Rutherfordton	51	27	$6,230,000	0	0	$0
Spindale	3,532	1,772	$383,582,700	193	82	$16,828,200
Unincorporated Area	**3,805**	**2,747**	**$5,680,017,346**	**3,000**	**2,278**	**$5,574,981,706**
Transylvania County	784	668	$4,418,102,126	788	672	$4,443,398,586
Brevard	87	48	$34,854,700	93	52	$34,712,910
Rosman	2,934	2,031	$1,227,060,520	2,119	1,554	$1,096,870,210
Unincorporated Area	**16,672**	**11,187**	**$22,994,509,681**	**8,211**	**6,268**	**$20,228,320,957**
South Mountains Regional Total	**6,057**	**4,648**	**$15,979,386,400**	**4,228**	**3,451**	**$14,475,878,200**

Source: FEMA DFIRM

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 code regulations were installed. This data is broken down by jurisdiction in **Table 6.16**.

TABLE 6.16: BUILDING VULNERABILITY FOR THE 100-YEAR FLOODPLAINS

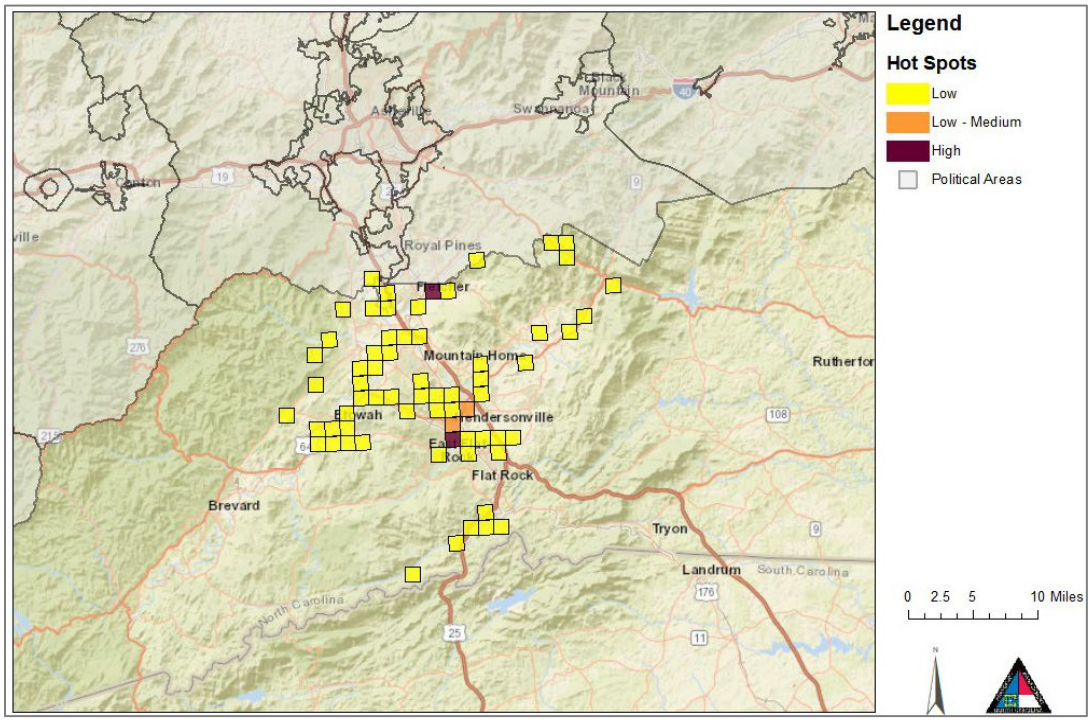
Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Henderson County	**416**	**557**	**$2,849,463**	**111**	**$4,602,077**	**7**	**$178,668**	**675**	**$7,630,206**
Flat Rock	4	6	$8,738	0	$0	0	$0	6	$8,738
Fletcher	13	32	$203,362	13	$2,133,993	0	$0	45	$2,337,355
Hendersonville	134	114	$680,992	64	$1,444,062	1	$37,354	179	$2,162,408

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
Laurel Park	0	0	$0	0	$0	0	$0	0	$0
Mills River	31	76	$165,328	3	$51,858	0	$0	79	$217,185
Unincorporated Area	234	329	$1,791,043	31	$972,164	6	$141,314	366	$2,904,520
Polk County	**125**	**107**	**$1,038,222**	**16**	**$889,325**	**2**	**$32,241**	**125**	**$1,959,788**
Columbus	0	0	$0	0	$0	0	$0	0	$0
Saluda	0	0	$0	0	$0	0	$0	0	$0
Tryon	45	33	$198,209	10	$618,947	2	$32,241	45	$849,397
Unincorporated Area	80	74	$840,013	6	$270,378	0	$0	80	$1,110,391
Rutherford County	**196**	**167**	**$3,201,304**	**29**	**$532,643**	**6**	**$96,201**	**202**	**$3,830,149**
Bostic	0	0	$0	0	$0	0	$0	0	$0
Chimney Rock Village	4	4	$29,906	0	$0	0	$0	4	$29,906
Ellenboro	0	0	$0	0	$0	0	$0	0	$0
Forest City	11	9	$37,650	2	$13,270	0	$0	11	$50,920
Lake Lure	23	18	$234,968	3	$204,358	2	$24,868	23	$464,194
Ruth	0	0	$0	0	$0	0	$0	0	$0
Rutherfordton	13	7	$63,994	5	$67,952	1	$11,403	13	$143,350
Spindale	1	1	$798	0	$0	0	$0	1	$798
Unincorporated Area	144	128	$2,833,988	19	$247,063	3	$59,930	150	$3,140,981
Transylvania County	**547**	**707**	**$4,959,838**	**61**	**$2,853,303**	**26**	**$935,582**	**794**	**$8,748,723**
Brevard	290	390	$2,712,498	30	$1,118,656	3	$113,414	423	$3,944,568
Rosman	26	28	$116,873	2	$4,870	0	$0	30	$121,743
Unincorporated Area	231	289	$2,130,467	29	$1,729,777	23	$822,168	341	$4,682,412
South Mountains Regional Total	**1,284**	**1,538**	**$12,048,827**	**217**	**$8,877,348**	**41**	**$1,242,692**	**1,796**	**$22,168,866**

Source: NCEM Risk Management Tool

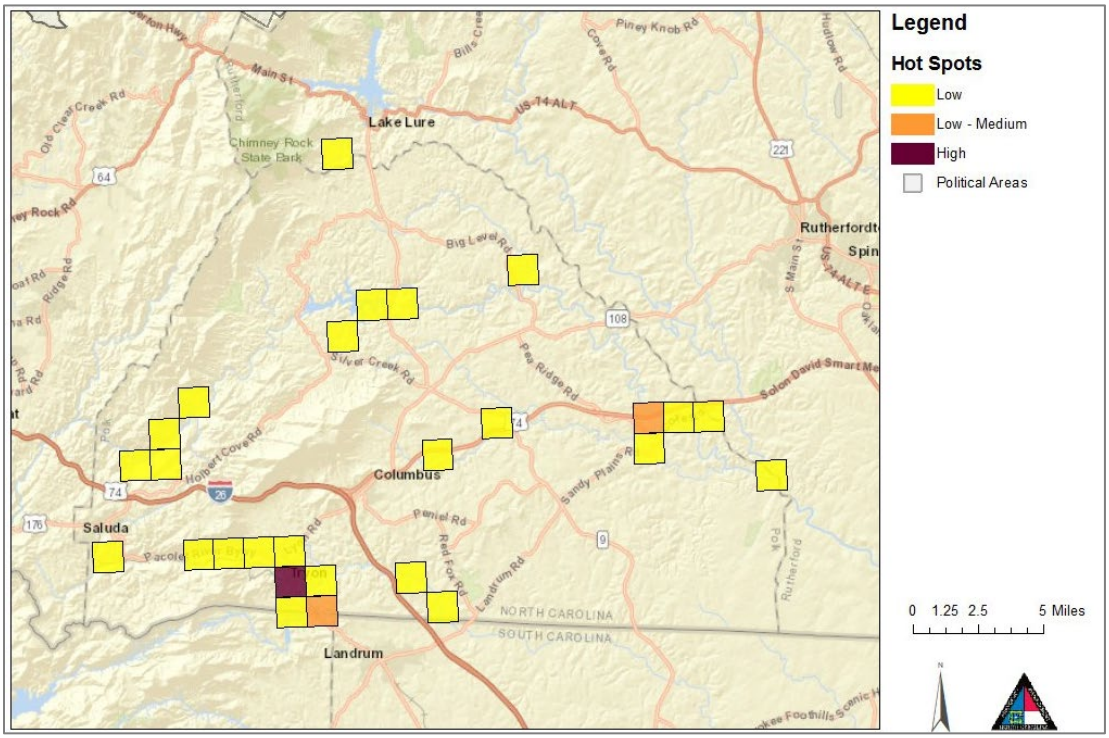
Figures 6.10-6.13 below display visual hotspots of potential dollar losses for the flood hazard in all South Mountains counties. Based on the images, most hotspots are in an area with low vulnerability.

FIGURE 6.10: POTENTIAL DOLLAR LOSSES FOR FLOODING IN HENDERSON COUNTY



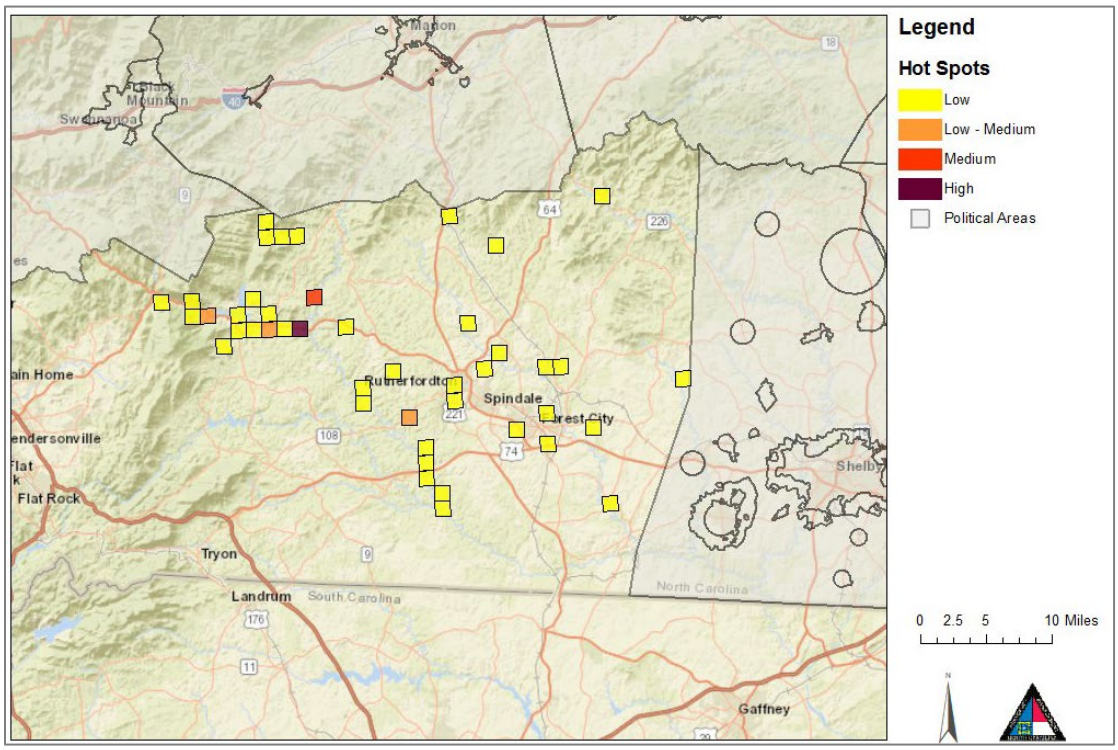
Source: NCEM Risk Management Tool

FIGURE 6.11: POTENTIAL DOLLAR LOSSES FOR FLOODING IN POLK COUNTY



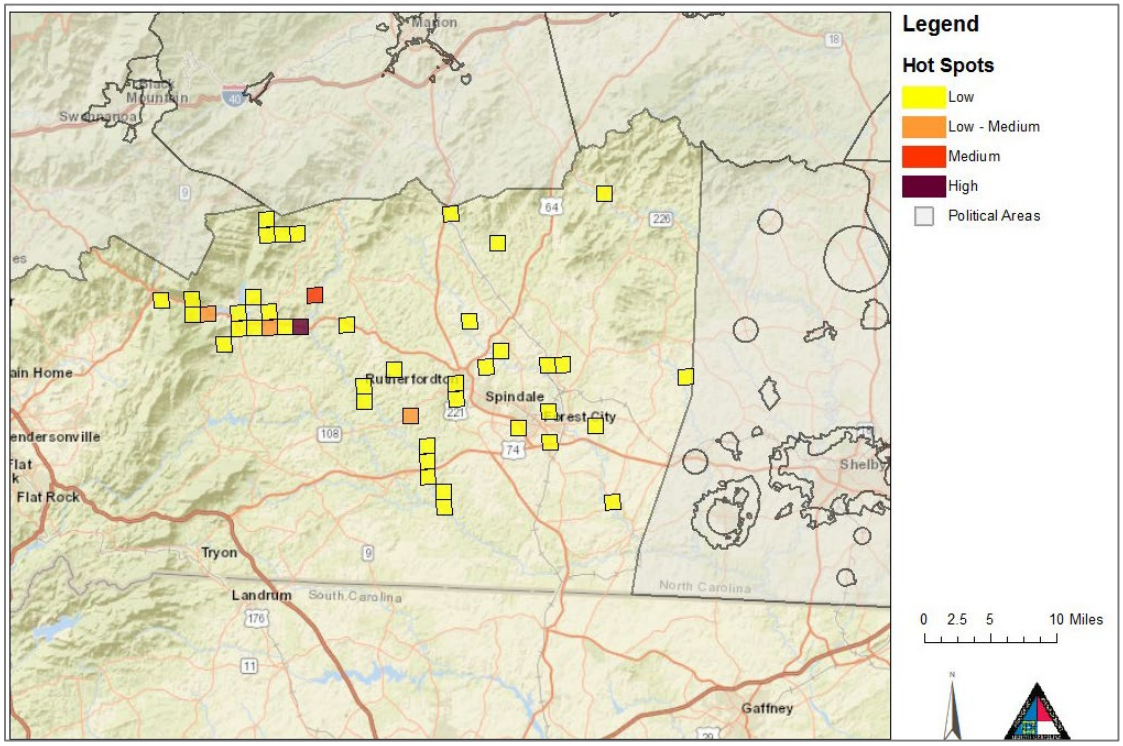
Source: NCEM Risk Management Tool

FIGURE 6.12: POTENTIAL DOLLAR LOSSES FOR FLOODING IN RUTHERFORD COUNTY



Source: NCEM Risk Management Tool

FIGURE 6.13: POTENTIAL DOLLAR LOSSES FOR FLOODING IN TRANSYLVANIA COUNTY



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 THE IN SOUTH MOUNTAINS REGION

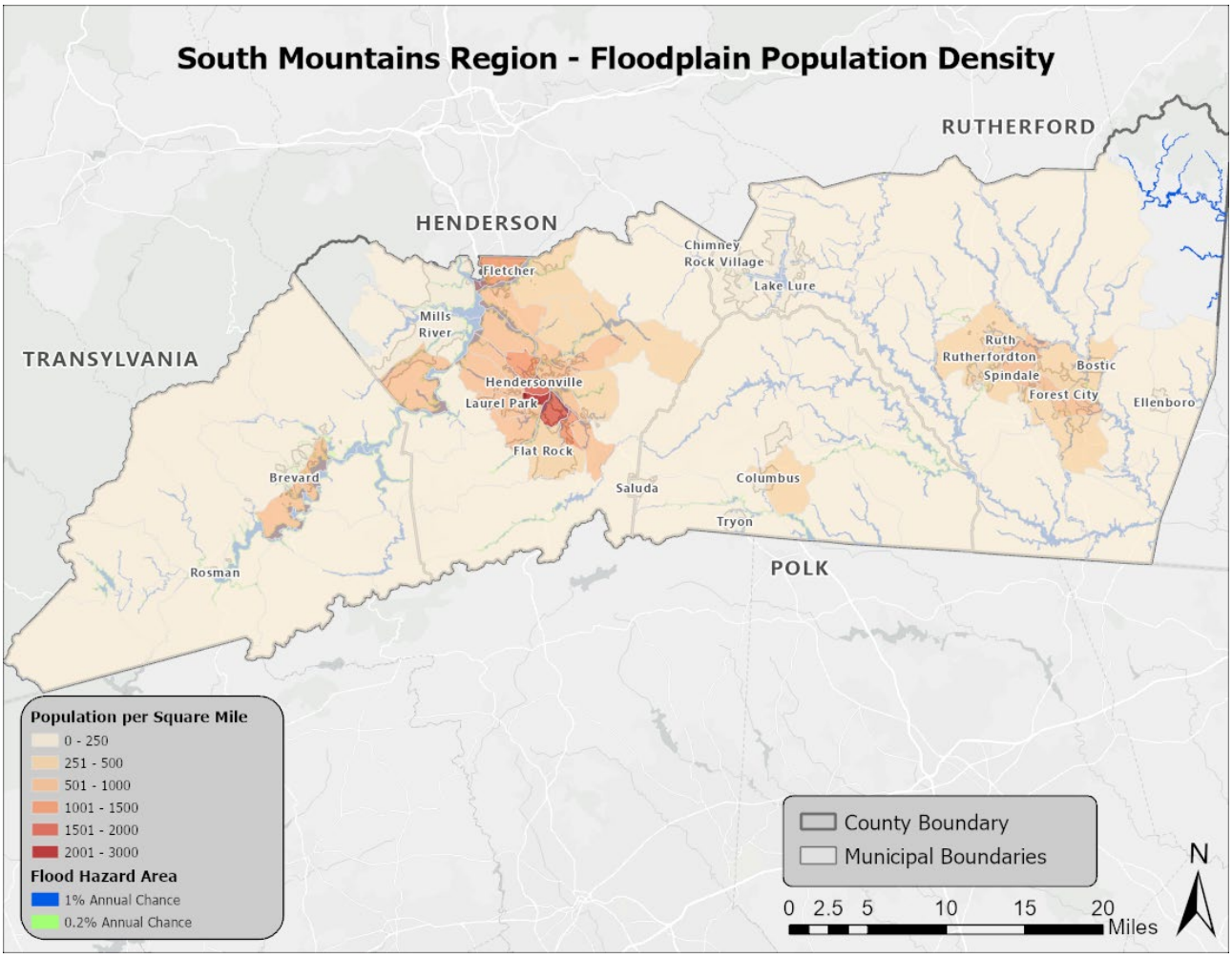
Location	Elderly at Risk	Children at Risk	Total at Risk
Henderson County	**325**	**62**	**1,290**
Flat Rock	5	1	13
Fletcher	17	2	74
Hendersonville	62	13	251
Laurel Park	0	0	0
Mills River	29	6	114
Unincorporated Area	212	40	838
Polk County	**60**	**6**	**186**
Columbus	0	0	0
Saluda	0	0	0
Tryon	13	1	29
Unincorporated Area	47	5	157
Rutherford County	**66**	**13**	**293**
Bostic	0	0	0
Chimney Rock Village	1	0	3
Ellenboro	0	0	0
Forest City	3	1	18
Lake Lure	3	0	9
Ruth	0	0	0
Rutherfordton	2	0	7
Spindale	0	0	2
Unincorporated Area	57	12	254
Transylvania County	**305**	**31**	**1,038**
Brevard	152	8	534
Rosman	1	0	2
Unincorporated Area	152	23	502
South Mountains Regional Total	**756**	**112**	**2,807**

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 South Mountains Region and specific floodplain areas of concern can be seen below in **Figure 6.14**.

FIGURE 6.14: POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA, U.S. Census Bureau

CRITICAL FACILITIES

The critical facility analysis revealed that there are approximately fifteen critical facilities located in the South Mountains Region's 1.0-percent and 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.) These facilities are one emergency operations center, fire station, EMS station, police station, school, and medical care facility in Transylvania County, and two fire stations and seven medical care facilities in Henderson County. There are no critical facilities intersecting a floodplain in Rutherford or Polk Counties. 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 South Mountains Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations

should be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions. **Table 6.18** below lists repetitive loss properties and their associated payments for each county.

TABLE 6.18: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE SOUTH MOUNTAINS REGION

Location	Number of Properties	Number of Losses
Henderson County	**23**	**95**
Flat Rock	0	0
Fletcher	1	2
Hendersonville	22	93
Laurel Park	0	0
Mills River	--	--
Unincorporated Area	0	0
Polk County	**5**	**10**
Columbus	2	4
Saluda	0	0
Tryon	2	4
Unincorporated Area	1	2
Rutherford County	**10**	**29**
Bostic	0	0
Chimney Rock Village	3	7
Ellenboro	--	--
Forest City	2	7
Lake Lure	3	10
Ruth	0	0
Rutherfordton	2	5
Spindale	0	0
Unincorporated Area	0	0
Transylvania County	**4**	**13**
Brevard	1	3
Rosman	2	8
Unincorporated Area	1	2
South Mountains Regional Total	**42**	**147**

Source: National Flood Insurance Program

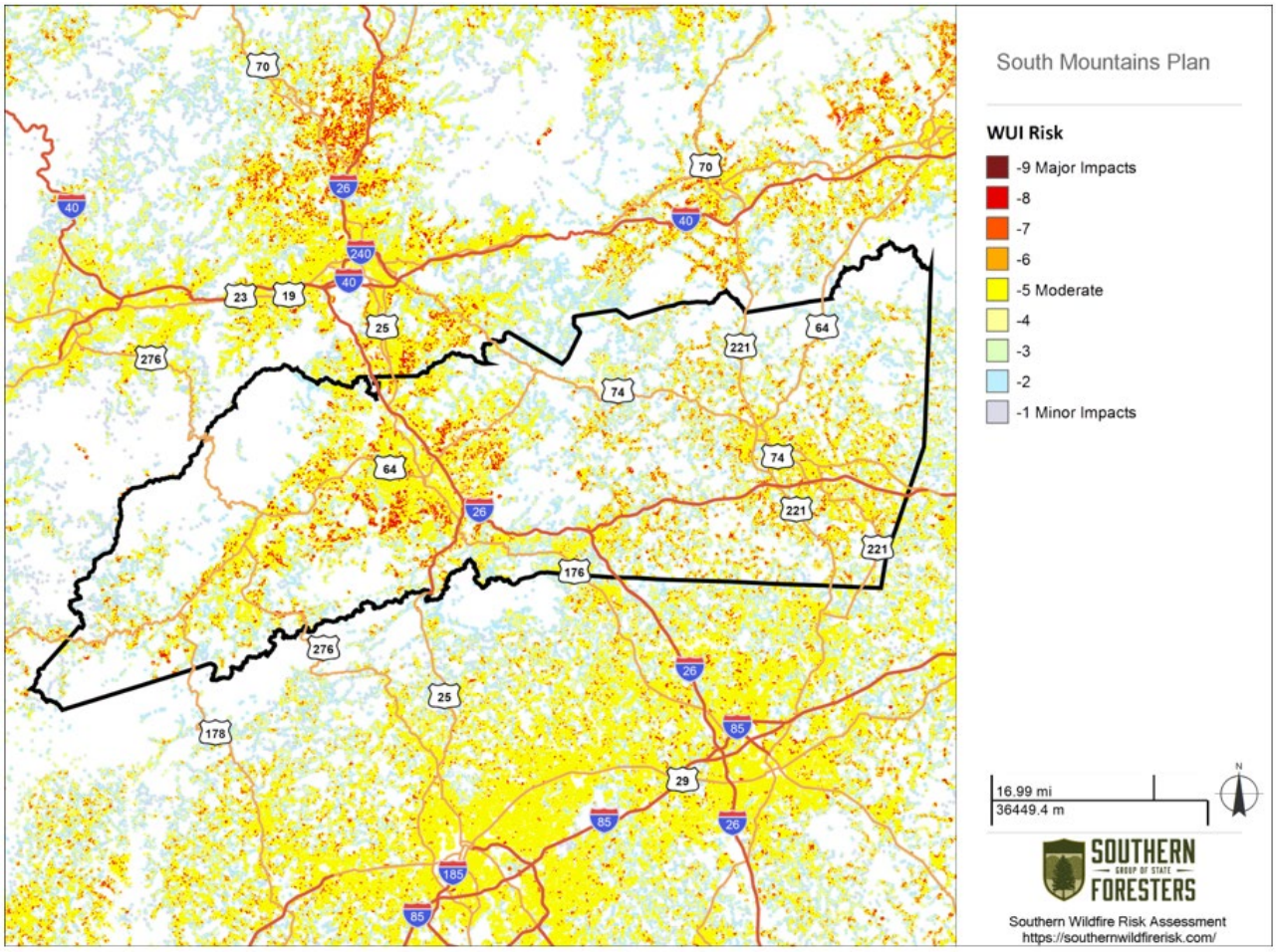
6.5.6 Wildfires

Although historical evidence indicates that the South Mountains 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 6.15** shows the WUI Risk Index for the region below.

FIGURE 6.15: WILDFIRE URBAN INTERFACE RISK INDEX IN THE SOUTH MOUNTAINS REGION



Source: Southern Wildfire Risk Assessment

Based on the data above, the region contains many areas where the value falls into an at-risk category. The region has somewhat more land labeled as at-risk compared to other regions of North Carolina. Overall, there is likely more risk in this region than in other areas of the country based on elevation differences among other characteristics as well. As of 2024 findings from the Southern Wildfire Risk Assessment, burn probabilities of the region range from 1 (lowest probability) to 5 on a scale rated up to 10 (highest probability). Specifically, out of 826,098 total assessed acres, 36.7% of the region is rated a probability of 1, 32.6% a 2, 19.4% a 3, 10.2% a 4, and 1.2% a 5.

SOCIAL VULNERABILITY

Even though not all areas have equal vulnerability, there is some susceptibility across the entire South Mountains 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, Transylvania County had the most with 5 facilities. These facilities were three medical care facilities and two fire/EMS stations. Rutherford County had 1 at-risk facilities, Henderson County had 4, and Polk County had 3. This data reflects a slightly elevated wildfire risk in Transylvania County and Henderson County for critical facilities.

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
Henderson County	4
Polk County	3
Rutherford County	1
Transylvania County	5
South Mountains Regional Total	**13**

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

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
Henderson County	**20,222**	**37,307**	**$6,395,054,521**	**1,427**	**$2,286,482,862**	**497**	**$1,007,988,629**	**39231**	**$9,689,526,014**
Flat Rock	622	1,624	$502,742,745	58	$49,854,132	33	$27,491,886	1,715	$580,088,763
Fletcher	430	1,442	$263,122,311	66	$209,538,121	12	$27,374,313	1,520	$500,034,745
Hendersonville	3,562	5,167	$919,719,932	483	$838,476,896	72	$194,773,749	5,722	$1,952,970,578
Laurel Park	879	855	$234,697,434	23	$77,381,481	4	$5,498,202	882	$317,577,118
Mills River	1,070	2,500	$381,401,360	103	$159,958,535	39	$80,842,159	2,642	$622,202,054
Unincorporated Area	13,659	25,719	$4,093,370,739	694	$951,273,697	337	$672,008,320	26,750	$5,716,652,756
Polk County	**5,309**	**4,836**	**$823,685,689**	**349**	**$348,431,318**	**122**	**$195,612,978**	**5,307**	**$1,367,729,984**
Columbus	286	210	$43,013,120	55	$63,415,601	21	$23,421,386	286	$129,850,107
Saluda	223	190	$27,110,787	24	$13,287,015	8	$8,104,656	222	$48,502,457
Tryon	1,020	904	$187,974,693	83	$54,617,218	32	$35,018,656	1,019	$277,610,567
Unincorporated Area	3,780	3,532	$565,587,089	187	$217,111,484	61	$129,068,280	3,780	$911,766,853
Rutherford County	**2,216**	**2,097**	**$321,123,037**	**128**	**$177,524,326**	**24**	**$25,757,282**	**2,249**	**$524,404,644**
Bostic	0	0	$0	0	$0	0	$0	0	$0
Chimney Rock Village	36	35	$5,804,489	1	$311,417	0	$0	36	$6,115,906

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
Ellenboro	2	2	$291,768	0	$0	0	$0	2	$291,768
Forest City	32	29	$5,745,279	2	$1,010,834	1	$616,256	32	$7,372,369
Lake Lure	189	170	$43,846,411	16	$27,243,223	3	$4,464,303	189	$75,553,937
Ruth	0	0	$0	0	$0	0	$0	0	$0
Rutherfordton	0	0	$0	0	$0	0	$0	0	$0
Spindale	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	1,957	1,861	$265,435,090	109	$148,958,852	20	$20,676,723	1,990	$435,070,664
Transylvania County	**8,238**	**15,018**	**$2,351,463,645**	**756**	**$608,301,384**	**259**	**$290,712,373**	**16,033**	**$3,250,477,402**
Brevard	2,489	3,354	$515,067,287	304	$325,640,670	129	$197,880,900	3,787	$1,038,588,857
Rosman	99	149	$11,743,345	11	$2,678,206	6	$12,547,947	166	$26,969,499
Unincorporated Area	5,650	11,515	$1,824,653,013	441	$279,982,508	124	$80,283,526	12,080	$2,184,919,046
South Mountains Regional Total	**35,985**	**59,258**	**$9,891,326,892**	**2,660**	**$3,420,739,890**	**902**	**$1,520,071,262**	**62,820**	**$14,832,138,044**

Source: NCEM Risk Management Tool

TABLE 6.21: POPULATION VULNERABILITY TO WILDFIRE HAZARD

Location	Elderly At Risk	Children At Risk	Total At Risk
Henderson County	**23,069**	**4,244**	**89,083**
Flat Rock	1,433	168	3,515
Fletcher	754	110	3,360
Hendersonville	2,865	609	11,542
Laurel Park	608	27	1,773
Mills River	961	199	3,765
Unincorporated Area	16,448	3,131	65,128
Polk County	**2,738**	**284**	**8,778**
Columbus	102	12	321
Saluda	39	5	114
Tryon	362	19	803
Unincorporated Area	2,235	248	7,540
Rutherford County	**876**	**180**	**3,872**
Bostic	0	0	0
Chimney Rock Village	10	1	28
Ellenboro	0	0	1
Forest City	9	5	57
Lake Lure	30	2	88
Ruth	0	0	0
Rutherfordton	0	0	0
Spindale	0	0	0
Unincorporated Area	827	172	3,698
Transylvania County	**7,378**	**990**	**24,652**
Brevard	1,315	72	4,618

Location	Elderly At Risk	Children At Risk	Total At Risk
Rosman	3	1	13
Unincorporated Area	6,060	917	20,021
South Mountains Regional Total	**34,061**	**5,698**	**126,385**

Source: NCEM Risk Management Tool

6.5.7 Hazardous Substances

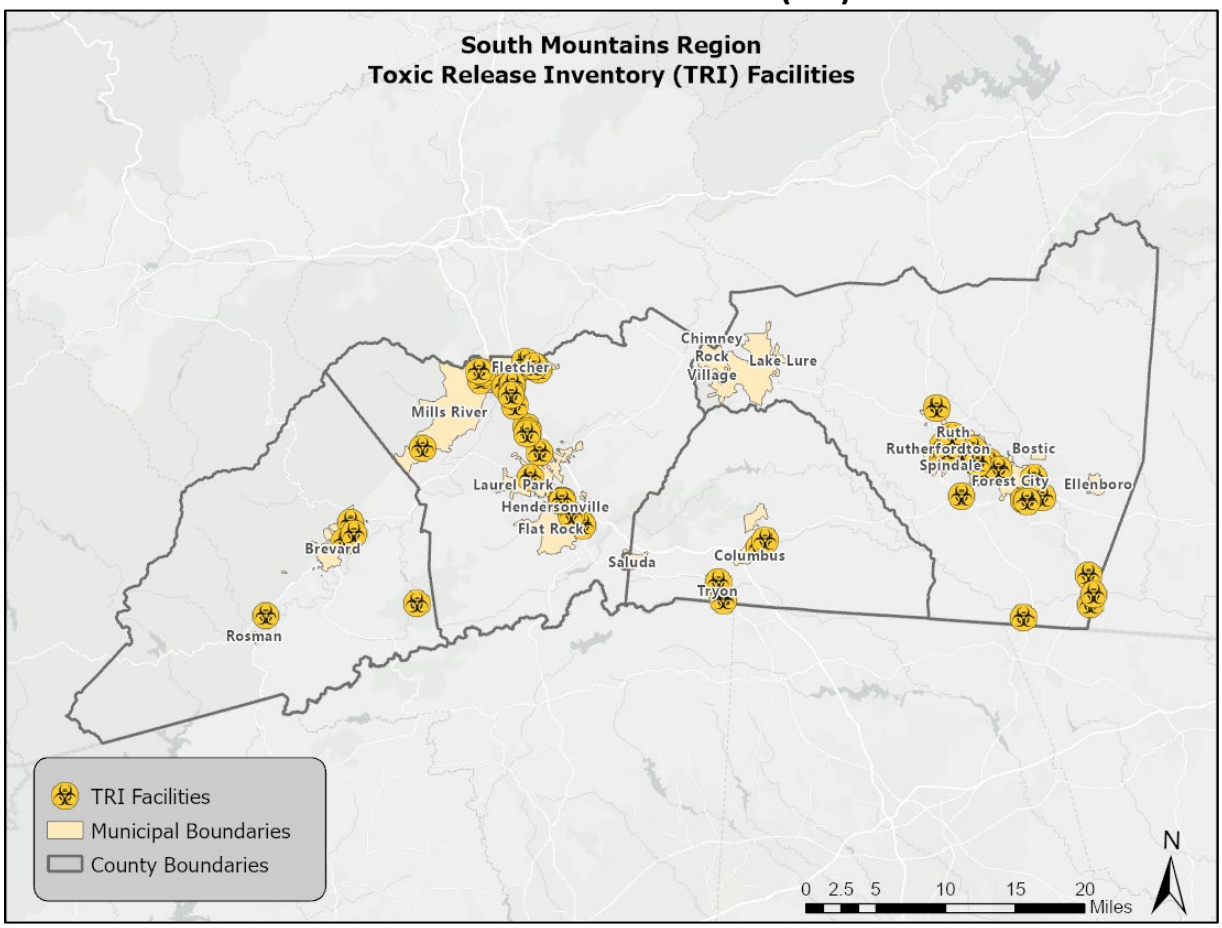
Although historical evidence and existing Toxic Release Inventory (TRI) sites indicate that the South Mountains Region is susceptible to hazardous substance events, there are few reports of damage. Therefore, a calculated annualized loss figure may not be completely reliable.

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, 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 South Mountains Region, along with buffers, were used for analysis as shown in **Figure 6.16.** 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 6.17** 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 railroad sites) and **Table 6.24** (mobile road sites)[12].

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

FIGURE 6.16: TOXIC RELEASE INVENTORY (TRI) FACILITIES



Source: EPA

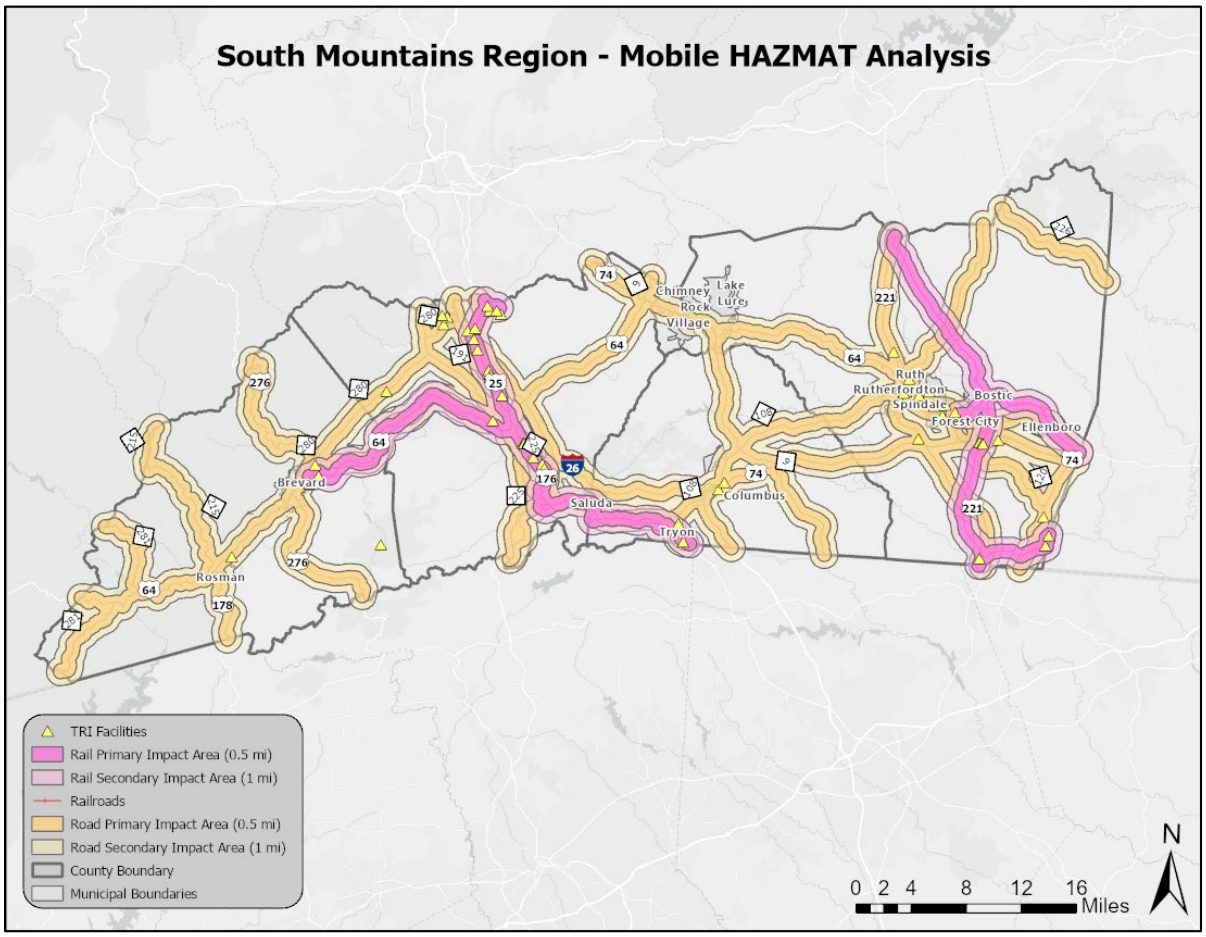
TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES)

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Henderson County	**5,822**	**4,816**	**$3,634,957,000**	**19,213**	**16,191**	**$24,365,747,000**
Flat Rock	377	302	$152,488,400	942	766	$655,213,200
Fletcher	1,035	926	$587,690,600	2,540	2,313	$1,264,174,900
Hendersonville	1,027	901	$387,722,200	4,681	4,072	$13,379,033,600
Laurel Park	99	92	$18,545,400	747	657	$243,507,000
Mills River	278	220	$453,534,600	961	759	$625,064,100
Unincorporated Area	3,006	2375	$2,034,975,800	9,342	7,624	$8,198,754,200
Polk County	**855**	**627**	**$166,369,816**	**2,630**	**2,010**	**$462,477,563**
Columbus	114	89	$23,446,571	407	336	$74,672,194

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
Saluda	0	0	$0	0	0	$0
Tryon	523	378	$61,456,893	1,217	933	$186,833,431
Unincorporated Area	218	160	$81,466,352	1006	741	$200,971,938
Rutherford County	**5,766**	**3,974**	**$1,050,847,000**	**12,211**	**8,323**	**$1,855,309,000**
Bostic	1	0	$0	3	0	$0
Chimney Rock Village	0	0	$0	0	0	$0
Ellenboro	0	0	$0	0	0	$0
Forest City	1,180	891	$465,879,400	3,085	2,274	$734,762,400
Lake Lure	0	0	$0	0	0	$0
Ruth	182	110	$19,164,400	269	175	$26,455,900
Rutherfordton	1,486	1,006	$198,835,400	2,158	1,487	$329,945,600
Spindale	1,924	1,360	$185,089,200	2,833	1,936	$294,222,300
Unincorporated Area	993	607	$181,878,600	3,863	2451	$469,922,800
Transylvania County	**1,021**	**807**	**$442,243,402**	**2,639**	**1,994**	**$2,875,592,652**
Brevard	506	414	$346,368,182	1,500	1,239	$2,685,429,372
Rosman	0	0	$0	6	3	$400,820
Unincorporated Area	515	393	$95,875,220	1133	752	$189,762,460
South Mountains Regional Total	**13,464**	**10,224**	**$5,294,417,218**	**36,693**	**28,518**	**$29,559,126,215**

Source: EPA, Local governments

FIGURE 6.17: MOBILE HAZMAT BUFFERS IN THE SOUTH MOUNTAINS REGION



Source: NCDOT, EPA

TABLE 6.23: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – RAIL)

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
Henderson County	**16,967**	**14,287**	**$11,887,399,300**	**29,451**	**24,285**	**$26,912,835,000**
Flat Rock	571	454	$577,933,300	1,275	1,051	$804,770,100
Fletcher	1,637	1,484	$907,693,300	2,398	2,178	$1,142,166,200
Hendersonville	5,004	4,400	$2,325,489,700	7,089	6,161	$14,420,110,600
Laurel Park	872	762	$384,270,900	1,389	1,100	$520,768,200
Mills River	0	0	$0	5	2	$649,100
Unincorporated Area	8,883	7,187	$7,692,012,100	17,295	13,793	$10,024,370,800
Polk County	**2,319**	**1,699**	**$349,212,458**	**3,740**	**2,593**	**$529,215,069**
Columbus	0	0	$0	0	0	$0
Saluda	558	383	$77,783,650	760	516	$99,448,766
Tryon	1,018	821	$175,477,936	1,243	953	$193,605,286

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	743	495	$95,950,872	1,737	1,124	$236,161,017
Rutherford County	**5,579**	**3,789**	**$610,573,300**	**11,256**	**7,725**	**$1,422,239,900**
Bostic	302	210	$45,211,800	302	210	$45,211,800
Chimney Rock Village	0	0	$0	0	0	$0
Ellenboro	534	415	$40,684,100	576	440	$42,335,800
Forest City	1,590	1,163	$217,152,600	3,865	2,783	$663,580,800
Lake Lure	0	0	$0	0	0	$0
Ruth	0	0	$0	0	0	$0
Rutherfordton	0	0	$0	0	0	$0
Spindale	0	0	$0	0	0	$0
Unincorporated Area	3,153	2,001	$307,524,800	6,513	4,292	$671,111,500
Transylvania County	**1,817**	**1,294**	**$509,306,652**	**3,763**	**2,722**	**$967,845,992**
Brevard	544	426	$315,177,812	1,314	1,050	$620,463,982
Rosman	0	0	$0	0	0	$0
Unincorporated Area	1,273	868	$194,128,840	2,449	1,672	$347,382,010
South Mountains Regional Total	**26,682**	**21,069**	**$13,356,491,710**	**48,210**	**37,325**	**$29,832,135,961**

Source: NCDOT, Local governments

TABLE 6.24: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – ROAD)

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Henderson County	**34,744**	**28,209**	**$31,225,448,657**	**48,755**	**38,975**	**$35,302,583,257**
Flat Rock	1,601	1,351	$1,046,895,000	2,349	1,911	$1,368,373,000
Fletcher	2,382	2,199	$1,119,628,000	2,899	2,609	$1,303,130,000
Hendersonville	7,601	6,631	$16,322,206,000	8,237	7,192	$16,521,129,100
Laurel Park	629	557	$293,402,100	1,296	1,044	$492,949,200
Mills River	2,703	2,156	$1,078,897,000	3,991	3,140	$1,719,703,800
Unincorporated Area	19,828	15,315	$11,364,420,557	29,983	23,079	$13,897,298,157
Polk County	**7,476**	**5,203**	**$1,206,366,270**	**10,840**	**7,273**	**$1,636,680,289**
Columbus	601	478	$143,946,014	621	493	$146,377,260
Saluda	751	522	$101,113,637	779	532	$102,932,166
Tryon	1,073	861	$180,189,865	1,243	953	$193,605,286
Unincorporated Area	5,051	3,342	$781,116,754	8,197	5,295	$1,193,765,577
Rutherford County	**26,398**	**16,937**	**$3,489,442,300**	**36,784**	**23,349**	**$4,647,864,200**
Bostic	2	0	$0	2	0	$0
Chimney Rock Village	463	241	$45,420,300	512	261	$48,116,400
Ellenboro	518	405	$39,689,800	576	440	$42,335,800
Forest City	4,050	2,942	$824,682,100	4,686	3,389	$895,036,200
Lake Lure	1,957	922	$294,720,100	2,528	1,158	$385,917,200
Ruth	269	175	$26,455,900	269	175	$26,455,900
Rutherfordton	2,399	1,612	$374,265,800	2,648	1,796	$442,154,700
Spindale	2,056	1,421	$238,621,600	2,801	1,962	$304,368,800
Unincorporated Area	14,684	9,219	$1,645,586,700	22,762	14,168	$2,503,479,200
Transylvania County	**16,270**	**11,003**	**$5,741,177,288**	**22,502**	**14,957**	**$9,236,434,968**
Brevard	4,049	3,455	$3,546,003,772	4,631	3,910	$5,575,771,472
Rosman	309	187	$104,669,950	315	190	$105,070,770
Unincorporated Area	11,912	7,361	$2,090,503,566	17,556	10,857	$3,555,592,726
South Mountains Regional Total	**84,888**	**61,352**	**$41,662,434,515**	**118,881**	**84,554**	**$50,823,562,714**

Source: NCDOT, Local governments

SOCIAL VULNERABILITY

Given high susceptibility across the entire South Mountains 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 183 total facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 79 facilities throughout the region. Rutherford County has the most facilities in the primary impact zone with 37 facilities followed by Henderson County with 30 facilities. These facilities are also 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 303 critical facilities located in the primary (0.5-mile) mobile HAZMAT buffer areas for roads and 125 for railroads throughout the region. Although this is a worst-case scenario model, it indicates that all of the critical facilities in the South Mountains region are vulnerable to a potential mobile HAZMAT incident. Additionally, there are 365 critical facilities located in the secondary (1-mile) buffer area of roads and 186 facilities in the secondary buffer area of railroads. 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 the vulnerability of these facilities. 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 South Mountains 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
HENDERSON COUNTY							
Tuxedo Hydroelectric Dam	NC00311	Y	Satisfactory	Private	15840	0	Green River
Osceola Lake Dam	NC00239	Y	Satisfactory	Private	500	1300	Shepherd Creek
Feeney Dam	NC01226	Y	Satisfactory	Private	225	840	Hoopers Creek
Blue Ridge Communtiy College Dam	NC03005	Y	Fair	State	40	100	Bat Fork Creek
Blue Star Dam Upper	NC01277	Y	Fair	Private	407	N/A	Mud Creek
Blue Star Dam Lower	NC00351	Y	Fair	Private	85	50	Mud Creek
Crooked Creek Lake Dam	NC00238	N	Fair	Private	123	N/A	Mud Creek
Forge Mountain Grist Mill Dam	NC01279	N	Fair	Private	32	125	Turkey Creek
Lake Hosea Dam	NC00226	Y	Fair	Private	77	141	UT to Shop Creek
Rhett Mill Dam	NC00235	Y	Satisfactory	Private	361	1200	King Creek
Wolf Lake Dam	NC00236	Y	Satisfactory	Private	300	26	Little Mud Creek
Sky Lake Estate Dam	NC01280	Y	Fair	Private	40	1450	Shaw Creek
Briar Lake Dam	NC00233	Y	Satisfactory	Private	12	375	Shaw Creek
Jordan Mill Pond Dam	NC03011	Y	Satisfactory	Private	30	550	UT to Mud Creek
Echo Lake Dam	NC01309	Y	Satisfactory	Private	27	461	Shaw Creek
Meditation Lake Dam	NC03013	Y	Satisfactory	Private	15	N/A	Mud Creek
Laurel Park Lake Dam	NC01717	Y	Satisfactory	Local Gov	0	N/A	Mud Creek
Lake Sheila Dam	NC01284	Y	Fair	Private	1024	0	UT to Pacolet River
Camp Pinewood Lake Dam	NC03016	Y	Satisfactory	Private	25	0	UT to Devil's Cradle Creek
Rainbow Spring Lake Dam	NC03018	Y	Fair	Private	13	0	Mud Creek
Ball Lake Dam	NC01285	N	Satisfactory	Private	20	N/A	UT to Hungry River
Sizemore Dam	NC03022	N	Satisfactory	Private	25	N/A	Mud Creek
Camp Judaea Dam	NC03025	N	Satisfactory	Private	15	N/A	UT to Little Clear Creek
Hendersonville Country Club Dam	NC03031	Y	Satisfactory	Private	22	N/A	UT to Mud Creek
Frady Dam	NC03037	N	Poor	Private	25	N/A	UT to Kimsey Creek
Pettit Pond Dam	NC03046	N	Fair	Private	17	0	Camp Creek

Hidden Valley Campground Dam	NC03063	N	Satisfactory	Private	15	0	French Broad River
Shealy Lake Dam Upper	NC03064	N	Satisfactory	Private	14	0	UT to Finley Creek
Wolf Weinhold Dam	NC03065	N	Satisfactory	Private	120	824	Hampy Creek
Freeman Dam	NC03076	Y	Satisfactory	Private	67	N/A	Vernon Creek
Macedonia Lake Dam	NC05445	Y	Fair	Private	130	139	Camp Creek
Little Lake Dam	NC05558	Y	Satisfactory	Private	43	230	Camp Creek
Carriage Park Dam #1	NC05605	Y	Fair	Private	127	231	N/A
General Electric Lighting Systems Dam	NC05628	Y	Satisfactory	Private	30	75	UT to Bat Fork Creek
Highland Lake SWDP Dam	NC05720	Y	Fair	Private	0	0	UT to King's Creek
Valmont Dam	NC05890	N	Fair	Private	0	0	UT to Brittain Creek
Tuxedo Saddle Dam	NC05974	Y	Satisfactory	Private	15840	0	Green River
Lake Pointe Dam	NC06159	N	Fair	Private	N/A	N/A	N/A
Ross Pond Dam	NC06978	N	N/A	Private	N/A	N/A	N/A
POLK COUNTY							
Orchard Lake Dam	NC00353	N	Fair	Private	60	N/A	UT to Pacolet River
Melrose Mountain Dam #2	NC00309	Y	Poor	Private	157	N/A	UT to Big Falls Creek
Melrose Mountain Dam #1	NC01221	Y	Poor	Private	52	N/A	UT to Big Falls Creek
Mahler's Pond Dam	NC00164	Y	Fair	Private	110	N/A	UT to Wolfe Creek
Derbyshire Dam	NC00209	Y	Fair	Private	1011	0	Hughes Creek
Turner Shoals Dam	NC00208	Y	Poor	Local Gov	16530	34000	Green River
Warrior Mountain Dam	NC03705	N	Fair	Private	20	N/A	Cove Creek
Old Tryon Water Suppy Dam	NC03719	N	Poor	Local Gov	15	N/A	Big Fall Creek
White Oak Mtn. Dam #1	NC05371	Y	Fair	Private	37	1060	Horse Creek
White Oak Mtn. Dam #2	NC05372	Y	Poor	Private	39	148	Horse Creek
White Oak Mtn. Dam #4	NC05373	Y	Fair	Private	22	159	Horse Creek
Robin Smith Dam	NC05652	N	Fair	Private	119	211	UT to Little Fall Creek
Cade Dam	NC06763	N	Fair	Private	N/A	N/A	N/A
Little Warrior Mountain Dam	NC06764	N	Fair	Private	N/A	N/A	N/A
Woodpecker Lane Dam	NC06765	N	Fair	Private	N/A	N/A	N/A
RUTHERFORD COUNTY							
Sunnyside Lake Dam	NC00097	Y	Poor	Private	97	150	Long Branch
Camp Occoneechee Dam	NC00241	Y	Fair	Private	138	N/A	Cane Creek

Lake Lure Dam	NC00100	Y	Fair	Local Gov	44914	54000	Rocky Broad River
Isothermal College Dam	NC00098	Y	Poor	State	104	1600	Bracketts Creek
Murray Hilton Lake Dam	NC00096	Y	Satisfactory	Private	274	N/A	South Creek
Brooks Lake Dam	NC00138	Y	Poor	Private	200	865	Mountain Creek
Bald Mountain Lake Dam	NC00099	Y	Fair	Private	288	15848	Buffalo Creek
Pine Knoll Fish Pond Dam	NC04093	N	Fair	Private	32	N/A	Jarretts Creek
John W. Bennett Dam	NC04095	Y	Fair	Private	25	192	Kathy Creek
2nd Broad River Watershed Dam #22	NC04096	Y	Satisfactory	Private	710	N/A	Hox Creek
Nelson Park Dam	NC04097	N	Poor	Private	28	N/A	UT to Second Broad River
2nd Broad River Watershed Dam #16	NC04099	Y	Satisfactory	Private	854	4000	Mountain Creek
2nd Broad River Watershed Dam #23	NC04104	Y	Satisfactory	Local Gov	770	N/A	Stoney Creek
2nd Broad River Watershed Dam #14	NC04107	Y	Fair	Private	480	N/A	Fork Creek
2nd Broad River Watershed Dam #13	NC04116	Y	Fair	Local Gov	1269	N/A	Mill Creek
Shumont Estates Dam	NC04117	Y	Fair	Private	200	0	UT to Bills Creek
2nd Broad River Watershed Dam #2	NC05440	Y	Satisfactory	Local Gov	3360	15000	Cathey's Creek
Laurel Lake Dam	NC05574	Y	Fair	Private	145	N/A	Bills Creek
Willow Lakes Estates Dam	NC05615	Y	Poor	Private	72	0	N/A
Cliffside Inactive Ash Basin #5 Main Dam	NC05914	Y	Satisfactory	Utility	0	N/A	Broad River
Cliffside Inactive Ash Basin #5 Saddle Dam	NC05959	Y	Satisfactory	Utility	0	N/A	Broad River
Crabtree Lake Dam	NC06594	N	Unsatisfactory	Private	27	N/A	N/A
Lake Noor Dam	NC07678	N	N/A	Private	N/A	N/A	N/A
Loves Forest City Dam	NC07681	N	N/A	Private	N/A	N/A	N/A
TRANSYLVANIA COUNTY							
Arrowhead Lake Dam	NC00169	Y	Fair	Private	100	N/A	Clear Creek
Betty Kay Lake Dam	NC00190	Y	Fair	Private	134	975	Morgan Creek
Cascade Lake Dam	NC00340	Y	Poor	Utility	2304	50778	Little River
Atagahi Lake Dam	NC00197	Y	Fair	Private	2780	N/A	Carson Creek
Deer Lake Dam	NC00193	Y	Fair	Private	69	N/A	Lambo Creek
Lake Tiaroga Dam	NC00194	Y	Fair	Private	1010	N/A	Batson Creek

Ticoa Lake Dam	NC00199	Y	Fair	Private	2435	4400	Batson Creek
Lake Wanteska Dam	NC00198	Y	Fair	Private	2300	N/A	Lower Creek
High Rock Lake Dam	NC00189	Y	Fair	Private	167	N/A	Steel Creek
Laurel Lake Dam	NC00195	Y	Fair	Private	166	N/A	Sutton Creek
Sagar Lower Dam	NC00200	N	Satisfactory	Private	0	N/A	Gerren Creek
Line Runner Ridge Dam	NC01339	Y	Poor	Private	127	N/A	UT to Gerren Creek
Lora Young Dam	NC00202	N	Unsatisfactory	Private	210	N/A	Upper Creek
Straus Lake Dam	NC00192	Y	Satisfactory	Private	58	20	Allison Creek
Thunder Lake Dam	NC00168	Y	Fair	Private	870	N/A	Clear Creek
Lake Toxaway Lower Dam	NC00167	Y	Fair	Private	21500	0	Toxaway River
Hemlock Lake Dam	NC00191	Y	Fair	Private	40	N/A	Morgan Creek
Indian Lake Lower Dam	NC04337	Y	Fair	Private	300	N/A	Indian Creek
Sequoyah Woods Lake Dam	NC00296	Y	Fair	Private	182	N/A	Steel Creek
Blue Ridge Hills Dam	NC01370	N	Fair	Private	117	1250	N. Fork Flat Creek
Aerated Stabilization Basin Dam	NC01373	Y	Fair	Private	1200	N/A	N/A
Brevard Music Camp Lower Dam	NC04338	Y	Poor	Private	21	N/A	Brushy Creek
Brevard Music Camp Upper Dam	NC04339	Y	Fair	Private	15	N/A	Brushy Creek
Eagles Nest Lake Dam	NC01393	Y	Poor	Private	100	N/A	Clear Creek
Arrowhead Lake Dam	NC01378	Y	Fair	Private	63	N/A	Morgan Creek
Pisgah Forest Farm Dam	NC04345	Y	Unsatisfactory	Private	10	N/A	UT to Little River
Marchman Lake Dam	NC01374	Y	Fair	Private	16	0	E. Fork French Broad River
Intermont Dam	NC01301	N	Fair	Private	117	N/A	Burlingame Creek
Lake Megan Dam	NC04349	Y	Fair	Private	24	N/A	Dunns Creek
Siniard Lower Pond Dam	NC01568	N	Fair	Private	24	N/A	Long Branch
Siniard Upper Pond Dam	NC04350	N	Unsatisfactory	Private	10	N/A	Long Branch
Emerald Lake Dam	NC04352	Y	Fair	Private	36	N/A	Duncan Creek
Rainbow Pond Dam	NC04353	N	Fair	Private	20	N/A	French Broad River
Gaither Pond Dam	NC04355	N	Fair	Private	6	N/A	Osborne Branch
Lewis Dam	NC04356	N	Poor	Private	10	N/A	Osborne Branch
Bass Lake Dam	NC04358	N	Fair	Private	6	N/A	UT to French Broad River
Turkey Pen Farm Dam	NC04361	N	Fair	Private	12	N/A	Dog Creek

Sapphire Lakes G & T Dam #1	NC04362	Y	Fair	Private	390	N/A	Horsepasture River
Eagle Lake Dam	NC04366	Y	Fair	Private	580	N/A	Phillips Creek
Salter Dam	NC04984	N	Poor	Private	13.75	N/A	N/A
Forest Lake Dam	NC05406	N	Unsatisfactory	Private	22	N/A	Wilson Mill Creek
Graber Dam	NC05739	Y	Satisfactory	Private	30	243	North Flat Creek
Mitchums Lake Dam	NC06434	N	Fair	Private	N/A	N/A	UT to Ruby Stream
Sykes Dambax Dam	NC06795	N	Fair	Private	N/A	N/A	N/A
Laurel Falls Upper Lake Dam	NC06908	N	N/A	Private	N/A	N/A	N/A
Calico Lake Dam	NC06910	N	Fair	Private	N/A	N/A	N/A

Source: NCDEQ

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 South Mountains region 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 South Mountains 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 South Mountains 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 Henderson, Polk, Rutherford, and Transylvania 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 South Mountains 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 SOUTH MOUNTAINS REGION

Hazard	Henderson County	Polk County	Rutherford County	Transylvania County	Total
Composite EAL	$10,798,724	$2,241,850	$6,196,413	$4,380,969	$23,617,956
Building EAL	$4,836,784	$1,239,726	$4,243,184	$2,528,055	$12,847,749
Population Equivalence EAL	$4,280,861	$960,713	$1,842,787	$1,548,051	$8,632,412
Agriculture EAL	$1,681,079	$41,411	$110,441	$304,863	$2,137,794
Drought	$30,288	$2,623	$1,814	$3,178	$37,903
Excessive Heat	Negligible	Negligible	Negligible	Negligible	Negligible
Hurricane & Coastal Hazards	$687,716	$223,450	$702,807	$352,975	$1,966,948
Tornadoes/Thunderstorms	$1,502,876	$301,294	$709,011	$406,407	$2,919,588
Severe Winter Weather	$311,402	$149,631	$413,803	$263,672	$1,138,508
Earthquakes	$916,747	$123,589	$443,212	$242,385	$1,725,933
Geological	$356,974	$91,285	$310,563	$263,959	$1,022,781
Dam Failure	Negligible	Negligible	Negligible	Negligible	Negligible
Flooding	$1,848,584	$118,815	$546,131	$1,099,602	$3,613,132
Wildfires	$12,704	$28,017	$114,432	$2,226	$157,379
Infectious Disease	Negligible	Negligible	Negligible	Negligible	Negligible
Hazardous Substances	Negligible	Negligible	Negligible	Negligible	Negligible
Radiological Emergency	Negligible	Negligible	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible	Negligible	Negligible
Cyber	Negligible	Negligible	Negligible	Negligible	Negligible
Electromagnetic Pulse	Negligible	Negligible	Negligible	Negligible	Negligible
Civil Disturbance	Negligible	Negligible	Negligible	Negligible	Negligible
Food Emergency	Negligible	Negligible	Negligible	Negligible	Negligible

Source: FEMA NRI

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to natural hazards including drought, hurricane and coastal hazards, tornadoes/thunderstorms, and severe winter weather. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.27** 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**
Henderson County	**217**	**41**	**0**	**2,144**	**0**	**276**	**0**	**229**	**231**	**0**	**0**	**0**	**0**	**138**	**4**	**0**	**5**	**3,285**
Flat Rock	1	0	0	85	0	0	0	3	1	0	0	0	0	2	0	0	0	92
Fletcher	0	5	0	121	0	39	0	4	14	0	0	0	0	8	0	0	0	191
Hendersonville	1	27	0	946	0	61	0	56	154	0	0	0	0	65	1	0	0	1,311
Laurel Park	0	0	0	22	0	2	0	3	13	0	0	0	0	2	0	0	0	42
Mills River	44	3	0	85	0	24	0	13	7	0	0	0	0	8	0	0	1	185
Unincorporated Area	171	6	0	885	0	150	0	150	42	0	0	0	0	53	3	0	4	1,464
Polk County	**26**	**15**	**0**	**478**	**0**	**143**	**0**	**92**	**56**	**1**	**0**	**0**	**0**	**102**	**0**	**0**	**5**	**919**
Columbus	0	6	0	71	0	15	0	22	15	0	0	0	0	9	0	0	0	138
Saluda	0	3	0	39	0	9	0	10	4	0	0	0	0	7	0	0	1	73
Tryon	0	6	0	160	0	24	0	16	10	1	0	0	0	28	0	0	3	249
Unincorporated Area	26	0	0	208	0	95	0	44	27	0	0	0	0	58	0	0	1	459
Rutherford County	**0**	**35**	**0**	**3,004**	**2**	**1,106**	**0**	**244**	**210**	**0**	**0**	**0**	**0**	**853**	**40**	**0**	**21**	**5,515**
Bostic	0	0	0	14	0	2	0	14	0	0	0	0	0	0	0	0	0	30
Chimney Rock Village	0	0	0	23	0	2	0	2	0	0	0	0	0	2	0	0	0	29
Ellenboro	0	0	0	26	0	2	0	16	4	0	0	0	0	6	0	0	0	54
Forest City	0	10	0	820	2	224	0	46	72	0	0	0	0	228	0	0	16	1,418
Lake Lure	0	2	0	144	0	44	0	16	2	0	0	0	0	68	0	0	0	276
Ruth	0	0	0	28	0	2	0	1	0	0	0	0	0	0	0	0	0	31
Rutherfordton	0	5	0	165	0	34	0	17	18	0	0	0	0	39	0	0	1	279
Spindale	0	14	0	266	0	72	0	14	10	0	0	0	0	48	0	0	2	426
Unincorporated Area	0	4	0	1,518	0	724	0	118	104	0	0	0	0	462	40	0	2	2,972
Transylvania County	**4**	**36**	**0**	**799**	**0**	**241**	**0**	**148**	**49**	**0**	**0**	**0**	**0**	**208**	**1**	**10**	**9**	**1,505**
Brevard	2	18	0	385	0	81	0	96	32	0	0	0	0	85	0	1	7	707

Rosman	0	1	0	24	0	10	0	5	0	0	0	0	0	2	0	1	2	45
Union	2	17	0	390	0	150	0	47	17	0	0	0	0	121	1	8	0	753
South Mountains Regional Total	**247**	**127**	**0**	**6,425**	**2**	**1,766**	**0**	**713**	**546**	**1**	**0**	**0**	**0**	**1,301**	**45**	**10**	**40**	**11,224**

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)
Henderson County																		
HENDERSON COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X			X					X	X	X	X
Bat Cave Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Blue Ridge Fire & Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Blue Ridge Fire & Rescue, Inc. 2	Fire/EMS	X	X	X	X	X	X			X		X			X	X		X
Dana Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X								
Edneyville Volunteer Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Edneyville Volunteer Fire and Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Edneyville Volunteer Fire and Rescue Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X								
Etowah-Horseshoe Volunteer Fire & Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X	X		X					X	X	X	X
Etowah-Horseshoe Volunteer Fire & Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Etowah-Horseshoe Volunteer Fire & Rescue Department, Inc. 3	Fire/EMS	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)
Etowah-Horseshoe Volunteer Fire & Rescue Department, Inc. 4	Fire/EMS	X	X	X	X	X	X			X						X		X
Fletcher Fire and Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Fletcher Fire and Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Fletcher Fire and Rescue Department, Inc. 3	Fire/EMS	X	X	X	X	X	X	X		X			X	X	X	X	X	X
Gerton Volunteer Fire Department and Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Green River Volunteer Fire & Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Green River Volunteer Fire & Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Green River Volunteer Fire & Rescue Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X								
Green River Volunteer Fire & Rescue Department, Inc. 4	Fire/EMS	X	X	X	X	X	X			X								
Hendersonville Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Hendersonville Fire Department 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Mills River Fire & Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Mills River Fire & Rescue Department, Inc. 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)
Mills River Fire & Rescue Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Mills River Fire & Rescue Department, Inc. 4	Fire/EMS	X	X	X	X	X	X			X								
Mountain Home Fire & Rescue Department, Inc.	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Mountain Home Fire & Rescue Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X						X		
Mountain Home Fire & Rescue Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X						X		
Valley Hill Fire & Rescue Department, INC	Fire/EMS	X	X	X	X	X	X			X								X
Valley Hill Fire & Rescue Department, INC 2	Fire/EMS	X	X	X	X	X	X			X								
Valley Hill Fire & Rescue Department, INC 3	Fire/EMS	X	X	X	X	X	X			X								
Valley Hill Fire & Rescue Department, INC 4	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
HENDERSON COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
ARC ANGEL TRANSPORT SERVICES	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
HENDERSON COUNTY RESCUE SQUAD INCORPORATED	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
CITY OF HENDERSONVILLE POLICE DEPARTMENT	Police	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)
NORTH CAROLINA STATE HIGHWAY PATROL - FLETCHER SATELLITE HANGAR / ASHEVILLE DUTY STATION OFFICE	Police	X	X	X	X	X	X			X				X	X	X		
LAUREL PARK POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X	X	X
FLETCHER POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL TROOP G DISTRICT III	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
HENDERSON COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X			X					X	X	X	X
Mills River Elementary	School	X	X	X	X	X	X			X					X	X		
Balfour Education Center	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Edneyville Elementary	School	X	X	X	X	X	X			X					X	X		
Dana Elementary	School	X	X	X	X	X	X			X								
Etowah Elementary	School	X	X	X	X	X	X			X					X	X	X	X
Hendersonville Middle	School	X	X	X	X	X	X			X			X	X	X	X		X
Hendersonville High	School	X	X	X	X	X	X			X				X	X	X	X	X
Apple Valley Middle	School	X	X	X	X	X	X			X					X	X		
Atkinson Elementary	School	X	X	X	X	X	X			X								
Bruce Drysdale Elementary	School	X	X	X	X	X	X			X					X	X	X	X
East Henderson High	School	X	X	X	X	X	X			X				X	X	X		X
Fletcher Elementary	School	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)
Hendersonville Elementary	School	X	X	X	X	X	X			X			X	X	X	X		X
North Henderson High	School	X	X	X	X	X	X			X					X	X		
Rugby Middle	School	X	X	X	X	X	X			X					X	X		
West Henderson High	School	X	X	X	X	X	X			X					X	X		
The Mountain Community Sch	School	X	X	X	X	X	X			X						X	X	X
Glenn C Marlow Elementary	School	X	X	X	X	X	X			X				X	X	X		
Upward Elementary	School	X	X	X	X	X	X			X						X		
Hillandale Elementary	School	X	X	X	X	X	X			X				X		X		X
Flat Rock Middle	School	X	X	X	X	X	X			X				X		X		X
Clear Creek Elementary	School	X	X	X	X	X	X			X		X						
Sugarloaf Elementary	School	X	X	X	X	X	X			X								
Henderson County Early College	School	X	X	X	X	X	X			X					X	X		
All Saints Parochial School	School	X	X	X	X	X	X			X					X	X		
Fletcher Academy	School	X	X	X	X	X	X			X				X	X	X		X
Imago Dei Classical Academy	School	X	X	X	X	X	X			X					X	X		
Immaculata Catholic School	School	X	X	X	X	X	X			X				X	X	X	X	X
Captain Gilmer Christian School	School	X	X	X	X	X	X			X				X	X	X		X
Heritage Hall International School	School	X	X	X	X	X	X			X								
Faith-Covenant Christian Academy	School	X	X	X	X	X	X			X					X	X	X	X
Mills River Seventh-day Adventist	School	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)
Lake House Academy	School	X	X	X	X	X	X			X				X	X	X	X	X
Mt. Carmel Baptist Academy	School	X	X	X	X	X	X			X						X		
Stoney Mountain Christian Academy	School	X	X	X	X	X	X			X			X	X	X	X	X	X
St. Gerard House	School	X	X	X	X	X	X			X				X	X	X	X	X
Timbersong Academy - Bat Cave	School	X	X	X	X	X	X			X						X		
Wild Oak Independent School	School	X	X	X	X	X	X			X						X		X
Upward Adventist School	School	X	X	X	X	X	X			X		X				X		
Veritas Christian Academy	School	X	X	X	X	X	X			X				X	X	X	X	X
The Way Christian Academy	School	X	X	X	X	X	X			X			X	X	X	X	X	X
BLUE RIDGE COMMUNITY COLLEGE	School	X	X	X	X	X	X			X					X	X		
HeartLife	Medical	X	X	X	X	X	X			X				X	X	X		X
Park Ridge Cardiopulmonary Rehabilitation Program	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Carolina Living Center	Medical	X	X	X	X	X	X			X						X	X	X
Carolina Living Center #1	Medical	X	X	X	X	X	X			X						X	X	X
Country Meadow Family Care Home	Medical	X	X	X	X	X	X			X						X	X	X
Hodges Family Care Home	Medical	X	X	X	X	X	X			X						X		
Oak Crest Family Care #1	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #10	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #11	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)
Oak Crest Family Care #12	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #2	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #3	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #4	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #5	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #6	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #7	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #8	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Crest Family Care #9	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Whispering Willows Retirement Inn	Medical	X	X	X	X	X	X			X				X		X	X	X
Advantage Home Care, Inc.	Medical	X	X	X	X	X	X			X					X	X	X	X
Ameri-Quipt	Medical	X	X	X	X	X	X			X				X	X	X		X
Community Care Link	Medical	X	X	X	X	X	X			X				X	X	X		X
Compassionate Companions, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Home Helpers	Medical	X	X	X	X	X	X			X								
Home Medical Systems	Medical	X	X	X	X	X	X	X		X					X	X	X	X
Lake Pointe Landing Home Care	Medical	X	X	X	X	X	X			X					X	X		
Lincare, Inc.	Medical	X	X	X	X	X	X		X	X					X	X		X
Pardee Home Care	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Park Ridge Home Health	Medical	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)
Pine Park Retirement Inn	Medical	X	X	X	X	X	X			X					X	X		
Sunnybrook Home Health, Inc.	Medical	X	X	X	X	X	X		X	X				X	X	X	X	X
United Medical, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Visiting Health Professionals	Medical	X	X	X	X	X	X			X					X	X		
Blue Ridge Retirement	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Cardinal Care Center-Hendersonville	Medical	X	X	X	X	X	X			X				X		X	X	X
Carolina Village, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Cherry Springs Village	Medical	X	X	X	X	X	X			X				X		X		X
Country Meadow Rest Home	Medical	X	X	X	X	X	X			X						X	X	X
Druid Hills #1	Medical	X	X	X	X	X	X	X		X				X	X	X	X	X
Druid Hills #2	Medical	X	X	X	X	X	X	X		X				X	X	X	X	X
Henderson's Assisted Living	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Heritage Lodge	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
McCullough's Rest Home	Medical	X	X	X	X	X	X			X					X	X		
Mountain View Assisted Living	Medical	X	X	X	X	X	X			X								
Pisgah View Rest Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Spring Arbor of Hendersonville	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Margaret R. Pardee Memorial Hospital	Medical	X	X	X	X	X	X			X				X	X	X		X
Park Ridge Hospital	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)
Americas Addiction Trtmnt-4 Seasons Mall Blvd	Medical	X	X	X	X	X	X	X		X					X	X		X
Appalachian Counseling, LLC	Medical	X	X	X	X	X	X			X					X	X	X	X
Boyd's Place	Medical	X	X	X	X	X	X			X				X		X		X
Country Cove Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Crossroads/Phoenix	Medical	X	X	X	X	X	X			X					X	X	X	X
Eagle's Nest Home	Medical	X	X	X	X	X	X			X					X	X		
Emmaus House	Medical	X	X	X	X	X	X			X				X				X
Gibadlo Alternative Family Home	Medical	X	X	X	X	X	X			X				X		X	X	X
Halcyon L.L.C #B	Medical	X	X	X	X	X	X			X				X		X		X
Halcyon L.L.C. #A	Medical	X	X	X	X	X	X			X				X		X		X
Hall Street I	Medical	X	X	X	X	X	X			X						X	X	X
Hall Street II	Medical	X	X	X	X	X	X			X						X	X	X
Hill Park Group Home	Medical	X	X	X	X	X	X			X								
Horizon Recovery	Medical	X	X	X	X	X	X			X					X	X	X	X
Hour House	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Laurel Park Group Home UCP Housing	Medical	X	X	X	X	X	X			X				X		X	X	X
Mountain Enrichment Center	Medical	X	X	X	X	X	X			X						X		
New Foundations Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Owens 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)
Pinebrook Group Home	Medical	X	X	X	X	X	X			X					X	X		X
Rayside A	Medical	X	X	X	X	X	X			X					X	X	X	X
Rayside B	Medical	X	X	X	X	X	X			X					X	X	X	X
Robin's Place	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Sakelaris Home	Medical	X	X	X	X	X	X			X								
Sixth Avenue West	Medical	X	X	X	X	X	X			X				X	X	X		X
Springside	Medical	X	X	X	X	X	X			X					X	X		
The Relationship Center	Medical	X	X	X	X	X	X			X					X	X	X	X
Trend Community Mental Health Services-Henderson	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Turning Point Services/Loving Touch Home	Medical	X	X	X	X	X	X			X								
Turning Point Services/Ogletree Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Willow Street Home	Medical	X	X	X	X	X	X			X					X	X	X	X
Windsor Hills	Medical	X	X	X	X	X	X			X				X	X	X		X
Beverly Healthcare, Hendersonville	Medical	X	X	X	X	X	X			X				X		X	X	X
Brian Center Health & Rehabilitation/Hendersonville	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Carolina Village, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Heritage Health Center	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Life Care Center of Hendersonville	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)
Pardee Care Center	Medical	X	X	X	X	X	X			X					X	X		
Park Ridge Living Center	Medical	X	X	X	X	X	X			X				X	X	X		X
The Laurels of Hendersonville	Medical	X	X	X	X	X	X			X				X		X		X
Universal Health Care/Fletcher	Medical	X	X	X	X	X	X			X		X		X	X	X	X	X
On Call	Medical	X	X	X	X	X	X		X	X				X	X	X	X	X
TEMPOOLE HEALTH CARE AGENCY, I NC.	Medical	X	X	X	X	X	X			X					X	X	X	X
Polk County																		
POLK COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X			X				X	X	X		
Green Creek Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Green Creek Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Green Creek Volunteer Fire Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X		X			X	X		
Mill Spring Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Mill Spring Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Saluda Volunteer Fire & Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Sunny View Fire & Rescue	Fire/EMS	X	X	X	X	X	X			X		X			X	X		
Sunny View Fire & Rescue 2	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)
Town of Columbus Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Town of Columbus Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Tryon Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
POLK COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X			X					X	X		
POLK COUNTY RESCUE SQUAD INCORPORATED	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
COLUMBUS POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		
NORTH CAROLINA STATE HIGHWAY PATROL - POLK SUBSTATION	Police	X	X	X	X	X	X			X				X	X	X		
POLK COUNTY SHERIFFS DEPARTMENT / POLK COUNTY JAIL	Police	X	X	X	X	X	X			X				X	X	X		
SALUDA POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X	X	X
TRYON POLICE DEPARTMENT - HEADQUARTERS	Police	X	X	X	X	X	X			X				X	X	X	X	X
Saluda Elementary	School	X	X	X	X	X	X			X					X	X	X	X
Polk County High	School	X	X	X	X	X	X			X			X	X	X	X		
Polk Central	School	X	X	X	X	X	X			X					X	X		
Tryon Elementary	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Sunny View Elementary	School	X	X	X	X	X	X			X		X			X	X		
Polk County Early College	School	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)
Polk County Middle	School	X	X	X	X	X	X			X					X	X		
Tryon SDA School	School	X	X	X	X	X	X			X				X	X	X		
Foothills Academy	School	X	X	X	X	X	X			X					X	X		
Foothills Family Care Home	Medical	X	X	X	X	X	X			X						X		
Twin Lanes Family Care Home	Medical	X	X	X	X	X	X			X					X	X	X	X
ACTS Home Health Agency	Medical	X	X	X	X	X	X			X						X		
Community Health Connections	Medical	X	X	X	X	X	X			X					X	X		
Link Medical, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Polk Home Health Agency	Medical	X	X	X	X	X	X			X				X	X	X		
Laurelwoods	Medical	X	X	X	X	X	X			X				X	X	X		
Ridge Rest	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Twin Lanes Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
St. Luke's Hospital	Medical	X	X	X	X	X	X			X					X	X		
Bridgewood House	Medical	X	X	X	X	X	X			X			X	X	X	X		
Luminous Enterprises- Highway 9	Medical	X	X	X	X	X	X			X					X	X		
Polk Mental Health Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Autumn Care of Saluda	Medical	X	X	X	X	X	X			X					X	X	X	X
White Oak Manor - Tryon	Medical	X	X	X	X	X	X			X				X	X	X	X	X
WillowBrooke Court SC Center at Tryon Estates	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)
Rutherford County																		
RUTHERFORD COUNTY EMERGENCY MANAGEMENT AGENCY	EOC/Response	X	X	X	X	X	X			X			X	X	X	X		
RUTHERFORD COUNTY COMMUNICATIONS	EOC/Response	X	X	X	X	X	X			X			X	X	X	X		
Bills Creek Community Volunteer Fire Dept. Inc.	Fire/EMS	X	X	X	X	X	X			X								
Bills Creek Community Volunteer Fire Dept. Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Bostic Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X							X	X
Cherry Mountain Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X								
Cherry Mountain Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Chimney Rock Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Cliffside Area Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Cliffside Area Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Cliffside Area Fire Department, Inc. 3	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Ellenboro Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Fairfield Mountains Volunteer Fire Department, Inc.	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)
Forest City Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Green Hill Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Hudlow Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Hudlow Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
Lake Lure Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Polkville Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Rutherfordton Fire Department	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Sandy Mush Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Sandy Mush Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Shiloh-Danieltown-Oakland Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Shiloh-Danieltown-Oakland Volunteer Fire Department, Inc. 2	Fire/EMS	X	X	X	X	X	X			X								
Shingle Hollow Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X								
Spindale Fire Dept.	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Union Mills Volunteer Fire Department, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
RUTHERFORD COUNTY EMERGENCY MEDICAL SERVICES STATION 2	Fire/EMS	X	X	X	X	X	X			X					X	X		
RUTHERFORD COUNTY EMERGENCY SERVICES	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
HICKORY NUT GORGE VOLUNTEER EMERGENCY MEDICAL SERVICES AND RESCUE	Fire/EMS	X	X	X	X	X	X			X					X	X		
RUTHERFORD COUNTY RESCUE CREW	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
RUTHERFORD COUNTY LIFE SAVING CREW INCORPORATED	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
VOLUNTEER LIFE SAVING AND RESCUE DEPARTMENT	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
NORTH CAROLINA DIVISION OF PARKS - CHIMNEY ROCK STATE PARK	Police	X	X	X	X	X	X			X					X	X		
CITY OF RUTHERFORDTON POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X		
CITY OF FOREST CITY POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X		X
CITY OF SPINDALE POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X		
RUTHERFORD COUNTY SHERIFFS DEPARTMENT / RUTHERFORD COUNTY JAIL	Police	X	X	X	X	X	X			X			X	X	X	X		
LAKE LURE POLICE DEPARTMENT	Police	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)
Cliffside Elementary	School	X	X	X	X	X	X			X				X	X	X		
East Rutherford High	School	X	X	X	X	X	X			X					X	X		X
East Rutherford Middle	School	X	X	X	X	X	X			X							X	X
Ellenboro Elementary	School	X	X	X	X	X	X			X					X	X	X	X
RS Central High	School	X	X	X	X	X	X			X			X	X	X	X		
Mt VernonRuth Elementary	School	X	X	X	X	X	X			X					X	X		
RS Middle	School	X	X	X	X	X	X			X			X	X	X	X		
Chase High	School	X	X	X	X	X	X			X						X		
Forest CityDunbar Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Rutherford Opportunity Center	School	X	X	X	X	X	X			X					X	X		X
Rutherfordton Elementary	School	X	X	X	X	X	X			X		X				X		
Spindale Elementary	School	X	X	X	X	X	X			X			X	X	X	X		
Sunshine Elementary	School	X	X	X	X	X	X			X								
Thomas Jefferson Class Academy	School	X	X	X	X	X	X			X				X	X	X	X	X
Pinnacle Elementary	School	X	X	X	X	X	X			X								
Forrest W Hunt Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Chase Middle	School	X	X	X	X	X	X			X								X
Harris Elementary	School	X	X	X	X	X	X			X					X	X		
Rutherford Early College High	School	X	X	X	X	X	X			X			X	X	X	X		
Lake Lure Classical Academy	School	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)
New Beginnings Christian School	School	X	X	X	X	X	X			X						X		X
The Master's Academy	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Glenwood Christian Academy	School	X	X	X	X	X	X			X			X	X		X	X	X
Faith Academy	School	X	X	X	X	X	X			X				X	X	X		X
Pine Ridge Mennonite School	School	X	X	X	X	X	X			X								
Trinity Christian School	School	X	X	X	X	X	X			X				X	X	X		
Word of Faith Christian School	School	X	X	X	X	X	X			X				X	X	X		
ISOTHERMAL COMMUNITY COLLEGE	School	X	X	X	X	X	X			X				X	X	X		
Cardiac and Pulmonary Rehabilitation of Rutherford	Medical	X	X	X	X	X	X			X				X	X	X		
Country Living and Moore Family Care Home	Medical	X	X	X	X	X	X			X					X	X		X
Dellinger's Family Care Home	Medical	X	X	X	X	X	X			X						X		
Dellinger's Retirement Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Forest Lake Retirement Home	Medical	X	X	X	X	X	X			X								
Golden Harvest Living Center #1	Medical	X	X	X	X	X	X			X				X	X	X		X
Golden Harvest Living Center #2	Medical	X	X	X	X	X	X			X				X	X	X		X
Hopewell Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X		
Joyful Home Family Care	Medical	X	X	X	X	X	X			X					X	X	X	X
Kelly's Family Care	Medical	X	X	X	X	X	X			X								
Tipton Family Care Home #4	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)
Tipton Home #6	Medical	X	X	X	X	X	X			X				X	X	X		
Tipton Retirement Home #1	Medical	X	X	X	X	X	X			X			X	X	X	X		
Tipton Retirement Home #5	Medical	X	X	X	X	X	X			X				X	X	X		
Union Mills Living Center #1	Medical	X	X	X	X	X	X			X						X		X
Union Mills Living Center #2	Medical	X	X	X	X	X	X			X						X		X
Union Mills Living Center #3	Medical	X	X	X	X	X	X			X						X		X
Yelton's Family Care #1	Medical	X	X	X	X	X	X			X					X	X		
Yelton's Family Care Home #2	Medical	X	X	X	X	X	X	X		X						X		
Yelton's Family Care Home #3	Medical	X	X	X	X	X	X	X		X						X		
Yelton's Family Care Home #4	Medical	X	X	X	X	X	X			X					X	X		X
Carolina Home 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		
CNC/Access, Inc.	Medical	X	X	X	X	X	X			X					X	X		X
Foothills Home Care, LLC	Medical	X	X	X	X	X	X			X			X	X	X	X		
Rutherford Home Health Care	Medical	X	X	X	X	X	X			X			X	X	X	X		
Rutherford Rehab Services	Medical	X	X	X	X	X	X			X			X	X	X	X		
Smith's Drugs Vital Care	Medical	X	X	X	X	X	X			X					X	X		X
Carolina House of Forest City	Medical	X	X	X	X	X	X			X					X	X		
Colonial Manor Rest Home	Medical	X	X	X	X	X	X			X						X		
Haven-n-Hills	Medical	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)
Henderson Care Center	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Hillcrest Adult Care Facility	Medical	X	X	X	X	X	X			X					X	X		
Holly Springs Senior Citizens Home	Medical	X	X	X	X	X	X			X								
Mae's Rest Home, Inc.	Medical	X	X	X	X	X	X			X							X	X
Oakland Living Center, Inc.	Medical	X	X	X	X	X	X			X						X		
Restwell Home	Medical	X	X	X	X	X	X			X			X	X	X	X		
Southern Manor Retirement Home, Inc.	Medical	X	X	X	X	X	X			X					X	X		X
Sunnyside Assisted Living Facility	Medical	X	X	X	X	X	X			X				X	X	X		
Hospice of Rutherford County, Inc.	Medical	X	X	X	X	X	X			X				X	X	X		X
Rutherford Hospital, Inc.	Medical	X	X	X	X	X	X			X				X	X	X		
Baker Home	Medical	X	X	X	X	X	X			X					X	X		
Blue Ridge Counseling Services	Medical	X	X	X	X	X	X			X			X	X	X	X		
Bradley Home	Medical	X	X	X	X	X	X			X						X		
C & R Snethen Home	Medical	X	X	X	X	X	X			X							X	X
Cardinal Road Home	Medical	X	X	X	X	X	X			X				X		X		
Chrisman Adult Home, Inc.	Medical	X	X	X	X	X	X			X								
Commonwood Home	Medical	X	X	X	X	X	X			X					X	X		
Curtis & Linda Snethen Home	Medical	X	X	X	X	X	X			X			X	X	X	X		
D and J Bradley Home	Medical	X	X	X	X	X	X			X						X		
Daigle Home	Medical	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)
Discovery/Rutherford Hospital Behavioral Health Ser	Medical	X	X	X	X	X	X			X				X	X	X		
Fournier Home	Medical	X	X	X	X	X	X			X			X	X	X	X		
Fuller Home	Medical	X	X	X	X	X	X			X			X	X	X	X		
Hardin Home	Medical	X	X	X	X	X	X			X					X	X		
Magnolia House of Rutherford County	Medical	X	X	X	X	X	X			X				X	X	X	X	X
McCallum Home	Medical	X	X	X	X	X	X			X								
McDowell Home	Medical	X	X	X	X	X	X			X				X	X	X		
Moore Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Moss Home	Medical	X	X	X	X	X	X			X				X	X	X		
Parkland Group Home	Medical	X	X	X	X	X	X			X				X		X	X	X
Pine Street	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Quintero Home	Medical	X	X	X	X	X	X			X						X		
Smith Home	Medical	X	X	X	X	X	X			X								
The Kid's Place	Medical	X	X	X	X	X	X			X						X		
The Oaks	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
The Raintree Clinic	Medical	X	X	X	X	X	X			X			X	X	X	X		
The Rutherford Center	Medical	X	X	X	X	X	X			X			X	X	X	X		
Tri-City Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Turning Point Services/McDaniels Home	Medical	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)
VOCA-Rollins Group Home	Medical	X	X	X	X	X	X			X						X		
VOCA-Woodland	Medical	X	X	X	X	X	X			X			X	X	X	X		
Whisnant Home	Medical	X	X	X	X	X	X			X					X	X	X	X
Wood Home	Medical	X	X	X	X	X	X			X					X	X	X	X
Autumn Care of Forest City	Medical	X	X	X	X	X	X			X					X	X		
Fair Haven Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Oak Grove Health Care Center	Medical	X	X	X	X	X	X			X				X	X	X		
White Oak Manor - Rutherfordton	Medical	X	X	X	X	X	X			X					X	X		
Willow Ridge of NC, LLC	Medical	X	X	X	X	X	X			X					X	X		
Transylvania County																		
TRANSYLVANIA COUNTY EMERGENCY MANAGEMENT	EOC/Response	X	X	X	X	X	X	X		X			X	X			X	X
Balsam Grove Volunteer Fire Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Brevard Fire Dept.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Cedar Mountain Volunteer Fire Rescue, Inc.	Fire/EMS	X	X	X	X	X	X	X		X		X			X	X		
Connestee Fire Rescue, Incorporated	Fire/EMS	X	X	X	X	X	X			X					X	X		
Connestee Fire Rescue, Incorporated 2	Fire/EMS	X	X	X	X	X	X			X								
Lake Toxaway Fire Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Lake Toxaway Fire Rescue, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X		

FACILITY NAME	FACILITY TYPE	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Little River Fire Department of Transylvania County, Inc.	Fire/EMS	X	X	X	X	X	X			X								X
Little River Fire Department of Transylvania County, Inc. 2	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
North Transylvania Fire Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
Rosman Fire/Rescue, Inc.	Fire/EMS	X	X	X	X	X	X			X					X	X		
NORTH CAROLINA HIGH LEVEL EXTRACTION RESCUE TEAM INCORPORATED	Fire/EMS	X	X	X	X	X	X			X		X			X	X		
TRANSYLVANIA COUNTY EMERGENCY MEDICAL SERVICES	Fire/EMS	X	X	X	X	X	X			X						X		
TRANSYLVANIA COUNTY EMERGENCY MEDICAL SERVICES 2	Fire/EMS	X	X	X	X	X	X	X		X					X	X		
TRANSYLVANIA COUNTY RESCUE SQUAD INCORPORATED	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
UNITED STATES FOREST SERVICE - PISGAH NATIONAL FOREST PISGAH RANGER DISTRICT	Police	X	X	X	X	X	X		X	X					X	X		
CITY OF BREVARD POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X		
NORTH CAROLINA DIVISION OF PARKS - GORGES STATE PARK	Police	X	X	X	X	X	X			X					X	X		
TRANSYLVANIA COUNTY SHERIFFS DEPARTMENT	Police	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)
T C Henderson Elementary	School	X	X	X	X	X	X			X					X	X		
Rosman Elementary	School	X	X	X	X	X	X			X					X	X		
Rosman High	School	X	X	X	X	X	X			X					X	X		
Brevard Middle	School	X	X	X	X	X	X			X				X	X	X		
Brevard Elementary	School	X	X	X	X	X	X			X					X	X		
Brevard High	School	X	X	X	X	X	X			X						X		
Pisgah Forest Elementary	School	X	X	X	X	X	X			X			X	X		X	X	X
Davidson River School	School	X	X	X	X	X	X			X			X	X		X	X	X
Rosman Middle	School	X	X	X	X	X	X			X					X	X		
Brevard Academy	School	X	X	X	X	X	X			X								
Anchor Baptist Academy	School	X	X	X	X	X	X			X					X	X	X	X
Bethany Christian School	School	X	X	X	X	X	X			X					X	X		
Mountain Sun Community School	School	X	X	X	X	X	X			X								
Calvary Baptist Mission Academy	School	X	X	X	X	X	X			X			X	X		X	X	X
The Outdoor Academy	School	X	X	X	X	X	X	X		X								
BREVARD COLLEGE	School	X	X	X	X	X	X			X					X	X		
Kings Bridge House	Medical	X	X	X	X	X	X	X		X						X		
The Parc at Brevard	Medical	X	X	X	X	X	X			X		X			X	X		
Carolina Counseling Center	Medical	X	X	X	X	X	X			X					X	X		
Forest Bend Group Home	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)
Transylvania Community Hospital Cardiac Rehab.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Four Seasons Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Tore's Home, Inc.	Medical	X	X	X	X	X	X			X						X		
Tore's Home, Inc. #2	Medical	X	X	X	X	X	X			X						X		
Transylvania Living Center	Medical	X	X	X	X	X	X			X					X	X		
College Walk Home Care	Medical	X	X	X	X	X	X			X				X	X	X		
Compassionate Companions, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Home Care - TCH	Medical	X	X	X	X	X	X			X				X	X	X		X
Loftis Oxygen & Medical Equipment, Inc.	Medical	X	X	X	X	X	X			X		X			X	X		
Tore's Home Services, Inc.	Medical	X	X	X	X	X	X			X						X		
Transylvania Community Hospital, Inc. And Bridgeway	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Brevard Counseling	Medical	X	X	X	X	X	X			X					X	X		
Brevard Group Home UCP Housing	Medical	X	X	X	X	X	X			X					X	X		
Counseling Centers of Brevard	Medical	X	X	X	X	X	X			X					X	X		
Transylvania Association for Disabled Citizens, Inc	Medical	X	X	X	X	X	X			X		X				X		
Trend Community Mental Health Services-Transylvania	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Brian Center Health and Rehabilitation/Brevard	Medical	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)
Ivy Hill Health and Retirement	Medical	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 South Mountains 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 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 South Mountains 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 that 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 within the South Mountains Region, 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 regulatory 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 an 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 be addressed through newly proposed mitigation actions 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. 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 and 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 South Mountains 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 South Mountains Regional Hazard Mitigation Planning Team.

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 how land is developed and structures are built; as well as protecting environmental, historic, and cultural resources in the community. 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 South Mountains Region 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 South Mountains Region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the South Mountains Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	HENDERSON COUNTY	Flat Rock	Fletcher	Hendersonville	Laurel Park	Mills River	POLK COUNTY	Columbus	Saluda	Tryon	RUTHERFORD COUNTY	Bostic	Chimney Rock	Ellenboro	Forest City	Lake Lure	Ruth	Rutherfordton	Spindale	TRANSYLVANIA COUNTY	Brevard	Rosman
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floodplain Management Plan																						
Open Space Management Plan (Parks & Rec/Greenway Plan)	✓	✓	✓	✓	✓	✓	✓				✓				✓	✓		✓		✓	✓	
Stormwater Management Plan/Ordinance	✓	✓	✓	✓	✓										✓						✓	
Natural Resource Protection Plan				✓			✓				✓									✓		
Flood Response Plan																						
Emergency Operations Plan	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓			
Continuity of Operations Plan																						
Evacuation Plan																						
Disaster Recovery Plan																						
Capital Improvements Plan			✓	✓	✓	✓	✓	✓		✓	✓				✓	✓		✓	✓			
Economic Development Plan	✓		✓		✓		✓						✓			✓		✓		✓		✓
Historic Preservation Plan																						
Flood Damage Prevention Ordinance	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Zoning Ordinance	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓
Subdivision Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓	✓	
Unified Development Ordinance	✓				✓	✓	✓	✓							✓			✓			✓	
Post-Disaster Redevelopment Ordinance																						
Building Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fire Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
National Flood Insurance Program (NFIP)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
NFIP Community Rating System																					✓	

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

7.3.2 Emergency Management

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

FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the South Mountains Region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- Each of the four counties participating in this multi-jurisdictional plan has previously adopted a hazard mitigation plan. Each participating municipality was included in their respective county's plan.

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 participating jurisdictions have developed a disaster recovery plan.

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

- Henderson County and Rutherford County each maintain emergency operations plans through their respective Emergency Management Departments.
- Henderson County coordinates all emergency management operations for the county and its incorporated municipalities.
- Rutherford County maintains a countywide emergency operations plan that covers all of its municipalities. However, the Town of Lake Lure has adopted its own town emergency operations plan administrated by the Town's Emergency Management Department.

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.

- None of the participating jurisdictions have developed a disaster recovery plan.

7.3.3 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals. Therefore, the capability assessment also included questions pertaining to general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the South Mountains 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.

- Henderson County and its participating municipalities have each adopted a local comprehensive plan.
- Polk County, the Towns of Columbus and Tryon, and the City of Saluda have each adopted a local land use plan.
- Rutherford County has adopted a land use plan that encompasses the county as well as the Town of Bostic, the Village of Chimney Rock, the Town of Ellenboro, the Town of Forest City, the Town of Lake Lure, the Town of Ruth, the Town of Rutherfordton, and the

Town of Spindale. Chimney Rock Village, Forest City, Lake Lure, Rutherfordton, and Spindale have also adopted municipal-level comprehensive plans.

- Transylvania County has adopted a comprehensive plan that addresses land uses within the county and the Town of Rosman. The City of Brevard has adopted a city 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.

- The Town of Fletcher, City of Hendersonville, Town of Laurel Park, and Town of Mills River have capital improvement plans in place.
- Polk County, the Town of Columbus, and Town of Tyron have capital improvement plans in place.
- Rutherford County, the Town of Forest City, Town of Lake Lure, Town of Rutherfordton, and Town of Spindale also have capital improvement plans.
- Transylvania County and the City of Brevard have capital improvement plans.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often-overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

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

Zoning Ordinance: Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- Henderson County and each of its participating municipalities administer a zoning ordinance.
- Polk County and each of its participating municipalities administer a zoning ordinance.
- Rutherford County does not have a zoning ordinance. However, the municipalities of Chimney Rock Village, Ellenboro, Forest City, Lake Lure, Rutherfordton, and Spindale have adopted zoning ordinances that are overseen by municipal zoning administrators.
- Transylvania County does not have a zoning ordinance. However, the City of Brevard and Town of Rosman have adopted a zoning ordinance administered locally.

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.

- Henderson County and all of its participating municipalities have adopted and enforce subdivision regulations.
- Polk County and all of its participating municipalities have also adopted and enforce subdivision regulations.
- Rutherford County, the Town of Bostic, the Village of Chimney Rock, the Town of Forest City, the Town of Spindale, and the Town of Lake Lure have each adopted subdivision regulations.
- Transylvania County and the City of Brevard have also both adopted subdivision regulations.

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.
- Henderson County provides building code enforcement for the county and all of its municipalities.
- Polk County Building Inspections enforces the building code within the county.
- Rutherford County provides building code enforcement not only for the county but also for the Village of Chimney Rock and the Towns of Lake Lure, Rutherfordton, Ruth, Spindale, Ellenboro, and Bostic.
- Transylvania County enforces the building code for the county and both of its municipalities.

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. Accordingly, advanced tools have been developed and are readily available to help reduce the impacts associated with flooding. These tools 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 to implement and sustain an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in the South Mountains 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
HENDERSON COUNTY†	03/01/82	01/06/10	214	$61,274,200	46	$471,151
Flat Rock	12/12/08	01/06/10	38	$11,277,400	1	$13,943
Fletcher	10/28/03	01/06/10	66	$21,474,000	10	$295,460
Hendersonville	01/20/82	01/06/10	157	$46,173,400	141	$1,788,634
Laurel Park	10/02/08	01/06/10	12	$3,760,000	5	$18,925
Mills River*	--	--	--	--	--	--
POLK COUNTY†	01/01/87	10/02/08	47	$13,626,400	34	$1,006,420
Columbus	04/24/09	10/02/08	1	$750,000	0	$0
Saluda	02/19/10	10/02/08	--	--	--	--
Tryon	08/19/86	10/02/08(M)	14	$4,038,000	2	$41,720
RUTHERFORD COUNTY†	06/01/87	01/06/10	35	$8,842,600	43	$1,210,066
Bostic	09/25/09	01/06/10	1	$350,000	0	$0
Chimney Rock Village	02/14/97	01/06/10	20	$7,162,000	2	$23,359
Ellenboro*	--	--	--	--	--	--
Forest City	06/17/86	01/06/10	2	$600,000	2	$75,275
Lake Lure	03/04/97	01/06/10	31	$8,768,000	2	$28,745
Ruth	09/28/18	01/06/10	--	--	--	--
Rutherfordton	06/17/86	01/06/10	4	$1,178,000	3	$11,832
Spindale	06/04/79	01/06/10	--	--	--	--
TRANSYLVANIA COUNTY†	01/02/80	04/19/10	145	$41,294,000	34	$1,230,252
Brevard	09/29/78	04/19/10	127	$40,186,400	13	$151,991
Rosman	06/02/72	04/19/10	8	$1,400,200	14	$207,400

†Includes unincorporated areas of county only
*Community does not participate in the NFIP
(M) – No Elevation Determined, all Zone A, C and X
Source: NFIP Community Status information as of 3/3/25; NFIP claims and policy information as of September 2024

All jurisdictions listed above that are participants in the NFIP will continue to comply with all required provisions of the program and will work to adequately comply in the future utilizing a number of strategies. For example, the jurisdictions will coordinate with NCEM and FEMA to develop maps and regulations related to special flood hazard areas within their jurisdictional boundaries and, through a consistent monitoring process, will design and improve their floodplain management program in a way that reduces the risk of flooding to people and property.

The Town of Ellenboro does not participate in the NFIP because none of its land area is currently located within the floodplain. The Towns of Mills River does not participate in the NFIP due to lack of available funding and political support.

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 Reductio
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.

- The City of Brevard is the only jurisdiction that currently participates in the CRS. Participation in the CRS program should be considered as a mitigation action by the counties and other municipalities. The program would be most beneficial to Henderson County, the City of Hendersonville, and Transylvania County.

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.

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.

- Henderson County has a Greenway Master Plan that serves as their Open Space Master Plan. All municipalities within the county have adopted an open space plan.
- Polk County has adopted an open space management plan.
- Rutherford County has an open space management plan as well as the Forest City, Lake Lure, and Rutherfordton.
- Transylvania County and the City of Brevard have adopted a joint comprehensive 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.

- Henderson County, Flat Rock, Hendersonville, Laurel Park, and Mills River have stormwater management plans/ordinances in place.
- The Town of Forest City and the City of Brevard have adopted a stormwater management ordinance.

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 the Towns of Ellenboro and Mills River, have adopted flood damage prevention regulations.

Substantial Damage Estimate 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. Determination of substantial damage is a coordinated effort between emergency management, police and fire departments and permitting departments such as planning and building inspections departments. Floodplain management and substantial damage estimating procedures for participating jurisdictions are detailed below.

TABLE 7.4: FLOODPLAIN MANAGEMENT AND SDE PROCEDURES

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
HENDERSON COUNTY	Maintains a countywide flood damage prevention ordinance and participates in the NFIP	County Floodplain Manager	Immediately after a flood event, employees across multiple departments that consist of planning staff, site development, building inspectors and certified floodplain managers deploy to the affected areas. Henderson County staff will conduct windshield surveys and assess damage. This is tracked digitally and on paper forms and then logged into County 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 County 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

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
				work is also field verified by inspectors to make sure construction is up to code and in compliance with Town ordinances.
Flat Rock	Maintains a village-wide flood damage prevention ordinance and participates in the NFIP	Village Zoning Administrator	Immediately after a flood event, the Floodplain Administrator would visit the affected area(s) to assess damage. The Town does not have in-house building code officials so assistance from the County may be required.	The outcome of the damage assessment would be logged in and once homeowners come in for permit repair work, this data is referenced and if a substantial damage is triggered, then the building must come into compliance with Town of Fletcher floodplain regulations. 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.
Fletcher	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Planning Director and Zoning Administrator serves as the Floodplain Administrator	Immediately after a flood event, the Floodplain Administrator would visit the affected area(s) to assess damage. The Town does not have in-house building code officials so assistance from the County may be required.	The outcome of the damage assessment would be logged in and once homeowners come in for permit repair work, this data is referenced and if a substantial damage is triggered, then the building must come into compliance with Town of Fletcher floodplain regulations. 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

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
				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.
Hendersonville	Maintains a citywide flood damage prevention ordinance and participates in the NFIP	City Manager appoints Floodplain Administrator. Zoning Administrator designated as Floodplain Administrator.	Immediately after a flood event, employees across multiple departments that consist of City of Hendersonville stormwater staff, construction inspectors, and certified floodplain managers deploy to the affected areas. The City is broken into three areas and each area has a dedicated number of teams to conduct windshield surveys and assess damage.	Substantial Damage Estimates are tracked digitally and on paper forms and then logged into a City database. 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 City of Hendersonville 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 the City Floodplain Administrator and Zoning Compliance Staff to make sure construction is up to code and in compliance with City ordinances.
Laurel Park	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Zoning Administrator	Immediately after a flood event, the Floodplain Administrator would visit the affected area(s) to assess damage. The Town does not have in-house building code officials so assistance from the County may be required.	The outcome of the damage assessment would be logged in and once homeowners come in for permit repair work, this data is referenced and if a substantial damage is triggered, then the building must come into compliance

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
				with Town of Fletcher floodplain regulations. 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.
Mills River*				
POLK COUNTY	Maintains a countywide flood damage prevention ordinance and participates in the NFIP	The Planning/Economic Development Director serves as the Floodplain Administrator.	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Columbus	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
			condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	
Saluda	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Building Codes Official	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Tryon	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
RUTHERFORD COUNTY	Maintains a countywide flood damage prevention ordinance and participates in the NFIP	The County Building Inspector serves as the Floodplain Administrator.	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination:	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
			• Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	flood prevention ordinance required
Bostic	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Chimney Rock Village	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
Ellenboro*				
Forest City	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	City Manager or his/her designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Lake Lure	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Ruth	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
			market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	
Rutherfordton	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Manager or his/her designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Spindale	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
TRANSYLVANIA COUNTY	Maintains a countywide flood damage prevention ordinance and participates in the NFIP	Building Permitting and Enforcement Department Director	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
			• Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	
Brevard	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Planning Director	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required
Rosman	Maintains a townwide flood damage prevention ordinance and participates in the NFIP	Town Designee	Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination: • Estimation of market value or obtaining appraisal • Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure Determination of whether work constitutes substantial improvement/repair of damage	If work constitutes substantial improvement or repair of substantial damage, applicants are notified and compliance with building codes and flood prevention ordinance required

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 7.5 provides a summary of the capability assessment results for the Cabarrus Stanly Union 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 7.5: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	HENDERSON COUNTY	Flat Rock	Fletcher	Hendersonville	Laurel Park	Mills River	POLK COUNTY	Columbus	Saluda	Tryon	RUTHERFORD COUNTY	Bostic	Chimney Rock Village	Ellenboro	Forest City	Lake Lure	Ruth	Rutherfordton	Spindale	TRANSYLVANIA COUNTY	Brevard	Rosman
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 7.6 provides a summary of the results for the South Mountains 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 7.6: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	HENDERSON COUNTY	Flat Rock	Fletcher	Hendersonville	Laurel Park	Mills River	POLK COUNTY	Columbus	Saluda	Tryon	RUTHERFORD COUNTY	Bostic	Chimney Rock Village	Ellenboro	Forest City	Lake Lure	Ruth	Rutherfordton	Spindale	TRANSYLVANIA COUNTY	Brevard	Rosman
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, FMA, PDM, PA, SBA, other federal grants, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.7 Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to reduce the impact of future hazard events. Hazard mitigation may not be a local priority or may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Capability Assessment Survey was used to capture information on political capability of the South Mountains 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, watershed protection, erosion and sedimentation control, zoning, and subdivision.
- Opposition to mitigation measures is not evident in Henderson County or its incorporated municipalities. In fact, Henderson County has taken a proactive approach to mitigation through the development of governing documents which promote the mitigation process. The Henderson County Governing Board is well educated on the hazards that threaten the county and has advisory boards that specialize in specific areas of hazard reduction. The county (its governing board, staff, and citizenry) appears highly capable and willing to promote the economic efficiency and social utility of the mitigation measures contained in this plan. In addition, they appear willing to assist all local municipalities in the implementation of strategies identified herein and specific to municipal jurisdictions.
- Mitigation strategies have been presented to the Polk County Planning Board on various occasions. The results have included an effort to map all county water sources in GIS, an updated and adopted flood prevention ordinance, adopting a soil and erosion ordinance, and recommended changes to the subdivision ordinance incorporating changes to road requirements and emergency apparatus. This demonstrates favorable political support and a willingness to adopt hazard mitigation efforts in an active manner.
- Rutherford 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 Rutherford County Board of Commissioners, the professional staff, and the citizens of the county are continually striving to make Rutherford 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.
- Opposition to mitigation measures is not evident in Transylvania County or its incorporated municipalities. In fact, Transylvania County has taken a proactive approach to mitigation through the development of governing documents which promote the mitigation process. The Transylvania County Governing Board is well educated on the hazards that threaten the county and has advisory boards that specialize in specific areas of hazard reduction. The county (its governing board, staff, and citizenry) appears highly capable and willing to promote the economic efficiency and social utility of the mitigation measures contained in this plan. In addition, they appear willing to assist all local municipalities in the implementation of strategies identified herein and specific to municipal jurisdictions.

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 South Mountains Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varies among the participating jurisdictions. For planning and regulatory capability, the majority of the jurisdictions are in the moderate range. There is more 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 7.7 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 33, which falls into the moderate capability ranking.

TABLE 7.7: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
HENDERSON COUNTY	40	High
Flat Rock	32	Moderate
Fletcher	37	Moderate
Hendersonville	39	Moderate
Laurel Park	35	Moderate
Mills River	25	Moderate
POLK COUNTY	39	Moderate
Columbus	30	Moderate
Saluda	25	Moderate
Tryon	30	Moderate
RUTHERFORD COUNTY	39	Moderate
Bostic	30	Moderate
Chimney Rock Village	32	Moderate
Ellenboro	25	Moderate
Forest City	35	Moderate
Jurisdiction	**Overall Capability Score**	**Overall Capability Rating**
Lake Lure	34	Moderate
Ruth	25	Moderate
Rutherfordton	33	Moderate
Spindale	32	Moderate
TRANSYLVANIA COUNTY	37	Moderate
Brevard	39	Moderate
Rosman	31	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 Team 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 South Mountains Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the South Mountains Regional Hazard Mitigation Planning Team and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

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

8.1 INTRODUCTION

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

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

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

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained

through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the South Mountains 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 the participating counties and municipalities 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 South Mountains 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 South Mountains Regional plan, the Regional Hazard Mitigation Planning Team members were tasked with establishing a priority for each action at the second Planning Team 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]
- Funding availability
- Continued compliance with the NFIP

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

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

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

8.2 MITIGATION GOALS

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

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, and as part of the development of the initial South Mountains Regional Hazard Mitigation Plan, the South Mountains counties and the participating municipalities have developed goal statements for local hazard mitigation planning in the region. To develop these goals, the previous four county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the four existing plans that were combined to form this regional plan. Many of the goals were similar and regional goals were formulated based on commonalities found between the goals in each plan.

During the development of the initial regional plan for the region, the proposed regional goals were presented, reviewed, voted on, and accepted by the Planning Team at the second Regional Hazard Mitigation Planning Team meeting. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The South Mountains Regional Mitigation Goals are presented in **Table 8.1**. Consistent implementation of actions over time will ensure that community goals are achieved.

As part of the development of the 2025 update of this plan, the goals found in Table 8.1 were reviewed and discussed at the 8/14/24 meeting of the Regional Hazard Mitigation Planning Committee. It was determined that the goals are still applicable for the region.

TABLE 8.1: SOUTH MOUNTAINS REGIONAL MITIGATION GOALS

	Goal
Goal #1	Improve public education/awareness
Goal #2	Protect human life, safety and welfare by minimizing the potential for damage to personal property, infrastructure, and loss of life due to natural and human caused hazards.
Goal #3	Protect and maintain emergency services infrastructure and equipment to support emergency responders and improve disaster response time/operations.
Goal #4	Improve technical, legal, and institutional capability to respond to and recover from disasters.
Goal #5	Reduce or eliminate the risk of natural disasters.

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

8.3.1 Prevention

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

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Storm-water 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., wind-proofing, flood-proofing, 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 SOUTH MOUNTAINS REGION

In order to determine the most appropriate mitigation techniques for the communities in the South Mountains Region, the Regional Hazard Mitigation Planning Team members thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous South Mountains Region 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 South Mountains 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 South Mountains Region. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed and relative priority. 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 South Mountains Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of "high," "moderate," or "low" as described below and in Section 8 (page 8.2).

The Mitigation Action Plan is organized by mitigation strategy category (Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, or Public Education and Awareness). The following are the key elements described in the Mitigation Action Plan:

- Hazard(s) Addressed—Hazard which the action addresses.
- Relative Priority—High, moderate, or low priority as assigned by the jurisdiction.
- Lead Agency/Department—Department responsible for undertaking the action.

- Potential Funding Sources—Local, State, or Federal sources of funds are noted here, where applicable.
- Implementation Schedule—Date by which the action the action should be completed. More information is provided when possible.
- Implementation Status (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 22 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
Henderson County	**9:3**	**27**
Flat Rock	9:9	4
Fletcher	9:10	3
Hendersonville	9:12	19
Laurel Park	9:16	4
Mills River	9:18	10
Polk County	**9:21**	**24**
Columbus	9:26	10
Saluda	9:29	12
Tryon	9:32	13
Rutherford County	**9:35**	**13**
Bostic	9:38	4
Chimney Rock Village	9:40	7
Ellenboro	9:42	4
Forest City	9:44	5
Lake Lure	9:46	6
Ruth	9:49	5
Rutherfordton	9:51	4
Spindale	9:53	5
Transylvania County	**9:55**	**7**
Brevard	9:58	8
Rosman	9:61	16

Henderson County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-4	Install stream gauges on major waterways throughout the County to collect data on stream water height and velocity (this will also assist in mitigating erosion hazards).	Flooding	High	General Revenue and Grants	County EMA	2030	This will remain an ongoing item based on funding availability.
P-5	Implement scaling as a method of preventative maintenance to reduce the amount of loose debris that could lead to landslides during high precipitation events or seismic events	Geological/Landslides	High	General Revenue and Grants	NCDOT	2030	DOT continues to make improvements in high probability areas along State maintained roads
P-7	Develop a stand-by acquisition grant application that lists properties with a high potential for damage or destruction due to a dam/levee failure.	Dam Failure	Low	General Revenue and Grants	County EMA	2030	Properties have been identified through the GIS layer development. No funding has been awarded for acquisition, so this will remain an action going forward.
P-8	Develop a stand-by acquisition grant application that lists properties located in multi-hazard areas which are prone not only to flash flooding but also to severe landslides. (Examples include properties located near US HWY 74 and NC HWY 9 (Bat Cave)	Flooding Geological/Landslides	High	General Revenue and Grants	County EMA	2030	The County is working with NCEM and FEMA on Mitigation Grants for interested properties. Will continue to pursue this action as possible and as funding is available.
P-11	Join the Community Rating System (CRS) program within the next two years.	Flooding	Moderate	General Revenue	Flood Damage Prevention Administrator	2030	Develop and distribute materials in conjunction with EMA and Building Services.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
P-12	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	Moderate	Federal Grants	Henderson County Emergency Management	As funding becomes available.	Action remains ongoing as funding becomes available.
Property Protection							
PP-1	Incorporate development and construction standards into the Zoning and Subdivision Ordinances to further regulate construction in areas prone to landslides.	Geological/Landslides Flooding	High	General Revenue	Planning Dept.	2030	Policymakers continue to review this item. Additional education and information has been shared with industry and community leaders. Action steps related to this were adopted in the 2045 Comprehensive Plan and will be considered during the Land Development Code rewrite process.
PP-2	Circulate an assessment survey to determine what methods or devices County agencies have in place for securing equipment and furniture during earthquake events.	Earthquakes	Low	General Revenue	Facilities Services	2030	Additional improvements have been made as budgeting, upgrades and renovations are taking place.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PP-3	Provide redundancy to protect against Cyber Communications/ Record Retention failures, as well as EOC back up internet and EOC internet for activations.	All	High	General Revenue and Grants	IT Dept.	2030	New action for the 2025 update.
PP-4	Establish auxiliary power systems via fixed or portable generators for all primary County buildings and schools. Make certain to include the wiring closets to accommodate technology routing.	All	High	General Revenue and Grants	County EMA Engineering Dept	2030	Ongoing project as budgets allow.
Natural Resource Protection							
NRP-5	Establishing a" green infrastructure" program to link, manage, and expand existing parks, preserves, greenways, etc.	Flooding	Moderate	General Revenue	Parks & Recreation	Ongoing, revisit in 2030	New action. The County has adopted a Greenway Master Plan to encourage planned growth of existing and new greenways.
Emergency Services							
ES-6	Reaffirm plans with emergency service agencies and providers for isolation and evacuation during HAZMAT events.	Hazardous Substances	Moderate	General Revenue and Grants	County EMA	2030, Annually review and update	Ongoing as budget allows.
ES-7	Incorporate the procedures for tracking high water marks following a flood into emergency response plans.	Flooding	Moderate	General Revenue	County EMA	2030	Utilize technology to identify high water marks when able and share data with key stakeholders for forecasting future needs.
ES-8	Leverage existing and emerging technologies to ensure up to date remote sensing data is current, especially in rapidly developing areas.	All	Moderate	General Revenue	IT Department	2030	Utilize current technology to maintain GIS layers for aerial photography for key hazard areas in Henderson County. (examples include LiDar, Oblique imagery)

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
ES-9	Continue to develop response equipment capacity for all hazards response in an austere environment	All	High	General Revenue and Grants	County EMA	2030	Ongoing as budget allows.
ES-10	Incorporate Audible Emergency Notification system for high hazard areas, for flash flooding and mass gatherings.	Flooding, Civil Disturbance	High	General Revenue and Grants	County EMA	2030	New action for the 2025 update.
ES-11	Support resiliency and redundancy for critical infrastructure providers for essential county services.	All	High	General Revenue and Grants	County EMA	2030	New action for the 2025 update.
Public Education and Awareness							
PEA-2	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	Low	General Revenue	Building Services	2030	Building Services and Fire Services will continue to provide education and outreach as available.
PEA-3	Provide new home and property buyers with information on quality redevelopment and safe housing development. The information is probably most efficiently dispersed at the County and local administration buildings.	All	Low	General Revenue	Building Services	2030	This item will continue as additional outreach is needed.
PEA-4	Manually disperse and have a website posting which provides information about the Henderson County Multi-Jurisdictional Hazard Mitigation Plan and relevant mitigation measures the public can take. In addition, provide a response/reply section where	All	High	General Revenue	County EMA	2030, Annually review and update materials	This item will continue as information and materials are updated.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
	residents can comment on the effectiveness of the current plan and where they can make suggestions for future revisions on then plan.						
PEA-5	Circulate information related to the property owner requirements and regulations related to the maintenance and repair of private roadways.	Geological/Landslides Flooding	High	General Revenue	County EMA/Planning Department	Action to be deleted.	There are no requirements or regulations for maintenance of private roads. Only regulations are on the developer at the time of construction. Action will be removed from future plan updates.
PEA-6	Educate property owners regarding options for mitigating their properties from flooding through outreach activities.	Flooding	High	General Revenue	County EMA	2030	Develop outreach materials for distribution to the public online and in-person.
PEA-7	Educate citizens about safety during flood conditions, including the dangers of driving on flooded roads.	Flooding	Moderate	General Revenue and Grants	County EMA	2030	Continue education initiatives through online and print media.
PEA-8	Distribute flood protection safety pamphlets or brochures to the owners of flood-prone property.	Flooding	Moderate	General Revenue and Grants	County EMA Planning Dept.	2030	Continue education initiatives through online and print media.
PEA-9	Increase Wildfire Risk Awareness	Wildfires	Moderate	General Revenue	County EMA	Ongoing, revisit in 2030	The county EMA works with the NC Forest Service to identify areas for education. These efforts can be increased.

Structural Projects							
SP-1	Install flood telemetry systems in sewage lift stations.	Flooding	Moderate	General Revenue	Engineering Dept.	Ongoing, revisit in 2030	Lift stations have a monitored SCADA system in place to allow quick response to emergencies.
SP-2	Install watertight covers or inflow guards on sewer manholes, converting and raising manholes in flood prone areas.	Flooding	Moderate	General Revenue	Engineering Dept.	Ongoing, revisit in 2030	Staff continue to evaluate the needs and make improvements as funding allows.

Village of Flat Rock Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-4	Convene the Planning Board to identify recommendations to reduce the vulnerability to landslides in the developed areas of Flat Rock and present them to the Village Council.	Geological/ Landslides	High	General Revenue	Village Council	2030	This item will continue. Policymakers continue to review this item. Additional education and information has been shared with the Village.
P-5	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	Moderate	Federal Grants	Village Staff	As funding becomes available.	New action for the 2025 plan.
Public Education and Awareness Activities							
PEA-1	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	Low	General Revenue	Planning Dept.	2030	Building Services and Fire Services will continue to provide education and outreach as available.
PEA-2	Provide new home and property buyers with information on quality redevelopment and safe housing development. The information is probably most efficiently dispersed at the County and local administration buildings.	All	Low	General Revenue	Planning Dept.	2030	This item will continue as information and materials are updated.

Town of Fletcher Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-3	Develop a stand-by acquisition grant application that lists properties located in the floodplain.	Flooding	Moderate	Grants	Town Council	Action to be deleted.	Action to be deleted. There has been no interest (by Council or by citizens) in buy-outs in the Town.
P-4	Identify properties adjacent to the railroad tracks and post in a GIS system for potential buyout of highly vulnerable structures.	Hazardous Substances	Moderate	General Revenue and Grants	Town Council	Action to be revisited during 2030 plan update.	The Town acquired several properties a few years ago along Hwy 25 by the railroad, that have since been demolished. The Town contracts with the local Council of Governments for GIS mapping assistance and could have a map of properties along the railroad tracks produced quickly if needed.
P-5	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Public Education and Awareness Activities							
PEA-1	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	Low	General Revenue	Planning Department	Action to be revisited during 2030 plan update.	Building services and Fire services will continue to provide education and outreach as available.
PEA-2	Provide new home and property buyers with information on quality redevelopment and safe housing development. The information is probably most efficiently dispersed at the County and local administration buildings.	All	Low	General Revenue	Planning Department	Action to be revisited during 2030 plan update.	This item will continue as additional outreach is needed.

City of Hendersonville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Encourage community to participate in the CRS program.	Flooding	Moderate	General Revenue and Grants	Development Assistance Department	2030	The City of Hendersonville is planning to participate in the CRS.
P-3	Develop a stand-by acquisition grant application that lists properties identified as repetitive loss properties due to water events.	Flooding	Moderate	Federal Grant	Planning Department	2030	We will be applying for mitigation grants to mitigate these properties.
P- 4	Establish a long-term waterway debris management program	Flooding	Moderate	General Revenue and Grants	Public Works/ Stormwater	2030	New action for the 2025 plan update.
P-5	Install additional stream and rain gauges across the City	Flooding/ Hurricanes and Tropical Storms /Drought	Moderate	General Revenue and Grants	Stormwater	2030	New action for the 2025 plan update.
P-6	Identify and retrofit critical infrastructure to withstand extreme weather events and reduce flooding	Flooding	High	General Revenue and Grants	Planning, Public Works, Stormwater, Engineering	2030	New action for the 2025 plan update.
P-7	Identify and map additional hazard area within the City (landslides, wildfire, flooding)	Flooding/ Wildfires/ Geological/ Landslides	Moderate	General Revenue and Grants	Planning, Engineering	2030	New action for the 2025 plan update.

P-8	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	Moderate	Federal Grants	Planning/ Engineering/ Stormwater/ Fire/Police/ Water Sewer	As funding becomes available.	New action for the 2025 plan update
Property Protection							
PP=-1	Purchase generators to use as an emergency power supply for water and sewer treatment plants if power is lost during a disaster.	All	High	General Revenue and Grants	Water and Sewer Dept.	2030	Backup power will be installed to water distribution and sewer collection systems.
Emergency Services							
ES-5	Develop an action plan to reroute and control traffic during emergency situations. Remote control capability has been implemented throughout the City.	All	High	General Revenue and Grants	Police Dept.	2030	Remote control capability has been implemented throughout the City, but an action plan has not been developed.
ES-6	Identify site for City Emergency Operations Center on south side of the City	All	High	General Revenue and Grants	Admin./ Planning/ Police/Fire	2030	New action for the 2025 plan update

ES-7	Develop redundant communications networks and services throughout the City (Emergency broadcast, Points of Presence, Cell on Wheels, underground fiber, radio	All	High	General Revenue and Grants	IT/Police/Fire	2030	New action for the 2025 plan update
ES-9	Continue to develop response equipment capacity for all hazards response in an austere environment	All	High	General Revenue and Grants	Public Works/Fire/ Police	2030	New action for the 2025 plan update
ES-10	Establish auxiliary power systems via fixed or portable generators for all critical city facilities. Make certain to include the wiring closets to accommodate technology routing.	All	High	General Revenue and Grants	IT/Public Works/Engineering	2030	New action for the 2025 plan update
Public Education and Awareness Activities							
PEA-1	Educate property owners regarding options for mitigating their properties from flooding through outreach activities.	FL	High	General Revenue	City Communications	2030	Develop outreach materials for distribution to the public online and in-person.
PEA-2	Educate property owners regarding options for mitigating their properties from wildfires through outreach activities.	WF	High	General Revenue	City Communications	2030	Develop outreach materials for distribution to the public online and in-person.
PEA-3	Develop education materials for all hazards in secondary language to reach all residents	All	High	General Revenue and Grants	Communications	2030	New action for the 2025 plan update

Natural Resource Protection							
NRP-1	Establishing a" green infrastructure" program to link, manage, and expand existing parks, preserves, greenways, etc.	FL/ET	Moderate	General Revenue	Engineering/ Stormwater/ Public Works	Ongoing	New action for the 2025 update
NRP-2	Identify open space and conservation areas along the floodplains and as soon as feasible plan for acquisition or easements.	FL	Moderate	General Revenue and	Planning/ Stormwater/ Engineering	2030	New action for the 2025 update
NRP-3	Develop buffers along wetlands and other sensitive natural areas	FL/WF/ LS/DR/ ET	Moderate	General Revenue	Planning Department	2030	New action for the 2025 update

Town of Laurel Park Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-5	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.
Natural Resource Protection							
NRP-2	Work in conjunction with the NCFS to create and maintain fire breaks; especially on Town ROW and support efforts with private property owners and HOAs.	Wildfires	High	General Revenue and NCFS	Town Manager	Ongoing	This action is incomplete. The Town will continue to work with NCFS as time, staffing and funding allows.

Emergency Services							
ES-3	Implement a citizen notification system (email, text, automated phone call)	All	Medium	General Revenue	Town Council	2030	Contract in review currently and system will need to be updated accordingly.
Property Protection							
PP-1	Purchase generators for all local emergency facilities.	All	High	General Revenue and Grants	Town Council	2030	The Town of Laurel Park has purchased and installed natural gas operated generators for the Town Hall and the Public Works Department to facilitate emergency management operations during power outages. Other facilities will be evaluated for generator need going forward.

Town of Mills River Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Encourage Town participation in the National Flood Insurance Program and subsequent participation in the Community Rating System Program.	Flooding	High	General Revenue	Town Council	2025	Town Council will consider participation. Staff will bring NFIP topic to Council for discussion / consideration every 3-5 years.
P-2	Develop a Flood Damage Prevention Ordinance.	Flooding	High	General Revenue	Town Council	2025	Town Council will consider adopting a floodplain management ordinance with basic limits on types of development, land uses, and fill within Special Flood Hazard Areas.
P-3	Develop a Stormwater Management Plan.	Flooding	Low	General Revenue	Town Council	2026	Town Council consider development
P-4	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Property Protection							
PP-1	Incorporate steep slope development standards into the Zoning and Subdivision Ordinances to regulate construction in areas	Geological (Landslide) Flooding	Medium	General Revenue	Town Council	2026	New action for 2025 plan update. Town Council will consider development and
Natural Resource Protection							
NRP-1	Continue building out the Town's new land preservation program, established in 2024.	Geological (Landslide) Flooding	Medium	General Revenue	Town Council	2025	New action for 2025 plan update. Town Council will consider applications for land preservation funds on an annual basis as part of the budget process.
Public Education and Awareness Activities							
PEA-1	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	Low	General Revenue	Planning Department	2026	Contractors have been educated to some degree, but more outreach is needed and the program needs to be re-evaluated. This action will be carried out going forward.
PEA-2	Provide new home and property buyers with information on quality redevelopment and safe housing development. The information is probably most efficiently dispersed at the County and local administration buildings.	All	Low	General Revenue	Planning Department	2025	The county has developed a brochure to provide information on safe housing development. However, further means of outreach need to be integrated.
PEA-3	Increase public awareness regarding flood hazards in the community. Create a page on the Town website with specific information regarding special flood hazard areas within Town limits and mitigation measures for existing and new development in these areas.	FL	Medium	General Revenue	Planning Department	2025	New action for 2025 plan. Planning staff will create this page, after Town Council chooses whether to adopt a floodplain management ordinance in 2025.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PEA-4	Implement a citizen notification system (email, text, automated phone call)	All	Medium	General Revenues	Town Council	2025	New action for 2025 plan. Town Council considering funding this project as part of the FY 25-26 budget. May partner with Henderson County to use a system compatible with theirs.

Polk County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Incorporate a GIS to maintain building/parcel data for purposes of conducting more detailed hazard risk assessments and for tracking permitting/land use patterns.	All	Moderate	NCEM/ FEMA/Local Funds	Polk County MIS	This action will be revisited during the 2030 update.	Continue to update GIS system as needed
P-6	Identify and map landslide-prone areas in County	Geological/ Landslides	High	State of NC, Grant funding	NC Geological Survey, County ES	Completed.	Action completed. Data now on County GIS site. Action to be removed during 2030 plan update.
P-7	Work with State of NC to expand FIMAN into Polk County – new gauges are needed on the Green River and White Oak Creek	Flooding	High	NCEM/FEMA Grants	County ES, NCEM	This action will be revisited during the 2030 update.	Still in progress. The County would like to consider three additional sites.
P-8	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	Moderate	Federal Grants	Polk County Emergency Management	As funding becomes available.	Action to remain in plan moving forward.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
P-9	Implement a program that identifies streams that are impacted by beaver dams and creates a solution to the flooding caused by the dams.	Flooding	Low	NCEM/FEMA/ Local Funds	NCDOT	This action will be revisited during the 2030 update.	Mitigate as necessary when beaver dams pose a threat to flooding and causing other safety issues.
Property Protection							
PP-4	Create a private bridge registry for bridges built over the county's four major streams.	Flooding	Low	Local Funds	GIS	Project completed.	Project completed. Will be removed during the 2030 plan update.
PP-5	Identify and remove large obstructions in the county's major streams.	Flooding	Low	NCDA&CS/ NCEM/ FEMA/Local Funds	Soil & Water	2028	In the past, major obstructions have been removed, but this will continu to be an issue. Seek grant funding to move this program forward.
PP-6	Acquire generators for emergency shelters.	All	High	FEMA Grant Funding (approximate cost $400,000)	County ES	2025-2030	Ongoing project. NO generators have been purchased at this time. They would be most beneficial at PCHS, PCMS, Sunnyview Elementary School, Cooper Gap Baptist Church, and Tryon 7th Day Adventist Church.
Emergency Services							
ES-3	Enhance weather monitoring to attain earlier severe winter and ice storm warnings, as well as any severe weather related events.	All	Moderate	NCEM/FEMA/ Local Funds	Communications Department	This action will be revisited during the 2030 update.	Many steps have been taken to enhance weather monitoring over the past several years, but with new advancements in equipment and systems, this program will need to be reviewed and updated. Continue to work closely with the National Weather Service.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
ES-5	Develop an inventory list of required equipment needed by Emergency Service agencies for hazardous material spills.	Hazardous Substances	Moderate	Local Funds	Polk County Chief's Assoc.	Action completed.	Equipment has been purchased and placed in the Hazmat trailer. This action will be removed during the 2030 plan update.
ES-6	Enhance County emergency Services' radio system for better interoperability with other agencies.	All	High	Grant funding as available, Local Funds (approximate	County ES	2028	A new radio system has been put in place. We still have a few areas that need to be addressed for better coverage.
ES-7	Acquire a drone to assist with assessing and monitoring emergencies.	All	Moderate	Grant funding, County Funding (approximate cost $30,000)	County ES	Completed.	Drone acquired. This action will be removed during the 2030 plan update.
ES-9	Install River Markers	Flooding	Moderate	Local, Grant Funding, State	County ES	2028	Install river markers so that Emergency Services personnel can locate missing and/or injured citizens along the river during recreational months.
ES-10	Acquire weather sirens for all fire departments in the county.	Tornadoes	Moderate	Local, Grant Funding, State	County EM	2028	Acquire weather sirens for all fire departments so we can notify the public during tornados.
ES-11	Work with the LEPC and emergency services to ensure proper SARA Title III reporting.	Hazardous Substances	Moderate	Local Funds	LEPC	This action will be revisited during the 2030 update.	This committee will need to meet and stay up to date on any new requirements that are passed concerning Title III reporting.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
ES-12	Improve cell phone coverage in the County.	All	High	State and Federal Grants	County Administration Emergency Management	2030	We would like to improve the cell phone coverage throughout the county. With more people utilizing cell phones as their only means of communications, it is important to reach out to cell phone providers to enhance the coverage in the county.
Structural Projects							
SP-1	Turner-Shoal Dam Upgrade: Construction updates to strengthen the dam.	Flooding /Dam Failure	High	County Funds	County ES, DEQ	2028	Some updates to the dam have been implemented but the dam is still in need of upgrade in some areas. Major repairs are expected to start within the next year. This will be multi-year project.
SP-2	Coordinate with NCDOT to repair/replace storm water drainage on Main Street Saluda	Flooding	Moderate	City Funds (estimated cost of $250,000)	City of Saluda	2030	Main Street drainage includes a 135-year-old rock culvert. The culvert is failing and collapsing the sidewalk.
SP-3	Coordinate with NCDOT to improve the cleaning of side ditches and culverts in the county to prevent water standing on the roadways.	Flooding	High	State	NCDOT	2028	New action for the 2025 plan. Roadways are flooding due to side ditches and culverts being stopped up.
SP-4	Work with State and Federal partners to identify opportunities to assist with repair of private roads and bridges following disasters.	Flooding, Hurricanes and Tropical Storms	High	State and Federal Grants	Polk County Emergency Management	As funding becomes available.	New action for the 2025 plan update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Public Education and Awareness							
PEA-1	Promote the availability of flood insurance to property owners by direct mail at least once a year.	Flooding	High	Local Funds	Planning and Zoning	Annually	Information has been sent out annually on the tax notices in the past. This program will need to be updated in the future and will be evaluated to determine if new outreach mechanisms are needed.
PEA-2	Provide brochures, flyers, and pamphlets on all hazards that affect Polk County. Information will be placed in departments/agencies that are considered high traffic areas.	All	Low	Local Funds	County ES	Annually	Information has been placed in high traffic areas, but the county will continue to look at ways to improve outreach including through online surveys (carried out in this plan) and other means, such as community events.
PEA-4	Provide a booth with hazard mitigation information at all major community events.	All	Low	Local Funds	County ES	Annually	The county has provided informational booths at many events including fairs and community gatherings. Information displayed will need to be updated periodically.
PEA-5	Work to extend broadband/fiber/cell service and internet in unserved/underserved areas of the County.	All	High	Grant funding as available, Local Fund	County ES	Ongoing	Great progress has been made on this project. Approximately 75% complete as of 2025.

Town of Columbus Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Implement a program that identifies streams that are impacted by beaver dams and creates a solution to the flooding caused by the dams.	Flooding	Low	NCEM/FEMA Local Funds	Polk County Public Works	Action Deleted	No issues of beaver dams in County/State implements program. This action will be removed during the 2025 update.
P-2	Create a private bridge registry for bridges built over the county's four major streams.	Flooding	Low	Local Funds	Polk County ES	2030	All bridges have been identified, but additional mapping of the bridges would be useful and measures still need to be carried out to mitigate the bridges themselves.
P-3	Incorporate a Geographic Information System to maintain building/parcel data for purposes of conducting more detailed hazard risk assessments and for tracking permitting/land use patterns.	All	Moderate	NCEM/ FEMA/Local Funds	Polk County MIS	2030	A GIS system has been built and includes building and parcel data. However, this data will need to be updated as it is out of date.
P-4	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Property Protection							
PP-3	Identify and remove large obstructions in the county's major streams.	Flooding	Low	NCEM/FEMA Local Funds	Public Works	2030	In the past, major obstructions have been removed, but this will continue to be an issue. Seek grant funding to move this program forward.
Emergency Services							
ES-1	Develop an inventory list of required equipment needed by Emergency Service agencies for hazardous material spills.	Hazardous Substances	Moderate	Local Funds	Polk county Chief's Association	2030	A list has been developed, but there are still items that are needed to complete the inventory to maximize response to spills.
ES-3	Work with the LEPC and emergency services to ensure proper SARA Title III reporting.	Hazardous Substances	Moderate	Local Funds	LEPC	Annually	This committee will need to meet and stay up to date on any new requirements that are passed concerning Title III reporting.
Structural Projects							
SP-1	Complete an emergency waterline from Henderson County	Drought	High	Local Funds	County ES	2030	This project has been discussed and is in the works, but is not complete. More work will need to be done going forward
Public Education and Awareness Activities							
PEA-1	Provide brochures, flyers (e.g NFIP), and pamphlets on all hazards that affect Polk County. Information will be placed in departments/ agencies that are considered high traffic areas.	All	Low	Local Funds	County ES	2030	Information has been placed in high traffic areas, but the county will continue to look at ways to improve outreach including through online surveys (carried out in this plan) and other means.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PEA-3	Provide a booth with hazard mitigation information at all community.	All	Low	Local Funds	County ES	2030	The county has provided informational booths at many events including fairs and community gatherings. Information displayed will need to be updated periodically.

City of Saluda Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Create a private bridge registry for bridges built over the county's four major streams.	Flooding	Low	Local Funds	Public Works	Action to be revisited during 2030 plan update.	This action has not yet been completed. All bridges have been identified, but additional mapping of the bridges would be useful, and measures still need to be carried out to mitigate the bridges themselves.
P-5	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	Moderate	Federal Grants	City Staff	As funding becomes available.	New action for the 2025 plan.
Property Protection							
PP-3	Identify and remove large obstructions in the county's major streams.	Flooding	Low	NCEM FEMA Local Funds	Public Works	Action to be revisited during 2030 plan update.	In the past, major obstructions have been removed, but this will continue to be an issue. Seek grant funding to move this program forward. Funding still needed to implement this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PP-4	Generators are needed for critical infrastructure	All	High	State and Federal Grants as available or City of Saluda	City of Saluda	Completed.	This action will be removed during the 2030 update.
Emergency Services							
ES-1	Develop an inventory list of required equipment needed by Emergency Service agencies for hazardous material spills.	Hazardous Substances	Moderate	Local Funds	Polk County Chief's Assoc.	Action to be revisited during 2030 plan update.	A list has been developed, but there are still items that are needed to complete the inventory to maximize response to spills.
ES-5	Develop a plan to mitigate likelihood of access isolation due to natural phenomena such as ice, snow, landslide, or winter storm.	Severe Winter Weather Geological/ Landslides	Low	City of Saluda	City of Saluda	This action will be revisited during the 2030 update.	This action remains necessary. Recent winter storms clogged roads with stuck vehicles making roads impassable thus eliminating physical connections to Henderson and Polk County.
ES-7	Coordinate with Polk County to enhance County Emergency Services' radio system for better interoperability with other agencies.	All	High	State and Federal Grants as available	County ES	This action will be revisited during the 2030 update.	Outdated equipment during recent emergencies made communication difficult. This action is currently being implemented.
ES-8	Increase access to broadband/fiber/cell service/internet in unserved/underserved areas of the City.	All	Moderate	Wilkes Communication	City of Saluda	This action will be revisited during the 2030 update.	Outdated phone and internet equipment throughout the City provides unreliable internet and phone service. As of the 2025 update, equipment has been upgraded but is still being worked on.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Es-9	Work with the LEPC and emergency services to ensure proper SARA Title III reporting.	Hazardous Substances	Moderate	Local Funds	LEPC	Annually, action to be revisited during 2030 plan update.	This committee will need to meet and stay up to date on any new requirements that are passed concerning Title III reporting.
Structural Projects							
SP-1	Complete an emergency waterline from Henderson County.	Drought	High	Local Funds	Town Manager	This action will be revisited during the 2030 update.	This project has been discussed and is in the works, but is not complete. More work will need to be done going forward.
Public Education and Awareness Activities							
PEA-1	Provide brochures, flyers (e.g NFIP), and pamphlets on all hazards that affect Polk County. Information will be placed in departments/agencies that are considered high traffic areas.	All	Low	Local Funds	County ES	This action will be revisited during the 2030 update.	Information has been placed in high traffic areas, but the county will continue to look at ways to improve outreach including through online surveys (carried out in this plan) and other means.
PEA-3	Provide a booth with hazard mitigation information at all community.	All	Low	Local Funds	County ES	This action will be revisited during the 2030 update.	The county has provided informational booths at many events including fairs and community gatherings. Information displayed will need to be updated periodically.

Town of Tryon Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Implement a program that identifies streams that are impacted by beaver dams and creates a solution to the flooding caused by the dams.	Flooding	Low	NCEM/ FEMA/Local Funds	Polk County Public works	This action will be revisited during the 2030 update.	A program that identifies and addresses beaver dams is in the works, but it has not been fully implemented so additional effort will need to be carried out.
P-2	Create a private bridge registry for bridges built over the county's four major streams.	Flooding	Low	Local Funds	Public Works	Action to be removed.	All bridges identified. Action to be removed during the 2030 update.
P-3	Incorporate a Geographic Information System to maintain building/parcel data for purposes of conducting more detailed hazard risk assessments and for tracking permitting/land use patterns.	All	Moderate	NCEM/FEMA/ Local Funds	Polk County MIS	This action will be revisited during the 2030 update.	GIS has included a landslide layer in the database. We will continue to update as needed.
P-4	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Property Protection							
PP-3	Identify and remove large obstructions in the county's major streams.	Flooding	Low	NCEM/FEMA/ Local Funds	Public Works	This action will be revisited during the 2030 update.	In the past, major obstructions have been removed, but this will continue to be an issue and the county will implement this program going forward.
Emergency Services							
ES-1	Develop an inventory list of required equipment needed by Emergency Service agencies for hazardous material spills.	Hazardous Substances	Moderate	Local Funds	Polk County Chief's Association	Ongoing. This action will be revisited during the 2030 update.	A list has been developed, but there are still items that are needed to complete the inventory to maximize response to spills. Items have been purchased but will continue to assess needs for more equipment.
ES-4	Develop and implement hazard mitigation planning web page on Polk County Emergency Services web site.	All	Moderate	Local	County ES	This action will be revisited during the 2030 update.	The county posts its hazard mitigation plan up on the website, but a page dedicated to hazard mitigation plan will still need to be developed.
ES-5	Work with the LEPC and emergency services to ensure proper SARA Title III reporting.	Hazardous Substances	Moderate	Local Funds	LEPC	This action will be revisited during the 2030 update.	County Emergency Services meets with the LEPC on a quarterly basis and has reported on SARA Title III over the past 5 years. Going forward, this committee will need to meet and stay up to date on any new requirements that are passed concerning Title III reporting.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Structural Projects							
SP-1	Complete an emergency waterline from Henderson County.	Drought	High	Local Funds	Town Managers	Action to be deleted.	This project to be deleted as it is not feasible.
SP-2	Rehab the Lake Lanier Dam	Dam Failure	High	Local Funds, Grants, Other Sources	Town Manager	2030	New action for the 2025 update. Perform needed upgrades and repairs to the Lake Lanier Dam.
SP-3	Upgrade the Town's water system and sewer systems.	Flooding	High	Local Funds, Grants, Other Sources	Town Manager	2030	New action for the 2025 update. Perform upgrades to the Town's water and sewer systems to prevent leaks and seepage.
Public Education and Awareness Activities							
PEA-1	Provide brochures, flyers (e.g NFIP), and pamphlets on all hazards that affect Polk County. Information will be placed in departments/agencies that are considered high traffic areas.	All	Low	Local Funds	County ES	This action will be revisited during the 2030 update.	Information has been placed in high traffic areas, but the county will continue to look at ways to improve outreach including through online surveys (carried out in this plan) and other means.
PEA-3	Provide a booth with hazard mitigation information at all community gatherings.	All	Low	Local Funds	County ES	This action will be revisited during the 2030 update.	The county has provided informational booths at many events including fairs and community gatherings. Information displayed will need to be updated periodically.

Rutherford County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-7	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Marshall	2030	Deferred due to funding and a lack of community interest
P-9	Develop parcel specific land use maps.	All	Moderate	Local Funds	GIS Department	2030	Deferred, the county has not been able to develop parcel specific land use maps due to lack of staff time. It will work to complete this action going forward.
P-10	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	Moderate	Federal Grants	Rutherford County Emergency Management	As funding becomes available	Continue to pursue action implementation as funding becomes available.

Natural Resource Protection							
NRP-1	Research and evaluate the possibility of stream buffers along the floodplains.	Flooding	Moderate		Planning Department	2030	Deferred, the county has not had sufficient staff time and funding to research/evaluate stream buffers, so it will work to complete this action in the next cycle.
NRP-2	Identify open space, greenways, and conservation areas along the floodplains and as soon as feasible should plan for acquisition or easements.	Flooding	Moderate	Grant Funds	Planning Department	2030	Deferred due to funding constraints. The county will work to complete this action in the next cycle.
NRP-3	Develop buffers along streams and rivers prone to repetitive flooding	Flooding	Moderate		Planning Department	2030	Deferred due to funding constraints. The county will work to complete this action in the next cycle.
Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	All	Moderate	FEMA Local Funds NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.
Emergency Services							
ES-3	The County is in need of a new EOC. The current one is shared space and far too small to adequately meet the needs of the County.	All	High	FEMA, State funding	EMD	2030	New action for the 2025 plan.

Structural Projects							
SP-1	Encourage the Broad River Water Authority, the Town of Forest City, and the Cleveland County Water District to continue to expand into the rural areas of the county.	Drought/ Wildfires	Moderate	Local Funds	County Fire Marshall	2030	Completed, but additional extensions are planned for other areas, so this action will be carried over to the next cycle.
SP-3	Public water suppliers should study the feasibility of water storage, either in the form of extra basins at the intake or treatment facility, or in the form of larger reservoirs.	Drought	Low		Water System managers	2030	Deferred due to lack of funding. The county will work to improve water storage capacity in the future.
Public Education and Awareness							
PEA-1	Create a brochure to be made available to the public online and in public locations such as the Building Department, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.
PEA-2	Create brochures or handouts that would be available to the public regarding a host of issues related to fire and burning.	Wildfires	Moderate	Local Funds	County Fire Marshall	2030	Deferred, Not adequate on personnel or staff time to create outreach materials. The county will work to complete this in the next several years.
PEA-3	Provide information to citizens regarding drought, heat, and shortage of water. Information could be available as brochures, notification on water bills, public service announcements, newspaper articles, etc.	Drought/ Wildfires	High		Water system managers	2030	Deferred although some information has been provided to customers, additional information should be developed and sent out to the public.

Town of Bostic Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to lack of community interest. The town will work to become more involved in the Firewise program going forward.
P-4	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Emergency Services							
ES-6	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	2030	Some training on damage assessments have been completed, but more are necessary to improve the overall process and efficiency.
Property Protection							
PP-1	Provide a quick-connect emergency generator hook-up for the communications center.	All	High	General Revenue and Grants	Police Department	2030	This is a revision to the previous ES-1 action and will be implemented by 2025 if feasible.

Chimney Rock Village Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Develop a storm water Management Ordinance. Encourage Town participation in the Community Rating System.	Flooding	High	General Revenue and Grants	Town Council	2030	The storm water Management plan is included in Land Development Code adopted March 2006. Completed Plan but no funding to implement. The village will need to work on developing an implementation plan.
P-3	Develop a stand-by acquisition grant application that lists properties located in the floodplain.	Flooding	Moderate	Grants	Town Council	2030	Deferred due to lack of funding and staff time to create the application and develop a list of eligible properties
P-5	Initiate a storm water study to determine if storm water is exacerbating flooding along waterways, and provide solutions or alternatives to manage this problem.	Flooding	Moderate	General Revenue	Public Works	2030	Deferred due to lack of funding to complete stormwater study. A comprehensive stormwater study should be completed in the future.
P-6	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to lack of funding. The town will work to become more involved in the Firewise program going forward.

P-5	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	Moderate	Federal Grants	Village Staff	As funding becomes available.	New action for the 2025 plan.
Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	All	Moderate	FEMA/Local Funds/NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.
Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Ellenboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to lack of community interest. The town will work to become more involved in the Firewise program going forward.
P-3	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.
Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	All	Moderate	FEMA/Local Funds/NCEM	County EM Staff	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.

Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Forest City Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Initiate a storm water study to determine if storm water is exacerbating flooding along waterways, and provide solutions or alternatives to manage this problem.	Flooding	Moderate	General Revenue	Public Works	2030	Deferred due to lack of funding to complete storm water study. A comprehensive storm water study should be completed in the future.
P-3	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfire	Moderate	Grant Funds	Fire Chief	2030	New Action
P-5	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	FEMA/Local Funds/NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.
Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Lake Lure Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Initiate a storm water study to determine if storm water is exacerbating flooding along waterways, and provide solutions or alternatives to manage this problem.	Flooding	Moderate	General Revenue	Public Works	2030	Deferred due to lack of funding to complete storm water study. A comprehensive storm water study should be completed in the future.
P-3	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfire	Moderate	Grant Funds	Fire Chief	2030	New Action
P-5	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Property Protection							
PP-1	Apply for funding through the FEMA High Hazard Dam Repair Program for mitigation measures associated with high hazard dams to include: 1) Geotechnical investigation to establish data for risk analysis and development of engineering designs/solutions. 2) Build upstream dam to reduce load on existing dam 3) Property Acquisition in inundation area(s) below dam 4) Raise crest of dam to increase storage capacity 5) Add additional spillways, widen or lower existing spillways to increase discharge capacity 6) Warning systems to alert downstream areas of potential dam failure 7) Improve flow path below dam to increase conveyance capacity 8) Encourage conservation or re-forestation of upstream land to reduce runoff 9) Development of community Stormwater Management Plans for upstream communities 10) Complete an Emergency Action Plan in conjunction with NCDEQ for all High Hazard Dams in the county.	Dam Failure	Moderate	Grants	Public Works	2030	New Action

PP-2	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	FEMA Local Funds NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.
Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Ruth Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to lack of community interest. The Town will work to become more involved in the Firewise program going forward.
P-3	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.
Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	FEMA/Local Funds/NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.

Structural Projects							
SP-1	Encourage the Broad River Water Authority, the Town of Forest City, and the Cleveland County Water District to continue to expand into the rural areas of the county.	Drought Wildfires	Moderate	Local Funds	County Fire Marshall	2030	Completed, but additional extensions are planned for other areas, so this action will be carried over to the next cycle.
Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Rutherfordton Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to funding and a lack of community interest
P-5	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.
Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	FEMA/Local Funds/NCEM	EMD	2030	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.

Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2030	Deferred, Not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Town of Spindale Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Initiate a storm water study to determine if storm water is exacerbating flooding along waterways, and provide solutions or alternatives to manage this problem.	Flooding	Moderate	General Revenue	Public Works	2030	Deferred due to lack of funding to complete storm water study. A comprehensive storm water study should be completed in the future.
P-3	Encourage small communities, towns, fire departments, or neighborhoods to participate in the Fire Wise Program and become certified Fire Wise Communities.	Wildfires	Moderate	Grant Funds	Fire Chief	2030	Deferred due to lack of community interest. The town will work to become more involved in the Firewise program going forward.
P-4	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	Moderate	Federal Grants	Town Staff	As funding becomes available.	New action for the 2025 plan.

Property Protection							
PP-1	All critical facilities that do not have backup power generation capabilities should seek funding in order to obtain these capabilities.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	FEMA/Local Funds/NCEM	EMD	2025	Deferred due to funding constraints. The county would like to equip all critical facilities with backup power generation capabilities in the future, so it will seek funding to do so.
Public Education and Awareness Activities							
PEA-1	Create a brochure to be made available to the public online and in public locations such as Town Hall, documenting what to do when extended power outages occur.	Hurricane/ Coastal Storms, Severe Winter Weather, Tornadoes/ Thunder-storms	Moderate	Local Funds	County EM Staff	2025	Deferred, not adequate personnel or staff time to create outreach materials. The county will work to complete this in the next several years.

Transylvania County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	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	Moderate	Federal Grants	Transylvania County Emergency Management	As funding becomes available	This action will continue to be active. Transylvania County has recently completed a residential elevation project in the Town of Rosman on Main St funded through mitigation funding grant.
P-3	Obtain inundation maps for high hazard dams that pose the greatest risk to life and property.	Flooding /Dam Failure	Moderate	N/A	Transylvania County Emergency Management	This is a reoccurring action as dams go through their renewal certification progress.	The emergency management office continues to work with local dam owners and engineers in the preparation of inundation maps and preplanning based on NC DENR recommendations and protocols. As plans are approved by DENR, copies are submitted to the local emergency management office and the inundation mapping is incorporated into the GIS system. The county

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Structural Projects							
SP-1	Elevate Wilson Road Bridge.	Flooding	Moderate	NCDOT	County Manager	Aim for 2030	This project is now being handled by NCDOT but no date of start or completion has been announced.
Public Education and Awareness							
PEA-1	Hold a hazard mitigation seminar, including information on preparedness for all hazards significant to Transylvania County, Brevard, and Rosman and promotion of participation in FireWise.	All	High	NCEM and Local Funds	Transylvania County Emergency Management	This is an ongoing effort for the community to ensure new residents are aware.	The first event was first held on June 18, 2012. Several agencies participated in the event with educational material and speakers for the public to learn about things they could do around their own home to mitigate dangers to themselves and others. The county will continue the public educational awareness programs.
PEA-2	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	High	Local Funds	Building Inspections	Annual review and update	Printed material was developed and is distributed through the county building department. This material is reviewed and updated annually. This process is ongoing and material provided to the contractors at time of obtaining building permits.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PEA-3	Provide new home and property buyers with information on quality redevelopment, safe housing development, and FireWise Communities. The information is probably most efficiently dispersed at the community administration buildings.	All	High	Local Funds	Building Inspector	Annual review and update	The printed material was developed and is distributed through the county building department, county administrative offices, city of Brevard administrative offices, and the town of Rosman administrative offices. This material is reviewed and updated annually. This process is ongoing and material provided to the contractors at time of obtaining building permits.
PEA-4	Manually disperse and have a website posting on the County and City websites, which provides information about the South Mountains Regional Hazard Mitigation Plan, and relevant mitigation measures the public can take. In addition, provide a response/reply section where residents can comment on the effectiveness of the current plan and where they can make suggestions for future revisions on the plan.	All	High	Local Funds	Transylvania County Emergency Management	Annual review and update	The plan is linked on all the local government websites and a feedback channel through the website is monitored for comment and suggestion. The county evaluates and updates its outreach plan on an annual basis. The plans are available through the Transylvania County Emergency Management website which is linked through the main county website and referenced by both municipalities.

City of Brevard Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Update components of existing storm water Management Plan.	Flooding	High	Local Funds	Floodplain Manager-Planning Department	Action to be revisited during the 2030 plan update.	Although a storm water Management Plan is in place, a review and update of the plan is necessary. A stormwater infrastructure inventory project is underway and wrapping up soon. Implemented a citywide stormwater fee based on impervious surface area per parcel earmarked for stormwater improvements & updating the stormwater master plan.
P-3	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	Moderate	Federal Grants	City Staff	As funding becomes available.	New action for the 2025 plan.

Property Protection							
PP-1	Obtain inundation maps for high hazard dams that pose the greatest risk to life and property.	Flooding /Dam Failure	Low	State or Federal Funds	ES	2030	The emergency management office continues to work with local dam owners and engineers in the preparation of inundation maps and preplanning based on NC DENR recommendations and protocols. As plans are approved by DENR, copies are submitted to the local emergency management office and the inundation mapping is incorporated into the GIS system. The county will continue to work on this action going forward.
Structural Projects							
SP-1	Elevate Old Hendersonville HWY between Osborne Road and Cherry Street and between Cherry Street and Dodson Flats.	Flooding	Low	State Funds	NCDOT	2030	This action is the responsibility of NCDOT and is being evaluated/carried out through the NCSTIP. The project has not been completed, but will continue to be worked on through the NCSTIP.
SP-2	Increase the culvert at Cherry Street and Old Hendersonville Highway.	Flooding	Moderate	State Funds	NCDOT	2030	The culvert increase has not been completed, but is on schedule to be completed by 2025.
Public Education and Awareness Activities							

PEA-2	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	High	Local Funds	Building Inspections	2030, Annual review and update	Printed material was developed and is distributed through the county building department. This material is reviewed and updated annually.
PEA-3	Provide new home and property buyers with information on quality redevelopment, safe housing development, and FireWise Communities. The information is probably most efficiently dispersed at the community administration buildings.	All	High	Local Funds	Planning Department	2030, Annual review and update	The printed material was developed and is distributed through the county building department, county administrative offices, city of Brevard administrative offices, and the town of Rosman administrative offices. This material is reviewed and updated annually.
PEA-4	Manually disperse and have a website posting on the County and City websites, which provides information about the Multi-Jurisdictional Hazard Mitigation Plan for Transylvania County, and relevant mitigation measures the public can take. In addition, provide a response/reply section where residents can comment on the effectiveness of the current plan and where they can make suggestions for future revisions on the plan.	All	High	Local Funds	City Manager	2030, Annual review and update	The plan is linked on all the local government websites and a feedback channel through the website is monitored for comment and suggestion. The county evaluates and updates its outreach plan on an annual basis

Town of Rosman Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Develop a Stormwater Management Plan	Flooding	Low	Local Funds	Floodplain Manager/Town Manager	2035	The Town of Rosman is currently looking at the installation of a water treatment facility and seeking potential funding for this project. As a part of this, they will also include a stormwater management plan as it directly affects the treatment process.
P-2	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	Moderate	Federal Grants	Henderson County Emergency Management	As funding becomes available.	Continue to pursue projects and funding as it becomes available.
Emergency Services							
ES-4	Purchase Starlink for Town Hall to ensure continuous communication services during emergencies.	All	Moderate	Grant funds	Town Mayor	2030	New action for the 2025 plan update. Identified as a need following Tropical Storm Helene.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Property Protection							
PP-1	Purchase and install generators for the Town's four wells.	All	Moderate	NCEM and Local Funds	Town Mayor	2030	The town is still attempting to locate grant funds for this project so that it can install the generators. It will work to complete this action in the future. Quick connects have been installed allowing for emergency generation of sites if necessary.
PP-2	Obtain inundation maps for high hazard dams that pose the greatest risk to life and property.	Flooding /Dam Failure	Moderate	State or Federal Funds	Transylvania County Emergency Management	This is a reoccurring action as dams go through their renewal certification process	The emergency management office continues to work with local dam owners and engineers in the preparation of inundation maps and preplanning based on NC DENR recommendations and protocols. As plans are approved by DENR, copies are submitted to the local emergency
Structural Projects							
SP-1	Elevate Main Street between Depot Street and Old Rosman Highway	Flooding	Moderate	FEMA, NCEM and Local Funds	Town Mayor	2040	The town is trying to locate funding sources for this project. It could be potentially split between the state and the town since both maintain the roadway. This is still an ongoing action with no date of completion.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
SP-2	Pave and regrade access road to Wastewater Treatment Plant. The gravel access road to the Town's Wastewater Treatment Plant has repeatedly been washed out following flood events. Paving and regrading the road will ensure access to the plant following flood events.	Flooding	High	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.
SP-3	Redesign and construct improved fence surrounding Wastewater Treatment Plant. The fence surrounding the Town's Wastewater Treatment Plant is repeatedly damaged in flood events, presenting security and access concerns for the plant's operations. Redesigning and constructing an improved fence surrounding the plant would alleviate these concerns.	Flooding	High	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.
SP-4	Replace existing culvert under Town Hall Parking Lot. The existing culvert underneath the Town Hall parking lot is metal. Replacing the metal culvert with a plastic one will extend its usable life.	Flooding	Moderate	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
SP-5	Construct an emergency shelter. Construct a new emergency shelter in the Town to serve Town residents and the surrounding community. The new shelter would be able to withstand all hazards that Rosman is vulnerable to, as well as be able to house displaced residents and serve as a point of distribution following disaster events.	All	Low	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.
SP-6	Debris removal in the French Broad River. Remove debris from the French Broad River to mitigate the hazards of flooding. Removing debris from river would reduce creek flooding. While this is not the only solution to river associated flooding and will likely need to be repeated in the future, if done properly, clearing the debris can reduce flooding impacts in the future and provide additional protection to the private property, public property, and natural resources. In order to reduce flooding problems in Rosman, debris should be regularly removed from the French Broad River.	Flooding	Moderate	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.
SP-7	Streambank revitalization. Revitalize deteriorated streambanks along the French Broad River to reduce erosion, flooding impacts, and threats to property.	Flooding	Moderate	Grant Funding	Town Mayor	2030	New action for the 2025 plan update.

Public Education and Awareness Activities							
PEA-2	Educate contractors about principles for quality redevelopment and safe housing development through written materials or a County sponsored workshop.	All	High	Local Funds	Building Inspectors	2030, Annual review and update	Printed material was developed and is distributed through the county building department. This material is reviewed and updated annually. This process is ongoing and material provided to the contractors at time of obtaining building permits.
PEA-3	Provide new home and property buyers with information on quality redevelopment, safe housing development, and FireWise Communities. The information is probably most efficiently dispersed at the community administration buildings.	All	High	Local Funds	Building Inspectors	2030, Annual review and update	The printed material was developed and is distributed through the county building department, county administrative offices, city of Brevard administrative offices, and the town of Rosman administrative offices. This material is reviewed and updated annually. This process is ongoing and material provided to the contractors at time of obtaining building permits.
PEA-4	Manually disperse and have a website posting on the County and City websites, which provides information about the Multi-Jurisdictional Hazard Mitigation Plan for Transylvania County, and relevant mitigation measures the public can take. In addition, provide a response/reply section where residents can comment on the effectiveness of the current plan and where they can make suggestions for future revisions on the plan.	All	High	Local Funds	Transylvania County Emergency Management	2003, Annual review and update	The plan is linked on all the local government websites and a feedback channel through the website is monitored for comment and suggestion. The county evaluates and updates its outreach plan on an annual basis

PEA-5	Obtain inundation maps for high hazard dams that pose the greatest risk to life and property.	Flooding /Dam Failure	Moderate	State or Federal Funds	Transylvania County Emergency Management	This is a reoccurring action as dams go through their renewal certification process	The emergency management office continues to work with local dam owners and engineers in the preparation of inundation maps and preplanning based on NC DENR recommendations and protocols. As plans are approved by DENR, copies are submitted to the local emergency management office and the inundation mapping is incorporated into the GIS system.

SECTION 10
PLAN MAINTENANCE

This section discusses how the South Mountains 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

---

44 CFR Requirement

44 CFR Part201.6(c)(4)(i):
The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

44 CFR Part 201.6(c)(4)(ii):
The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

10.1 IMPLEMENTATION AND INTEGRATION

Each agency, department or other partner participating under the South Mountains 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 to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The participating jurisdictions in the South Mountains Region will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant City and County government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of the South Mountains 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 South Mountains Region.

Since the initial plan was adopted in 2015, each County and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances
- Integrating the mitigation plan into reviews and updates of County emergency operations plans
- Integrating the mitigation plan into review and updates of building codes
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding.

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Committee, individual county meetings, and the annual review process described herein.

10.2 MONITORING, EVALUATION, AND ENHANCEMENT

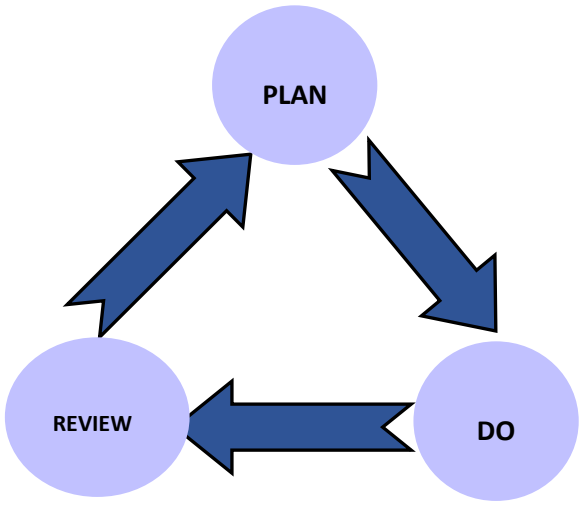
Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance 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 South Mountain 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 South Mountain Region. 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 Henderson, Polk, Rutherford and Transylvania Counties 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 South Mountain Region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to

address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.



The plan review provides participating jurisdiction officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. North Carolina Emergency Management's Hazard Mitigation Planning section will help coordinate the reconvening the Regional Hazard Mitigation Planning Committee and conducting the five-year review through coordination with each County's Emergency Management Departments.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the South Mountain 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 South Mountain 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 South Mountain counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to the North Carolina Division of Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the Regional Hazard Mitigation Planning Committee for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

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

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

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

- Adopt the proposed amendments as presented
- Adopt the proposed amendments with modifications
- Refer the amendments request back to the Regional Hazard Mitigation Planning Committee for further revision, or

- Defer the amendment request back to the Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings

10.3 CONTINUED PUBLIC INVOLVEMENT

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

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

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

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

10.4 EVALUATION OF 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 2020 update of this plan, the Regional Hazard Mitigation Planning Committee determined that the procedures for the upcoming five-year monitoring and evaluation process will remain as defined above, with minor revisions as noted, and will be re-evaluated during the next plan update process.

The five-year comprehensive update process began as early as 2023 when North Carolina Emergency Management obtained HMGP funding to update fund the South Mountains 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 South Mountain 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

This appendix includes the FEMA APP Letter and the local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This appendix includes the following:

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

South Mountains 2024 Regional Hazard Mitigation Plan - Public Survey

We need your help!

Henderson, Polk, Transylvania, and Rutherford Counties and the municipalities within the counties are working together to become less vulnerable to natural, man-made, and technological hazards, 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 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 South Mountains Regional Hazard Mitigation Plan, please contact Hannah DeLude from ESP Associates, Inc. at hdelude@espassociates.com.

1 1\. Where do you live?*

- ◯ Unincorporated Henderson County
- ◯ Unincorporated Rutherford County
- ◯ Bostic
- ◯ Chimney Rock Village
- ◯ Ellenboro
- ◯ Fletcher
- ◯ Hendersonville
- ◯ Laurel Park
- ◯ Rosman
- ◯ Rutherfordton
- ◯ Spindale
- ◯ Other
- ◯ Unincorporated Polk County
- ◯ Unincorporated Transylvania County
- ◯ Brevard
- ◯ Columbus
- ◯ Flat Rock
- ◯ Forest City
- ◯ Lake Lure
- ◯ Mills River
- ◯ Ruth
- ◯ Saluda
- ◯ Tryon

* 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
- ◯ Severe Winter Weather
- ◯ Flooding
- ◯ Excessive Heat
- ◯ Tornadoes/Thunderstorms
- ◯ Dam Failure
- ◯ Earthquakes

- ◯ Geological (landslides, sinkholes, erosion)
- ◯ Infectious Disease
- ◯ Radiological Emergency
- ◯ Cyber
- ◯ Food Emergency
- ◯ 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!

Plan Regional de mitigación de riesgos de las Montañas del Sur 2024 - Encuesta Pública

¡Necesitamos tu ayuda!

Los condados de Henderson, Polk, Transylvania y Rutherford y los municipios dentro de los condados están trabajando juntos para llegar a ser menos vulnerables a los peligros naturales, tecnológicos, y artificiales provocados por el hombre. ¡Su participación en el proceso es importante para nosotros!

Los condados, junto con las jurisdicciones locales y otros socios, están trabajando para actualizar el Plan Regional de Mitigación de Riesgos multi-jurisdiccional. Este plan identifica y evalúa los peligros de nuestra comunidad e identifica estrategias que determinan cómo mitigar mejor esos riesgos.

Esta encuesta es una oportunidad para compartir sus opiniones y participar en el proceso de planificación de mitigación. La información que proporcionas nos ayudará a entender sus inquietudes sobre peligros y puede guiar actividades de mitigación que deberían ayudar a disminuir los impactos de futuros eventos peligrosos.

Si tiene alguna pregunta sobre esta encuesta o desea conocer más formas en las que puede participar en el desarrollo del Plan Regional de Mitigación de Riesgos de las montañas del Sur, comuníquese con Hannah DeLude de ESP Associates, Inc. hdelude@espassociates.com

1. ¿Dónde vive? (Elija uno)

- ○ Condado de Henderson (no incorporado)
- ○ Condado de Polk (no incorporado)
- ○ Condado de Rutherford (no incorporado)
- ○ Condado de Transylvania (no incorporado)
- ○ Bostic
- ○ Brevard
- ○ Chimney Rock Village
- ○ Columbus
- ○ Ellenboro
- ○ Flat Rock
- ○ Fletcher
- ○ Forest City
- ○ Hendersonville
- ○ Lake Lure
- ○ Laurel Park
- ○ Mills River
- ○ Rosman
- ○ Ruth
- ○ Rutherfordton
- ○ Saluda
- ○ Spindale
- ○ Tryon
- ○ Otro lugar

2. ¿Alguna vez viviste o fuiste afectado por un desastre?

- ○ Sí
- ○ No

3. En caso afirmativo, por favor explique:

4. ¿Qué tan preocupado está usted por la posibilidad de que nuestra comunidad sea afectada por un desastre? (Elija uno)

- ○ Muy preocupado
- ○ Un poco preocupado
- ○ No preocupado

5. Seleccione cuál cree que es **la mayor amenaza** para su vecindario (elija una):

- ○ Sequía
- ○ Huracanes y peligros costeros
- ○ Clima invernal severo
- ○ Inundación
- ○ Calor excesivo
- ○ Tornados/Tormentas
- ○ Falla de la presa
- ○ Terremotos
- ○ Geológico (deslizamientos de tierra, socavones, erosión)
- ○ Enfermedad infecciosa
- ○ Emergencia Radiológica
- ○ Amenaza cibernética
- ○ Emergencia alimentaria
- ○ Incendios forestales
- ○ Sustancias peligrosas
- ○ Terrorismo
- ○ Pulso electromagnético
- ○ Disturbios civiles

6. Seleccione cuál cree que es **la segunda mayor amenaza** para su vecindario (elija una):

- ○ Sequía
- ○ Huracanes y peligros costeros
- ○ Clima invernal severo
- ○ Inundación
- ○ Calor excesivo
- ○ Tornados/Tormentas
- ○ Falla de la presa
- ○ Terremotos
- ○ Geológico (deslizamientos de tierra, socavones, erosión)
- ○ Enfermedad infecciosa
- ○ Emergencia Radiológica
- ○ Amenaza cibernética
- ○ Emergencia alimentaria
- ○ Incendios forestales
- ○ Sustancias peligrosas
- ○ Terrorismo
- ○ Pulso electromagnético
- ○ Disturbios civiles

7. ¿Existen otros peligros que usted cree que son una amenaza para su comunidad?

8. ¿Su casa está ubicada en una llanura aluvial? (Elija uno)

- ○ Sí
- ○ No
- ○ No sé

9. ¿Tiene seguro contra inundaciones? (Elija uno)

- ○ Sí
- ○ No
- ○ No sé

10. Si no tiene seguro contra inundaciones, ¿por qué no? (Elija uno)

- ○ No ubicado en una llanura aluvial
- ○ Muy caro
- ○ No es necesario porque nunca se inunda
- ○ Not necessary because I'm elevated or otherwise protected
- ○ No es necesario porque estoy elevado o protegido de otra manera
- ○ Otro motivo

11. Si es "Otro motivo", explique:

12. ¿Ha tomado medidas para hacer que su hogar o vecindario sea más resistente a los peligros?

- ○ Sí
- ○ No

13. En caso afirmativo, por favor explique:

14. ¿Está interesado en hacer que su hogar/vecindario sea más resistente a los peligros?

- ○ Sí
- ○ No

15. ¿Sabe a qué oficina contactar para obtener más información sobre cómo reducir los riesgos a los peligros en su área?

- ○ Sí
- ○ No

16. ¿Cuál es la manera más efectiva para que usted reciba información sobre cómo hacer su casa y su vecindario más resistentes a los peligros?

- ○ Periódico
- ○ Televisión
- ○ Radio
- ○ Internet (incluye redes sociales)
- ○ Correo
- ○ Talleres/reuniones públicas
- ○ Reuniones escolares

17. ¿Hay otras formas en las que prefiere recibir información? Si es así, por favor explique:

18. En su opinión, ¿cuáles son algunas medidas que su gobierno local podría tomar para reducir o eliminar el riesgo de daños futuros en su vecindario?

19. ¿Existen otras cuestiones relativas a la reducción del riesgo y las pérdidas asociadas? con peligros o desastres en la comunidad que usted cree que son importantes?

Varias actividades comunitarias pueden reducir nuestro riesgo de peligros. En general, estas actividades se clasifican en una de las seis grandes categorías siguientes. En las siguientes seis preguntas, díganos qué tan importante cree que es cada una para su comunidad.

20. **Prevención** - Acciones administrativas o regulatorias que influyen en la forma en que se desarrollan y se construyen edificios. Unos ejemplos incluyen planificación y zonificación, códigos de construcción, preservación de espacios abiertos, y regulaciones de llanuras aluviales.

- ○ Muy importante
- ○ Un poco importante
- ○ No importante

21. **Protección de la Propiedad** - Acciones que impliquen la modificación de edificios existentes para protegerlos de un peligro o retirarlos del área de peligro. Unos ejemplos incluyen adquisición, reubicación, elevación, modernizaciones estructurales y contraventanas contra tormentas.

- ○ Muy importante
- ○ Un poco importante
- ○ No importante

22. **Protección de Recursos Naturales** - Acciones que además de minimizar perdidas del peligro, también preservan o restablecen las funciones de los sistemas naturales. Unos ejemplos incluyen: protección de llanuras aluviales, preservación de hábitats, estabilización de pendientes, zonas de amortiguamiento ribereñas, y regulación administración de bosques.

- ○ Muy importante
- ○ Un poco importante
- ○ No importante

23. **Proyectos Estructurales** - Acciones destinadas a disminuir el impacto de un peligro por medio de modificar la progresión natural del peligro. Unos ejemplos incluyen presas, diques, cuencas de detención/retención, modificación de canales, muros de contención y alcantarillas pluviales.

- ○ Muy importante
- ○ No importante
- ○ No importante

24. **Servicios de Emergencia** - Acciones que protegen a las personas y la propiedad durante e inmediatamente después de un evento peligroso. Unos ejemplos incluyen sistemas de alerta, evacuación, planificación, entrenamiento para respuestas de emergencias, y protección de instalaciones y sistemas críticas de emergencia.

- ○ Muy importante
- ○ Un poco importante
- ○ No importante

25. **Educación y Conciencia Pública** - Acciones para informar a la ciudadanía sobre los peligros y las técnicas que pueden utilizar para protegerse a sí mismos y a su propiedad. Unos ejemplos incluyen proyectos de extensión, programas de educación escolar, materiales de biblioteca, y eventos de demostración.

- ○ Muy importante
- ○ Un poco importante
- ○ No importante

Opcional: Esta encuesta se puede entregar anónimamente; sin embargo, si nos proporciona su nombre e información de contacto, podremos comunicarnos con usted para saber más sobre sus ideas o inquietudes:

¡Gracias por tomarse el tiempo de responder esta encuesta! ¡Se agradece tu aporte!

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

NCLocal 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)	Henderson County, Flat Rock, Fletcher, Hendersonville, Laurel Park, Mills River, Polk County, Columbus, Saluda, Tryon, Rutherford County, Bostic, Chimney Rock Village, Ellenboro, Forest City, Lake Lure, Ruth, Rutherfordton, Spindale, Transylvania County, Brevard, Rosman
Title of Plan	South Mountains Regional Hazard Mitigation Plan
New Plan or Update	Update
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	3/4/2025
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	919-264-9582
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	Carl Baker, Hazard Mitigation Planner
State Review Date	03/11/2025
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	**Henderson County**								
2	Flat Rock								
3	Flecther								
4	Hendersonville								
5	Laurel Park								
6	Mills River								
7	**Polk County**								
8	Columbus								
9	Saluda								
10	Tryon								
11	**Transylvania County**								
12	Brevard								
13	Rosman								
14	**Rutherford County**								
15	Bostic								
16	Chimney Rock Village								
17	Ellenboro								

#	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	Forest City								
19	Lake Lure								
20	Ruth								
21	Rutherfordton								
22	Spindale								

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 SMtns 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 SMtns 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?	Section 2: 2.2 History of Hazard Mitigation Planning in the SMtns Region 2.3 Updating the Plan 2.4 SMtns HMPC 2.5 Community Meetings and Workshops 2.6 Involving the Public 2.7 Involving the Stakeholders	
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.

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
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: A1: No revisions required. A2: No revisions required. A3: No revisions required. A4: No revisions required.

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/Landslides** – 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/Landslides** – 5.9.2 • **Dam Failure** – 5.10.2 • **Flooding** – 5.11.2, Appendix F • **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 **5.21.1 Hazard Extent Table**	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/Landslides – 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/Landslides – 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?	Tables 5.2 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))	**Section 6 throughout**	
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/Landslides** – 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/Landslides** – 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
NCEM 1st Review: B1: No revisions required. B2: 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 7:9-7:15; 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 7:9-7:21; 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
NCEM 1st Review: C1: No revisions required. C2: No revisions required. C3: No revisions required. C4: See Review Tool Addendum. ESP Response: All revisions made. C5: See Review Tool Addendum. ESP Response: All revisions made.

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 10:5	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 10:5	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 10:5	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
NCEM 1st Review: D1: No revisions required. D2: No revisions required. D3: 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 8:7)	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
NCEM 1st Review: E1: No revisions required. E2: No revisions required.

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**:**		

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		

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]

LOCAL MITIGATION PLAN REVIEW TOOL

ADDENDUM

South Mountains Regional Hazard Mitigation Plan – 2025 Update
DRAFT – March 2025
ELEMENT C: REQUIRED REVISIONS
NCEM 1st Review:
C4 and C5 Review Comments

Jurisdiction	Action #	Hazard Addressed	Comment
Henderson County	P-9	Flooding	Change to PEA ESP Response: Revised
	P-10	Flooding	Change to PEA ESP Response: Revised
	NRP-6	Wildfires	Change to PEA ESP Response: Revised
	NRP-7, NRP-8	Flooding	Change to Structural Projects ESP Response: Revised
	ES-3	All	Change to Property Protection to count as an all-hazard action. This applies throughout Section 9; all of the jurisdictions that list generators for critical facilities as an Emergency Services action should be changed to a PP action. See pdf comments throughout the section. ESP Response: All revised
Flat Rock, Fletcher, Mills River, Saluda, Tryon, Bostic, Ruth, Rutherfordton, Spindale, Brevard	N/A	All	Consider adding a generator for critical facilities action, and possibly a wildfire action. ESP Response: Revisiting with jurisdictions
Laurel Park	PEA-1	All	Change to Emergency Services ESP Response: Revised
Polk County Columbus Saluda Tryon	P-5 P-2 P-2 P-1	Hazardous Substances	Change to ES or PEA. Public notification is not a Prevention action. This requirement does not mitigate a natural hazard. ESP Response: Revised
	P-9	Flooding, Hurricanes and Tropical Storms	Change to Structural Projects. ESP Response: Revised
	P-10	All	Not a mitigation action. Change to ES. ESP Response: Revised
	PP-3	Flooding	Change to Prevention. ESP Response: Revised
Columbus, Tryon	PP-1, PP-2	Flooding	Change to Prevention. ESP Response: Revised
	ES-2	All	Change to Prevention. ESP Response: Revised
Saluda	PP-2	Flooding	Change to Prevention. ESP Response: Revised

Rutherford County			See pdf comments. ESP Response: Revised all pdf comments.
Transylvania County	ES-1	Flooding/Dam Failure	Change to Prevention. ESP Response: Revised
	SP-1	Flooding	Correct funding sources. ESP Response: Revised
Brevard	P-4	Flooding	Change to Structural Projects. ESP Response: Revised
Brevard, Rosman	ES-1	Flooding/Dam Failure	Change to PP or PEA ESP Response: Revised

Meeting Participant Overview

NAME	DEPARTMENT/AGENCY	Attended Internal Kickoff Meeting (2/21/24)	Attended Stakeholder Kickoff Meeting (4/2/24)	Attended HIRA/Mitigation Strategy Meeting (8/14/24)
HENDERSON COUNTY				
Bianculli, Janna	Henderson County, Senior Planner		X	X
Brissie, James	Henderson County, Public Safety Director	X	X	X
Christie, Patricia	Village of Flat Rock, Village/Zoning Administrator		X	X
Cortes, Victoria	Henderson County, EM Planner	X	X	X
Hoffman, Mike	City of Hendersonville, Stormwater Division Manager			X
Johnston, Deb	Henderson County, Site Development Director		X	X
Linville, Toby	Henderson County, Floodplain Administrator		X	X
Malecek, Mike	Town of Mills River, Planning Director		X	
McFalls, Tim	Henderson County, EM/Rescue Manager	X		
Miller, James	City of Hendersonville, Fire Chief		X	X
Moffitt, Dustin	City of Hendersonville, Stormwater Technician		X	
Morgan, Mike	Henderson County, Chief Communications Officer		X	X
Morrow, Tyler	City of Hendersonville, Planning Manager		X	
Myhand, Blair	City of Hendersonville, Police Chief		X	
Ward, Justin	City of Hendersonville, Deputy Fire Chief – Administration			X
Williams, Ted	City of Hendersonville, Deputy Fire Chief – Operations			X
Young, Nathan	City of Hendersonville, Fire Marshal			X
POLK COUNTY				
Arledge, Bobby	Polk County, EM Director/Fire Marshall	X	X	X
Kegley, Andrew	Polk County, Assistant Fire Marshal			X

SOUTH MOUNTAINS MEETING PARTICIPANTS AND SIGN-IN SHEETS

NAME	DEPARTMENT/AGENCY	Attended Internal Kickoff Meeting (2/21/24)	Attended Stakeholder Kickoff Meeting (4/2/24)	Attended HIRA/Mitigation Strategy Meeting (8/14/24)
RUTHERFORD COUNTY				
Hamrick, Frankie	Rutherford County, EM Director/Fire Marshal	X		
TRANSYLVANIA COUNTY				
Shook, Kevin	Transylvania County, EM Director/Addressing Coordinator	X	X	X
REGIONAL STAKEHOLDERS				
Atchley, Greg	NCEM, Western Area Branch Chief	X		
Baker, Carl	NCEM, Hazard Mitigation Planner	X	X	X
Crew, Chris	NCEM, State Hazard Mitigation Officer	X	X	X
Delude, Hannah	ESP Associates, Hazard Mitigation Planner	X	X	
Flores, John	ESP Associates, Hazard Mitigation Planner	X	X	X
Kudla, Kymberly	FEMA Region 4		X	
Mello, John	NCEM, Hazard Mitigation Planner	X	X	X
Roderick, Mary	Land of Sky Regional Council			X
Slaughter, Nathan	ESP Associates, Hazard Mitigation Dept. Manager	X	X	X
Webster, Andrea	NCORR, Resilience Policy Advisor			X

SOUTH MOUNTAINS NEIGHBORING JURISDICTIONS

Email Correspondence

Hi All,

I hope this message finds you well.

I am reaching out to inform you that Henderson, Polk, Rutherford, and Transylvania 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: South Mountains Hazard Mitigation Plan Update. 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

Outside Stakeholder Contacts

Jurisdiction	Name	Title	Email
Cherokee County SC	Rick Peterson	Cherokee County EM Director	rick.peterson@cherokeecountysc.com
Jackson County NC	Todd Dillard	Jackson County EM Director	todddillard@jacksonnc.org
	Mike Poston	Jackson County Planning Director	michaelposton@jacksonnc.org
Haywood County NC	Greg Shuping	Haywood County EM Director	gregory.shuping@haywoodcountync.gov
	Kris Boyd	Haywood County Development services Director	kris.boyd@haywoodcountync.gov
Buncombe County NC	Jerry VeHaun	Buncombe County EM Director	jerry.vehaun@buncombecounty.org
	Nathan Pennington	Buncombe County Planning Director	Nathan.Pennington@buncombecounty.org
McDowell County NC	William Kehler	McDowell County EM Director	william.kehler@mcdowellgov.com

SOUTH MOUNTAINS NEIGHBORING JURISDICTIONS

	Ronald Harmon	McDowell County Planning Administrator	rharmon@mcdowellgov.com
Burke County NC	Michael Willis	Burke County ES Director	Michael.Willis@burkenc.org
Cleveland County NC	Perry David	Cleveland County EM Director	perry.davis@clevelandcounty.com
	Chris Martin	Cleveland County Senior Planner	chris.martin@clevelandcounty.com
Oconee County, SC	Scott Krein	Oconee County EM Director	skrein@oconeesc.com
		Oconee County Community Development	communitydevelopmentinfo@oconeesc.com
Pickens County, SC	Denise Wiatek	Pickens County EM Director	dkwiatek@co.pickens.sc.us
Greenville County, SC	Jim Marett	Greenville County Interim EM Director	jmarett@greenvillecounty.org
Spartanburg County, SC	Doug Bryson	Spartanburg County EM Director	dbryson@spartanburgcounty.org

Internal Stakeholder Meeting Kickoff
February 21st, 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 – 2/21/24
b. PROPOSED DELIVERY OF DRAFT – 1/19/25
c. EXISTING PLAN EXPIRATION DATE – 7/19/25

IV. Next Steps

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

1. Summary

Meeting title "South Mountains Regional HMP Internal Kickoff "

Attended participants 14

Start time 2/21/24, 2:49:27 PM

End time 2/21/24, 3:33:08 PM

Meeting duration 43m 40s

Average attendance time 35m 11s

2. Participants

Name	First Join	Last Leave	In-Meeting Duration	Email	Participant ID (UPN)	Role
Nathan Slaughter	2/21/24, 2:50:26 PM	2/21/24, 3:33:08 PM	42m 42s	nslaughter@espassociates.com	nslaughter@espassociates.com	Organizer
Crew, John (NCEM)	2/21/24, 2:49:32 PM	2/21/24, 3:32:57 PM	43m 25s	john.crew@ncdps.gov	john.crew_ncdps.gov#EXT#@ESPASSOCIATES.onmicrosoft.com	Presenter
John Flores	2/21/24, 2:49:39 PM	2/21/24, 3:33:01 PM	40m 47s	jflores@espassociates.com	jflores@espassociates.com	Presenter
Tim McFalls	2/21/24, 2:52:20 PM	2/21/24, 3:33:01 PM	40m 40s	tmcfalls@hendersoncountync.gov	tmcfalls@hendersoncountync.gov	Presenter
Baker, Carl (NCEM)	2/21/24, 2:53:24 PM	2/21/24, 3:33:05 PM	39m 40s	carl.baker@ncdps.gov	carl.baker@ncdps.gov	Presenter
Victoria Cortes	2/21/24, 2:53:50 PM	2/21/24, 3:33:01 PM	39m 10s	vcortes@hendersoncountync.gov	vcortes@hendersoncountync.gov	Presenter
Frankie Hamrick	2/21/24, 2:55:00 PM	2/21/24, 3:01:36 PM	6m 35s	Frankie.Hamrick@rutherfordcountync.gov	frankie.hamrick@rutherfordcountync.gov	Presenter
Bobby Arledge	2/21/24, 2:56:42 PM	2/21/24, 3:33:04 PM	36m 22s			Presenter
Jimmy Brissie	2/21/24, 2:56:50 PM	2/21/24, 3:33:03 PM	36m 13s	jbrissie@hendersoncountync.gov	jbrissie@hendersoncountync.gov	Presenter
Kevin Shook	2/21/24, 2:57:18 PM	2/21/24, 3:33:06 PM	35m 47s	Kevin.Shook@transylvaniacounty.org	Kevin.Shook@transylvaniacounty.org	Presenter

Atchley, Greg (NCEM) 2/21/24, 2:57:47 PM 2/21/24, 3:33:03 PM 35m 15s
Greg.Atchley@ncdps.gov Greg.Atchley@ncdps.gov Presenter

Mello, John (NCEM) 2/21/24, 2:59:41 PM 2/21/24, 3:33:02 PM 33m 20s
John.Mello@ncdps.gov John.Mello@ncdps.gov Presenter

Hannah Delude 2/21/24, 3:00:50 PM 2/21/24, 3:33:00 PM 32m 9s
hdelude@espassociates.com hdelude@espassociates.com Presenter

F.Harmick Rutherford Co EM 2/21/24, 3:01:24 PM 2/21/24, 3:32:52 PM 30m 26s
Presenter

3. In-Meeting Activities

Name Join Time Leave Time Duration Email Role

Nathan Slaughter 2/21/24, 2:50:26 PM 2/21/24, 3:33:08 PM 42m 42s
nslaughter@espassociates.com Organizer

Crew, John (NCEM) 2/21/24, 2:49:32 PM 2/21/24, 3:32:57 PM 43m 25s
john.crew@ncdps.gov Presenter

John Flores 2/21/24, 2:49:39 PM 2/21/24, 2:51:09 PM 1m 29s jflores@espassociates.com
Presenter

John Flores 2/21/24, 2:53:43 PM 2/21/24, 3:33:01 PM 39m 18s
jflores@espassociates.com Presenter

Tim McFalls 2/21/24, 2:52:20 PM 2/21/24, 3:33:01 PM 40m 40s
tmcfalls@hendersoncountync.gov Presenter

Baker, Carl (NCEM) 2/21/24, 2:53:24 PM 2/21/24, 3:33:05 PM 39m 40s
carl.baker@ncdps.gov Presenter

Victoria Cortes 2/21/24, 2:53:50 PM 2/21/24, 3:33:01 PM 39m 10s
vcortes@hendersoncountync.gov Presenter

Frankie Hamrick 2/21/24, 2:55:00 PM 2/21/24, 3:01:36 PM 6m 35s
Frankie.Hamrick@rutherfordcountync.gov Presenter

Bobby Arledge 2/21/24, 2:56:42 PM 2/21/24, 3:33:04 PM 36m 22s Presenter

Jimmy Brissie 2/21/24, 2:56:50 PM 2/21/24, 3:33:03 PM 36m 13s
jbrissie@hendersoncountync.gov Presenter

Kevin Shook 2/21/24, 2:57:18 PM 2/21/24, 3:33:06 PM 35m 47s
Kevin.Shook@transylvaniacounty.org Presenter

Atchley, Greg (NCEM) 2/21/24, 2:57:47 PM 2/21/24, 3:33:03 PM 35m 15s
Greg.Atchley@ncdps.gov Presenter

Mello, John (NCEM) John.Mello@ncdps.gov	2/21/24, 2:59:41 PM Presenter	2/21/24, 3:33:02 PM	33m 20s
Hannah Delude hdelude@espassociates.com	2/21/24, 3:00:50 PM Presenter	2/21/24, 3:33:00 PM	32m 9s
F.Harmick Rutherford Co EM Presenter	2/21/24, 3:01:24 PM	2/21/24, 3:06:11 PM	4m 47s
F.Harmick Rutherford Co EM Presenter	2/21/24, 3:07:13 PM	2/21/24, 3:32:52 PM	25m 39s

Internal Stakeholder Meeting Kickoff
February 21st, 2024
10:00am – 11:00am
Teams Meeting

The internal kickoff meeting for the South Mountains 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 from ESP Associates facilitated the meeting, starting with 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). Additionally, the implications of NC Senate Bill 300 were noted, particularly regarding its relevance to state-declared disasters.

The planning process was reviewed, which involves organizing resources and forming a Hazard Mitigation Planning Committee comprised of county and municipal stakeholders. Public involvement and community engagement will be integral, with plans for surveys and public meetings to gather input and feedback. The inclusion of socially vulnerable population is a FEMA requirement, and coordinating departments and agencies should expand invitations to identify and include those traditionally underserved and under-represented.

The meeting also covered essential aspects of risk assessment, including hazard identification and vulnerability assessment, to understand the potential impacts of various hazards. 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. The status of each existing mitigation action must be reviewed and updated to reflect implementation progress and/or barriers.

Adoption and implementation will involve collaboration with each county and municipality, with a focus on overcoming challenges faced in previous planning cycles. NCEM has been encouraging the adoption process to begin upon plan submittal to FEMA to help expedite the process. The project team and NCEM are available to help with this task.

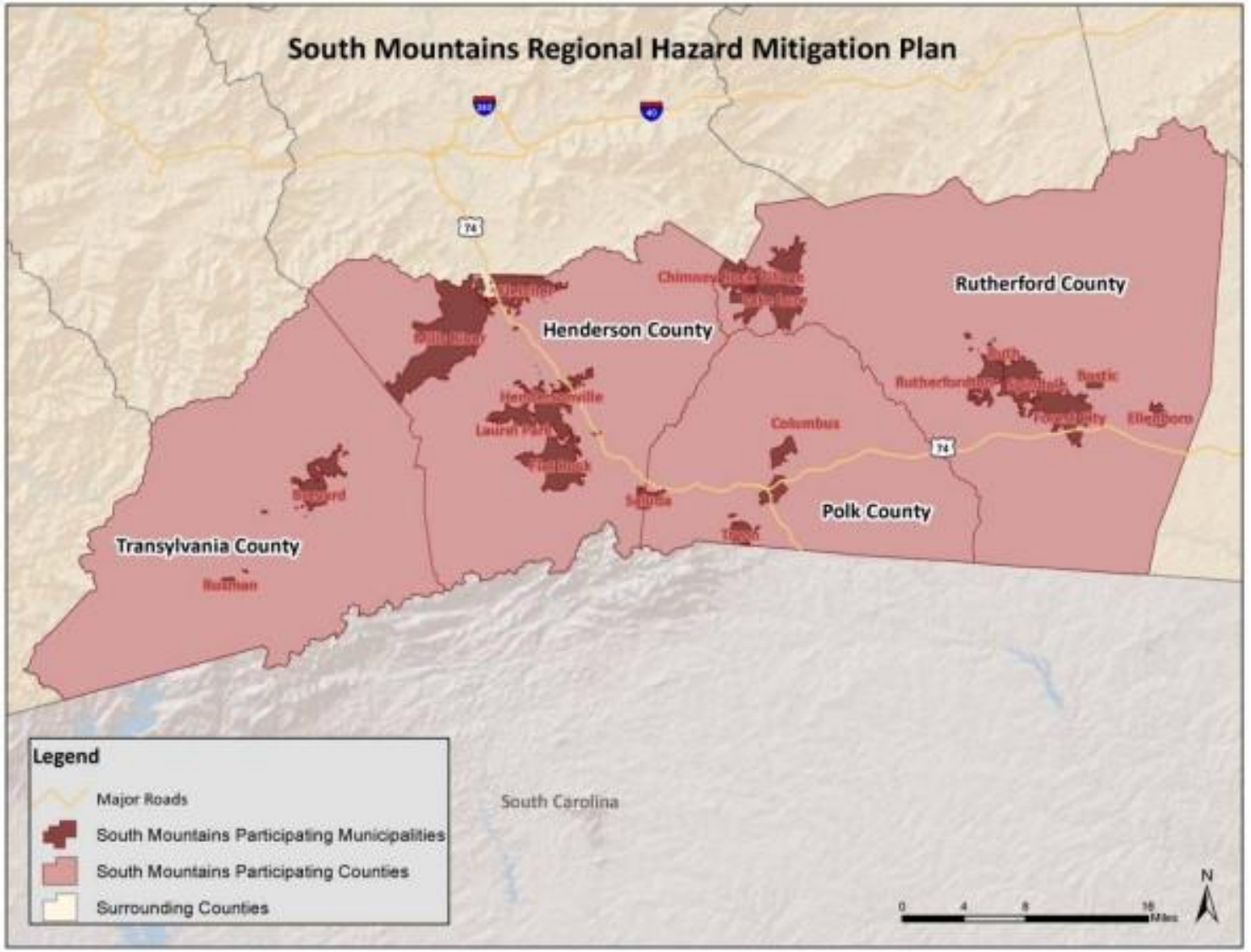
The project schedule includes planning for a larger kickoff meeting with more stakeholders and a series of follow-up meetings. The draft plan is expected to be completed by January 2025, ahead of the expiration of the current plan in July 2025. Nathan will follow up with the counties on specific dates and scheduling coordination.

South Mountains

Hazard Mitigation Plan Update

February 21, 2024

Internal Kickoff (Microsoft Teams)



Agenda

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

Introductions

- Welcome!
- Project Team Introductions
- Participant Introductions

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. Public Education and Awareness

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
- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)
- Eligibility for Federal Disaster Funding
  - Update HMP Every 5 Years
- NC Senate Bill 300

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

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)

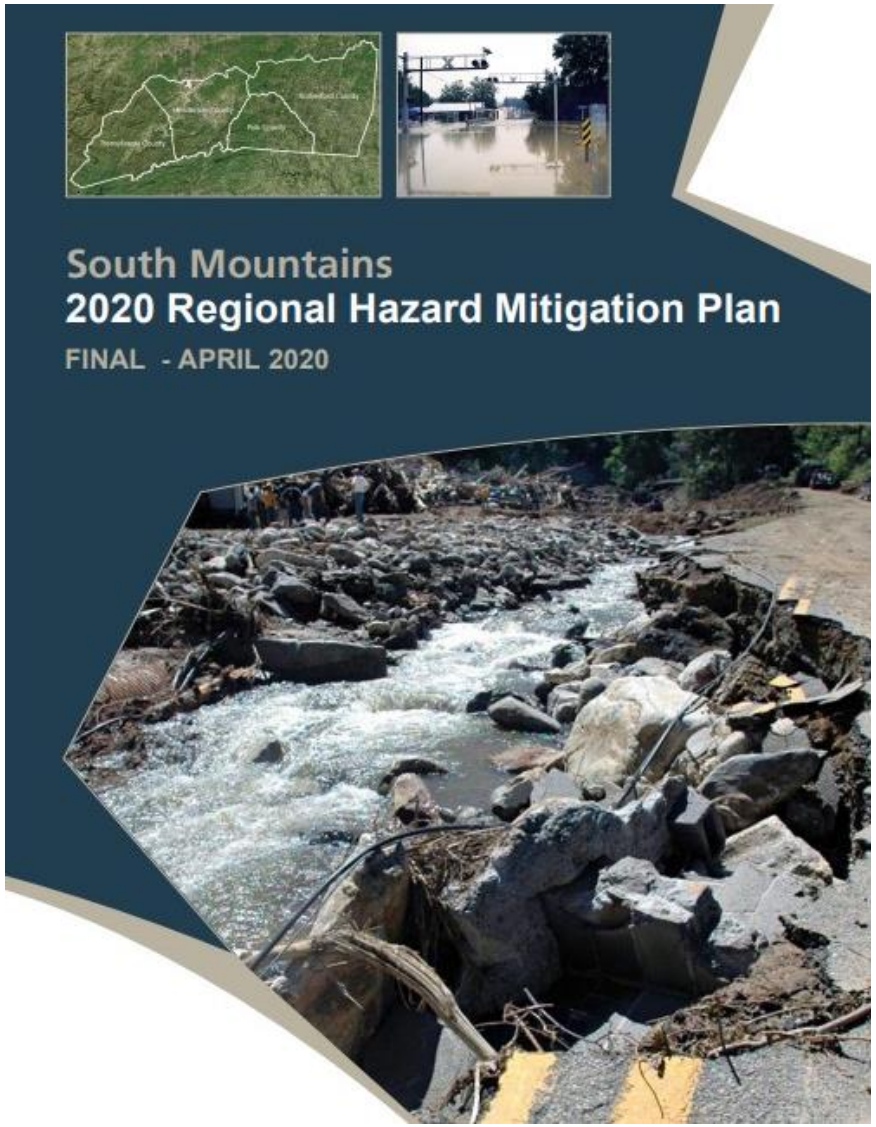
Step 2: Risk Assessment

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

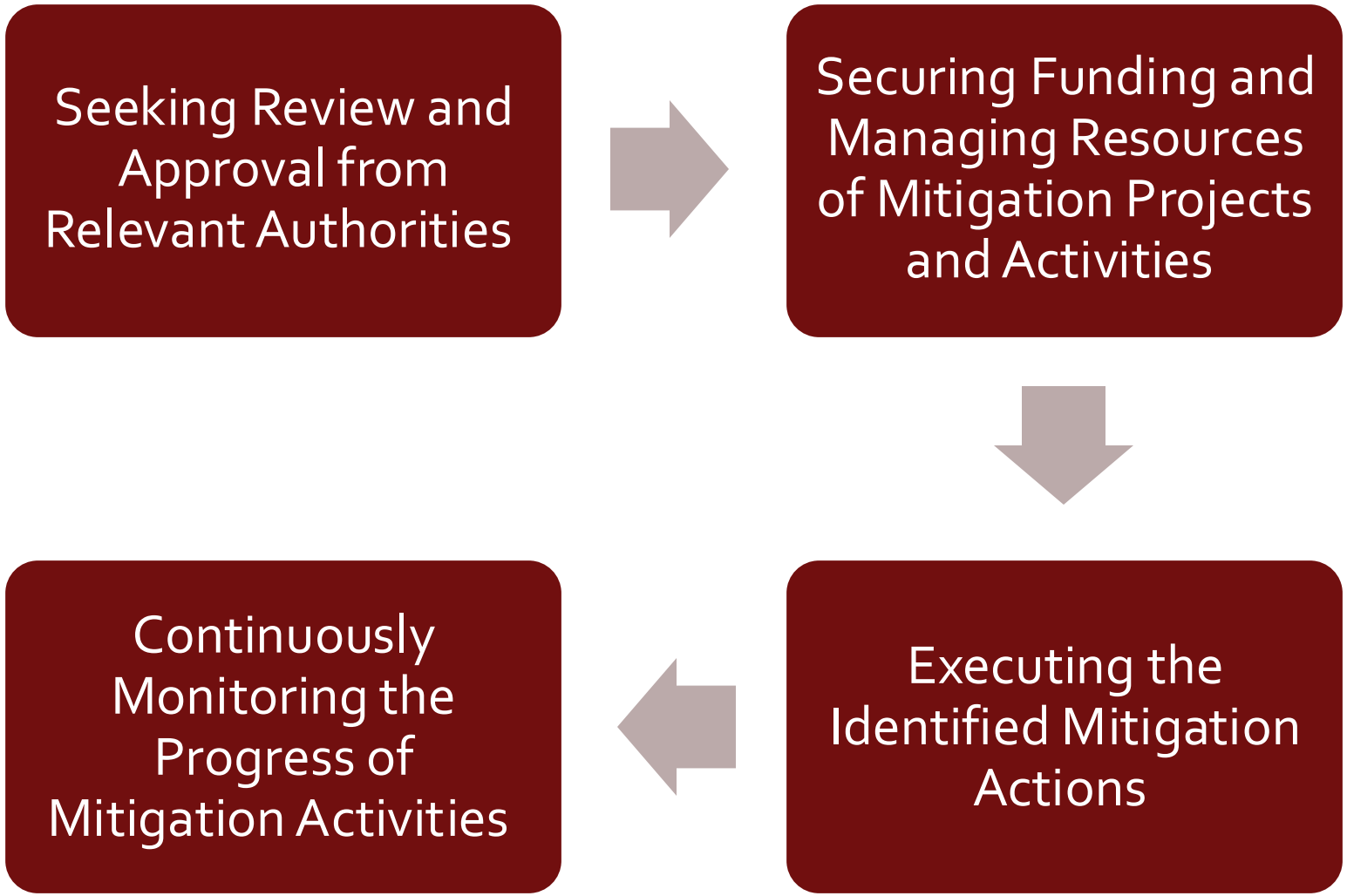
Capability Assessment (How Prepared We Are)	• **Communities to Self-Assess Capability**
	  • What Mitigation Actions are Feasible
	  • Where Gaps Exist

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



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 – 2/21/24
- Proposed Delivery of Draft – 1/19/25
- Existing Plan Expiration Date – 7/19/2025

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

Contact Information

Nathan Slaughter –
nslaughter@espassociates.com

John Flores –
jflores@espassociates.com

Hannah DeLude –
hdelude@espassociates.com

Adjourn –
Thank you!

Larger Stakeholder Meeting Kickoff
April 2nd, 2024
10:00am – 12:00pm
Mill Spring, 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 – 2/21/24
b. LARGER KICKOFF MEETING – 4/2/24
c. PROPOSED DELIVERY OF DRAFT – 1/19/25
d. EXISTING PLAN EXPIRATION DATE – 7/19/25
e. PUBLIC MEETINGS – TBD

VI. Next Steps

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

Larger Stakeholder Meeting Kickoff
April 2nd, 2024
10:00am – 12:00pm
Mill Spring, NC

In April 2024, the kickoff meeting for the South Mountains 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 update reflects changing risks due to increased development and a shift toward an "all hazards" approach, incorporating climate change considerations per new FEMA requirements. The need to address new vulnerabilities was acknowledged, particularly among socially vulnerable populations, and to adopt effective strategies that maximize the value of implemented measures.

In effort to ensure continued eligibility, 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 engagement with smaller communities and socially vulnerable populations, documenting the engagement process and any associated materials.

The participating counties and municipalities were encouraged to regularly upload and/or share relevant project information to their websites and social media. Initial survey findings revealed that 60 percent of respondents selected online/social media outlets as their preferred method of information sharing.

The floor was then opened to participants for questions or to highlight any key concerns and/or challenges. A few newer hazards and concerns were identified including population growth, steep slope hazards (landslides), cyber, and active threat. These hazards will be assessed and included within the hazard mitigation plan update.

Project team contact information was shared, in-person participants were asked to make sure they sign the attendance sheet for documentation, and the meeting was adjourned.

Scanned Sign-In Sheets
Larger Stakeholder Kickoff Meeting

South Mountains Regional Hazard Mitigation Plan Update
Stakeholder Meeting

April 2, 2024
10:00 AM - Noon

Name	Agency/Department/Position	Phone Number	E-mail Address
Michael Malecek	Town of Mills River Planning Director	828-890-2901	michael.malecek@millsriver.org
Deb Johnston	Henderson Co Director of Sik Development	828 694 6553	djohnston@hendersoncountync.gov
Toby Linville	Henderson County Floodplain Administrator	828-694-6627	tlinville@hendersoncountync.gov
Jinny Brissie	HENDERSON County Emergency Svcs Director	828-697-4728	jbrissie@hendersoncountync.gov
Victoria Cortes	Henderson County Emergency Services EM Planner	828-458-9209	vcortes@hendersoncountync.gov
Kevin Shook	Transylvania County Emergency Management EM Director	828-884-3108	Kevin.shook@transylvaniacounty.org
Bobby Arledge	Polk County Emergency Management Director	828-894-6347	barledge@polkNC.org
Dustin Moffitt	City of Hendersonville Stormwater Stormwater Tech.	828 376 2117	dmoffitt@hvlnc.gov mhoffman@hvlnc.gov

South Mountains Regional Hazard Mitigation Plan Update
Stakeholder Meeting

April 2, 2024

10:00 AM - Noon

Name	Agency/Department/Position	Phone Number	E-mail Address
Blair Myhand	Hendersonville PD	828)793-0139	bmyhand@hvlnc.gov
D. James Miller	Hendersonville Fire	828.674.6339	DMiller@HVLNC.GOV
Tyler Morrow	Hendersonville Planning	828-233-3702	tmorrow@hvlnc.gov

1. Summary

Meeting title "South Mountains Regional Hazard Mitigation Plan Stakeholder Kickoff Meeting "

Attended participants 10

Start time 4/02/24, 9:52:14 AM

End time 4/02/24, 10:47:44 AM

Meeting duration 55m 30s

Average attendance time 51m 4s

2. Participants

Name	First Join	Last Leave	In-Meeting Duration	Email	Participant ID (UPN)	Role
Nathan Slaughter	4/02/24, 9:52:17 AM	4/02/24, 10:47:42 AM	55m 25s	nslaughter@espassociates.com	nslaughter@espassociates.com	Organizer
Hannah Delude	4/02/24, 9:52:23 AM	4/02/24, 10:47:38 AM	55m 14s	hdelude@espassociates.com	hdelude@espassociates.com	Presenter
Baker, Carl (NCEM)	4/02/24, 9:53:36 AM	4/02/24, 10:47:36 AM	53m 59s	carl.baker@ncdps.gov	carl.baker@ncdps.gov	Presenter
Mike Morgan	4/02/24, 9:54:56 AM	4/02/24, 10:47:34 AM	52m 38s	tmorgan@hendersoncountync.gov	tmorgan@hendersoncountync.gov	Presenter
Pat Christie	4/02/24, 9:55:39 AM	4/02/24, 10:47:44 AM	52m 4s	pchristie@villageofflatrock.org	pchristie@villageofflatrock.org	Presenter
Crew, John (NCEM)	4/02/24, 9:57:31 AM	4/02/24, 10:47:37 AM	50m 6s	john.crew@ncdps.gov	john.crew_ncdps.gov#EXT#@ESPASSOCIATES.onmicrosoft.com	Presenter
Mello, John (NCEM)	4/02/24, 9:59:33 AM	4/02/24, 10:47:36 AM	48m 3s	John.Mello@ncdps.gov	John.Mello@ncdps.gov	Presenter
Kudla, Kymberly	4/02/24, 9:59:35 AM	4/02/24, 10:47:36 AM	48m 1s	kymberly.kudla@fema.dhs.gov	0323751063@FEMA.DHS.GOV	Presenter
Janna Bianculli	4/02/24, 9:59:36 AM	4/02/24, 10:47:33 AM	47m 57s	JBianculli@hendersoncountync.gov	jbianculli@hendersoncountync.gov	Presenter
John Flores	4/02/24, 10:00:29 AM	4/02/24, 10:47:40 AM	47m 10s	jflores@espassociates.com	jflores@espassociates.com	Presenter

3. In-Meeting Activities

Name	Join Time	Leave Time	Duration	Email	Role
Nathan Slaughter	4/02/24, 9:52:17 AM	4/02/24, 10:47:42 AM	55m 25s	nslaughter@espassociates.com	Organizer
Hannah Delude	4/02/24, 9:52:23 AM	4/02/24, 10:47:38 AM	55m 14s	hdelude@espassociates.com	Presenter
Baker, Carl (NCEM)	4/02/24, 9:53:36 AM	4/02/24, 10:47:36 AM	53m 59s	carl.baker@ncdps.gov	Presenter
Mike Morgan	4/02/24, 9:54:56 AM	4/02/24, 10:47:34 AM	52m 38s	tmorgan@hendersoncountync.gov	Presenter
Pat Christie	4/02/24, 9:55:39 AM	4/02/24, 10:47:44 AM	52m 4s	pchristie@villageofflatrock.org	Presenter
Crew, John (NCEM)	4/02/24, 9:57:31 AM	4/02/24, 10:47:37 AM	50m 6s	john.crew@ncdps.gov	Presenter
Mello, John (NCEM)	4/02/24, 9:59:33 AM	4/02/24, 10:47:36 AM	48m 3s	John.Mello@ncdps.gov	Presenter
Kudla, Kymberly	4/02/24, 9:59:35 AM	4/02/24, 10:47:36 AM	48m 1s	kymberly.kudla@fema.dhs.gov	Presenter
Janna Bianculli	4/02/24, 9:59:36 AM	4/02/24, 10:47:33 AM	47m 57s	JBianculli@hendersoncountync.gov	Presenter
John Flores	4/02/24, 10:00:29 AM	4/02/24, 10:47:40 AM	47m 10s	jflores@espassociates.com	Presenter

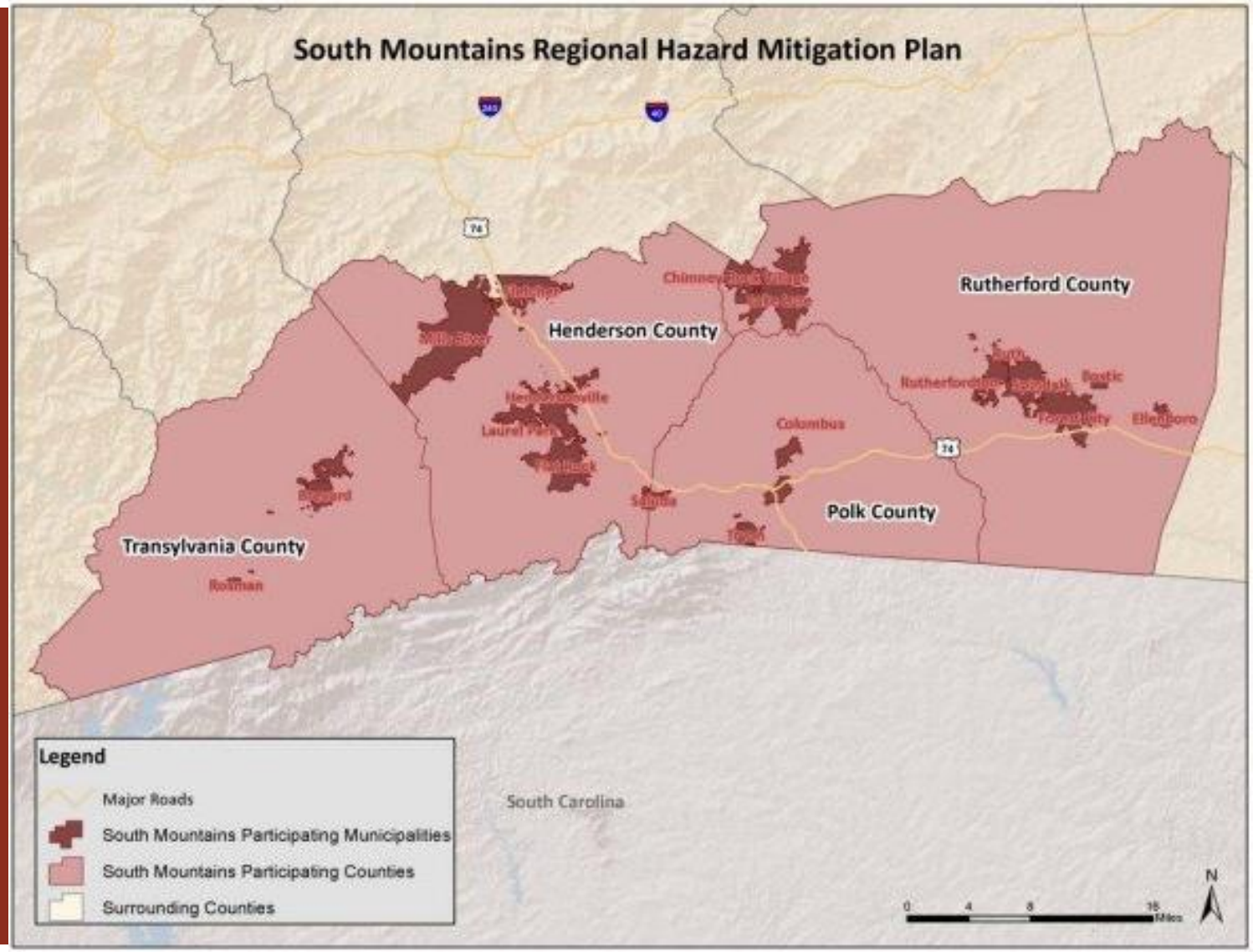
South Mountains

2025 Hazard Mitigation Plan Update

Stakeholder Kickoff Meeting

April 2nd, 2024

Mill Spring, 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

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 the participating jurisdictions 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

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. Severe Winter Weather	12. Hazardous Substances
6. Dam Failures	13. Radiological Emergency
7. Flooding	14. Terrorism
8. Earthquakes	15. Electromagnetic Pulse

HIGH RISK	Winter Storm and Freeze Thunderstorm Wind / High Wind Flooding Wildfires
MODERATE RISK	Drought Hurricanes and Coastal Hazards Dam Failure Excessive Heat Geological Hazardous Substances
LOW RISK	Terrorism Earthquakes Radiological Emergency Infectious Disease Cyber Electromagnetic Pulse

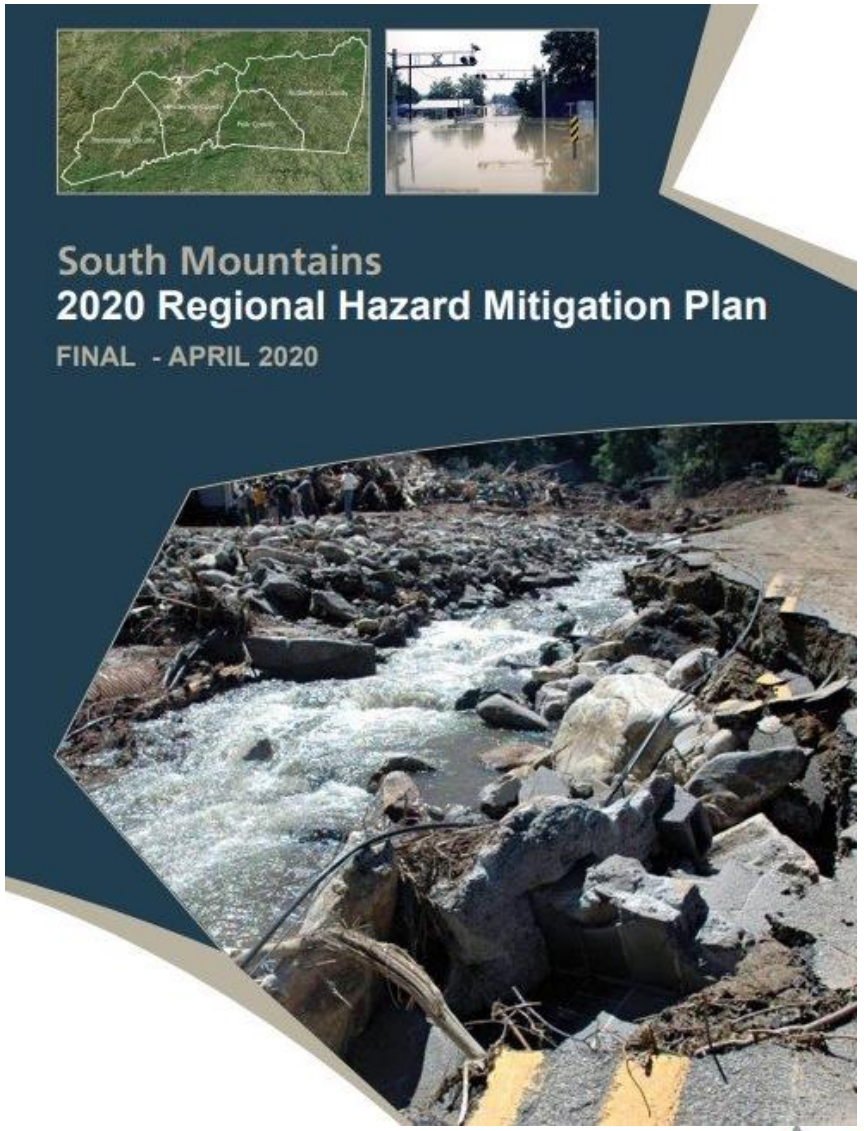
Plan Update Process
Step 3: Develop a Mitigation Plan

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 – 2/21/24

Larger Stakeholder Meeting –4/2/24

Public Meeting #1 – Date TBD

Proposed Delivery of Draft – 1/19/25

Public Meeting #2 – Date TBD

Existing Plan Expiration Date – 7/19/25

Plan Website

- Project Team requests counties/municipalities post relevant project information and updates
  - Public Survey indicate online/social media is preferred method of information sharing (60%)
- 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

SOUTH MOUNTAINS

REGIONAL HAZARD MITIGATION PLAN 2025 UPDATE

QR CODE TO PUBLIC SURVEY

Background

The South Mountains Regional Hazard Mitigation Plan aims to assess, reduce, and prepare for the impact of natural and man-made hazards in the region. The 2025 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.

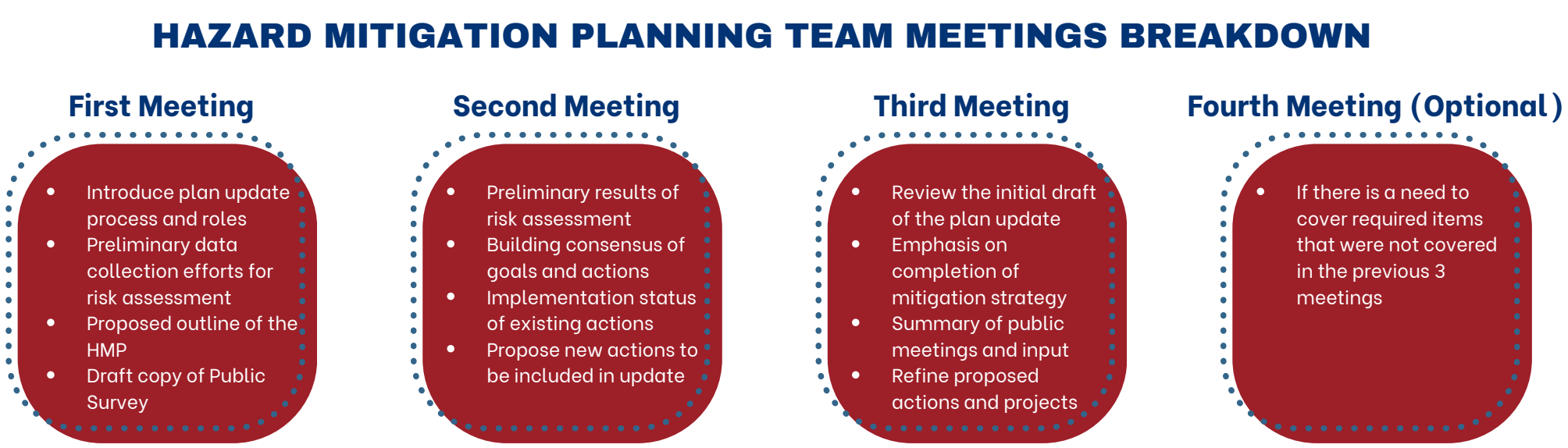
Mitigation Techniques

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



An internal meeting was held on February 21, 2024 with stakeholders from all counties present. During this meeting, Henderson County volunteered to host any in-person meetings. Polk County also agreed to host any upcoming meetings (larger Stakeholder Kickoff Meeting, Public Meeting #1, or the Mitigation Strategy Meeting).

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 South Mountains Regional HMP 2024 Update! We look forward to working with you!

Combined HIRA/Mitigation Strategy Meeting
August 14th, 2024
10:00am – 12:00pm
Hendersonville, 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-JANUARY 2025

Combined HIRA/Mitigation Strategy Meeting
August 14th, 2024
10:00am – 12:00pm
Hendersonville, NC

The HIRA and Mitigation Strategy Meeting for the South Mountains Regional Hazard Mitigation Plan Update was the second official meeting of the planning process. Nathan Slaughter from ESP, led the meeting, emphasizing the importance of maximizing attendees' time by covering multiple elements of the risk and capability assessment findings, as well as the mitigation strategy. Participants included both in-person attendees and those joining online, with a sign-in sheet circulated for documentation purposes.

The Hazard Identification and Risk Assessment (HIRA), includes four steps, including (1) identifying hazards, (2) profile hazards, (3) inventory assets, and (4) estimate losses. The meeting's objectives were to review and discuss HIRA findings and adjust information based on stakeholder input. The meeting would then shift focus to the mitigation action plan and the development of potential new mitigation actions.

During the hazard identification segment, it was noted that there have been 13 FEMA Major Disaster Declarations in total, with multiple hazard categories impacting the region. The findings included the addition of two new hazards—civil disturbance and food emergency—consistent with the State HMP. Also consistent with the State's HMP, this regional plan update will take an "all-hazard" approach, accounting for human-caused hazards in addition to natural hazards.

The hazard profiles highlighted 18 different hazards, detailing background information, historical occurrences, and vulnerability assessments. Among the key findings, excessive heat and severe winter weather were identified as the highest-risk hazards, followed by tornadoes/thunderstorms, excessive heat, severe winter weather, and flooding. Ms. Andrea Webster with NCORR presented on the significant public health impacts of excessive heat, noting its classification as a leading natural hazard killer despite a lack of direct property impact.

Additional comments were noted by participants regarding several hazards that should be taken into consideration for the region's risk assessment and overall plan update. These adjustments are briefly summarized below:

1. Geological hazards should indicate landslides, which could potentially increase the anticipated impact. Some counties have more up-to-date data than others, and this information should be integrated into the plan.
2. Dam failure is a hazard of concern with 125 of the 362 dams in the region categorized as high hazard.
3. The scoring for wildfire should be increased to increase overall risk ranking. It was noted that wildfire events are more severe than winter weather or excessive heat.
4. The hazard probability for infectious disease should be increased, which would increase the hazard's overall risk rating.
5. The hazard probability and impact for cyber should be increased, which again, would increase the hazard's overall risk rating.

Nathan Slaughter responded by noting that the assessment will be revisited qualitatively to ensure that all scoring accurately reflects the hazards discussed during the meeting.

The meeting transitioned into the Mitigation Strategy section, where objectives and capability assessments were reviewed. Minor revisions for mitigation goals 1, 2, and 5 were suggested. The region is characterized by either high or moderate capabilities in terms of community readiness to implement and maintain mitigation activities.

Discussion turned toward FEMA requirements regarding capability assessments, specifically relating to floodplain management and substantial damage estimate procedures. Nathan emphasized the importance of capturing this data for all cities and counties and clarified that the assessments focus on structures damaged by flooding events.

The mitigation strategy development process was outlined, indicating that all action plans need to be revisited as part of the update. Data indicates every dollar spent on mitigation saves six dollars on future damages. A status update for each mitigation action is required by FEMA, summarizing implementation progress and/or any challenges limiting implementation. In terms of new mitigation goals, participants were encouraged to consider mitigation goals, community objectives, local capabilities, as well as BRIC projects.

Looking ahead, the project schedule was shared, with key dates including the kickoff on April 2nd, 2024, and the anticipated delivery of the draft plan in January 2025. Nathan encouraged participants to think about the adoption process for their jurisdictions, as all must adopt the updated plan to remain eligible for FEMA funding. There will be a public meeting, although the specific dates are yet to be determined.

All attendees were encouraged to review all jurisdictional action plans rather than just their own, as the collective efforts are crucial for the overall effectiveness of the mitigation strategy. Further updates would be provided regarding public engagement opportunities and the next in-person meeting (likely once a draft is ready). The meeting adjourned with team contact information shared.

South Mountains Regional Hazard Mitigation Plan Update
Mitigation Strategy Meeting

August 14, 2024

10:00 AM - 1:00 PM

Name	Agency/Department/Position	Phone Number	E-mail Address
Andrew Kegley	Polk Co. EM/ Asst. Fire Marshal	828-894-6342	akegley@polknc.org
Bobby Arledge	Polk Co EM Director	828-894-6342	barledge@polknc.org
Victoria Cortes	Henderson County EM Planner	828-458-9209	vcortes@hendersoncountync.gov
Mike Morgan	Henderson County Chief Comm Officer	828-707-4571	tmorgan@hendersoncountync.gov
Jimmy Brissie	Henderson County EM	828-697-4728	jbrissie@hendersoncountync.gov
Justin Ward	Hendersonville Fire Dept.	828-606-7683	jward@hvlnc.gov
Mary Roderick	Land of Sky Regional Council	4254420385	mary@landofsky.org
Mike Huffman	City of Hendersonville	828 458 5693	mhuffman@hvlnc.gov

South Mountains Regional Hazard Mitigation Plan Update
Mitigation Strategy Meeting

August 14, 2024

10:00 AM - 1:00 PM

Name	Agency/Department/Position	Phone Number	E-mail Address
Kevin Shook	Transylvania County Emergency Management	828 884 3108	Kevin.shook@transylvaniacounty.org
Toby Linville	Henderson County Floodplain Admin	828-674-6627	tlinville@hendersoncountync.gov
Janna Bianculli	Co Henderson County Planning	828-694-6557	jbianculli@hendersoncountync.gov
D. JAMES MILLER	HENDERSONVILLE FIRE DEPARTMENT	828.674.0339	DMILLER@HVLNC.GOV

1. Summary

Meeting title "Risk Assessment and Mitigation Strategy Meeting for South Mountain Regional Hazard Mitigation Plan "

Attended participants 12

Start time 8/14/24, 9:48:53 AM

End time 8/14/24, 12:40:03 PM

Meeting duration 2h 51m 10s

Average attendance time 2h 17m 44s

2. Participants

Name	First Join	Last Leave	In-Meeting Duration	Email	Participant ID (UPN)	Role
Nathan Slaughter	8/14/24, 9:48:57 AM	8/14/24, 12:32:49 PM	2h 43m 52s	nslaughter@espassociates.com	nslaughter@espassociates.com	Organizer
Crew, John (NCEM) (External)	8/14/24, 9:50:06 AM	8/14/24, 12:32:34 PM	2h 42m 28s	John.Crew@ncdps.gov	John.Crew@ncdps.gov	Presenter
Mello, John (NCEM) (External)	8/14/24, 9:54:02 AM	8/14/24, 12:32:44 PM	2h 38m 42s	John.Mello@ncdps.gov	John.Mello@ncdps.gov	Presenter
Baker, Carl (NCEM) (External)	8/14/24, 9:55:00 AM	8/14/24, 12:32:41 PM	2h 37m 40s	carl.baker@ncdps.gov	carl.baker@ncdps.gov	Presenter
Pat Christie (External)	8/14/24, 9:55:54 AM	8/14/24, 12:32:51 PM	2h 36m 57s	pchristie@villageofflatrock.org	pchristie@villageofflatrock.org	Presenter
Williams, Ted (External)	8/14/24, 9:59:59 AM	8/14/24, 12:32:42 PM	2h 32m 43s	twilliams@hvlnc.gov	twilliams@hvlnc.gov	Presenter
John Flores	8/14/24, 10:00:39 AM	8/14/24, 12:32:52 PM	2h 32m 13s	jflores@espassociates.com	jflores@espassociates.com	Presenter
Victoria Cortes (External)	8/14/24, 10:00:49 AM	8/14/24, 12:40:03 PM	2h 39m 14s	vcortes@hendersoncountync.gov	vcortes@hendersoncountync.gov	Presenter
read.ai meeting notes (Unverified)	8/14/24, 10:01:14 AM	8/14/24, 11:06:04 AM	1h 4m 49s			Presenter
Webster, Andrea (External)	8/14/24, 10:02:15 AM	8/14/24, 10:59:35 AM	57m 19s	andrea.webster@ncdps.gov	andrea.webster@ncdps.gov	Presenter
Young. Nathan (External)	8/14/24, 10:11:47 AM	8/14/24, 12:30:49 PM	2h 19m 2s	nyoung@hvlnc.gov	nyoung@hvlnc.gov	Presenter

Deb Johnston (External) 8/14/24, 10:24:55 AM 8/14/24, 12:32:43 PM 2h 7m 48s
djohnston@hendersoncountync.gov djohnston@hendersoncountync.gov Presenter

3. In-Meeting Activities

Name Join Time Leave Time Duration Email Role

Nathan Slaughter 8/14/24, 9:48:57 AM 8/14/24, 12:32:49 PM 2h 43m 52s
nslaughter@espassociates.com Organizer

Crew, John (NCEM) (External) 8/14/24, 9:50:06 AM 8/14/24, 12:32:34 PM 2h 42m 28s
John.Crew@ncdps.govPresenter

Mello, John (NCEM) (External) 8/14/24, 9:54:02 AM 8/14/24, 12:32:44 PM 2h 38m 42s
John.Mello@ncdps.gov Presenter

Baker, Carl (NCEM) (External) 8/14/24, 9:55:00 AM 8/14/24, 12:32:41 PM 2h 37m 40s
carl.baker@ncdps.gov Presenter

Pat Christie (External) 8/14/24, 9:55:54 AM 8/14/24, 12:32:51 PM 2h 36m 57s
pchristie@villageofflatrock.org Presenter

Williams, Ted (External) 8/14/24, 9:59:59 AM 8/14/24, 12:32:42 PM 2h 32m 43s
twilliams@hvlnc.gov Presenter

John Flores 8/14/24, 10:00:39 AM 8/14/24, 12:32:52 PM 2h 32m 13s
jflores@espassociates.com Presenter

Victoria Cortes (External) 8/14/24, 10:00:49 AM 8/14/24, 12:40:03 PM 2h 39m 14s
vcortes@hendersoncountync.gov Presenter

read.ai meeting notes (Unverified) 8/14/24, 10:01:14 AM 8/14/24, 11:06:04 AM 1h 4m 49s
Presenter

Webster, Andrea (External) 8/14/24, 10:02:15 AM 8/14/24, 10:59:35 AM 57m 19s
andrea.webster@ncdps.gov Presenter

Young. Nathan (External) 8/14/24, 10:11:47 AM 8/14/24, 12:30:49 PM 2h 19m 2s
nyoung@hvlnc.gov Presenter

Deb Johnston (External) 8/14/24, 10:24:55 AM 8/14/24, 12:32:43 PM 2h 7m 48s
djohnston@hendersoncountync.gov Presenter

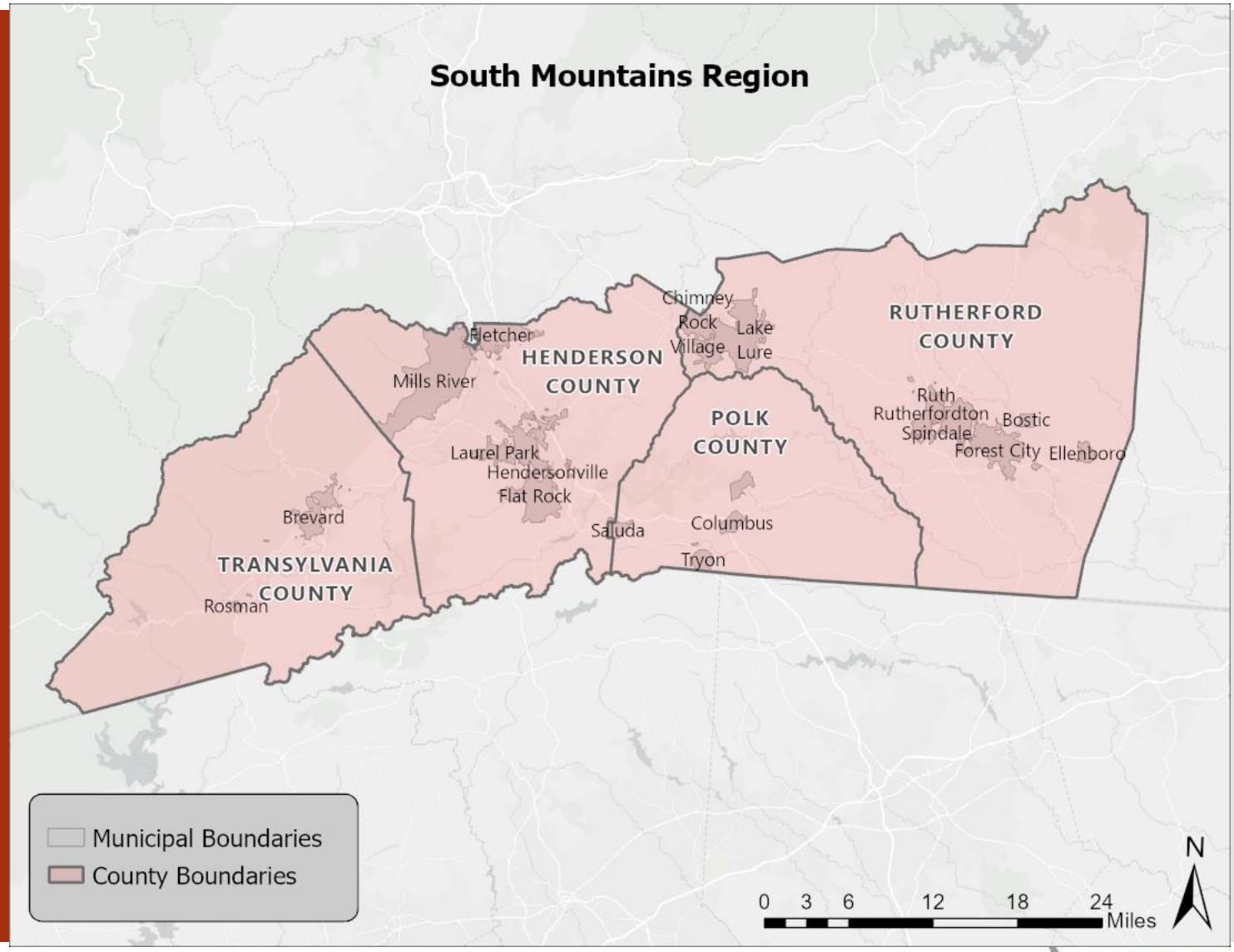
South Mountains Region

2025 Hazard Mitigation Plan Update

HIRA/Mitigation Strategy Meeting

August 14, 2024

2529 Asheville Hwy, Hendersonville, 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	Henderson County	Polk County	Rutherford County	Transylvania County
1977	542	Severe Storms & Flooding	X	X	X	
1989	827	Tornadoes			X	
1995	1073	Severe Storms, Flooding, High Winds				X
1996	1087	Blizzard of 96	X	X	X	X
1996	1103	Winter Storm	X	X	X	
1996	1134	Hurricane Fran	X	X	X	
1998	1200	Severe Storms and Flooding				X
2002	1448	Severe Ice Storm		X	X	
2004	1546	Tropical Storm Frances	X	X	X	X
2004	1553	Hurricane Ivan	X	X	X	X
2018	4393	Hurricane Florence		X		
2020	4487	COVID-19 Pandemic	X	X	X	X
2020	4543	Severe Storms, Tornadoes, and Flooding		X	X	

Total Declarations: **13**

- Categories
  - Hurricanes and coastal storms (4)
  - Severe winter weather (3)
  - Tornadoes and thunderstorms (5)
  - Pandemic (1)

Review of Existing Plan Hazards

Hazard	Included in 2023 State HMP?	Included in 2020 SMtns Plan?	Included in 2025 SMtns 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 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

Location	2022	2021	2020	2010	% Change 2010-2020
Henderson County	**116,469**	**115,613**	**116,281**	**106,740**	**8.94%**
Flat Rock	3,483	3,460	3,486	3,114	11.95%
Fletcher	8,000	7,935	7,987	7,187	11.13%
Hendersonville	15,102	14,878	15,137	13,137	15.22%
Laurel Park	2,615	2,663	2,250	2,180	3.21%
Mills River	7,100	7,082	7,078	6,802	4.06%
Unincorporated Area	80,169	79,595	80,343	74,320	8.10%
Polk County	**19,538**	**19,413**	**19,328**	**20,510**	**-5.76%**
Columbus	1,087	1,139	1,060	999	6.11%
Saluda	617	646	631	719	-12.24%
Tryon	1,516	1,334	1,562	1,646	-5.10%
Unincorporated Area	16,318	16,294	16,075	17,146	-6.25%
Rutherford County	**64,680**	**64,592**	**64,444**	**67,810**	**-4.96%**
Bostic	304	296	355	386	-8.03%
Chimney Rock Village	220	131	140	113	23.89%
Ellenboro	944	746	723	873	-17.18%
Forest City	7,357	7,330	7,377	7,476	-1.32%
Lake Lure	1,575	1,500	1,365	1,192	14.51%
Ruth	621	525	347	440	-21.14%
Rutherfordton	3,671	3,668	3,640	4,213	-13.60%
Spindale	4,218	4,153	4,225	4,321	-2.22%
Unincorporated Area	45,770	46,243	46,272	48,796	-5.17%
Transylvania County	**33,131**	**32,979**	**32,986**	**33,090**	**-0.31%**
Brevard	7,777	7,712	7,744	7,609	1.77%
Rosman	642	700	701	576	21.70%
Unincorporated Area	24,712	24,567	24,541	24,905	-1.46%
South Mountains Regional Total	**233,818**	**232,597**	**233,039**	**228,150**	**2.14%**

Asset Inventory – Parcels & Building Exposure (2010+)

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

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Henderson County	**73,922**	**$52,170,024,082**	**52,536**	**$40,974,609,557**
Flat Rock	3,222	$2,389,682,000	2,071	$1,865,254,200
Fletcher	3,803	$2,278,956,000	2,887	$1,645,054,400
Hendersonville	8,237	$19,125,687,238	5,568	$16,521,129,100
Laurel Park	1,873	$871,368,100	1,017	$670,099,100
Mills River	4,433	$2,735,732,922	3,478	$1,812,748,200
Unincorporated Area	52,354	$24,768,597,822	37,515	$18,460,324,557
Polk County	**17,239**	**$3,648,945,187**	**11,152**	**$2,409,558,991**
Columbus	621	$223,571,557	505	$146,377,260
Saluda	779	$150,595,872	489	$102,932,166
Tryon	1,243	$245,490,299	892	$193,605,286
Unincorporated Area	14,596	$3,029,287,459	9,266	$1,966,644,279
Rutherford County	**57,361**	**$8,982,070,368**	**38,175**	**$6,644,094,900**
Bostic	302	$50,689,200	207	$45,211,800
Chimney Rock Village	524	$105,026,200	204	$49,063,700
Ellenboro	576	$52,098,100	503	$42,335,800
Forest City	4,772	$1,082,605,682	3,665	$902,060,900
Lake Lure	5,108	$1,309,048,172	1,705	$792,345,800
Ruth	269	$32,578,200	190	$26,455,900
Rutherfordton	2,648	$513,917,618	1,869	$442,154,700
Spindale	2,981	$370,476,996	2,080	$315,345,400
Unincorporated Area	40,181	$5,465,630,200	27,752	$4,029,120,900
Transylvania County	**32,155**	**$17,522,400,041**	**21,860**	**$12,142,585,388**
Brevard	4,639	$6,856,669,782	3,757	$5,578,608,012
Rosman	315	$125,528,750	331	$105,070,770
Unincorporated Area	27,201	$10,540,201,509	17,772	$6,458,906,606
South Mountains Regional Total	**180,677**	**$82,323,439,678**	**123,723**	**$62,170,848,836**

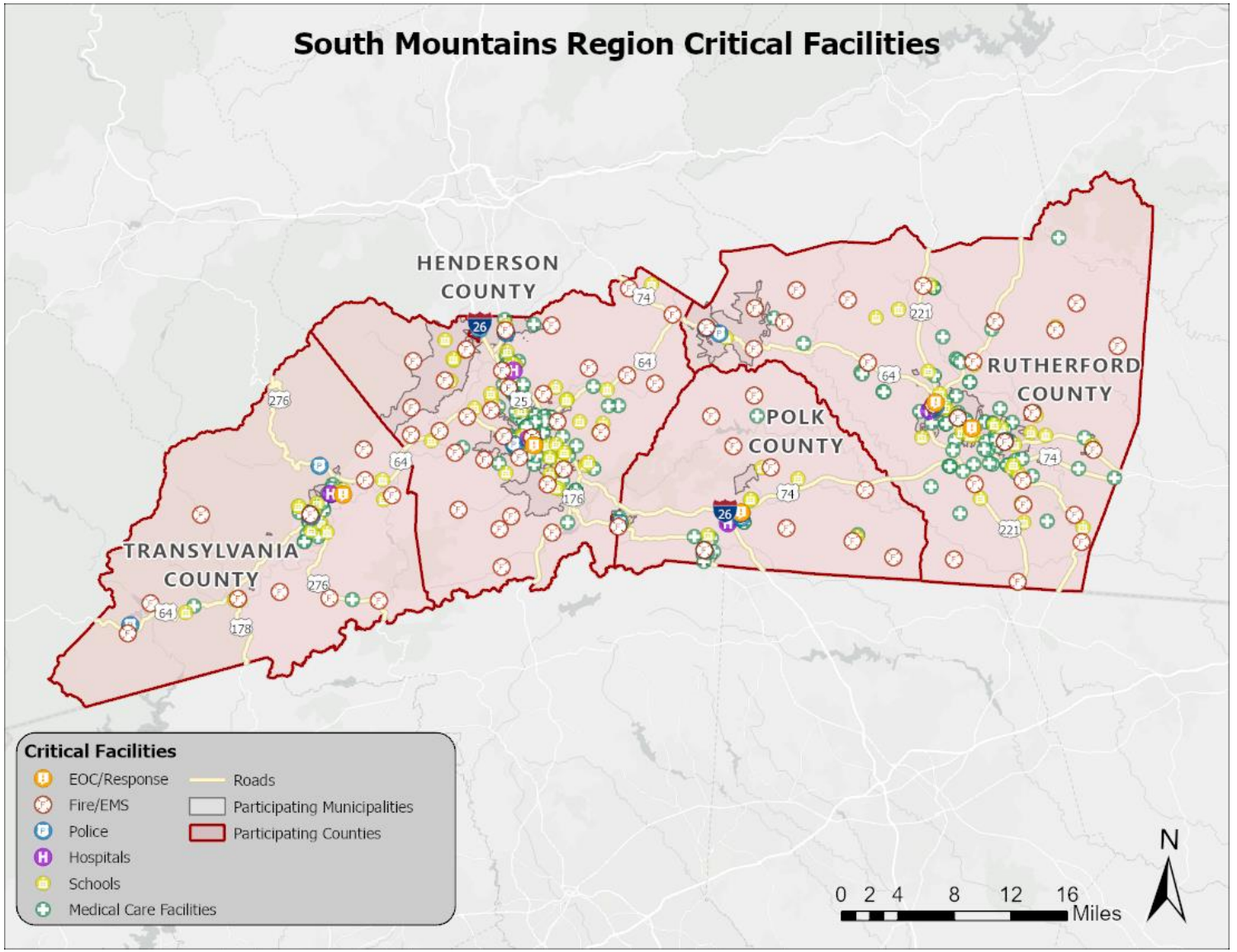
Asset Inventory – Critical Facilities

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

Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	EOCs	Schools	Other
Henderson County	**32**	**6**	**91**	**1**	**42**	**12**
Flat Rock	1	0	1	0	2	0
Fletcher	1	2	2	0	1	1
Hendersonville	2	2	38	1	8	4
Laurel Park	2	1	3	0	0	3
Mills River	4	0	0	0	5	0
Unincorporated Area	22	1	47	0	26	4
Polk County	**11**	**5**	**16**	1	**9**	**0**
Columbus	1	3	5	1	0	0
Saluda	1	1	1	0	1	0
Tryon	1	1	4	0	1	0
Unincorporated Area	8	0	6	0	7	0
Rutherford County	**25**	**6**	**79**	**2**	**28**	**0**
Bostic	1	0	1	0	1	0
Chimney Rock Village	1	1	0	0	0	0
Ellenboro	1	0	3	0	1	0
Forest City	1	1	15	0	6	0
Lake Lure	2	1	1	0	1	0
Ruth	0	0	0	0	0	0
Rutherfordton	1	2	9	1	2	0
Spindale	1	1	10	1	1	0
Unincorporated Area	17	0	40	0	16	0
Transylvania County	**11**	**4**	**22**	**1**	**16**	**2**
Brevard	1	2	15	1	8	1
Rosman	1	0	0	0	3	0
Unincorporated Area	9	2	7	0	5	1
South Mountains Regional Total	**79**	**21**	**208**	**5**	**95**	**14**

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	Henderson County	Polk County	Rutherford County	Transylvania County
Percent of the population over age 5 that speaks a language other than English (2022 ACS 5-Year Estimates)	**10.3%**	7.0%	5.1%	2.6%
Percent of the population that has a disability (2022 ACS 5-Year Estimates)	14.8%	18.1%	**21.2%**	14.9%
Percent of the population that lives below the poverty level (2022 ACS 5-Year Estimates)	11.4%	11.0%	**18.4%**	13.4%
Social Vulnerability Index (CDC/ATSDR, 2022)	0.4286 (low to med)	0.3583 (low to med)	**0.8072 (high)**	0.4773 (low to med)
Environmental Justice Index (CDC/ATSDR, 2022)	3 high-burden tracts	0 high-burden tracts	**9 high-burden tracts**	0 high-burden tracts
Base Risk Index (FEMA NRI, 2024)	**70.7**	19.31	59.37	41.78
Social Vulnerability (FEMA NRI, 2024)	38.32	36.47	**84.21**	52.23
Community Resilience (FEMA NRI, 2024)	**41.85**	25.75	26.48	32.08

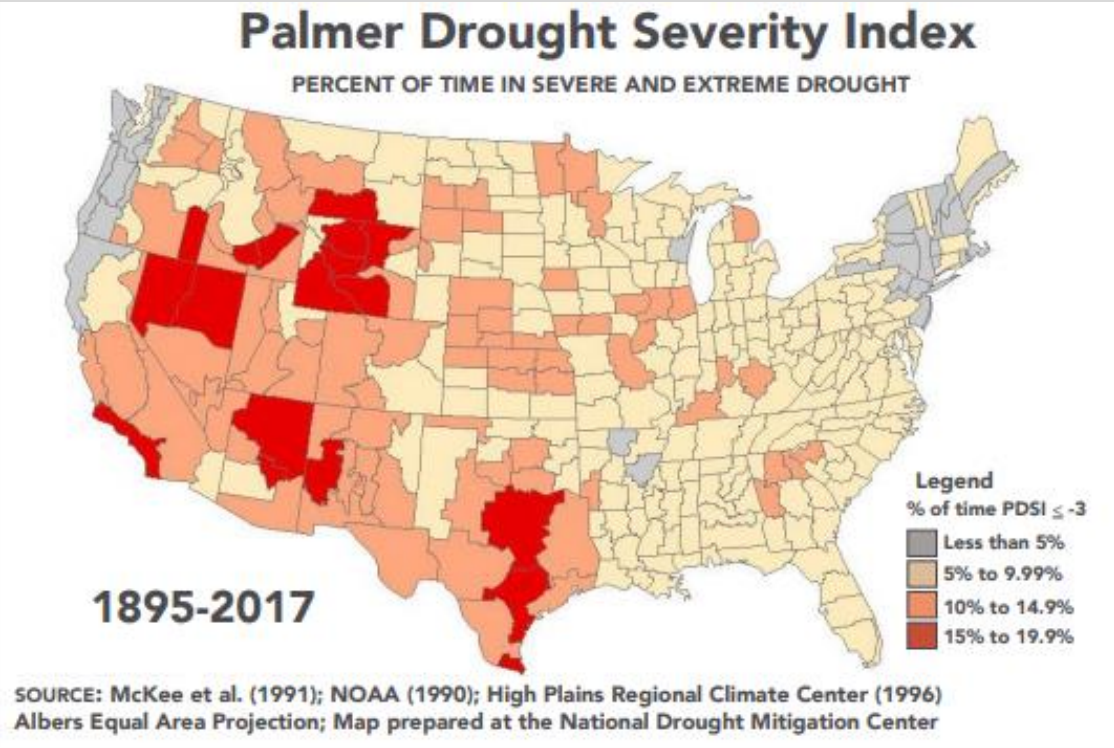
Hazard Profiles

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	Hailstorm, 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 one week	3.0
Earthquakes		Likely	Limited	Moderate	Less than 6 hours	Less than 6 hours	2.6
Geological	Landslide, Sinkholes, Erosion	Likely	Limited	Small	Less than 6 hours	Less than 6 hours	2.4
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	3.0
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, Chemical, 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	Number Years with Drought Occurrences	Number Years with Exceptional Drought Occurrences
Henderson County	21	2
Polk County	22	3
Rutherford County	23	3
Transylvania County	23	3

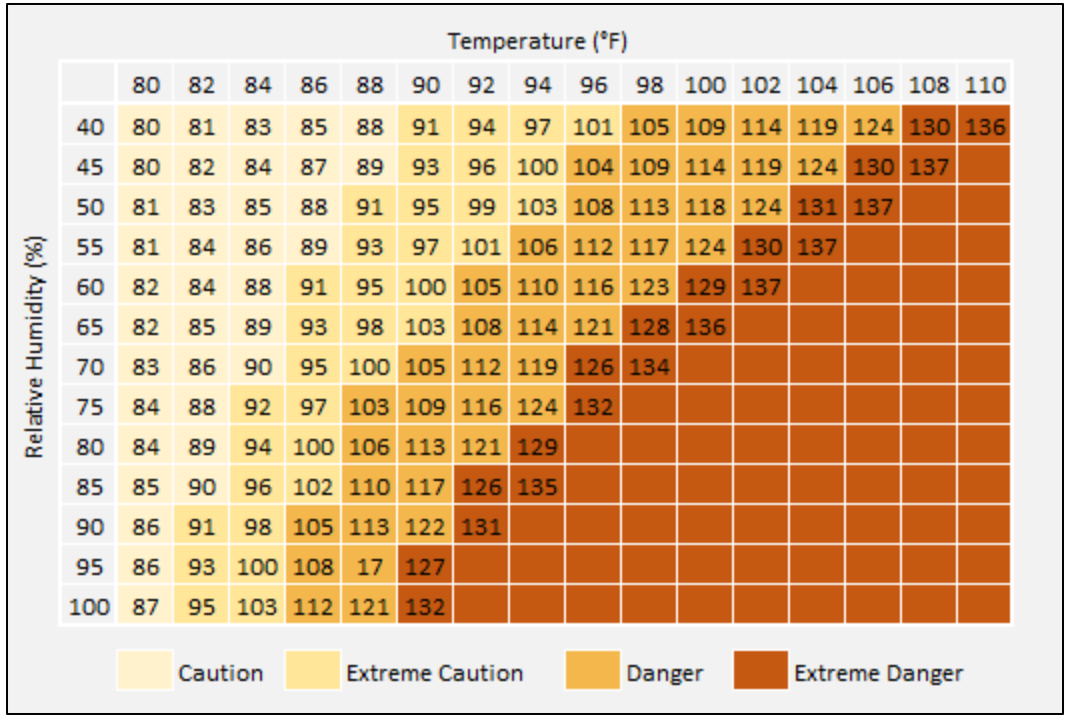
Source: North Carolina Drought Monitor (through February 2024)

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, counties in the region have had some level of drought occurrences in roughly 21-23 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**:
  - Henderson – Relatively low
  - Polk – Very low
  - Rutherford – Very low
  - Transylvania – Very low

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

Excessive Heat



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

MAX RECORDED TEMPERATURES BY COUNTY

Location	Date	Temperature (°F)
Henderson County	8/23/1983	101
Polk County	6/22/1964	105
Rutherford County	8/10/2007	103
Transylvania County	7/21/1926	99
South Mountains Regional Maximum	**6/22/1964**	**105**

Source: State Climate Office of North Carolina

AVERAGE MAX TEMPERATURE IN HENDERSONVILLE, HENDERSON COUNTY (MOST CENTRALIZED STATION)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	66.8	69.4	76.9	83.5	86.9	90.5	92.1	90.9	88.1	81.6	73.9	67.1

Source: State Climate Office of North Carolina

- **2024 FEMA NRI excessive heat hazard ratings**:
  - Henderson – No rating
  - Polk – No rating
  - Rutherford – No rating
  - Transylvania – No rating
- 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

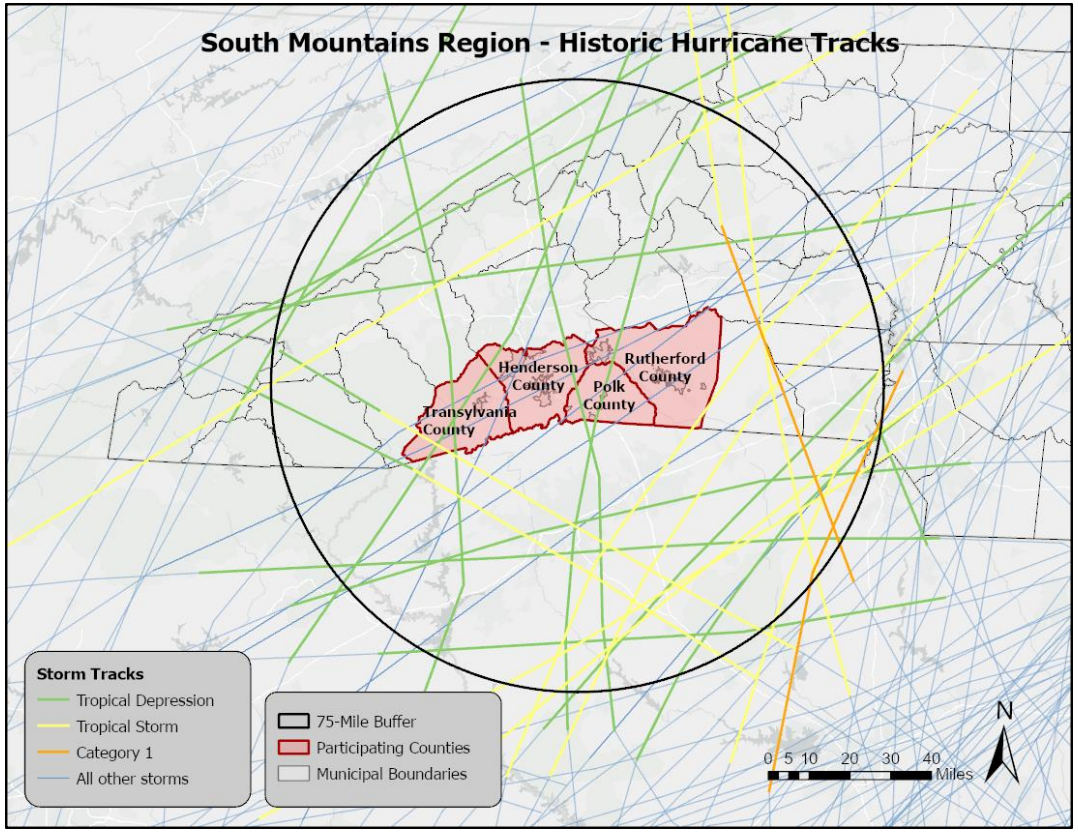
Hurricane & Coastal Hazards

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

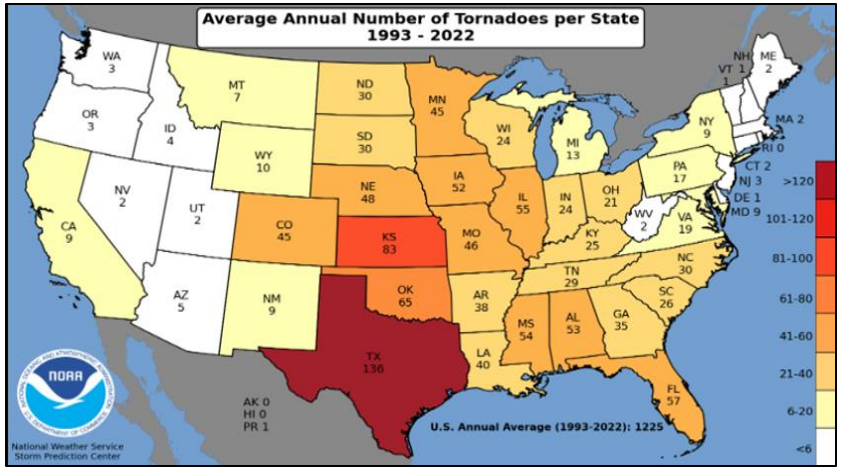
A hurricane-level storm makes landfall in NC roughly **once every 3 years**.

- North Carolina is vulnerable to hurricanes and tropical storms beyond the coastline
- Per the National Hurricane Center, roughly **45 hurricanes or tropical storms passed within 75 miles of the South Mountains Region** since 1850
  - 9+ 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**:
  - Henderson – Relatively low
  - Polk – Very low
  - Rutherford – Relatively low
  - Transylvania – Very low

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**, formation most likely between March-May
- Tornado magnitude is reported according to the Enhanced Fujita Scale (effective 2005)
- Per NCEI, tornadoes have resulted in 21 recorded events up to category F4 and over $4.1 million (2023 dollars) in property damages since 1950*
  - 10+ injuries
  - Total number of tornadoes is not significantly different from the past, but clustering appears to be increasing
- **2024 FEMA NRI tornado hazard ratings**:
  - Henderson – Relatively moderate
  - Polk – Relatively low
  - Rutherford – Relatively low
  - Transylvania – Relatively low

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Moderate	6 to 12 hours	Less than 6 hours

Tornadoes / Thunderstorms – Thunderstorm Wind

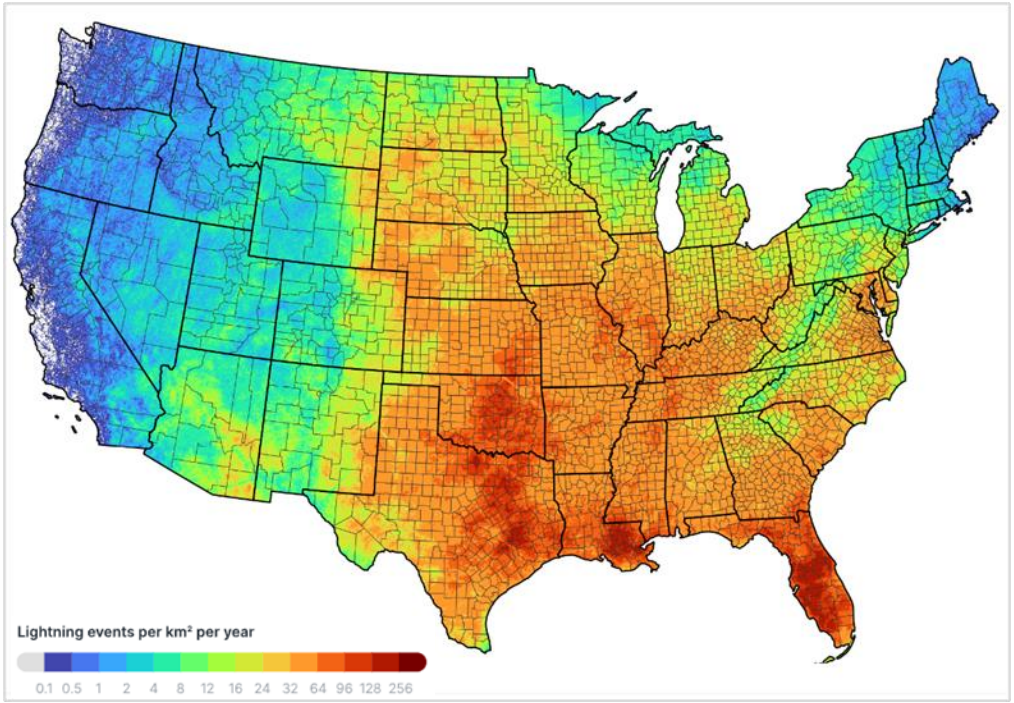
NCEI THUNDERSTORM / HIGH WIND EVENTS

Location	Number of Occurrences	Deaths/Injuries	Property Damage (2023)
Henderson County	**189**	**2/8**	**$2,733,917**
Flat Rock	3	0/0	$0
Fletcher	7	0/0	$110,447
Hendersonville	21	0/3	$81,815
Laurel Park	3	0/0	$26,627
Mills River	12	0/0	$52,762
Unincorporated Area	143	2/5	$2,462,266
Polk County	**123**	**0/2**	**$1,628,904**
Columbus	22	0/2	$72,271
Saluda	4	0/0	$0
Tryon	15	0/0	$50,054
Unincorporated Area	82	0/0	$1,506,579
Rutherford County	**258**	**4/3**	**$3,524,304**
Bostic	10	0/0	$0
Chimney Rock Village	10	0/0	$0
Ellenboro	8	0/0	$1,672
Forest City	26	0/0	$680,559
Lake Lure	18	0/0	$3,378
Ruth	4	0/0	$0
Rutherfordton	52	1/0	$527,234
Spindale	5	0/0	$0
Unincorporated Area	125	3/3	$2,311,461
Transylvania County	**110**	**0/0**	**$1,435,391**
Brevard	23	0/0	$151,528
Rosman	6	0/0	$0
Unincorporated Area	81	0/0	$1,283,863
South Mountains Regional Total	**680**	**6/13**	**$9,322,516**

- Although thunderstorms generally affect a small area, they are very dangerous and may cause extensive damages
- Per the U.S. NWS, **100,000+ thunderstorms 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**:
  - Henderson – Relatively high
  - Polk – Relatively low
  - Rutherford – Relatively moderate
  - Transylvania – Relatively low

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 53 recorded events and over $3.9 million (2023 dollars) in property damages since 1995
  - 38 injuries
- Region averages **16-32 lightning events per square kilometer per year** (2016-2023 Vaisala NLDN data)
- **2024 FEMA NRI lightning hazard ratings**:
  - Henderson – Relatively moderate
  - Polk – Relatively low
  - Rutherford – Relatively moderate
  - Transylvania – 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 damaging outgrowth of thunderstorms and form as ice crystals out of warm air updrafts
- Per NCEI, hail has resulted in 430 recorded events and over $5.5 million (2023 dollars) in property damages in the region since 1963
  - 0.75-inch to 2.75-inch hail
- **2024 FEMA NRI hail hazard ratings**:
  - Henderson – Relatively moderate
  - Polk – Very low
  - Rutherford – Relatively low
  - Transylvania – Very low

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

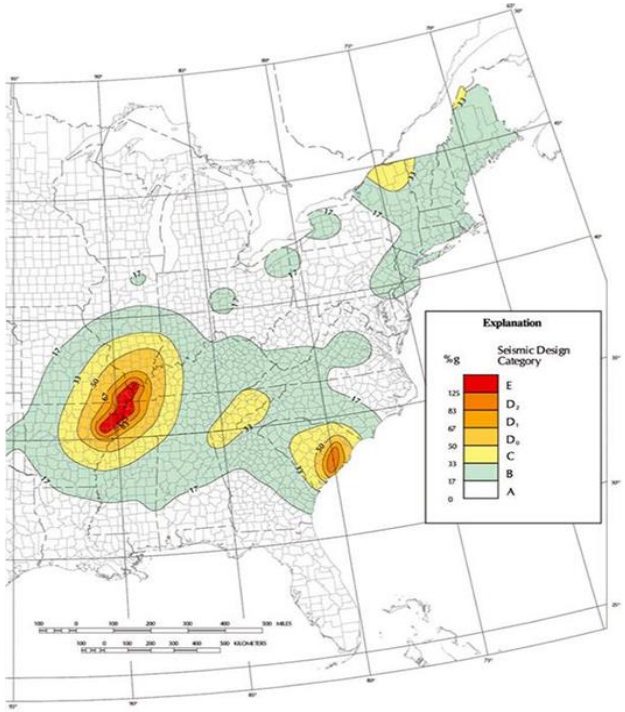
Location	Number of Occurrences	Deaths / Injuries	Property Damage (2023)
Henderson County	169	2/0	$2,171,743
Polk County	110	0/0	$0
Rutherford County	109	0/0	$0
Transylvania County	166	1/0	$12,179,938
South Mountains Regional Total	**554**	**3/0**	**$14,351,681**

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**.

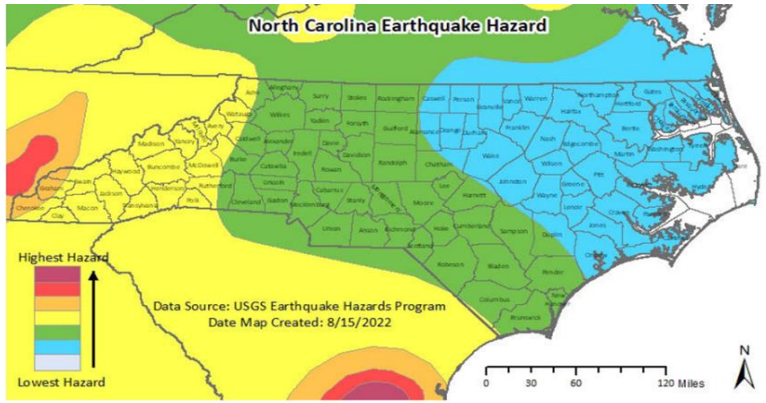
- A winter storm can range from moderate snowfall or ice over a few hours to blizzard conditions with blinding snow that lasts for several days
- **Severe winter weather** can lead to dangerous driving conditions, communications and utility disruptions, and severe injuries
- Winter weather has resulted in 3 disaster declarations and 554 recorded events in the region since 1993 per NCEI records
- Per NOAA, average winter temps in urban hubs of NC have recently spiked by 2-3°F
- **2024 FEMA NRI winter weather hazard ratings**:
  - Henderson – Relatively low
  - Polk – Very low
  - Rutherford – Very low
  - Transylvania – Very low

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Moderate	Less than 6 hours	Less than 6 hours

Earthquake



Source: United States Geological Survey

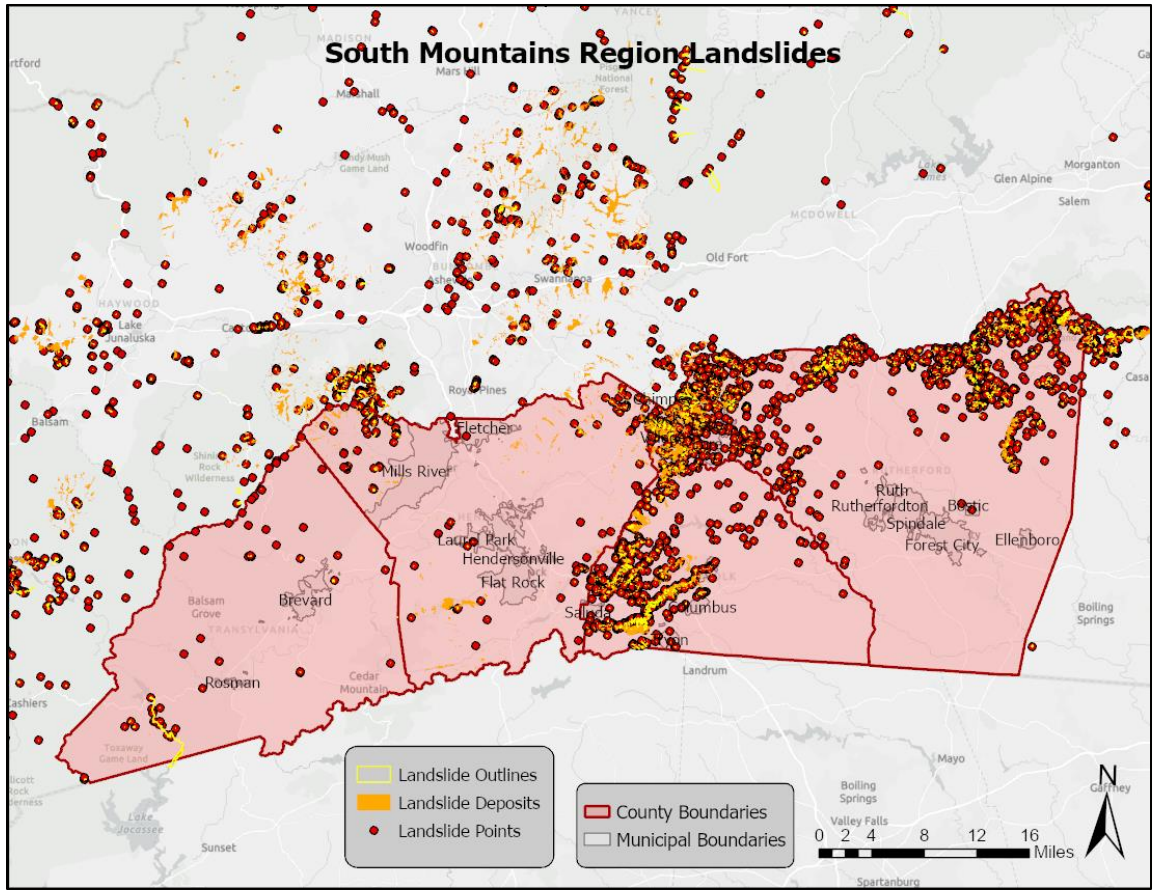


Source: North Carolina Geological Survey

- **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)
- **140+ earthquakes** have affected the region since 1886
  - Strongest: VI (MMI scale)
  - Most: Henderson (64)
- 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**:
  - Henderson – Relatively low
  - Polk – Very low
  - Rutherford – Relatively low
  - Transylvania – Very low

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	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
- Steep regional topography increases susceptibility to landslides, although soil profiles suggest sinkholes and erosion are uncommon
- Landslide activity is very significant in the region (2,800+ reports per NCGS)
  - USGS has previously mapped large regional areas of moderate incidence and high susceptibility (1982)
- The number of landslides is projected to increase due to more extreme rainfall events
- **2024 FEMA NRI landslide hazard ratings**:
  - Henderson – Relatively high
  - Polk – Relatively moderate
  - Rutherford – Relatively high
  - Transylvania – Relatively high

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

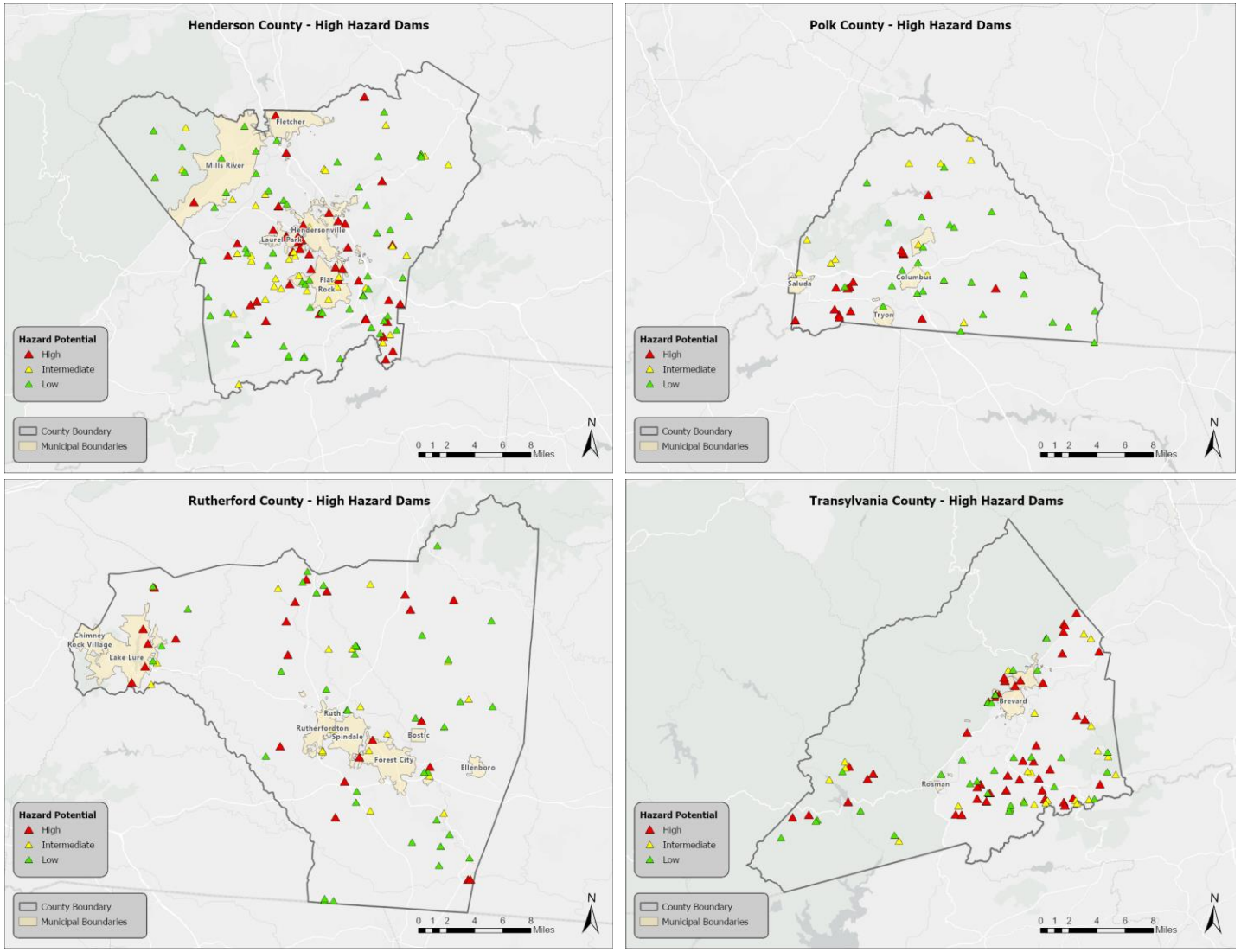
SOUTH MOUNTAINS REGION HIGH-HAZARD DAMS

Location	Number High Hazard Dams
Henderson County	41
Polk County	15
Rutherford County	23
Transylvania County	46
South Mountains Regional Total	**125**

- Interest in **dam safety** has increased due to (1) aging infrastructure, (2) new data, and (3) population growth near downstream SFHAs
  - **FEMA priority**
- Although unlikely, dam failure carries serious risks as the energy of stored water is capable of significant losses
- Per NCDEQ as of December 2023, there are **362 dams** in the South Mountains Region
  - **≈34%** are 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

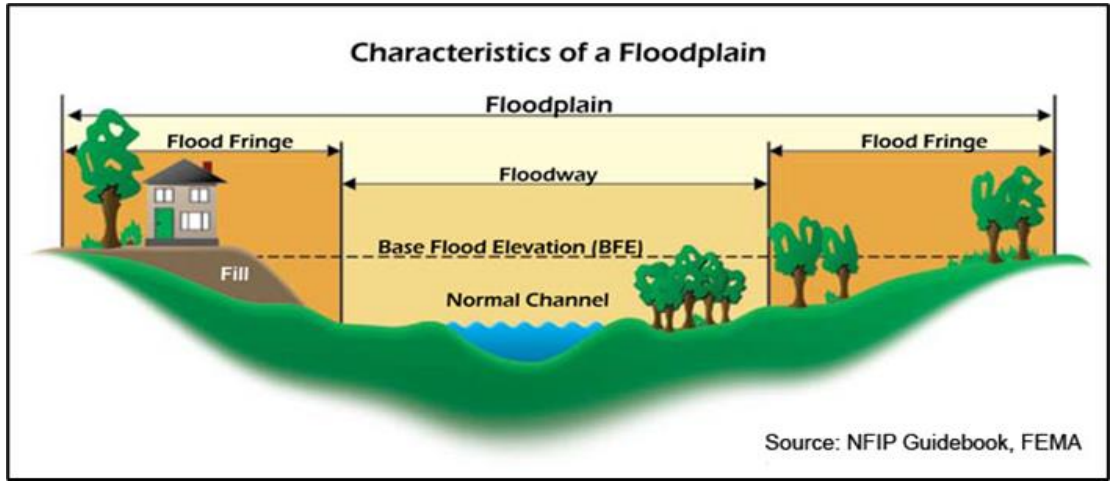
Flooding

SUMMARY OF APPROXIMATE FLOODPLAIN AREAS

Location	100-year area (sq. mi.)	500-year area (sq. mi.)
Henderson County	22.69	1.96
Polk County	9.94	0.75
Rutherford County	28.34	0.25
Transylvania County	16.59	1.49
South Mountains Regional Total	**77.56**	**4.45**

Source: Federal Emergency Management Agency, Map Service Center

These floodplain areas account for **≈5.3%** of the total land area in the region (≈1,554 square miles).

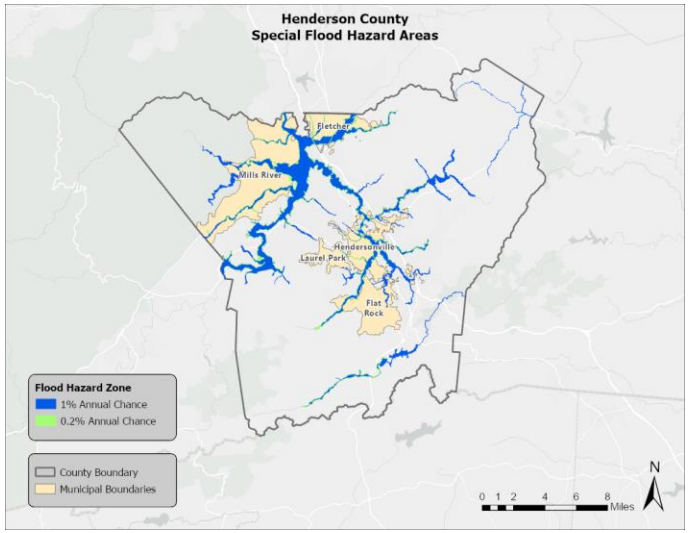


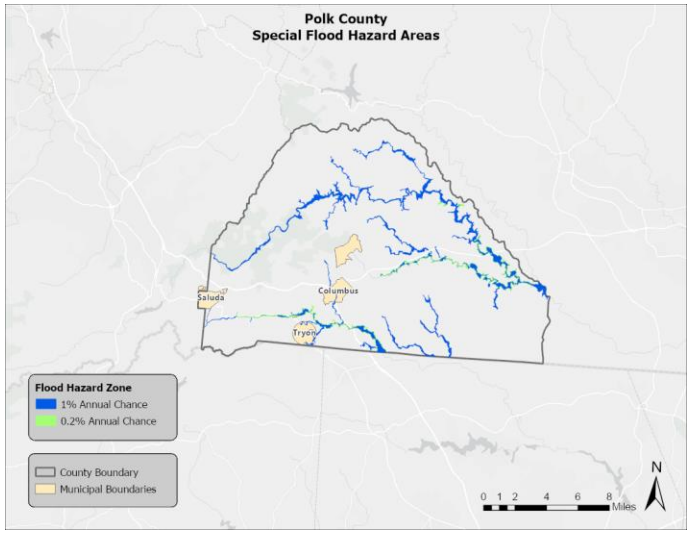
Structures in a Special Flood Hazard Area (SFHA) have a **≈26% chance of flooding** during the span of a 30-year mortgage.

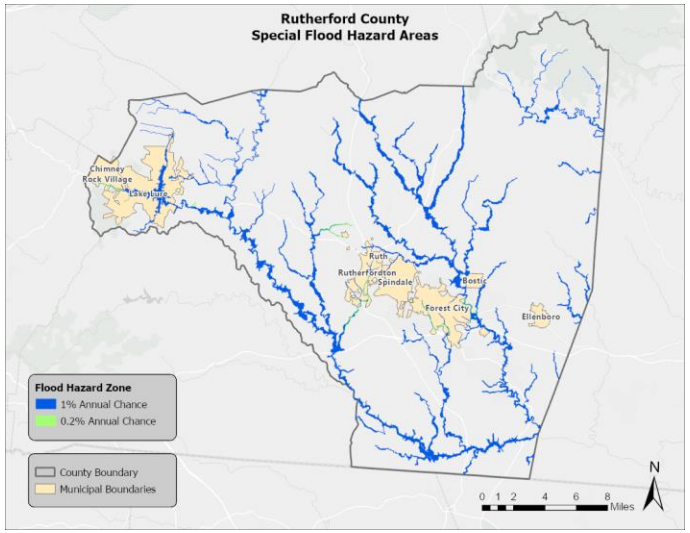
- **Flooding** is a top hazard in the nation for weather-related mortality and **the most common and costly natural hazard**
  - Many compounding hazards can intensify
  - Urban stormwater needs are growing
- **2 main sources**:
  - Riverine flooding
  - Flash flooding
- NC climate projections suggest a likely increase in total annual precipitation and a very likely increase in extreme precipitation frequency/intensity
- **2024 FEMA NRI riverine flooding hazard ratings**:
  - Henderson – Relatively moderate
  - Polk – Very low
  - Rutherford – Relatively low
  - Transylvania – Relatively low

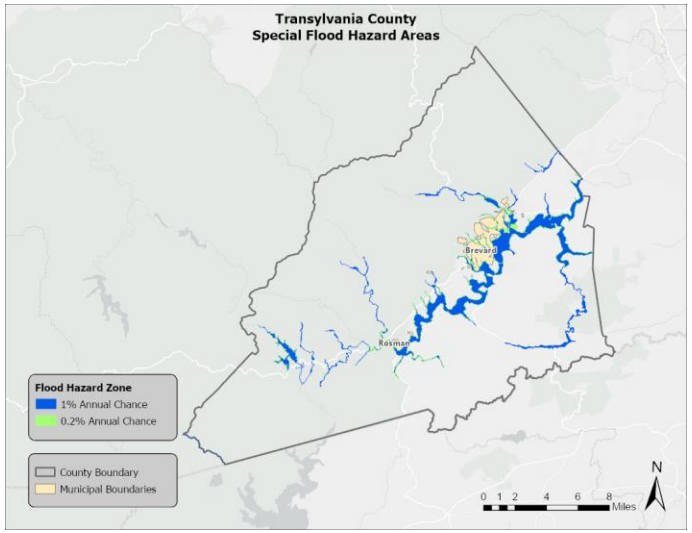
Flooding

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Critical	Moderate	6 to 12 hours	Less than 1 week









Source: Federal Emergency Management Agency, Map Service Center

Flooding – NFIP Historical Losses and Repetitive Loss Properties (2024)

NFIP INSURED FLOOD LOSSES

Location	Flood Losses	Claims Payments (2023 dollars)
Henderson County	**218**	**$2,598,433**
Flat Rock	3	$13,944
Fletcher	11	$305,778
Hendersonville	163	$1,788,634
Laurel Park	6	$18,925
Mills River*	--	--
Unincorporated Area	35	$471,152
Polk County	**46**	**$1,048,141**
Columbus	0	$0
Saluda	0	$0
Tryon	3	$41,720
Unincorporated Area	43	$1,006,421
Rutherford County	**68**	**$1,349,282**
Bostic	0	$0
Chimney Rock Village	3	$23,360
Ellenboro*	--	--
Forest City	2	$75,276
Lake Lure	2	$28,746
Ruth	0	$0
Rutherfordton	4	$11,833
Spindale	0	$0
Unincorporated Area	57	$1,210,067
Transylvania County	**89**	**$1,589,644**
Brevard	17	$151,991
Rosman	19	$207,401
Unincorporated Area	53	$1,230,252
South Mountains Regional Total	**421**	**$6,585,499**

NFIP REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Henderson County	**23**	**95**
Flat Rock	0	0
Fletcher	1	2
Hendersonville	22	93
Laurel Park	0	0
Mills River*	--	--
Unincorporated Area	0	0
Polk County	**5**	**10**
Columbus	2	4
Saluda	0	0
Tryon	2	4
Unincorporated Area	1	2
Rutherford County	**10**	**29**
Bostic	0	0
Chimney Rock Village	3	7
Ellenboro*	--	--
Forest City	2	7
Lake Lure	3	10
Ruth	0	0
Rutherfordton	2	5
Spindale	0	0
Unincorporated Area	0	0
Transylvania County	**4**	**13**
Brevard	1	3
Rosman	2	8
Unincorporated Area	1	2
South Mountains Regional Total	**42**	**147**

*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

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Moderate	12 to 24 hours	More than 1 week

Wildfire

SOUTH MOUNTAINS REGION WILDLAND URBAN INTERFACE (WUI)

Housing Density	WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
LT 1hs/40ac	1,743	0.8 %	119,982	21.2 %
1hs/40ac to 1hs/20ac	4,474	2.0 %	95,676	16.9 %
1hs/20ac to 1hs/10ac	12,032	5.3 %	105,332	18.6 %
1hs/10ac to 1hs/5ac	23,413	10.4 %	94,989	16.8 %
1hs/5ac to 1hs/2ac	51,605	22.9 %	90,120	15.9 %
1hs/2ac to 3hs/1ac	124,370	55.3 %	59,156	10.4 %
GT 3hs/1ac	7,363	3.3 %	941	0.2 %
Total	**225,000**	**100.0 %**	**566,196**	**100.0 %**

Source: Southern Wildfire Risk Assessment

SOUTH MOUNTAINS REGION BURN PROBABILITY

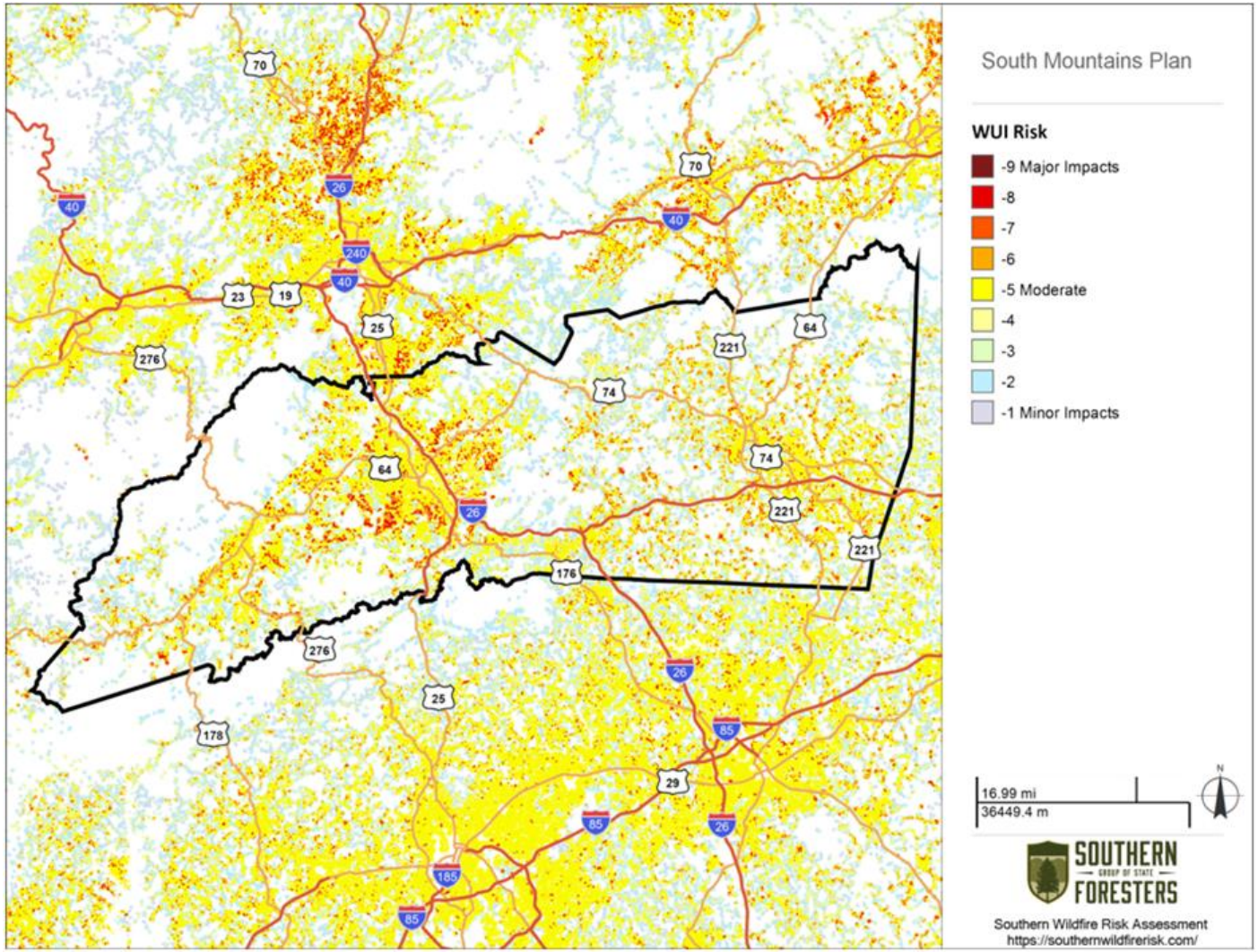
Class	Acres	Percent
1 (Lowest Probability)	302,812	36.7 %
2	269,152	32.6 %
3	160,150	19.4 %
4	84,375	10.2 %
5	9,609	1.2 %
6	0	0.0 %
7	0	0.0 %
8	0	0.0 %
9	0	0.0 %
10 (Highest Probability)	0	0.0 %
Total	**826,098**	**100.0 %**

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**:
  - Henderson – Very low
  - Polk – Very low
  - Rutherford – Relatively low
  - Transylvania – Very low

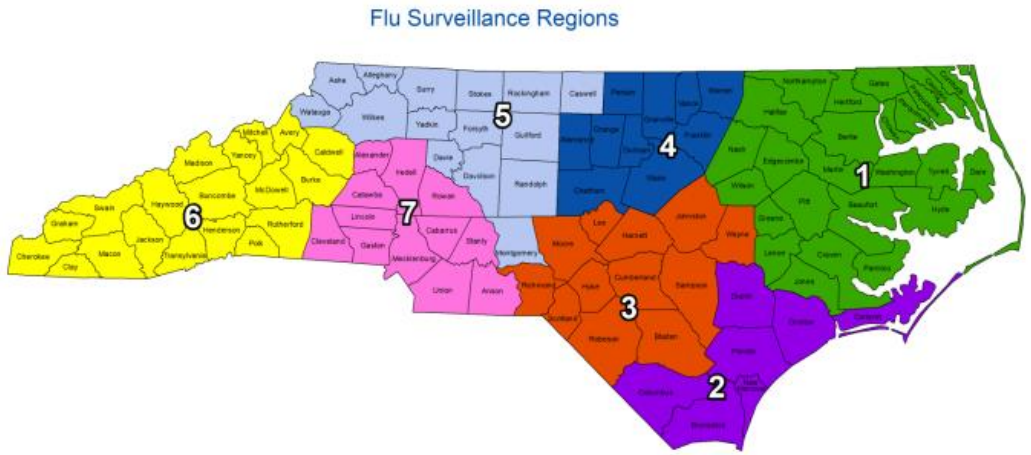
Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Moderate	12 to 24 hours	More than 1 week

Wildfire



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

Infectious Disease

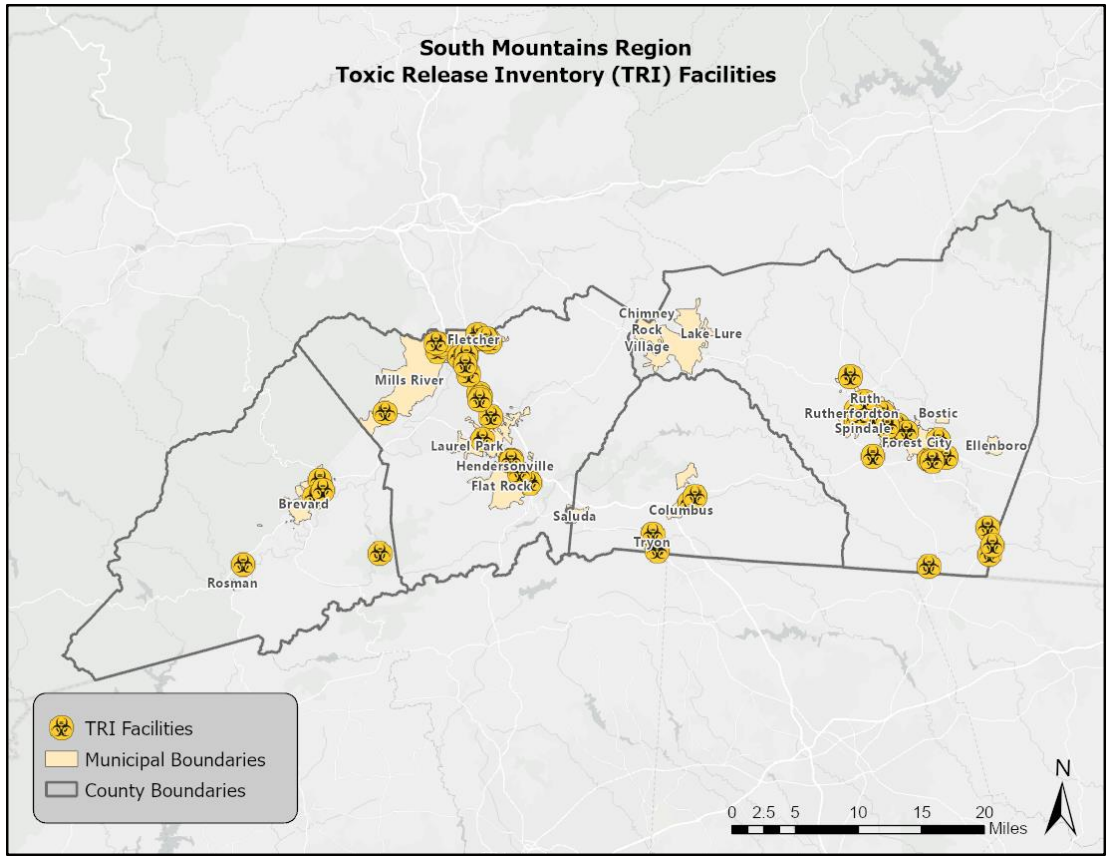


Source: NCDHHS Division of Public Health

- **Infectious disease** hazards include infectious diseases, vector-borne diseases, and foreign animal diseases (FAD) for consistency with State HMP
- All counties in the region are in **Flu Surveillance Region 6**
- 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, the **spread of disease may increase** due to:
  - Milder winters
  - Warmer summers
  - Fewer days of frost

Probability	Impact	Spatial Extent	Warning Time	Duration
Likely	Limited	Small	Less than 6 hours	Less than 24 hours

Hazardous Substances

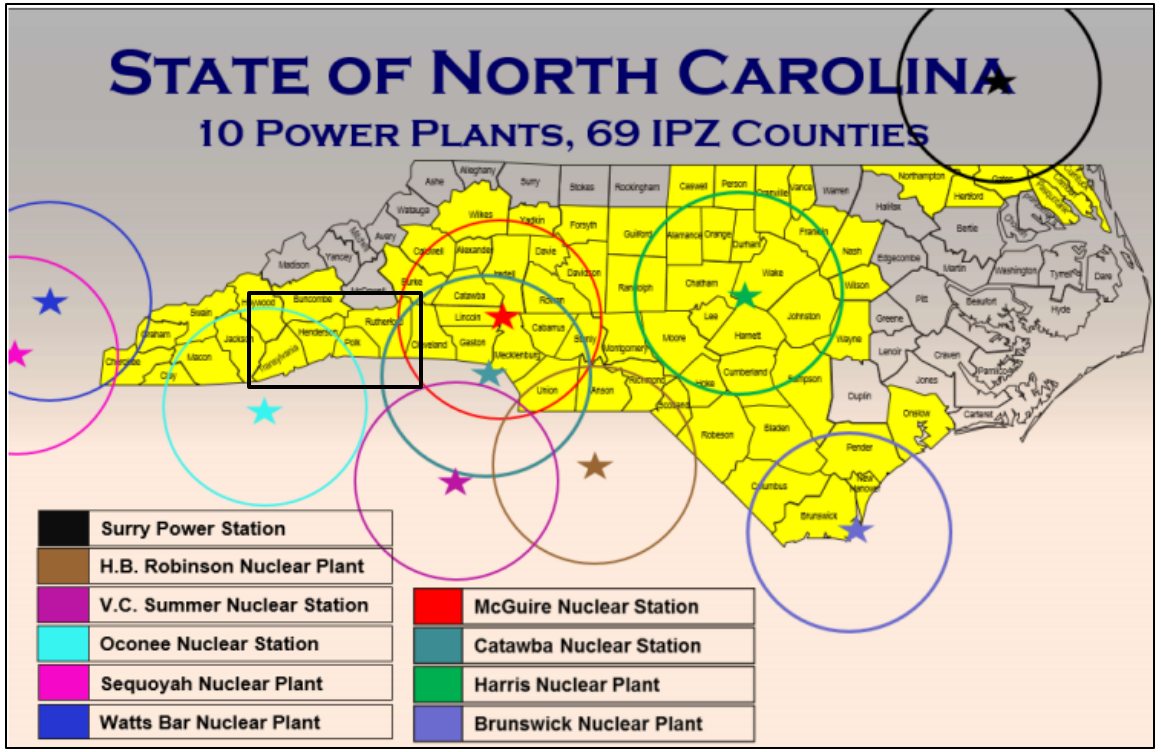


Source: Environmental Protection Agency

- **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
  - **15 serious incidents** reported in the region through USDOT (PHMSA)
- Per 2023 EPA data, **61 Toxic Release Inventory (TRI) facilities** in the region
- More growth = greater vulnerability of the population to this hazard, especially near transportation facilities

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"
- Very rare hazard, but many incidents are recognized by their large area of impact and severe chronic effects
- **Oconee Nuclear Station** is closest to the region followed by **Catawba Nuclear Station** (SC) and **McGuire Station** (NC)
- Although hazard is very unlikely, potential damage to nuclear facilities requires 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	2020 Population Density (sq. mi.)
Henderson County	**116,469**	**311.8**
Flat Rock	3,483	430.3
Fletcher	8,000	1,248.9
Hendersonville	15,102	2,043.6
Laurel Park	2,615	803.3
Mills River	7,100	317.2
Unincorporated Area	80,169	--
Polk County	**19,538**	**81.3**
Columbus	1,087	282.1
Saluda	617	405.8
Tryon	1,516	782.2
Unincorporated Area	16,318	--
Rutherford County	**64,680**	**114.0**
Bostic	304	380.5
Chimney Rock Village	220	41.7
Ellenboro	944	571.5
Forest City	7,357	860.9
Lake Lure	1,575	103.7
Ruth	621	818.4
Rutherfordton	3,671	878.6
Spindale	4,218	781.3
Unincorporated Area	45,770	--
Transylvania County	**33,131**	**87.2**
Brevard	7,777	1,445.6
Rosman	642	1,283.9
Unincorporated Area	24,712	--
South Mountains Regional Total	**233,818**	**149.0**

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

- The main types of weapons used in 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**, and/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**: NCDIT
- 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 regional preparedness and training for future threats is 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
- **Key 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 (e.g., crop loss 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	Hailstorm, 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 one week	3.0
Earthquakes		Likely	Limited	Moderate	Less than 6 hours	Less than 6 hours	2.6
Geological	Landslide, Sinkholes, Erosion	Likely	Limited	Small	Less than 6 hours	Less than 6 hours	2.4
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	3.0
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, Chemical, 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 & 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 Earthquakes Geological Dam Failure Wildfires Infectious Disease Hazardous Substances Terrorism Cyber
LOW RISK	Radiological Emergency 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

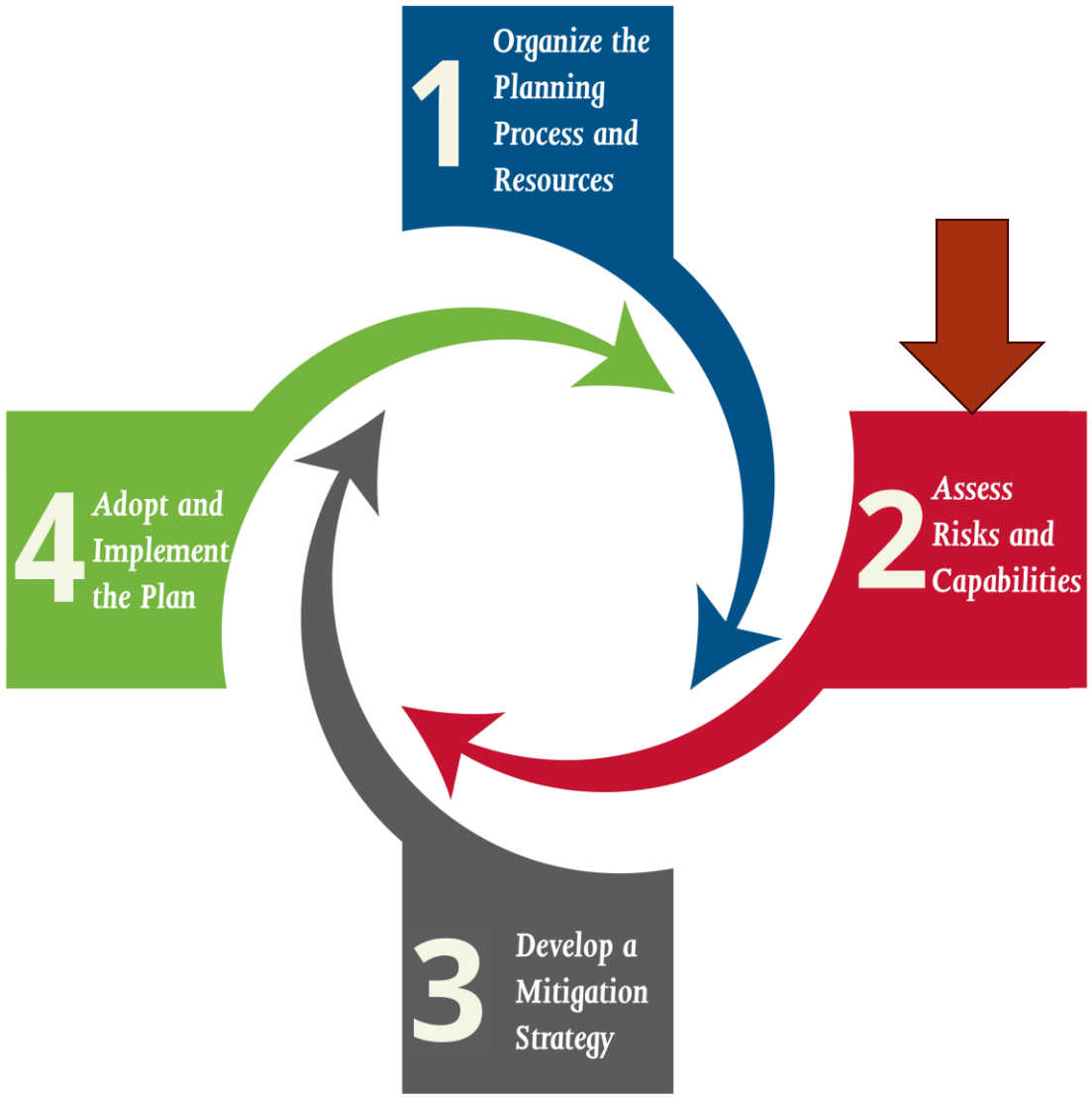
Status: Ongoing

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, NCEM data, and FEMA HAZUS analysis
- **Status**: Ongoing

Capability Assessment

What is Our Capacity to Mitigate?

- Communities previously self-assessed capability
- Feasible mitigation actions
- Identify key gaps
- **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

Capability Assessment Initial Findings

Jurisdiction	Overall Capability Rating	Jurisdiction	Overall Capability Rating
Rutherford County	**Moderate**	**Henderson County**	**High**
Bostic	Moderate	Flat Rock	Moderate
Chimney Rock	Moderate	Fletcher	Moderate
Ellenboro	Limited	Hendersonville	High
Forest City	Moderate	Laurel Park	Moderate
Lake Lure	Moderate	Mills River	Moderate
Ruth	Limited	**Transylvania County**	**High**
Rutherfordton	Moderate	Brevard	High
Spindale	Moderate	Rosman	Moderate
Polk County	**Moderate**		
Columbus	Moderate		
Saluda	Moderate		
Tryon	Moderate		

Capability Rating Summary
High Capability – 1 jurisdictions
Moderate Capability – 13 jurisdictions
Low Capability – 0 jurisdictions

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 Earthquakes Geological Dam Failure Wildfires Infectious Disease Hazardous Substances Terrorism Cyber
LOW RISK	Radiological Emergency 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?

National Benefit-Cost Ratio Per Peril *BCR numbers in this study have been rounded	Exceed common code requirements	Meet common code requirements	Utilities and transportation	Federally funded
Overall Hazard Benefit-Cost Ratio	4:1	11:1	4:1	6:1
Riverine Flood	5:1	6:1	8:1	7:1
Hurricane Surge	7:1	Not applicable	Not applicable	Too few grants
Wind	5:1	10:1	7:1	5:1
Earthquake	4:1	12:1	3:1	3:1
Wildland-Urban Interface Fire	4:1	Not applicable	Not applicable	3:1

Benefit-cost ratio by hazard and mitigation measure (Source: *Natural Hazard Mitigation Saves: 2018 Interim Report*, National Institute of Building Sciences)

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

ESP

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	Improve public education/awareness.
Goal #2	Protect human life, safety and welfare by minimizing the potential for damage to personal property, infrastructure, and loss of life due to natural and human caused hazards.
Goal #3	Protect and maintain emergency services infrastructure and equipment to support emergency responders and improve disaster response time/operations.
Goal #4	Improve technical, legal, and institutional capability to respond to and recover from disasters.
Goal #5	Reduce or eliminate the risk of natural disasters.

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

Henderson County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2020 Action Implementation Status
P-4	Install stream gauges on major waterways throughout the County to collect data on stream water height and velocity (this will also assist in mitigating erosion hazards).	FL/ER	Low	General Revenue and Grants	County EMA	2025	This will remain an ongoing item based on funding availability.
P-5	Implement scaling as a method of preventative maintenance to reduce the amount of loose debris that could lead to landslides during high precipitation events or seismic events	LS	Moderate	General Revenue and Grants	NCDOT	2025	DOT continues to make improvements in high probability areas along State maintained roads
P-7	Develop a stand-by acquisition grant application that lists properties with a high potential for damage or destruction due to a dam/levee failure.	D	Low	General Revenue and Grants	County EMA	2025	Properties have been identified through the GIS layer development. No funding has been awarded for acquisition, so this will remain an action going forward.
P-8	Develop a stand-by acquisition grant application that lists properties located in multi-hazard areas specifically those properties located near US HWY 74 and NC HWY 9 (Bat Cave) which are prone not only to flash flooding but also to severe landslides.	FL/LS	Low	General Revenue and Grants	County EMA	2025	Properties have been identified; landowners are unwilling to sell at this time. Will continue to pursue this action as possible and as funding is available.
P-9	Educate citizens about safety during flood conditions, including the dangers of driving on flooded roads.	FL	Low	County EMA	General Revenue and Grants	2025	New action

Review Previous Mitigation Action Plans (2020)

Action	Description	Hazard(s) Addressed	Priority	Potential Funding Sources	Lead Agency	Implementation Schedule	Implementation Status
P-4	Install stream gauges on major waterways throughout the County to collect data on stream water height and velocity (this will also assist in mitigating erosion hazards).	FL/ER	Low	General Revenue and Grants	County EMA	2025	This will remain an ongoing item based on funding availability.

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; likely to intensify in future years)

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; highly likely to affect most of the region)

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; most common and costly 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

- 74 responses thus far (34% respondents live in Mills River; 28% from unincorporated Henderson County; 10% from unincorporated Transylvania County)
- Flooding ranked highest threat to your community followed by Wildfires, Tornadoes/Thunderstorms, and Geological Hazards
- 61% 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
- 58% of respondents indicate the internet/social media is the most effective way to receive information; 19% 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 – 85%
2. Prevention - 78%
3. Natural Resource Protection – 77%
4. Public Education and Awareness – 64%
5. Structural Projects – 54%
6. Property Protection – 35%

Public Survey

Current Responses: 74

Scan the QR Code for Access to the Public Survey!

Or ACCESS SURVEY HERE

Project Schedule

Project Kickoff Date: 4/2/24

Public Meeting #1: Date TBD

HIRA/Mitigation Strategy Meeting: *Today*

Proposed Delivery of Draft: 1/19/25

Public Meeting #2: Date TBD

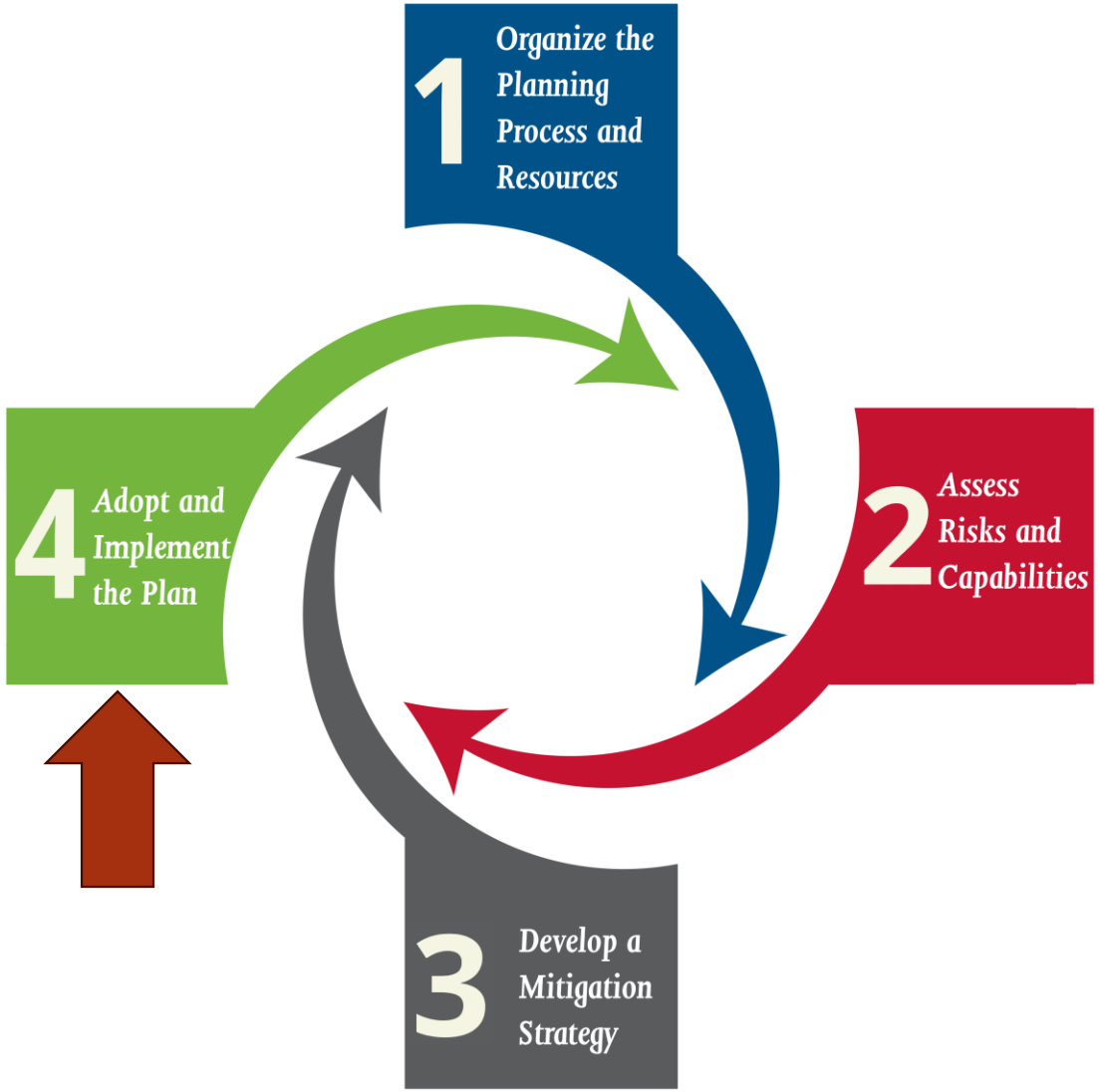
Existing Plan Expiration Date: 7/19/25

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-January

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 Henderson, Polk, Transylvania and Rutherford Counties

Andrea Webster
Resilience Policy Advisor
NCORR
andrea.webster@ncdps.gov

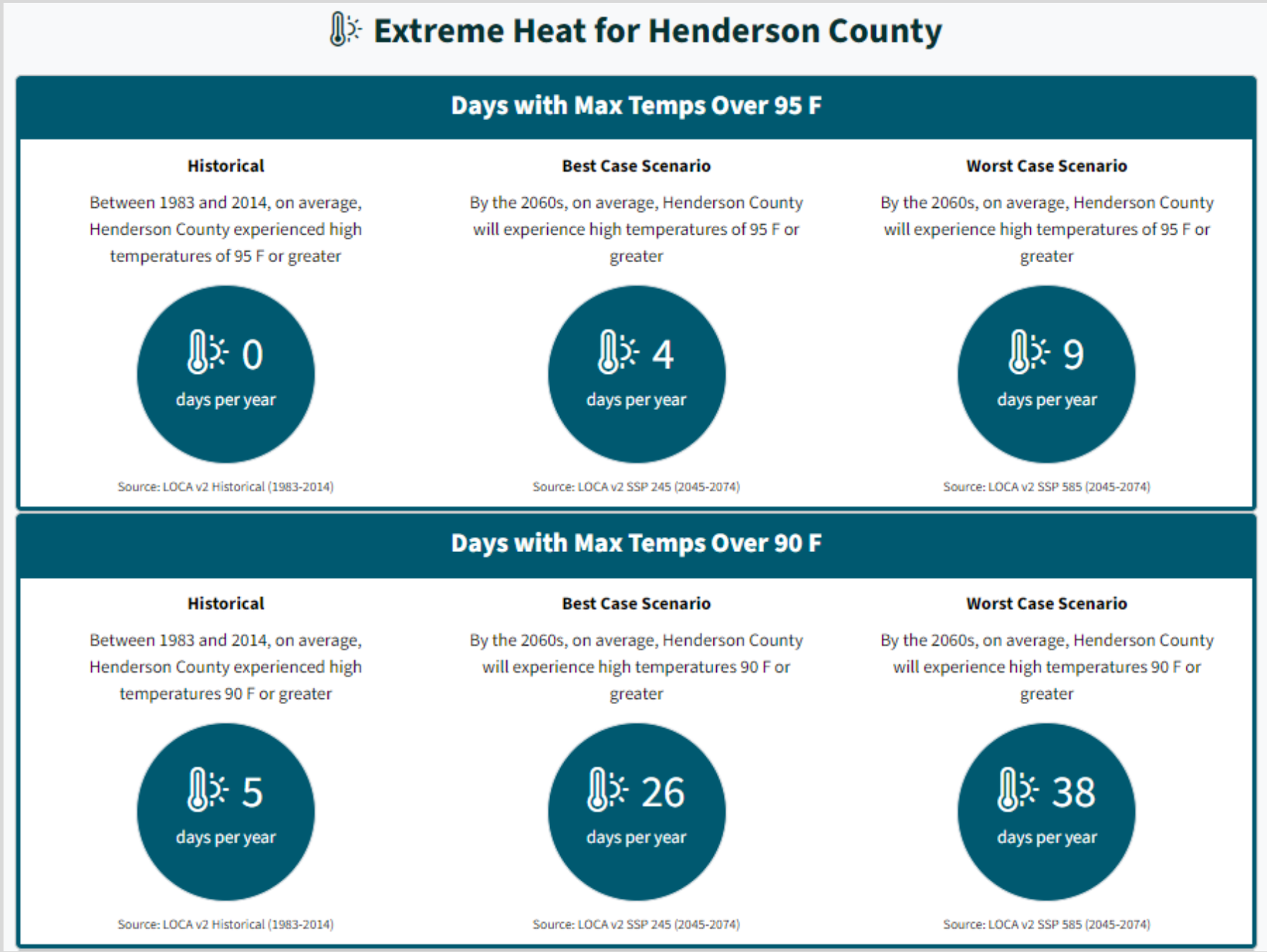
But we live in the South!

What can we expect?

- Temperatures will continue increasing

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.

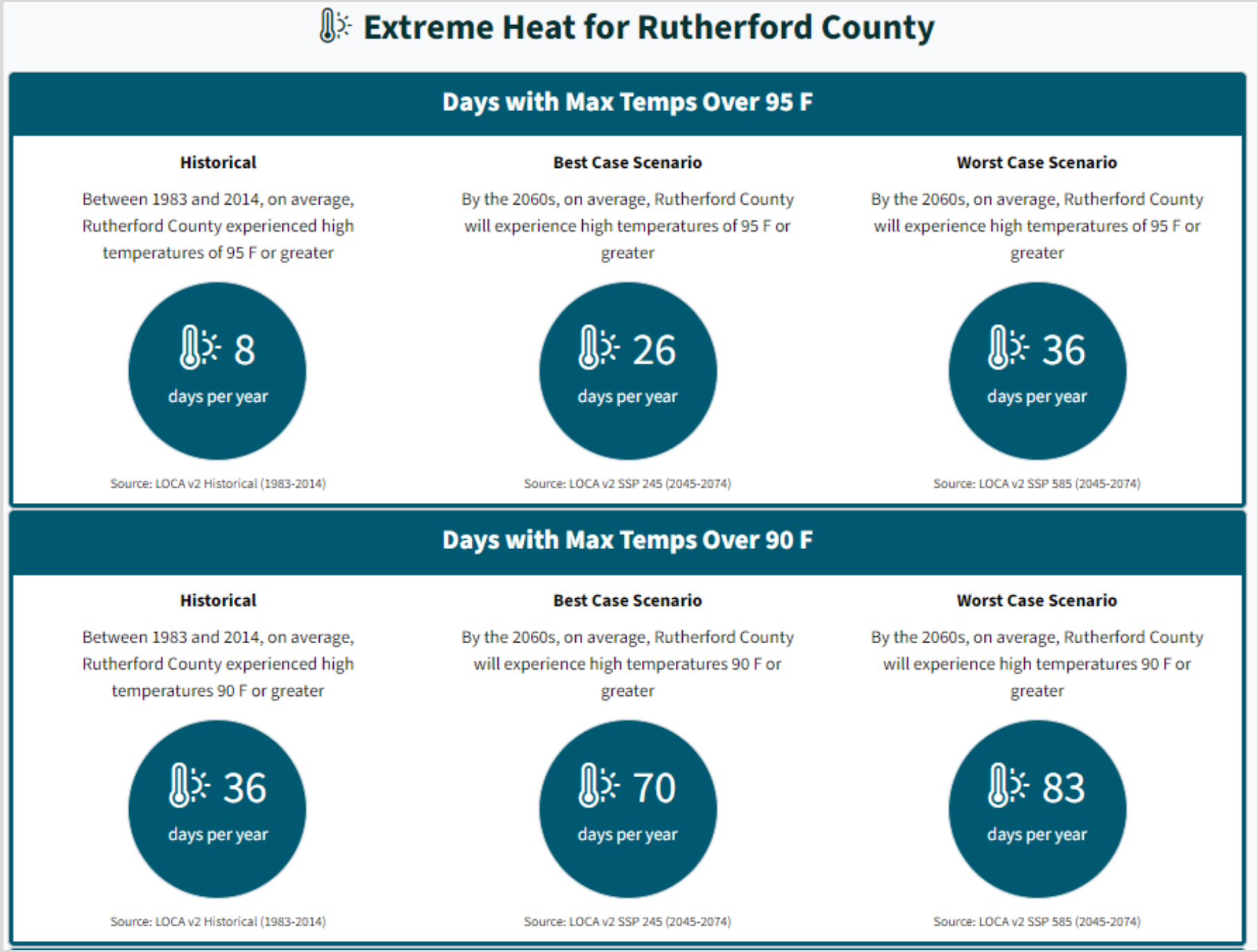


Daytime Temps

Daytime temperature data for Henderson and Transylvania Counties are very similar

www.resilienceexchange.nc.gov/

> Climate Projections



Daytime Temps

Daytime temperature data for Rutherford and Polk Counties are very similar

www.resilienceexchange.nc.gov/

> Climate Projections

Nighttime Temps

Extreme Heat for Henderson County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Henderson County experienced low temperatures 70 F or greater

1 night per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Henderson County will experience low temperatures 70 F or greater

9 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Henderson County will experience low temperatures 70 F or greater

18 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

Extreme Heat for Transylvania County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Transylvania County experienced low temperatures 70 F or greater

0 nights per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Transylvania County will experience low temperatures 70 F or greater

2 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Transylvania County will experience low temperatures 70 F or greater

6 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

www.resilienceexchange.nc.gov/

> Climate Projections

Nighttime Temps

Extreme Heat for Rutherford County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Rutherford County experienced low temperatures 70 F or greater

7 nights per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Rutherford County will experience low temperatures 70 F or greater

30 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Rutherford County will experience low temperatures 70 F or greater

44 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

Extreme Heat for Polk County

Nights with Min Temps Over 70 F

Historical

Between 1983 and 2014, on average, Polk County experienced low temperatures 70 F or greater

12 nights per year

Source: LOCA v2 Historical (1983-2014)

Best Case Scenario

By the 2060s, on average, Polk County will experience low temperatures 70 F or greater

42 nights per year

Source: LOCA v2 SSP 245 (2045-2074)

Worst Case Scenario

By the 2060s, on average, Polk County will experience low temperatures 70 F or greater

59 nights per year

Source: LOCA v2 SSP 585 (2045-2074)

www.resilienceexchange.nc.gov/

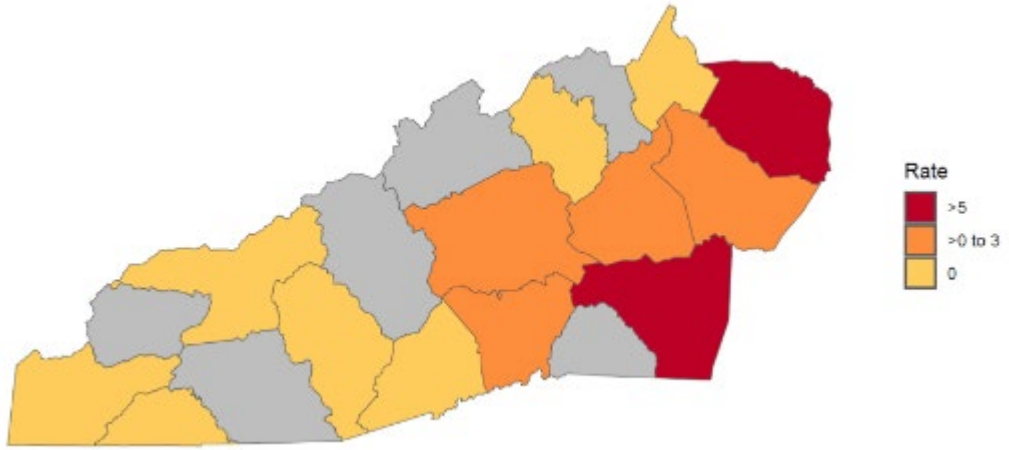
> Climate Projections

Why should we care?

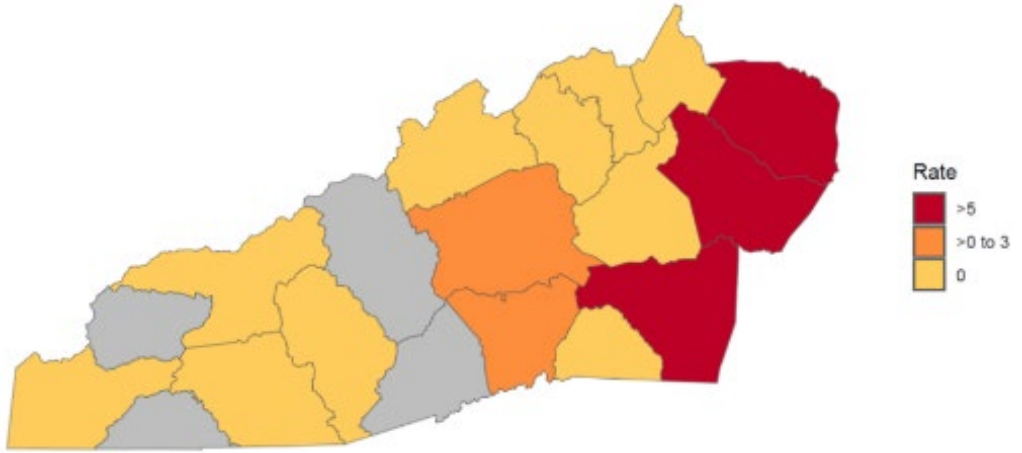
NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Public Health

Rate of Heat-Related Illness Emergency Department (HRI ED) Visits Per 100,000 Population

June 30 – July 6, 2024:
28 HRI ED Visits



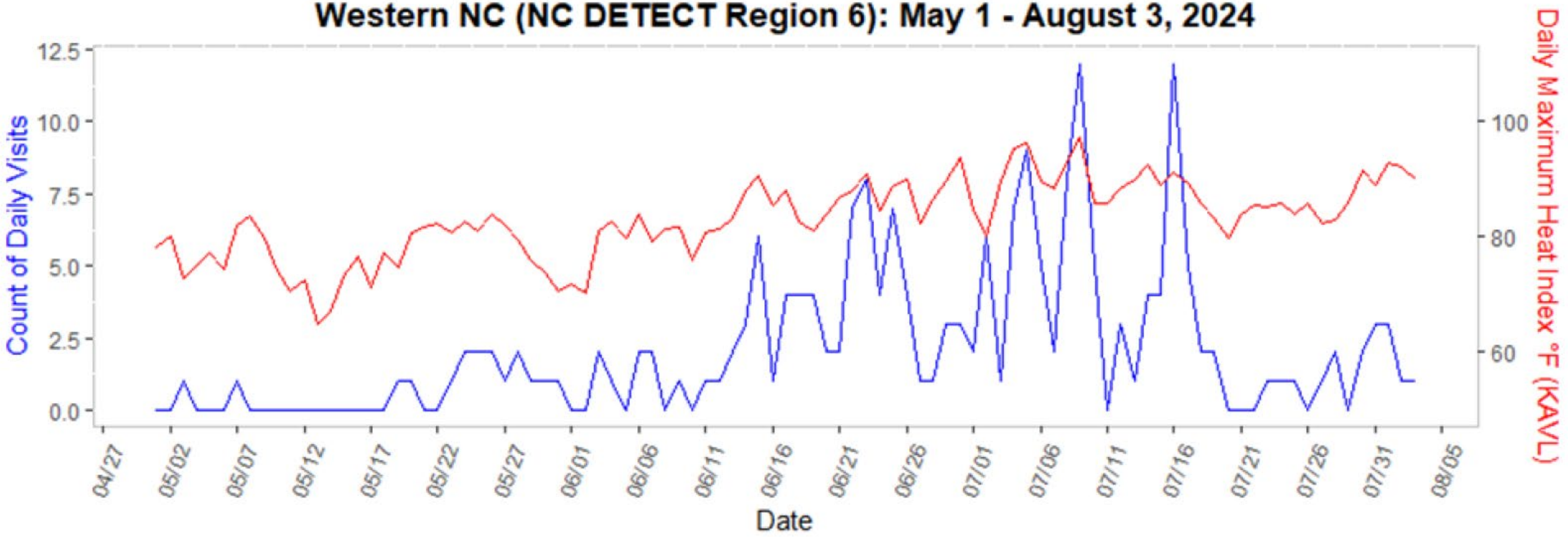
July 7 – 13, 2024:
28 HRI ED Visits



Resiliency

NCORR

Figure 3. Count of Emergency Department Visits for Heat-related Illness and Maximum Heat Index
Western NC (NC DETECT Region 6): May 1 - August 3, 2024



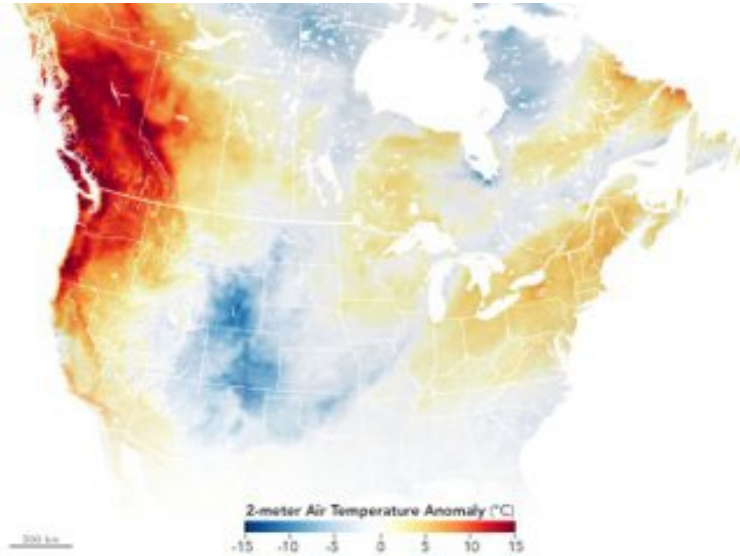
Source: NC DETECT Data and State Climate Office at NC State University

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Public Health

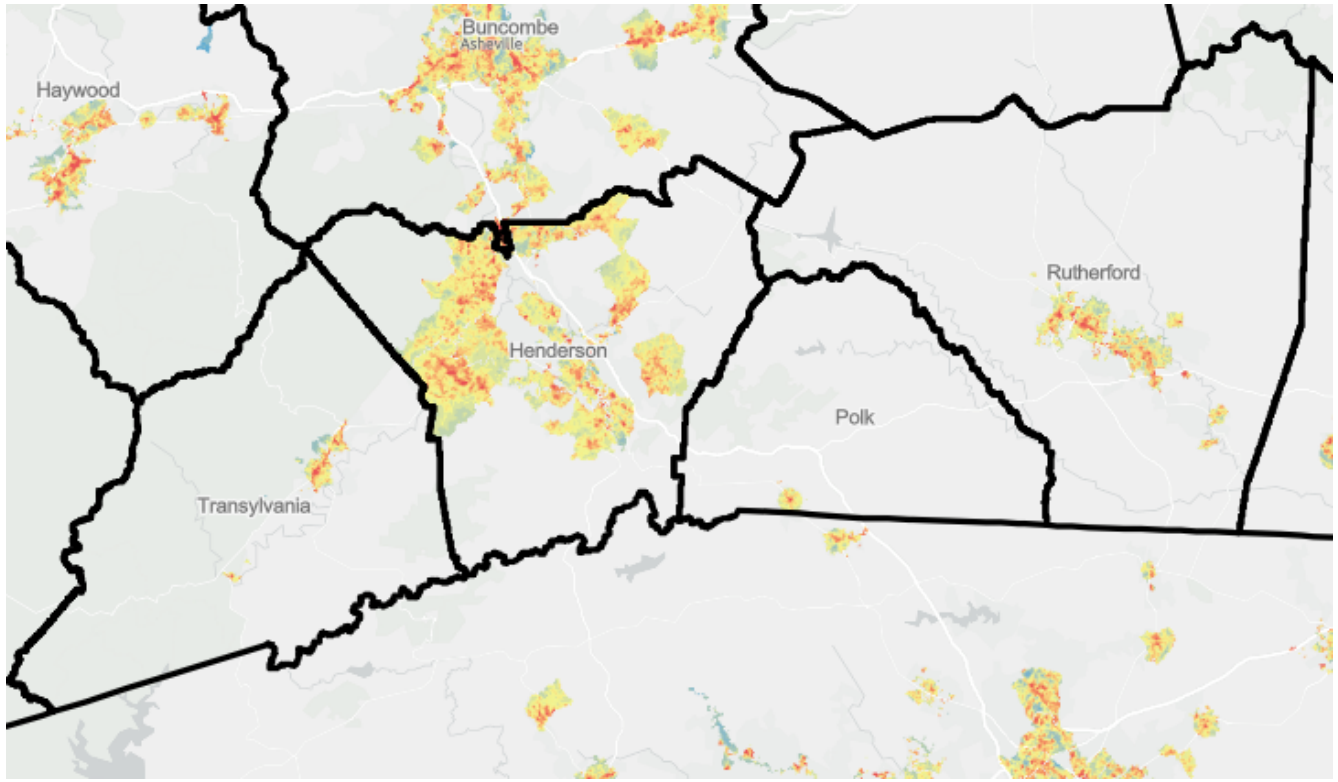
Why should we care?

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

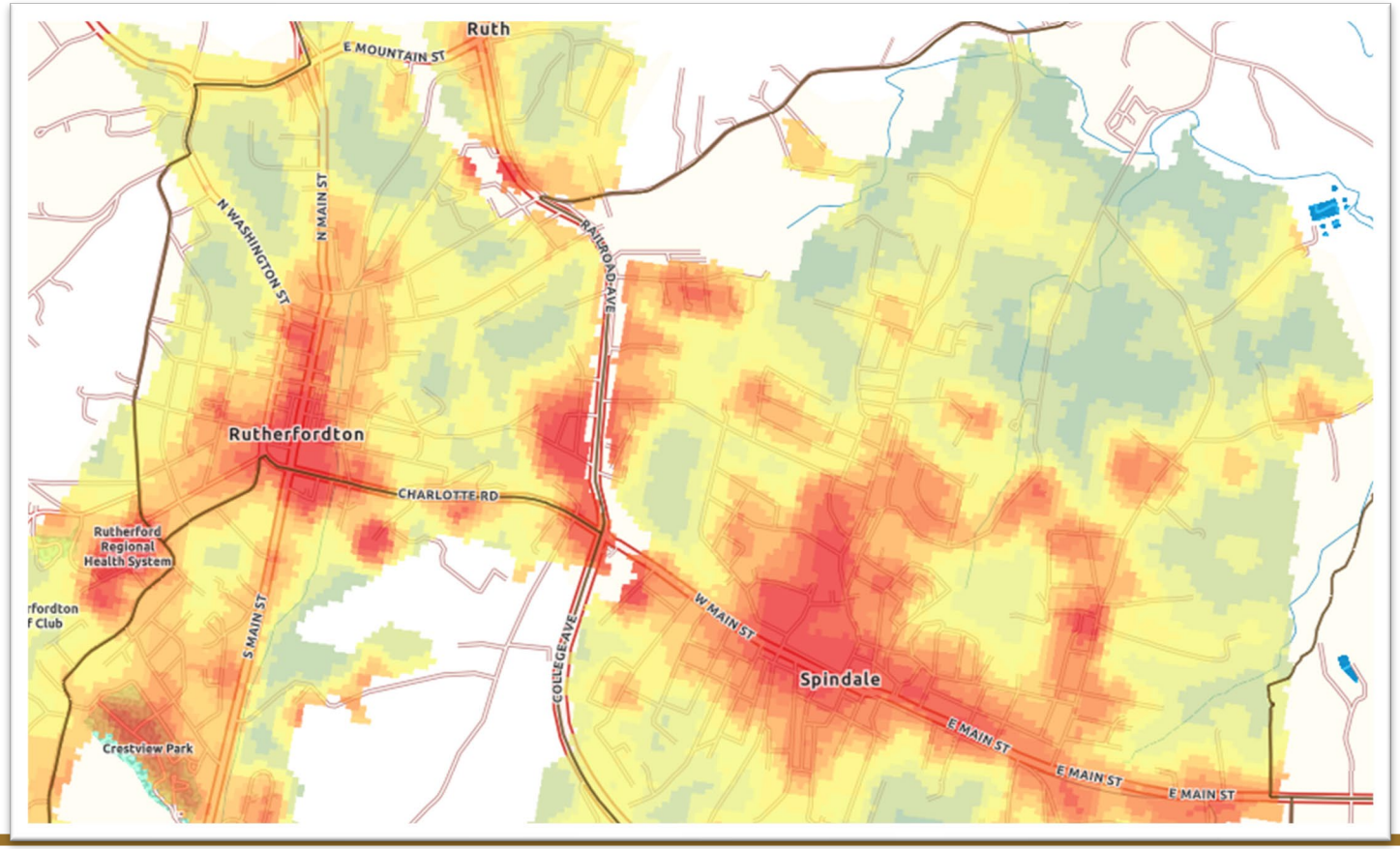


Red and orange areas on the map are hotter than the city's average temperature.

Blue and green colors are cooler than the city's average temperature.

www.resilienceexchange.nc.gov/
> Vulnerability Maps

Urban Heat Islands: Rutherfordton and Spindale



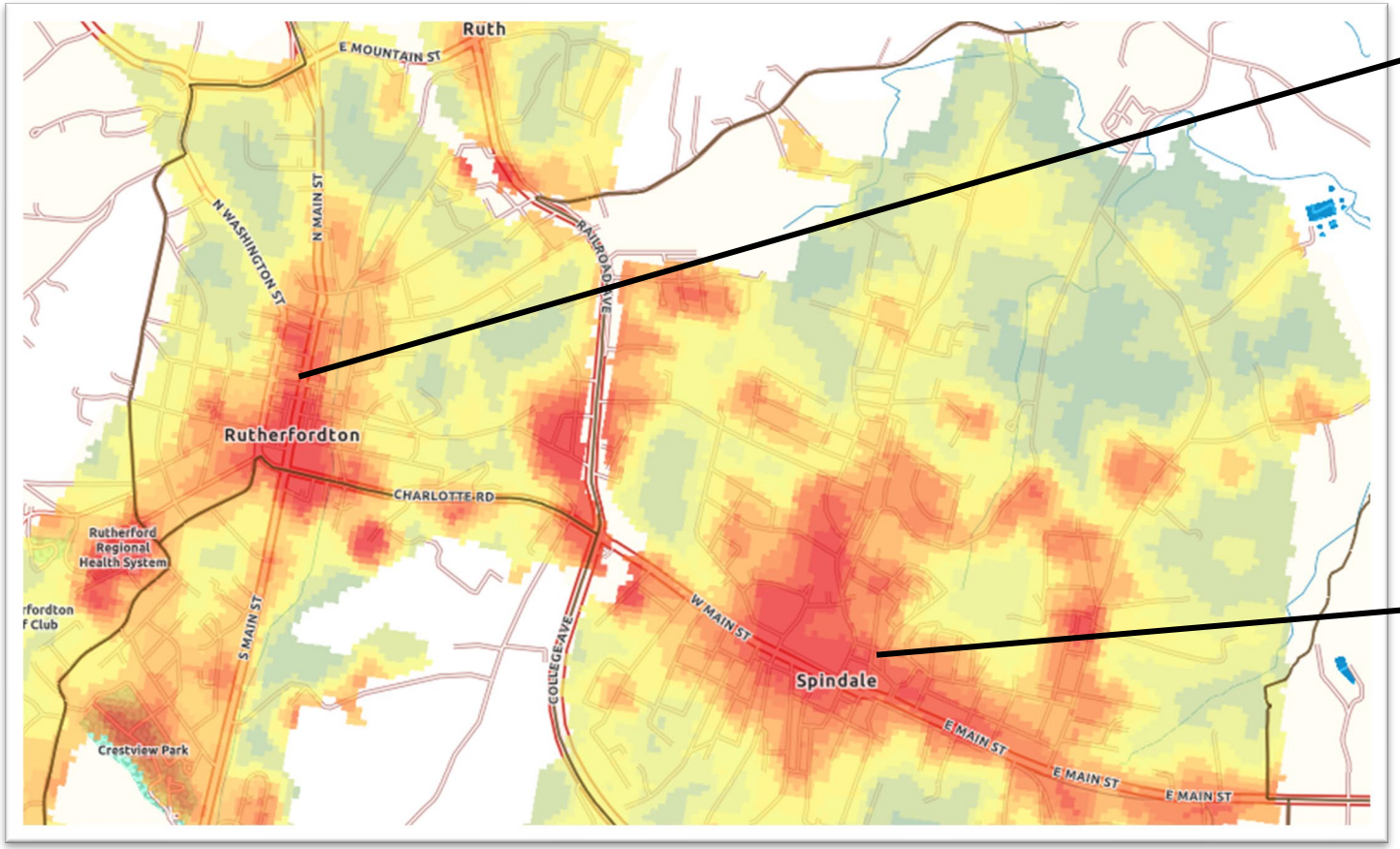
Red and orange areas on the map are hotter than the city's average temperature.

Blue and green colors are cooler than the city's average temperature.

www.resilienceexchange.nc.gov/
> Vulnerability Maps

Population Stats

Rutherfordton and Spindale



- Population: 2,477
- 21.4% (529) of residents live below poverty
- 19.9% (494) of residents live with a disability
- 22.9% (643) residents are 65+ years old

- Population: 3,901
- 16.5% (642) of residents live below poverty
- 30.9% (1,207) of residents live with a disability
- 44.6% (1,051) of households are renter-occupied
- 21.0% (888) residents are 65+ years old

8/21/2024

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

Agriculture

- 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

Date TBD

Time TBD

Teams Meeting

Public Meeting

Date TBD

Time TBD

Teams Meeting

South Mountains 2025 Regional Hazard Mitigation Plan - Public Survey

We need your help!

Henderson, Polk, Transylvania, and Rutherford Counties and the municipalities within the counties are working together to become less vulnerable to natural, man-made, and technological hazards, and your participation in the process is important to us!

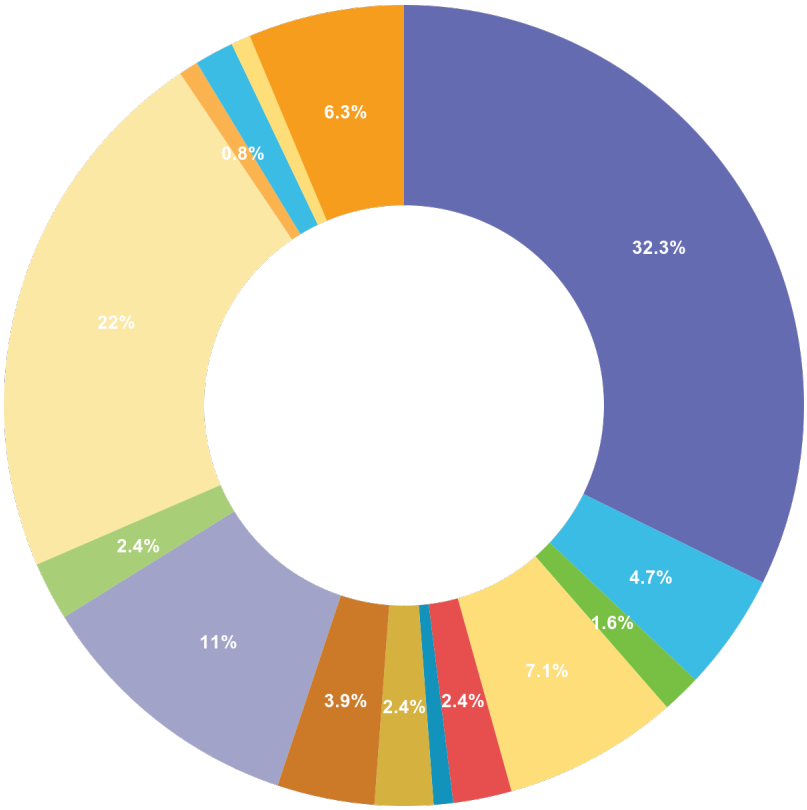
The counties, along with local jurisdictions and other partners, are working to update the multi-jurisdictional Regional Hazard Mitigation Plan. This plan identifies and assesses our community's hazards and identifies strategies that determine how to best mitigate those risks.

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 South Mountains Regional Hazard Mitigation Plan, please contact Hannah DeLude from ESP Associates, Inc. at hdelude@espassociates.com.

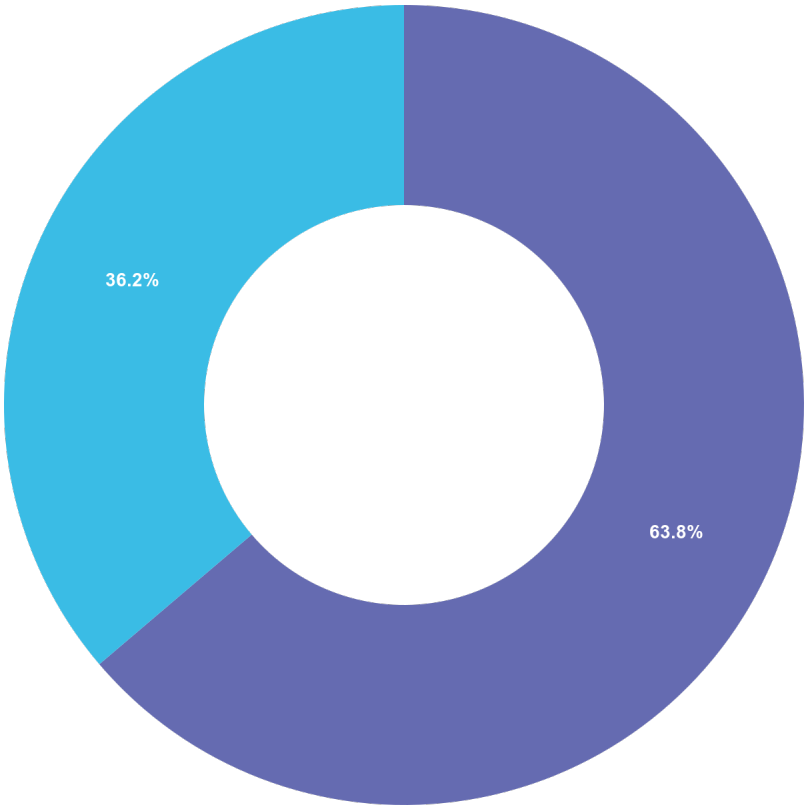
Q1 1\. Where do you live?*



Answered: 127 **Unanswered:** 0

Choice	Total
Unincorporated Henderson County	41
Unincorporated Polk County	6
Unincorporated Rutherford County	2
Unincorporated Transylvania County	9
Bostic	0
Brevard	3
Chimney Rock Village	0
Columbus	1
Ellenboro	0
Flat Rock	3
Fletcher	5
Forest City	0
Hendersonville	14
Lake Lure	0
Laurel Park	3
Mills River	28
Rosman	1
Ruth	0
Rutherfordton	0
Saluda	2
Spindale	0
Tryon	1
Other	8

Q2 2\. Have you ever experienced or been impacted by a disaster?*



Answered: 127 **Unanswered:** 0

Choice	Total
Yes	81
No	46

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

Tuesday, January 28, 2025 at 2:30 PM UTC

Hurricane Helene, COVID

Friday, January 24, 2025 at 3:06 PM UTC

Landslide up above our home with major damage to the terrace and ridge behind our home that we built in 1987 and moved in 1988.

Monday, January 13, 2025 at 7:09 PM UTC

Hurricane Helene damage our home

Sunday, January 12, 2025 at 12:09 AM UTC

During tropical storm Helene, trees blown down, one hit house, extensive damage. Bridge for neighborhood badly damaged.

Thursday, December 19, 2024 at 9:42 PM UTC

I have experienced and been impacted, not only by the disaster of Helene, but also many storms before her. I live on Finley Creek. I know it is a creek that goes unnoticed and does not compare to the concerns of mud creek, clear creek, or the French broad river. However, I am letting you know that it is rapidly growing into a large body of water that is comparable and needs to be a concern. Massive amounts of stormwater are being funneled into what was once a very small creek. Stormwater from surrounding developments, as well as developments that have created their own creeks, and are funneling their water into Finley Creek. Rain that would normally be absorbed by the earth is no longer. Even the smallest amounts of rain bring great rise to this creek. I tried to have the problems with Finley creek recognized and addressed long before Helene. Now Helene made these problems even greater. Please pay attention to this creek.

Thursday, December 19, 2024 at 8:42 PM UTC

Helene created over a dozen mud slides within the community of Cummings Cove. Three of the slides affected roads and 4 affected houses. The rest were away from both houses and roads.

Wednesday, December 11, 2024 at 6:29 PM UTC

Minor impact from Hurrican Helene - we lost power and potable water for about 10 days

---

Sunday, December 8, 2024 at 6:38 AM UTC

Hurricane Hugo, Fran, Helene

Wednesday, December 4, 2024 at 7:19 PM UTC

Hurricane Helene wiped out the roads to my home.

Sunday, December 1, 2024 at 9:37 PM UTC

Hurricane Helene damaged our vacation cabin in Bat Cave and caused landslide of our driveway of our permanent residence in Saluda NC(Hendersonville county portion)

Friday, November 29, 2024 at 4:09 AM UTC

During Helene my house was hit by a falling snag. I was very lucky that no appreciable damage occurred. Road access was unavailable for about 24 hours due to fallen trees, and was potentially hazardous for several more days due to downed power lines. Tap water and electric power were unavailable at the house for Sept 27-Oct.5. I was fortunate to learn from my car radio and BPR radio service that major roads to South Carolina were open within a couple days of the storm. I spent 5 days at my daughter's in Simpsonville, SC.

Tuesday, November 12, 2024 at 8:41 PM UTC

With the recent hurricane Helene several trees around out house fell and several neighbors and fallen trees we all, blocked roads and downed power lines

---

Wednesday, November 6, 2024 at 5:52 PM UTC

Multiple hurricanes along the Atlantic. Wildfire, recent pandemic, tornados, etc. Most recently Hurricane Helene

---

Wednesday, November 6, 2024 at 11:20 AM UTC

Several floods over 64 years with Helene being the most recent

---

Monday, November 4, 2024 at 7:48 PM UTC

Helene also just a few yrs after moving here 2 hurricanes close together trees ripped not only our utility lines down but ripped the electric meter off house!

Tuesday, October 29, 2024 at 2:06 AM UTC

Helene destroyed the bottom level of my hone

Wednesday, October 23, 2024 at 3:20 PM UTC

Helene here and Wilma in Florida

Monday, October 21, 2024 at 1:24 PM UTC

house flooded during Hurrican Helene

Thursday, September 26, 2024 at 5:14 AM UTC

Hurricanes fl and micro burst here

Thursday, September 26, 2024 at 12:23 AM UTC

Hurricane Hugo

Wednesday, September 25, 2024 at 12:25 PM UTC

In Greenville NC major flooding from Hurricane Floyd no power and very little water for a week.

Wednesday, September 25, 2024 at 1:09 AM UTC

Tropical storm when vacationing on the South Carolina coast

Tuesday, September 24, 2024 at 10:13 PM UTC

Spent the first 60 years of my life on the coast - I've experienced many hurricanes!

Tuesday, September 24, 2024 at 7:54 PM UTC

Floods in Morrow and South Lebanon, Ohio. Tornado in Xenia, Ohio. Blizzards in Warren County, Ohio and in Butler County, Ohio. Flood in Henderson County, North Carolina.

Tuesday, September 24, 2024 at 5:07 PM UTC

House fire, been in a hurricane and experienced flooding

Tuesday, September 24, 2024 at 3:45 PM UTC

Flooding of Kimsey Creek.

Thursday, September 19, 2024 at 4:33 PM UTC

Knocked out power from storm

Wednesday, September 18, 2024 at 3:44 PM UTC

Henderson County famers were impacted in 2021 and 2023 by significant freeze disasters and in 2018 by tremendous flooding.

Tuesday, September 17, 2024 at 12:44 PM UTC

We were impacted by a derecho in Maryland which took out a number of trees on our property.

We also experienced a severe ice storm which brought down a tree and damaged our home.

Sunday, September 15, 2024 at 1:10 PM UTC

Hurricanes

Sunday, September 15, 2024 at 1:03 PM UTC

A neighbor had a lightening strike that followed a joint connection into our house that destroyed equipment: TV, modem router and printers.

Saturday, September 14, 2024 at 7:42 PM UTC

Flooding farm land

Thursday, September 12, 2024 at 12:24 PM UTC

I'm a farmer so anytime we get a natural disaster my farm is impacted. Also just being a Henderson Co resident, I'm impacted every time we have rd closures.

Friday, August 23, 2024 at 10:42 PM UTC

Flooding

Thursday, August 22, 2024 at 7:53 PM UTC

Trees down in residential lot

Thursday, August 22, 2024 at 6:51 PM UTC

Flooding that shut down 26 several years ago

Thursday, August 22, 2024 at 5:26 PM UTC

The land slides of 2000, the snow events that knocked Polk County out for months and the numerous power outages everytime the wind blows

---

Monday, August 5, 2024 at 7:53 PM UTC

Flood, Tornado, Snowstorm, Rockslide.

Wednesday, July 10, 2024 at 7:50 PM UTC

I have been through a major blackout in a major US city and a couple of hurricanes. My parents survived the Joplin tornado, but lost their home.

Wednesday, June 5, 2024 at 2:15 PM UTC

We have significant flooding in our backyard during heavy sustained rainfall, which at times in the past has come close to the back of our home. It eventually runs off as long as local drainage is not impeded.

Wednesday, June 5, 2024 at 1:55 PM UTC

I've lived in areas that were impacted by hurricanes, floods, and wildfires.

Saturday, June 1, 2024 at 11:39 AM UTC

flooding

Tuesday, May 28, 2024 at 11:15 AM UTC

Hurricanes, ice storm for 5 days, blizzard

Sunday, May 26, 2024 at 1:38 AM UTC

Flooding

Saturday, May 25, 2024 at 7:28 PM UTC

Mayor snow storm. 1993

Saturday, May 25, 2024 at 7:27 PM UTC

Blizzard of 1993

Saturday, May 25, 2024 at 11:42 AM UTC

Flooded roads around our neighborhood make us nervous at times about leaving our home for fear that we might not be able to get back to it

Friday, May 24, 2024 at 4:40 PM UTC

Extraordinary rainfall caused a retention pond to fail which flooded our home which caused significant damage.

Friday, May 24, 2024 at 12:46 PM UTC

Tornado in 2002. Morgan County,Indiana

Friday, May 24, 2024 at 12:43 PM UTC

Before we moved to Mills River our home in Spartanburg, SC was flooded due to uncontrolled development upstream with inadequate storm water control!

Friday, May 24, 2024 at 11:52 AM UTC

Tornado, floods

Thursday, May 23, 2024 at 7:48 PM UTC

I have been in the fire service for over 43 years. Managed, lead, and commanded numerous disasters over those years. Because of my service involvement I lived in the communities I served and experienced the outputs and outcomes of disasters.

Thursday, May 23, 2024 at 3:29 PM UTC

Blizzard of 93

Tuesday, April 30, 2024 at 5:12 PM UTC

The fire at Pardee hospital in April of 2022

Thursday, April 25, 2024 at 11:29 PM UTC

When I lived in Stanly County, Hurricane Hugo came through. We also experienced "down winds" and severe storms with flooding and tornados.

Wednesday, April 17, 2024 at 3:42 PM UTC

Hurricanes, ice storms, snow storms and floods affect Laurel Park and Henderson County. We sometimes loose power for days and have to drive alternate routes. My house has been damaged by trees and limbs brought down by ice storms.

Wednesday, April 17, 2024 at 4:51 AM UTC

Floods in Bat Cave and blizzard of 1993

Wednesday, April 17, 2024 at 12:18 AM UTC

Multiple Hurricanes and landslides with flooding in our area. We also face wildfires due to the vast wooded area we have.

Tuesday, April 16, 2024 at 8:18 PM UTC

Mud slide, forest fire, flooding, blizzard

Tuesday, April 16, 2024 at 4:32 PM UTC

Blizzard 1993

Tuesday, April 16, 2024 at 4:28 PM UTC

Not at my current location but I have been involved with several tornados, severe storms and hurricanes

Monday, April 15, 2024 at 7:56 PM UTC

Flash floods and damaging winds

Friday, April 12, 2024 at 8:03 PM UTC

fire

Friday, April 12, 2024 at 3:07 PM UTC

Wildfire on mountain ridge I live on in 2023. It was in the Cliff's spreading towards High Vista community where I live. It was fought from the air with helicopters and fire fighters on the ground.

Thursday, April 11, 2024 at 5:01 PM UTC

Several power outages usually less than 12 hours to resolve.

Thursday, April 11, 2024 at 1:42 PM UTC

Hurricanes where I previously lived. Some flooding and loss of power from tail end of hurricanes here.

Tuesday, April 9, 2024 at 4:27 PM UTC

flooding

Tuesday, April 9, 2024 at 10:26 AM UTC

flooding during tropical storm fred

Tuesday, April 9, 2024 at 1:47 AM UTC

minor earth quakes. and flooding is the main problem .

Wednesday, April 3, 2024 at 1:21 PM UTC

HURRICAIN CAME THROUGH CAUSED FLOODING THAT WASHED AWAY A MAIN BRIDGE ON A PRIVATE DRIVE THAT IMPACTED 8 FAMILIES

Tuesday, April 2, 2024 at 12:17 PM UTC

Hurricanes on the eastern side of the state

Thursday, March 28, 2024 at 9:23 PM UTC

We went thru numerous hurricanes when we lived in South Louisiana from 1984-2020

Thursday, March 28, 2024 at 8:08 PM UTC

I've been involved in emergency services in Transylvania County for over 32 years as a volunteer Firefighter, paid Firefighter, and Paramedic, and have been involved in multiple disasters.

Friday, March 22, 2024 at 5:00 PM UTC

Our town became an island one year after two tropical storms blew through back-to-black, flooding one way out, and causing landslides the other way out, effectively cutting off our little town for 24 hours. Then we had another tropical storm blow through which flooded our rivers and destroyed many favorite forest destinations, and cutting off many roads which were inaccessible until this year. I work in radio (and did through the last disaster), so getting updates about what was happening was difficult as emergency services were busy taking care of things. Eventually, FEMA contacted us for an interview to allow folks to learn how to apply for compensation. Increasing storms and winds have been responsible for repeated flooding of our area, and there is nobody that is a licensed HAM radio operator, creating a concern that if communications were down, we could become completely isolated with no way to communicate with the rest of the world.

Thursday, March 21, 2024 at 7:59 PM UTC

When travelling home in one of the worse storms in recent years I was caught between many downed trees and power lines trying to get to my house. I have also been impacted by flooding on roadways traveling to and from work.

Thursday, March 21, 2024 at 10:05 AM UTC

Wilson Road, which is my only access out of my neighborhood, floods every time there is significant rainfall - and that is often. Recently, Wilson Road was blocked by both a flood and a landslide.

Thursday, March 21, 2024 at 2:30 AM UTC

Local flooding of ditches and resivor due to improper maintenance and up keep.

Wednesday, March 20, 2024 at 10:40 PM UTC

Local road flooding caused by excessive rains. Cuts off our ability to exit our road for one to two days.

Wednesday, March 20, 2024 at 9:22 PM UTC

In Florida, not in North Carolina

Wednesday, March 20, 2024 at 9:13 PM UTC

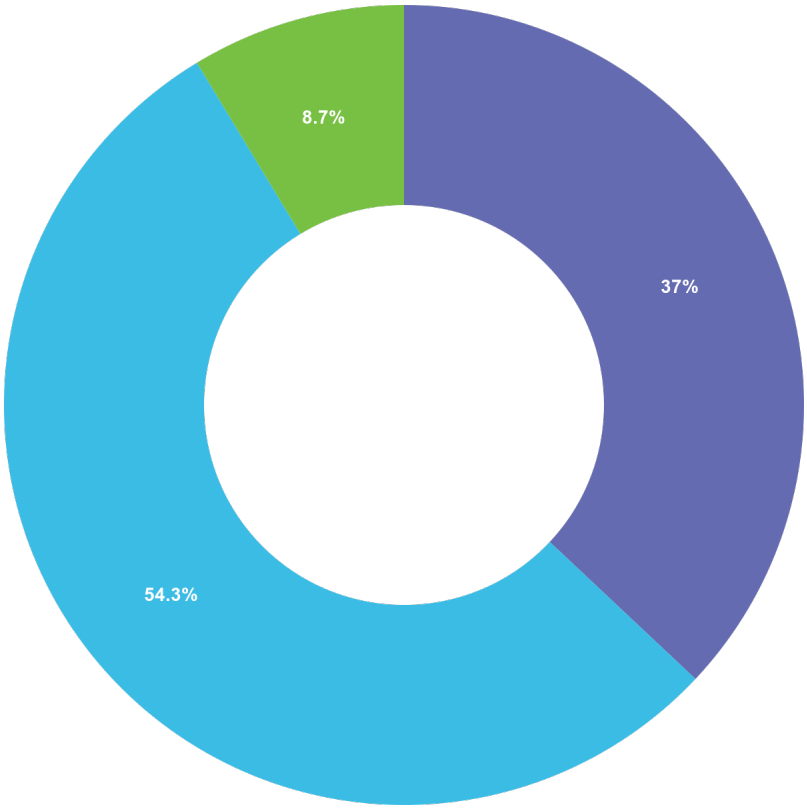
Flooding; Severe Winter Weather; Severe Thunderstorms

Wednesday, March 20, 2024 at 8:47 PM UTC

Flooding and drought.

Answered: 81 **Unanswered:** 46

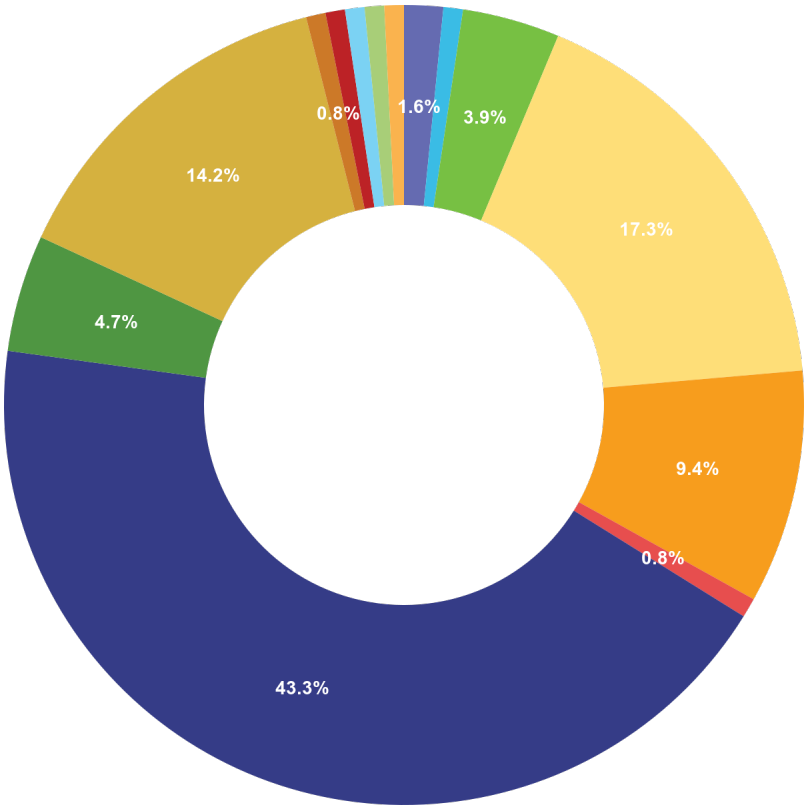
Q4 4\. How concerned are you about the possibility of our community being impacted by a disaster?*



Answered: 127 **Unanswered:** 0

	Choice	Total
	Extremely concerned	47
	Somewhat concerned	69
	Not concerned	11

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

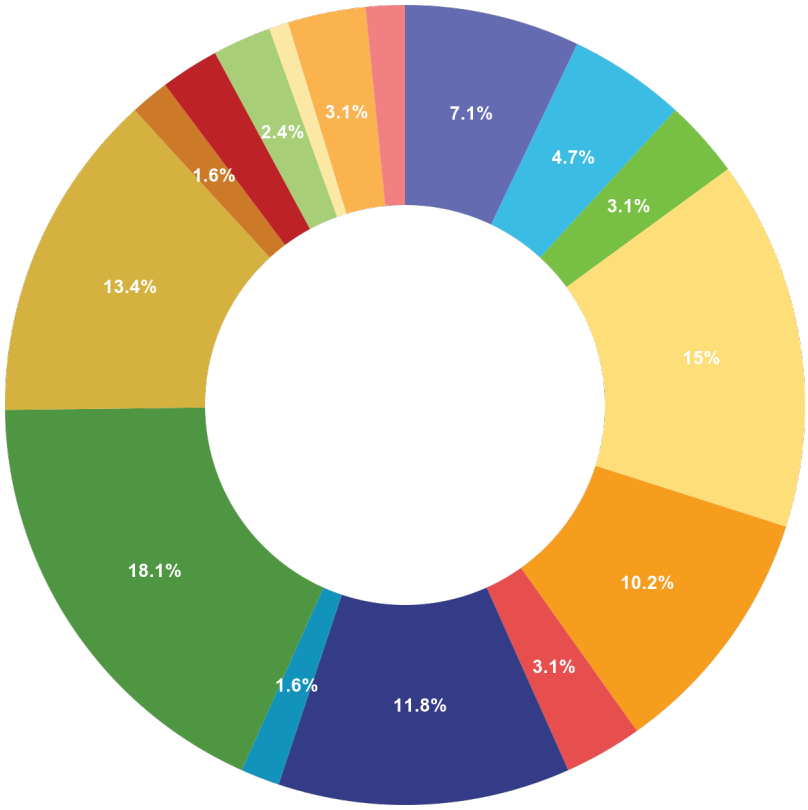


Answered: 127 **Unanswered:** 0

	Choice	Total
	Drought	2
	Excessive Heat	1
	Hurricane and Coastal Hazards	5
	Tornadoes/Thunderstorms	22
	Severe Winter Weather	12
	Dam Failure	1
	Flooding	55
	Earthquakes	0
	Geological (landslides, sinkholes, erosion)	6
	Wildfires	18

Choice	Total
Infectious Disease	1
Hazardous Substances	1
Radiological Emergency	0
Terrorism	1
Cyber	1
Electromagnetic Pulse	0
Food Emergency	1
Civil Disturbance	0

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



Answered: 127 **Unanswered:** 0

	Choice	Total
	Drought	9
	Excessive Heat	6
	Hurricane and Coastal Hazards	4
	Tornadoes/Thunderstorms	19
	Severe Winter Weather	13
	Dam Failure	4
	Flooding	15
	Earthquakes	2
	Geological (landslides, sinkholes, erosion)	23
	Wildfires	17

Choice	Total
Infectious Disease	2
Hazardous Substances	3
Radiological Emergency	0
Terrorism	0
Cyber	3
Electromagnetic Pulse	1
Food Emergency	4
Civil Disturbance	2

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

Friday, January 24, 2025 at 3:06 PM UTC

Fire is always a concern on any mtn property with lots of trees but the landslides are the most concern as we also lost parts of two major roads in our development High Vista Community.

Monday, January 13, 2025 at 7:09 PM UTC

hurricane

Sunday, January 12, 2025 at 12:09 AM UTC

Heavily wooded area, wildfires are also a concern. Flooding could impact our bridge again.

Thursday, December 19, 2024 at 9:42 PM UTC

Erosion has occurred changing the path of this waterway with the loss of large amounts of property, even moving the creek closer to my home. Erosion has occurred under numerous trees that will soon fall on my

home and property, and I am unable to get property owners to take care of them because it doesn't affect them directly. Also massive amounts of debris come down the creek creating major dams, backing up the water so much that when it does break the dam it creates a dangerous 'tsunami' effect. I have witnessed this, it is frightening.
The debris that comes down from these storms is always left for me to clean up.

Thursday, December 19, 2024 at 8:42 PM UTC

Power outages and lack of cell connectivity

Sunday, December 8, 2024 at 6:38 AM UTC

EMP and cyber

Sunday, December 1, 2024 at 9:37 PM UTC

Hurricane flooding and landslides

Friday, November 29, 2024 at 4:09 AM UTC

Infectious diseases and/or public health failures.

Tuesday, November 12, 2024 at 8:41 PM UTC

Major storm damage, flooding and damage to bridges/roads in our area.

Wednesday, November 6, 2024 at 5:52 PM UTC

Hurricane, Wildfire

Wednesday, November 6, 2024 at 11:20 AM UTC

Increased population with a huge amount of disingenuous and dangerous religious extremists

---

Monday, November 4, 2024 at 7:48 PM UTC

Heavy snow/ice storms bringing dow utility lines & trees.

Tuesday, October 29, 2024 at 2:06 AM UTC

No

Wednesday, October 23, 2024 at 3:20 PM UTC

Land slides, flooding

Monday, October 21, 2024 at 1:24 PM UTC

no

Thursday, September 26, 2024 at 12:23 AM UTC

Supply Chain impacts, civil disturbances due to political climate, economic downturn/depression

---

Wednesday, September 25, 2024 at 12:25 PM UTC

Other than what was stated previously no.

Wednesday, September 25, 2024 at 1:09 AM UTC

Extreme heat

Tuesday, September 24, 2024 at 10:13 PM UTC

Localized flooding

Tuesday, September 24, 2024 at 7:54 PM UTC

Yes. The remnants of hurricanes that produce floods, high winds, and prolonged power outages. Forest Fires could also be a serious threat. Earthquakes with significant damage are unlikely but still within the realm of possibility. ANYTHING that produces significant power outages that lasts for days will result in sincere economic hardships for the residents.

Tuesday, September 24, 2024 at 6:48 PM UTC

Drought

Tuesday, September 24, 2024 at 5:15 PM UTC

No

Tuesday, September 24, 2024 at 4:29 PM UTC

Rainwater runoff, elder care during emergencies, power outages, etc.

Tuesday, September 24, 2024 at 3:45 PM UTC

Excessive building in our area increasing the amount of runoff water into Kinsey Creek.

Friday, September 20, 2024 at 1:49 PM UTC

Nearly the entire list on the previous questions.

Wednesday, September 18, 2024 at 3:44 PM UTC

Drought

Tuesday, September 17, 2024 at 12:44 PM UTC

Wild-land fires.

Sunday, September 15, 2024 at 1:10 PM UTC

I am somewhat concerned about the potential for locally based terrorism from organized militia

Sunday, September 15, 2024 at 1:03 PM UTC

Road flooding

Thursday, August 22, 2024 at 11:50 PM UTC

Contaminated wells used for drinking

Thursday, August 22, 2024 at 5:30 PM UTC

Fuel Shortages when there are issues with the supply chain

Thursday, August 22, 2024 at 5:26 PM UTC

Flash floods pose a pretty significant threat along the Pacolet Ruver basin

---

Monday, August 5, 2024 at 7:53 PM UTC

Septic and water supply issues. The lack of sanitary sewer prevents us from being able to reclaim and recycle water in case of drought. We don't have a lot of reservoirs to store water here. Most people are on septic and so we don't get the water back into the system once it enters the groundwater.

Wednesday, July 10, 2024 at 7:50 PM UTC

I'm not really sure. Depends on how well the infrastructure holds up, really. It's bad enough that we seem to lose power when the wind changes direction (and the lines in my subdivision are buried - it's the lines coming in that are the problem). The main roads through the county aren't wide enough and easily get bogged down for the littlest thing. How would anyone evacuate in an emergency? I don't think we could.

Saturday, July 6, 2024 at 3:52 AM UTC

Not at the moment

Wednesday, June 5, 2024 at 2:25 PM UTC

Potential increased rainfall as being predicted by environmental agencies

---

Wednesday, June 5, 2024 at 2:15 PM UTC

Effects of hurricanes, the short and long term effects of climate change

---

Wednesday, June 5, 2024 at 1:55 PM UTC

As our planet warms, I think we'll see an increase in extreme weather events such as flooding, drought, tornadoes and hurricanes.

Saturday, June 1, 2024 at 1:28 PM UTC

Wildfires

Tuesday, May 28, 2024 at 11:15 AM UTC

Flooding, heat & drought and severe Thunderstorm with tornadoes are increasing. I also believe Terrorism in our community can not be ruled out, now.

Monday, May 27, 2024 at 6:36 PM UTC

Erosion

Saturday, May 25, 2024 at 7:28 PM UTC

Wind

Saturday, May 25, 2024 at 7:27 PM UTC

Flooding

Saturday, May 25, 2024 at 11:42 AM UTC

No

Friday, May 24, 2024 at 4:40 PM UTC

Growth on the side of roads which prevent clear views at intersections. The amount of traffic on the 2 lane roads in our community is substantial. The larger trucks have a hard time making turns onto the narrow road such as at Banner Farm and 191.

Friday, May 24, 2024 at 1:52 PM UTC

Overpopulation.
Unmitigated growth of overpriced housing developments.
Reduction of farmlands.

Friday, May 24, 2024 at 1:24 PM UTC

flooding and water pollution

Friday, May 24, 2024 at 12:46 PM UTC

The loss of the tree canopies, man-made erosion and unrelenting construction are a very real and concerning threat. We keep taking from the natural barriers to floods,m and the like with little to no prevention for catastrophes in place.

Friday, May 24, 2024 at 12:43 PM UTC

Our current two party political system

Friday, May 24, 2024 at 11:52 AM UTC

Food shortages, bears

Friday, May 24, 2024 at 11:30 AM UTC

Cyber attack

Thursday, May 23, 2024 at 7:51 PM UTC

Over growth

Thursday, May 23, 2024 at 7:48 PM UTC

Climate change impacts.

Thursday, May 23, 2024 at 3:29 PM UTC

Cyber

Tuesday, April 30, 2024 at 5:12 PM UTC

No

Monday, April 29, 2024 at 1:42 PM UTC

Long-term power outage

Thursday, April 25, 2024 at 11:29 PM UTC

We have a lot of flooding, but I am more concerned with high winds, storms, and tornados. I have undergroung power lines, but the wifi and cell service goes out a lot, without that there is no phone service for emergencies and to check on loved ones.

Wednesday, April 17, 2024 at 3:42 PM UTC

A bad drought could bring fire danger.

Wednesday, April 17, 2024 at 2:57 PM UTC

Urban Interface Wildfires

Wednesday, April 17, 2024 at 4:51 AM UTC

Heavy rains and droughts

Wednesday, April 17, 2024 at 12:18 AM UTC

Flooding along with winter weather are major concerns for us.

Thursday, April 11, 2024 at 1:42 PM UTC

not that I am aware of

Tuesday, April 9, 2024 at 1:47 AM UTC

no fear hear. the true problem are the council that make radial changes with no input from We the People.

Monday, April 8, 2024 at 11:39 PM UTC

Civil Disturbance, communication infrastructure.

Wednesday, April 3, 2024 at 1:21 PM UTC

MANY BUT YOU NEVER KNOW WHAT IS COMMING IT IS BEST TO BE PREPARED FOR AS MANY AS

Thursday, March 28, 2024 at 9:23 PM UTC

Flooding from tropical systems

Friday, March 22, 2024 at 5:00 PM UTC

Other than a lack of a licensed radio operator in case of emergency, there is a risk of high winds funneling through our valley and causing widespread damage to trees and powerlines as well as causing a radio blackout. We are all dependent on the grid.

Thursday, March 21, 2024 at 10:05 AM UTC

Ice storms make travel impossible - but they don't occur as often as in the past.

Thursday, March 21, 2024 at 2:30 AM UTC

Flooding, wildfires, and drout.

Wednesday, March 20, 2024 at 9:22 PM UTC

Donald Trump

Wednesday, March 20, 2024 at 9:13 PM UTC

Wildfires, Drought, Geological, Flooding, Dam Breach, Infectious Diseases, Cyber Attack

Nuclear Exposure in parts of county near nuclear power plant in neighboring state

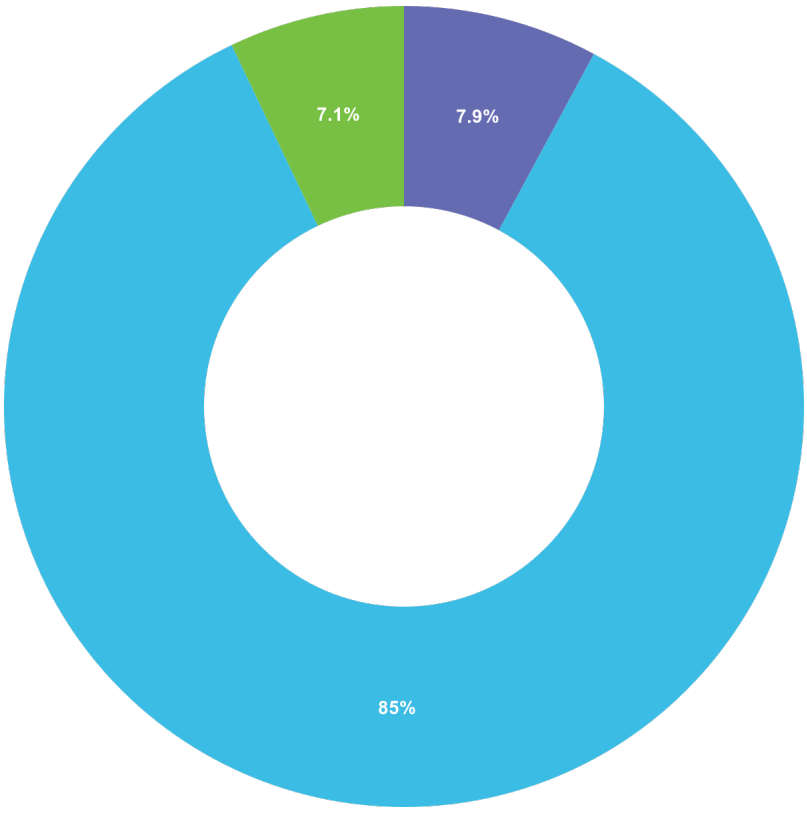
---

Wednesday, March 20, 2024 at 8:47 PM UTC

Lack of housing. Drought. Seasons getting hotter.

Answered: 72 **Unanswered:** 55

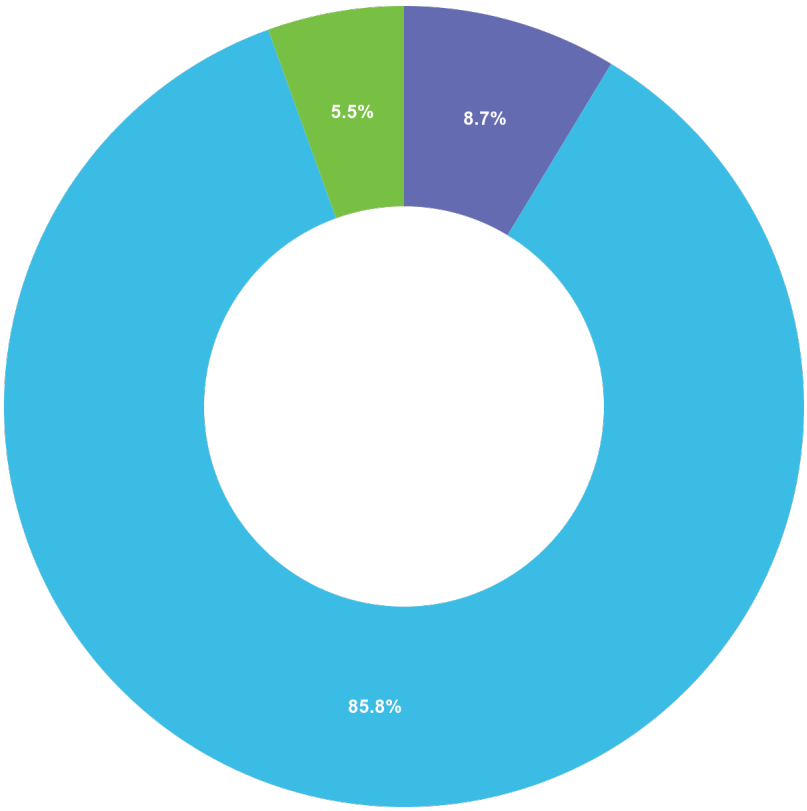
Q8 8\. Is your home located in a floodplain?*



Answered: 127 **Unanswered:** 0

Choice	Total
Yes	10
No	108
I don't know	9

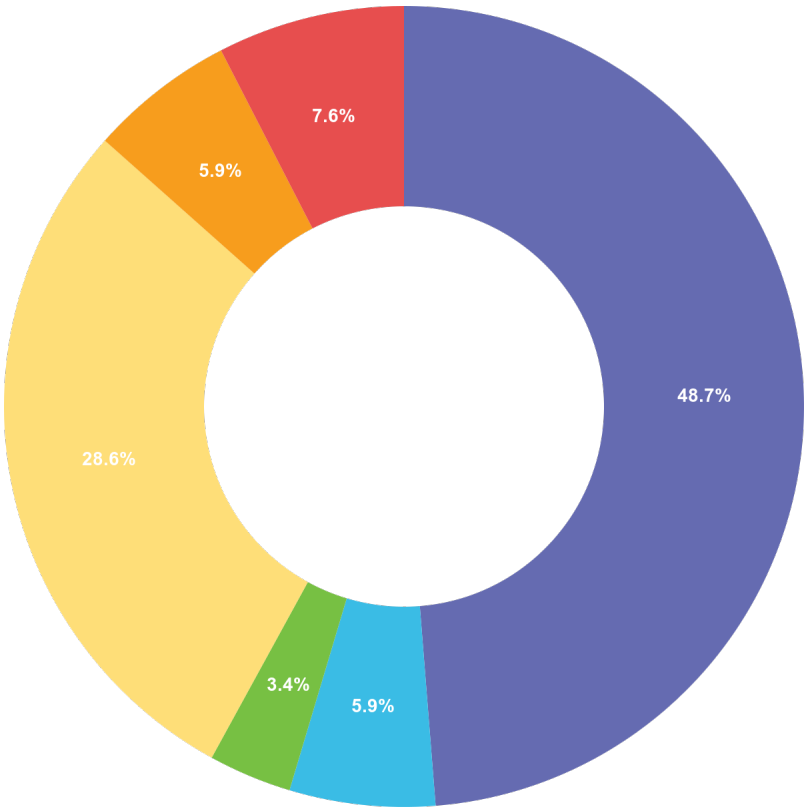
Q9 9\. Do you have flood insurance?*



Answered: 127 **Unanswered:** 0

Choice	Total
Yes	11
No	109
I don't know	7

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



Answered: 119 **Unanswered:** 8

Choice	Total
Not located in a floodplain	58
Too expensive	7
Not necessary because it never floods	4
Not necessary because I'm elevated or otherwise protected	34
Never really considered it	7
Other	9

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

Friday, January 24, 2025 at 3:06 PM UTC

n/a

Thursday, December 19, 2024 at 9:42 PM UTC

Flood Insurance is too expensive and does not cover much.

Sunday, December 1, 2024 at 9:37 PM UTC

We considered purchasing for our vacation home in Bat Cave area but bei mg our insurance was for s con dart and short term rental we couldn’t find a provider. We now know could get through FEMA(maybe?) but we’re not aware of that at the time.

Tuesday, September 24, 2024 at 6:48 PM UTC

Our house is on enough of a hill that we would not have a problem, however I do believe that the flood

plains are underestimated and many of my neighbors would be affected even though they are not technically in a flood plain either.

Tuesday, September 24, 2024 at 4:29 PM UTC

I was told my home is just outside of the flood plain that would require me to purchase insurance.

Friday, September 20, 2024 at 1:49 PM UTC

Not offered by insurance agent.

Wednesday, July 10, 2024 at 7:50 PM UTC

We live on a mountain. The flood plain is a couple thousand feet below us.

Tuesday, May 28, 2024 at 11:15 AM UTC

My home is slightly elevated, and it’s very expensive.

Sunday, May 26, 2024 at 1:38 AM UTC

Already have flood insurance

Saturday, May 25, 2024 at 1:16 PM UTC

Insurance company, state farm, wouldn't offer it to us.

Friday, May 24, 2024 at 4:40 PM UTC

We had flood insurance when our home flood but it did not cover the ingress of water unless the entire area of 2 miles was also flooded.

Tuesday, April 9, 2024 at 1:47 AM UTC

rental landlord does not care.

Wednesday, April 3, 2024 at 1:21 PM UTC

I DONT THINK YOU CAN GET FLOOD INSURANCE ANY LONGER IN ALOT OF AREAS

Friday, March 22, 2024 at 5:00 PM UTC

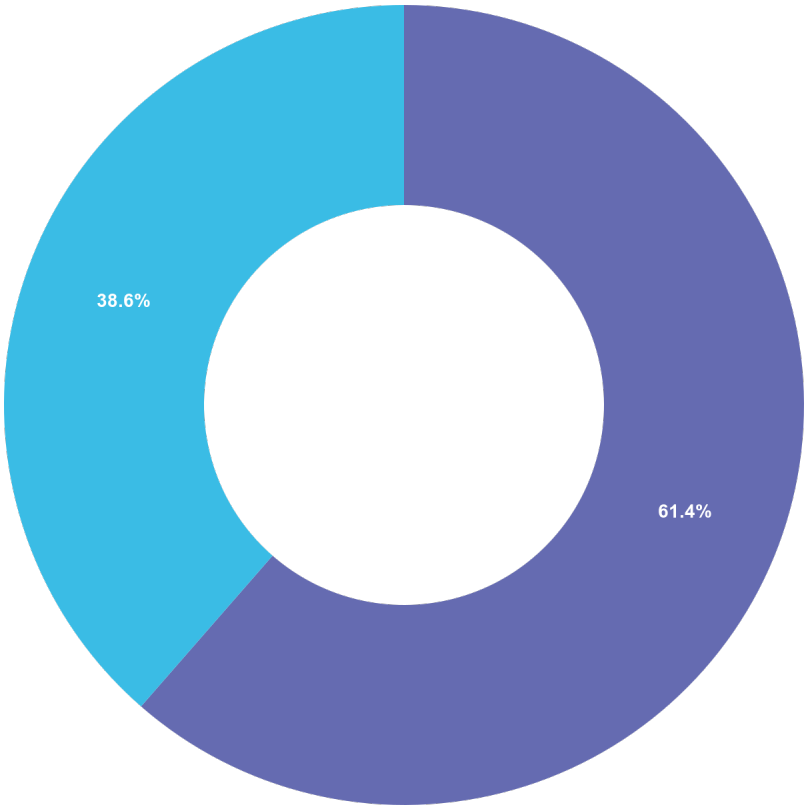
Other too (I live in public housing)

Thursday, March 21, 2024 at 2:30 AM UTC

I have insurance but live on a lower level of a mtn. With that being said our state maintain ditches are not kept up with the loss of road access and land.

Answered: 15 **Unanswered:** 112

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



Answered: 127 **Unanswered:** 0

	Choice	Total
●	Yes	78
●	No	49

Q13 13\. If "Yes," please explain.

Friday, January 24, 2025 at 3:06 PM UTC

Digging of water drainage ditches and wood fabric on landslide effected areas.

Sunday, January 12, 2025 at 12:09 AM UTC

A number of large pine trees were removed from the subdivision entrance road - it has helped to mitigate the icing on the (steep) road in the winter, which makes access safer during winter weather. Also, the homeowners paid to reinforce our bridge several years ago - we had a contractor install several large boulders in front of the base of the bridge to protect the foundation. Those boulders helped protect the bridge from washing away during Helene, although it did sustain serious damage. We also work on keeping the drainage ditches clear, to prevent runoff that could cause erosion to the sides of the road and damage to the asphalt.

Thursday, December 19, 2024 at 9:42 PM UTC

I have been physically and continuously, trying to clean up debris to keep this waterway from damning up and minimizing, flooding and erosion. I have also tried to do some planting to minimize flooding and erosion. I physically can’t no longer do any of this I need help.

Thursday, December 19, 2024 at 8:42 PM UTC

I'm speaking for the entire community as HOA President. We have an ongoing road and drainage budget. We try to improve drainage every year.

Wednesday, December 11, 2024 at 6:29 PM UTC

Added some drains around the foundation

Sunday, December 1, 2024 at 9:37 PM UTC

We are just trying to save our property now and then can look into actions to decrease risk.

Friday, November 29, 2024 at 4:09 AM UTC

Removal of three large trees...note - I will need to continue to clear several others on my property.

Tuesday, November 12, 2024 at 8:41 PM UTC

removal of dead or damaged trees, recently paved our rd

Wednesday, November 6, 2024 at 5:52 PM UTC

Firewise community

Monday, November 4, 2024 at 7:48 PM UTC

Cleared out a great deal of trees over house

Tuesday, October 29, 2024 at 2:06 AM UTC

I have installed French drain and trenches around my property, purchased a water barrier and installed 3 sump pumps

---

Wednesday, October 23, 2024 at 3:20 PM UTC

Firewise program

Monday, October 21, 2024 at 1:24 PM UTC

moderate site grading

Thursday, September 26, 2024 at 5:14 AM UTC

Cutting down trees, redirecting water away from home

Thursday, September 26, 2024 at 12:23 AM UTC

Power outages - generator, emergency supplies, etc

Home security

Wednesday, September 25, 2024 at 12:25 PM UTC

No, neighborhood is in HOA

Tuesday, September 24, 2024 at 10:13 PM UTC

My Tiny home is anchored to the ground.

Tuesday, September 24, 2024 at 6:48 PM UTC

Whole-house generator with automoatic cutover installed; removing trees that could fall on the house in a storm; paid for replacement of a collapsed culvert on the golf course behind our house.

Tuesday, September 24, 2024 at 5:15 PM UTC

Ditches around house

Tuesday, September 24, 2024 at 5:07 PM UTC

Removed some dangerous trees that posed a risk during a storm

Tuesday, September 24, 2024 at 4:29 PM UTC

Whole house surge protector, upgraded circuits, outlets, drainage & erosion control measures around my home.

Friday, September 20, 2024 at 3:04 PM UTC

Help fund city drain on our street

Friday, September 20, 2024 at 1:49 PM UTC

I keep an emergency kit with at least 3 days of food that doesn't require cooking. I keep cash on hand in case there is a civic disturbance and/or widespread outage that disables ATMs/electronic payment. I keep at least a month's supply of pet food on hand. I have adequate cold weather clothing that would enable me to be without heat. I try to keep my prescription medications filled as soon as my insurance allows a refill.

Thursday, September 19, 2024 at 5:10 PM UTC

Landscaping, home improvements

Tuesday, September 17, 2024 at 12:44 PM UTC

We installed solar panels and a 10 kW house battery. A recent thunderstorm did result in loss of line power and the battery took over.

Sunday, September 15, 2024 at 1:10 PM UTC

Removed vulnerable trees

Saturday, September 14, 2024 at 7:42 PM UTC

Field management, drainage, no till planting

Wednesday, September 11, 2024 at 8:43 PM UTC

Removed selected trees

Sunday, August 25, 2024 at 1:42 PM UTC

Removed threatening trees, erosion control, alerted Duke to damaged poles, AI surveillance. Dam control

---

Friday, August 23, 2024 at 10:42 PM UTC

Built house with extra attachments for roof to protect against wind.

Thursday, August 22, 2024 at 7:53 PM UTC

Keeping ditch and culverts cleaned out as best I can.

Thursday, August 22, 2024 at 5:30 PM UTC

Keep leaves blown away from the house. Keep trees cut and away from the house.

Thursday, August 22, 2024 at 5:26 PM UTC

Tree trimming, generator, new metal roof

Monday, August 5, 2024 at 7:53 PM UTC

added generator, cleaned up outside, and built a storm shelter

---

Sunday, June 9, 2024 at 1:13 AM UTC

I avoid hazardous activity, stay abreast of weather warnings & procedures, keep autos safety updated, have a plan for sheltering in place, emergency foods & water access.

Wednesday, June 5, 2024 at 3:06 PM UTC

Trim undergrowth

Wednesday, June 5, 2024 at 2:15 PM UTC

Making every effort to keep drainage areas clear as much as possible, including the swail in our back yard.

Wednesday, June 5, 2024 at 1:55 PM UTC

I have purchased a generator.

Saturday, June 1, 2024 at 9:41 PM UTC

Defendable space around entire home from wildland / interface fires

---

Saturday, June 1, 2024 at 6:11 PM UTC

Security alarm system

Reinforced strike plate on back door

Saturday, June 1, 2024 at 11:39 AM UTC

Built above the flood elevation

Tuesday, May 28, 2024 at 11:15 AM UTC

Why did not have large trees around our home, that would fall during Highwinds. There are a few steps to each entrance into our home. So it will not easily flood. We don't have "junk" laying around on our property. We keep it clean and cluttered, which minimizes fires, and the snake population.

Monday, May 27, 2024 at 6:36 PM UTC

Convinced my HOA that I needed a culvert because water run off from heavy rains was causing fast erosion of my property. Still have issues with run off and erosion.

Sunday, May 26, 2024 at 1:38 AM UTC

Proper drainage

Saturday, May 25, 2024 at 7:28 PM UTC

Cut down over grown trees. Clean up debris. Winter ready water pipe.

Saturday, May 25, 2024 at 11:42 AM UTC

The neighborhood has worked to make sure that the community pond (water point for FD) has an overflow drainage system so that the road will not flood

---

Friday, May 24, 2024 at 4:40 PM UTC

We moved to a home on a hill with no other property draining onto ours.

Friday, May 24, 2024 at 1:52 PM UTC

Planting native plans.
Addressing drainage/flooding issues to the best of my ability.
Raising my own food and meat.

Friday, May 24, 2024 at 1:24 PM UTC

Sump Pump and tree trimming

Friday, May 24, 2024 at 12:43 PM UTC

We moved

Friday, May 24, 2024 at 11:30 AM UTC

Replaced the drainage culvert that allows us to cross our driveway from a small culvert to 48”. And it still comes close to flooding over which could take out our driveway and leave us stranded. It was working great until more houses were built up the mountain from us and now it’s sketchy again. No one seems to take into consideration those sorts of implications when approving development. Our private road will flood out and wash away at some point however we don’t single handedly have the funds to repair it and surely not everyone on this road will agree how to handle it between the city slickers and those of us who have been here forever and there is no HOA. We will all be stranded.

Thursday, May 23, 2024 at 7:48 PM UTC

Fire wise

Tuesday, April 30, 2024 at 5:12 PM UTC

Back up generators and emergency procedures in place

Monday, April 29, 2024 at 1:42 PM UTC

stored food and water and have a generator

Friday, April 19, 2024 at 2:50 PM UTC

smoke alarm system. Security cameras.

Wednesday, April 17, 2024 at 3:42 PM UTC

I had a whole house generator that runs on propane installed. Replaced a retaining wall and had the roof

replaced.

Wednesday, April 17, 2024 at 2:57 PM UTC

Keep leaf litter away from home

Wednesday, April 17, 2024 at 4:51 AM UTC

Better drainage around house

Wednesday, April 17, 2024 at 12:18 AM UTC

Defensible space from wildfires and we now have a four-wheel drive tractor with a bucket to help move landslides

---

Tuesday, April 16, 2024 at 8:18 PM UTC

Tree thinning, defensible area creation

Tuesday, April 16, 2024 at 4:28 PM UTC

Generator, food storage, clearing of vegetation

Monday, April 15, 2024 at 7:56 PM UTC

Maintain drainage

Friday, April 12, 2024 at 8:03 PM UTC

generator

Friday, April 12, 2024 at 3:07 PM UTC

I keep leaves and debris away from home.

Thursday, April 11, 2024 at 5:01 PM UTC

I have made sure to have contingency plans in place for my own household such as extra dry goods stored, generator power, alternate heating sources, water collection and filtration devices, etc in order to be prepared for a widespread emergency situation.

Thursday, April 11, 2024 at 1:42 PM UTC

did not plant trees close to house

Tuesday, April 9, 2024 at 4:27 PM UTC

additional drainage work on property

Tuesday, April 9, 2024 at 10:26 AM UTC

grading, cooperating with neighbors to direct surface water away from housea

---

Tuesday, April 9, 2024 at 1:47 AM UTC

started a neighbor hood watch group. know you're neighbor.

Monday, April 8, 2024 at 11:39 PM UTC

Backup generator

Monday, April 8, 2024 at 8:39 PM UTC

Awareness in community of our Dam. It is an earthen dam and if not attended to, our community will be in trouble.

Wednesday, April 3, 2024 at 1:21 PM UTC

BUILT OUR OWN BRIDGE THAT IS FORTIFIED MUCH BETTER NEIGHBORS TALK TO EACH OTHER AND HELP EACH OTHER WHILE PREPARING THEIR OWN HOMES

Tuesday, April 2, 2024 at 12:17 PM UTC

sump pump in crawl space for flooding

Thursday, March 28, 2024 at 9:23 PM UTC

Developed a water channeling system to reduce risk of rapid rainfall causing slope failure around home. Reduced dead vegetation and underbrush in area close to home to mitigate wildfire risk.

Thursday, March 28, 2024 at 8:08 PM UTC

Created a wildfire buffer around my house, diverted storm water

---

Friday, March 22, 2024 at 5:00 PM UTC

No... again... Public Housing. (Ya'll, this survey is requiring this box have an entry even if we don't choose 'other')

Thursday, March 21, 2024 at 10:05 AM UTC

As a member of the board for my property owner association, we have worked to protect our private road from trees, landslides, and collapse.

Thursday, March 21, 2024 at 2:30 AM UTC

Up keep of local ditches. And other erosion problems.

Wednesday, March 20, 2024 at 9:22 PM UTC

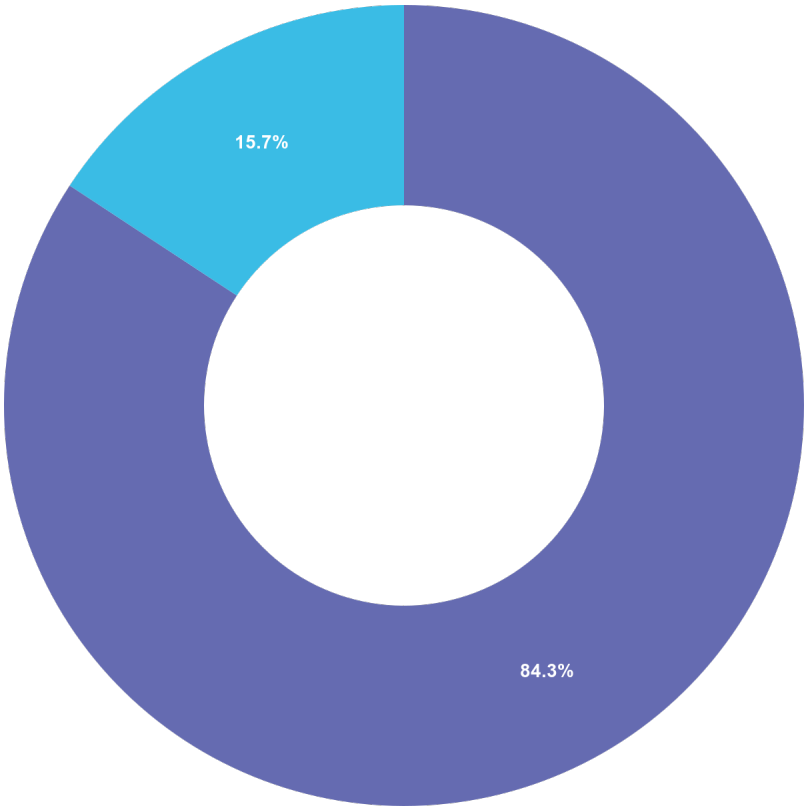
Fire mitigation

Wednesday, March 20, 2024 at 9:13 PM UTC

Clear leaves from around property. Keep limbs trimmed from house and power lines. Prepared with food and water in the event of power outages.

Answered: 80 **Unanswered:** 47

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

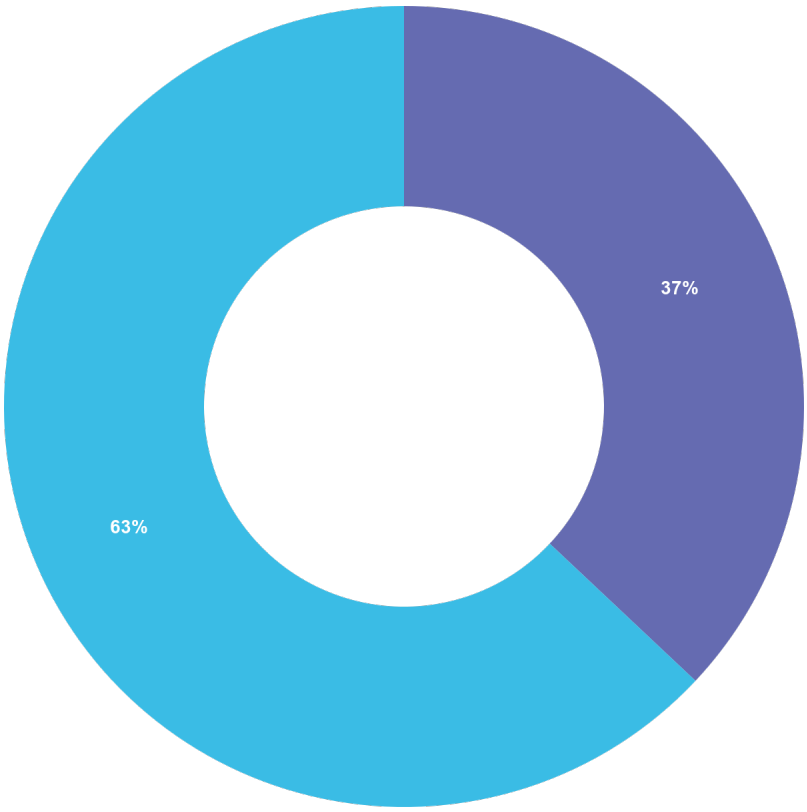


Answered: 127 **Unanswered:** 0

Choice	Total

Choice	Total
Yes	107
No	20

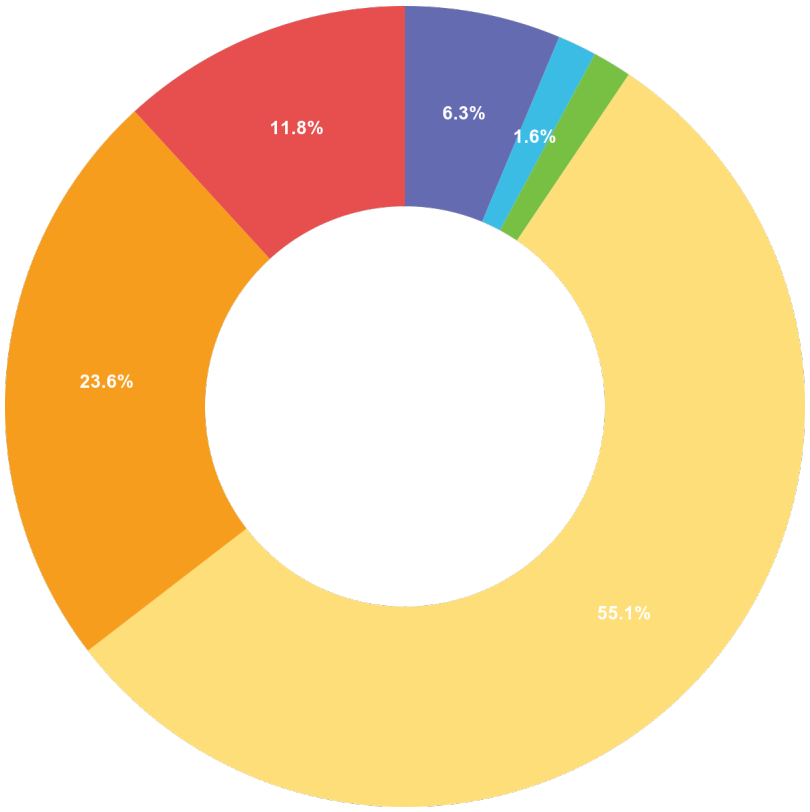
Q15 15\. Do you know what office to contact to find out more information about how to reduce your risks to hazards in your area?*



Answered: 127 **Unanswered:** 0

Choice	Total
Yes	47
No	80

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: 127 **Unanswered:** 0

Choice	Total
Newspaper	8
Television	2
Radio	2
Internet (Including Social Media)	70
Mail	30
Public Workshops/Meetings	15
School Meetings	0

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

Friday, January 24, 2025 at 3:06 PM UTC

Email is the quickest. Thanks. Rick

Monday, January 13, 2025 at 7:09 PM UTC

mail

Sunday, January 12, 2025 at 12:09 AM UTC

Mail is also good, to actually receive something in hand.

Thursday, December 19, 2024 at 9:42 PM UTC

Email is also better way of receiving information. Websites are always informative but I honestly don’t spend a lot of time on the county website. Therefore, I’m sure I miss a lot of information.

Wednesday, December 4, 2024 at 7:19 PM UTC

Email or text

Sunday, December 1, 2024 at 9:37 PM UTC

Internet would be good too

Friday, November 29, 2024 at 4:09 AM UTC

Postings in the Henderson County's monthly email distribution service have been helpful, as have announcements from BPR radio during Helene. I also rely on localized news sources such as WTZQ; also Hendersonville Lightning and Asheville Watchdog on internet, and occasionally the Lightning, Xpress and Asheville Planet on hard copy.

Tuesday, November 12, 2024 at 8:41 PM UTC

Internet

Wednesday, November 6, 2024 at 5:52 PM UTC

email

Wednesday, November 6, 2024 at 11:20 AM UTC

Email. I never read the local paper anymore

Monday, November 4, 2024 at 7:48 PM UTC

Email

Tuesday, October 29, 2024 at 2:06 AM UTC

Email, newsletter or text

Wednesday, October 23, 2024 at 3:20 PM UTC

email, text

Monday, October 21, 2024 at 1:24 PM UTC

regular mail

Thursday, September 26, 2024 at 12:23 AM UTC

Texting, email

Wednesday, September 25, 2024 at 12:25 PM UTC

email

Wednesday, September 25, 2024 at 1:09 AM UTC

Mail is also fine

Tuesday, September 24, 2024 at 10:13 PM UTC

Notice via mail

Tuesday, September 24, 2024 at 8:44 PM UTC

Text

Tuesday, September 24, 2024 at 6:33 PM UTC

email

Tuesday, September 24, 2024 at 5:07 PM UTC

Internet, community meetings

Tuesday, September 24, 2024 at 4:29 PM UTC

We have a county television station that is not fully utilized with current information.

Tuesday, September 24, 2024 at 3:45 PM UTC

Email

Friday, September 20, 2024 at 1:49 PM UTC

Mail

Thursday, September 19, 2024 at 4:33 PM UTC

Local news website like wlos news 13 or blue ridge now

Tuesday, September 17, 2024 at 12:44 PM UTC

We have a number of HOA in our community and we are organized. So sharing f information this way might work.

Sunday, September 15, 2024 at 1:10 PM UTC

Public information sessions

Thursday, August 22, 2024 at 11:50 PM UTC

Neighborhood meetings work too

Thursday, August 22, 2024 at 7:53 PM UTC

Saw this on FB so it works for me

Thursday, August 22, 2024 at 6:51 PM UTC

Info sent home through the school

Thursday, August 22, 2024 at 5:26 PM UTC

Cell phone and text

Monday, August 5, 2024 at 7:53 PM UTC

Presentations at public meetings for the smaller jurisdictions

---

Wednesday, July 10, 2024 at 7:50 PM UTC

Television is good. Put something on WLOS. Also in the local papers, which means it'll show up online.

Thursday, June 13, 2024 at 3:16 PM UTC

Text Message

Sunday, June 9, 2024 at 1:13 AM UTC

Mail reaches even those not technologically astute, but TV, radio, weather radio, newspapers, internet & telephone, are all ways to reach me.

Wednesday, June 5, 2024 at 2:25 PM UTC

Public meetings

Wednesday, June 5, 2024 at 2:15 PM UTC

Email, though this is part of internet, I suppose.

Wednesday, June 5, 2024 at 1:55 PM UTC

I like to receive information via email. I also appreciate the local leaders in my community disseminating information through community meetings.

Monday, June 3, 2024 at 6:19 PM UTC

e-mail

Saturday, June 1, 2024 at 6:36 PM UTC

Internet

Saturday, June 1, 2024 at 6:11 PM UTC

Email

Saturday, June 1, 2024 at 1:28 PM UTC

Email from city council

Saturday, June 1, 2024 at 11:39 AM UTC

internet

Tuesday, May 28, 2024 at 11:15 AM UTC

Public meetings and workshops are a good idea.

Monday, May 27, 2024 at 6:36 PM UTC

Emails

Saturday, May 25, 2024 at 7:27 PM UTC

Social media

Saturday, May 25, 2024 at 1:16 PM UTC

Text

Friday, May 24, 2024 at 1:52 PM UTC

By email.

Friday, May 24, 2024 at 11:52 AM UTC

Text

Friday, May 24, 2024 at 11:30 AM UTC

I’m old fashioned and like stuff in the mail but social media will do

---

Thursday, May 23, 2024 at 7:48 PM UTC

Email, and website access

Thursday, April 25, 2024 at 11:29 PM UTC

I look at the news, Channel 13

Friday, April 19, 2024 at 2:50 PM UTC

Mail

Wednesday, April 17, 2024 at 3:42 PM UTC

Social media and radio are good too.

Wednesday, April 17, 2024 at 4:51 AM UTC

Email

Thursday, April 11, 2024 at 1:42 PM UTC

no

Tuesday, April 2, 2024 at 12:17 PM UTC

text by phone

Thursday, March 28, 2024 at 9:23 PM UTC

Workshops/public meetings

Friday, March 22, 2024 at 5:00 PM UTC

I work in radio... so email me and I'll get the word out. ;-) info@wsqlradio.com

---

Thursday, March 21, 2024 at 7:59 PM UTC

Local governments typically use sandwich boards placed throughout the community to let people know what is going on or how to give input

---

Thursday, March 21, 2024 at 10:05 AM UTC

no

Thursday, March 21, 2024 at 2:30 AM UTC

Television

Wednesday, March 20, 2024 at 9:22 PM UTC

Through our POA

Wednesday, March 20, 2024 at 9:13 PM UTC

Meetings and Workshops

Answered: 64 **Unanswered:** 63

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?

Tuesday, January 28, 2025 at 2:30 PM UTC

Dedicate funding through a capital reserve fund for disaster recovery, invest in current infrastructure, up-size/over-build infrastructure

---

Friday, January 24, 2025 at 3:06 PM UTC

To assist property owners in mitigation of erosion and land movement as to prevent more damage as these areas have now been compromised to to Helana.

Sunday, January 12, 2025 at 12:09 AM UTC

After Helene, loss of communication (no cell service, internet, land lines) and power outages were the most challenging thing to deal with. Falling trees caused so much damage, blocked roads/driveways, crushed homes and there was no government response, at least not in our area. (I do realize Helene was an overwhelming disaster and all emergency personnel did what they could - but perhaps we need an organized group of citizens who can be trained and activated during serious disasters - churches could provide a lot of help) Individuals and volunteers from churches responded within a day or two and helped open our road and clear off trees from homes, driveways. Flooding was terrible, we were fortunate not to have our neighborhood flooded, but roads washed out both ways near the entrance of the subdivision. I don't know if we can improve the infrastructure around here enough to ever handle another Helene-type event, but there are definite clear problem areas that need updates in drainage, erosion control, flood mitigation.

Thursday, December 19, 2024 at 9:42 PM UTC

Put some funding towards plants and grading especially for private homes on waterways. it is obvious that it’s too late to stop the over development. There needs to be education for homeowners and developers who owned property on waterways, but their home is not close to that waterway, how their changes to the landscape and structural building affect people and homes downstream. This could also be pointed out to people who build on the side of a mountain or steep grade, pay attention to how you are affecting the people below you.
To many people do not care.

Thursday, December 19, 2024 at 8:42 PM UTC

The County can never eliminate all risks, but being better prepared next time would help. It seems DRC people (both FEMA and the County), while very nice, just don't have the full picture and there is a lot of conflicting information depending on who you talk to. They are learning along with me and the rest of my community.

Wednesday, December 11, 2024 at 6:29 PM UTC

Take better carew of the roads and make sure culverts are clear.Limit buidling in flood prone areas

Sunday, December 8, 2024 at 6:38 AM UTC

Keep ditches along roads clean and open, do not leave debris piled up in them.

Wednesday, December 4, 2024 at 7:19 PM UTC

Help to repair the very old - bumpy dirt mountain roads

Sunday, December 1, 2024 at 9:37 PM UTC

Make it mandatory for during real estate transaction owners are made aware of any specific hazard level/ issue noted in mitigation plan.

Friday, November 29, 2024 at 4:09 AM UTC

Continue support for National Weather Service and private weather network reporting such as WUnderground; continue support for intergovernmental cooperation services in support of mutual disaster responses, avoid politicized responses to climate mitigation strategies, and support long term atmospheric carbon-gas reduction efforts, including limits on use or air-dispersal of high impact refrigerant compounds that might aggravate greenhouse effects. Consider effects of forest management on wildfire risk in land planning.

Tuesday, November 12, 2024 at 8:41 PM UTC

reinforce infrastructure in our area to better protect them from damage in the future

Wednesday, November 6, 2024 at 5:52 PM UTC

Conduct a risk assessment, match it against current capabilities, and prioritize gaps, hold elected and appointed leaders accountable.

Wednesday, November 6, 2024 at 11:20 AM UTC

It’s too late

Monday, November 4, 2024 at 7:48 PM UTC

Help clear streams, rivers, creeks

Tuesday, October 29, 2024 at 2:06 AM UTC

Provide information about how to flood proof my home and give how to make these improvements that eliminates flood damage

Wednesday, October 23, 2024 at 3:20 PM UTC

comprehensive disaster mitigation plan

Monday, October 21, 2024 at 1:24 PM UTC

buying out homes within the floodplain that experience flooding

Thursday, September 26, 2024 at 5:14 AM UTC

There isn't much of a presence. During emergencies there should be someone posting in local fb groups. No reason not to have a larger social media footprint besides your own.

Thursday, September 26, 2024 at 12:23 AM UTC

Promote community engagement and preparedness events - like a neighborhood watch. Auxiliary teams could support first responders that share community driven - not Red Cross, or other emergency management groups that are “red tapped”.

Wednesday, September 25, 2024 at 12:25 PM UTC

less development/infrastructure there is already plenty in my area. Too much development causes stormwater/flooding problems.

Wednesday, September 25, 2024 at 1:09 AM UTC

Improve flood prone areas

Update the water supply system to reduce water waste

Manage development to ensure it doesn’t exceed capacity of water supply and overall infrastructure

---

Tuesday, September 24, 2024 at 10:13 PM UTC

Control burns. Inspection & removal of debris under bridges, as well as drains.

Tuesday, September 24, 2024 at 8:44 PM UTC

Having a plan to preserve the natural environment which is being impacted by hone developments. More parks and natural areas. Farm land is being sold, land cleared of trees.

Tuesday, September 24, 2024 at 7:54 PM UTC

Demand that all future electrical transmission lines be buried rather than elevated on poles. Make it impossible to build housing developments in floodplains. Reclaim wetlands to mitigate flooding.

Tuesday, September 24, 2024 at 6:48 PM UTC

Update flood plain maps; transition to below-ground utilities

---

Tuesday, September 24, 2024 at 6:33 PM UTC

Stop over development. The roads already have too much traffic and if people tried to evacuate it would be a disaster. Also with all the trees being cut down, areas are more prone to flooding.

Tuesday, September 24, 2024 at 4:29 PM UTC

Bury power lines, establish fire protection boundaries, better inform local residents, consider senior residential communities for establishing safe sanctuary areas for them & their pets.

Tuesday, September 24, 2024 at 3:45 PM UTC

Stop approving all these new neighborhoods without the infrastructure to support it.

Friday, September 20, 2024 at 1:49 PM UTC

Publish evacuation routes, have information available at all public library locations.

Thursday, September 19, 2024 at 5:10 PM UTC

Storm drain management

Thursday, September 19, 2024 at 4:33 PM UTC

drainage for roads that flood like sugarloaf road or airport road. enforcement of burn bans and litter fines for wildfire control, and surveillance during drought. also checking power lines and boxes one time i saw one smoking a few weeks ago on south allen road

---

Wednesday, September 18, 2024 at 3:44 PM UTC

Difficult to say.

Tuesday, September 17, 2024 at 12:44 PM UTC

Develop actionable plans and then inform the communities. For example, for wild land fires, tell residents how to prepare for possible evacuations.

Sunday, September 15, 2024 at 1:10 PM UTC

I feel our local government does a nice job with being proactive by trimming overhanging tree limbs and maintaining roads, but more needs to be done to restrict development and limit its negative environmental impact (runoff management, eg).

Sunday, September 15, 2024 at 1:03 PM UTC

Being informed of specific potential issues we should be aware of and what we should do, much like drinking water alerts

---

Sunday, September 15, 2024 at 10:23 AM UTC

Take into account future planning/road work to minimize issues with groundwater, pooling water, redirecting water that leads to flooding.

Saturday, September 14, 2024 at 7:42 PM UTC

Managed growth, less pavement

Thursday, September 12, 2024 at 12:24 PM UTC

Clean debris like trees and logjams up in Mud Creek which would allow water to flow rather than be dammed up like constantly happens

---

Sunday, August 25, 2024 at 1:42 PM UTC

Communication. Keeping power line clear(duke just completed). Need fire hydrants activated to working order on Howard Gap Rd

---

Friday, August 23, 2024 at 10:42 PM UTC

Drills and creating plans with many backup choices.

Friday, August 23, 2024 at 3:30 AM UTC

Tornado sirens

Thursday, August 22, 2024 at 11:50 PM UTC

Awareness and education

Thursday, August 22, 2024 at 6:51 PM UTC

Maintain roads better near me so they don't wash away

Thursday, August 22, 2024 at 5:30 PM UTC

Spend money to purchase more equipment to monitor flooding, river gauges, tornado sirens, enhance emergency services in the county

---

Thursday, August 22, 2024 at 5:26 PM UTC

Can't really reduce the hazards unless they are man made hazards. The warning system needs to warn us quicker. I usually recieve the warning texts after the hazardous event has already past by

---

Monday, August 5, 2024 at 7:53 PM UTC

Explain what are the public vs citizen responsibilities around their property.

Wednesday, July 10, 2024 at 7:50 PM UTC

Deal with infrastructure. Good luck getting anyone to take any of it seriously.

Saturday, July 6, 2024 at 3:52 AM UTC

People just need to beware and think when the winter is coming be prepared for it

---

Thursday, June 13, 2024 at 3:16 PM UTC

Tree trimming

Sunday, June 9, 2024 at 1:13 AM UTC

Keep trees trimmed along roadways & near electrical lines, create volunteer teams in neighborhoods & "buddy systems, utlize schools & public buildings & churches as emergency centers (food, shelter, bedding).

Wednesday, June 5, 2024 at 3:06 PM UTC

Improve drainage

Wednesday, June 5, 2024 at 2:25 PM UTC

Increase awareness through public meetings or mailings or internet. Also, identify hazards and take steps to mitigate them

---

Wednesday, June 5, 2024 at 2:15 PM UTC

Very careful zoning and planning that takes into consideration infrastructure preparation and development.;
Careful choice in responsible contractors and developers to ensure they take seriously their impact within a community; thoughtful planning by Henderson County Commission and Planning Board to ensure growth that enhances and supports the needs of the community and those who reside there, and plans for a sustainable
future.

Wednesday, June 5, 2024 at 1:55 PM UTC

Stop the building of new houses in flood plains or on steep slopes. Invest in renewable energy. Make our communities more pedestrian and bicycle friendly.

Monday, June 3, 2024 at 6:19 PM UTC

Dissemination information and offer site visits.

Saturday, June 1, 2024 at 9:41 PM UTC

Identify possible hazards, develop programs to address same and provide funding to launch

---

Saturday, June 1, 2024 at 6:36 PM UTC

community outreach and workshops

Saturday, June 1, 2024 at 6:11 PM UTC

Replace broken asphalt over bridge on north mills River Road.

Saturday, June 1, 2024 at 1:28 PM UTC

Limit dense housing projects. Develop more green space. Limit forest clearing for housing.

Saturday, June 1, 2024 at 11:39 AM UTC

Better internet connection

Tuesday, May 28, 2024 at 11:15 AM UTC

Stop these massive housing projects. The road infrastructure is a problem, and to fix it is even more construction, taking peoples land or more roads, and then the cost of all that. It’s also very taxing on our school system. Our elementary schools are busting at the seams. Mills River has some space, but the county chooses to use it for their offices instead of for student space. Marlow could possibly add on. Rugby and West are at capacity. Right now the hazards that teenage drivers have getting to and from school are great, with all the construction and road traffic of impatient people trying to get to work or into town.

In the event of massive flooding, Low lying areas will definitely be impacted. Homes/dwellings with “junk“ all around their property would send remnants of that into our rivers. Perhaps, knowing where to dispose of junk, cars and debris would be helpful. Some incentive for doing so could be a motivation for some.

Monday, May 27, 2024 at 6:36 PM UTC

Work with our HOA to mitigate erosion. Also work with then on the fire hazard we have with the build up of leaves. They do not provide a service to remove leaves or pick up bagged leaves. Do this would reduce our possibility of wildfires.

Sunday, May 26, 2024 at 1:38 AM UTC

Stop over development

Saturday, May 25, 2024 at 7:28 PM UTC

We go by the Henderson County emergency preparedness program please let them know.

Saturday, May 25, 2024 at 7:27 PM UTC

We go by Henderson County emergency plan

Saturday, May 25, 2024 at 1:16 PM UTC

Do better when building things and the impact on the things around that property. Where the water will go when flooding happens.

Saturday, May 25, 2024 at 11:42 AM UTC

I appreciate the steps taken already. Rebuilt bridge on warlick and the work done on banner Farm.

Friday, May 24, 2024 at 1:52 PM UTC

STOP ALLOWING CORPORATIONS TO BUILD NEIGHBORHOODS OF MULTI-MILLION DOLLAR HOMES AND “LUXURY” APARTMENTS.

Should I say it louder for those it the back?

Friday, May 24, 2024 at 1:24 PM UTC

Warning system

Friday, May 24, 2024 at 12:46 PM UTC

Put a moratorium on the excessive construction.
That wont happen though. There are too many people concerned with making money and to hell with the consequences.
Mills River is no longer a beautiful place. It is an ugly scarred shell of what once was.
You cannot keep taking from Nature and not expect to have floods, erosion or other issues.

Friday, May 24, 2024 at 12:43 PM UTC

Stop allowing uncontrolled development! Stop cutting down trees and take stormwater control and human caused climate change much more seriously!

Friday, May 24, 2024 at 11:52 AM UTC

Stop tearing trees and nature down.

Friday, May 24, 2024 at 11:30 AM UTC

Maintain private roads by making them public or whatever it is. These little hollers are gonna drown when the water comes down these mountains, especially with all the houses y’all keep approving to be built. I don’t know who plans the drainage or if there is any consideration for that but it’s a noticeable impact

---

Thursday, May 23, 2024 at 7:51 PM UTC

Better traffic control especially when water puddles all over roads better animal control when rabies known present not leaving is to take care of it

---

Thursday, May 23, 2024 at 7:48 PM UTC

Codified requirements and following applicable codes

Monday, May 6, 2024 at 3:26 PM UTC

Pray

Tuesday, April 30, 2024 at 5:12 PM UTC

Provide money to improve infrastructure

Monday, April 29, 2024 at 1:42 PM UTC

Full-scale Exercise

Thursday, April 25, 2024 at 11:29 PM UTC

Protect wetlands and flood zone areas, do not build on them.

Wednesday, April 17, 2024 at 5:25 PM UTC

Do not relax zoning laws in floodplains.

Wednesday, April 17, 2024 at 3:42 PM UTC

Enact and enforce stricter land use and flood plain rules.

Wednesday, April 17, 2024 at 4:51 AM UTC

Fund DOT to provide more mitigation with gravel state roads and more tree removal along roads where no power lines right of way’s are

---

Wednesday, April 17, 2024 at 12:18 AM UTC

By working with the local officials within the communities to see what they see as issues.

Monday, April 15, 2024 at 7:56 PM UTC

Strengthen floodplain ordinances

Friday, April 12, 2024 at 3:07 PM UTC

Better access to water hydrants on the top of mountain on Chestnut Ridge.

Thursday, April 11, 2024 at 5:01 PM UTC

Encourage people/communities to be self sufficient and be prepared to help themselves in the event of an emergency. Also continue to disseminate info to show how to be prepared etc.

Thursday, April 11, 2024 at 1:42 PM UTC

do not know

Tuesday, April 9, 2024 at 10:26 AM UTC

perform geotechnical surveys before clearing acres at a time with no runoff plan.

Tuesday, April 9, 2024 at 1:47 AM UTC

fat chance this will not happen for the rails do not run anymore. only bio haz. is a gas truck wrecking .

Wednesday, April 3, 2024 at 1:21 PM UTC

CLEAN UP THE DEAD TREES AND ALLOW LOGGING AGAIN IN THE PUBLIC LANDS TO HELP PREVENT WILDFIRES, CLEAN THE RIVIERS AND CREEKS OF THE TREES AND BLOCKAGES FROM PREVIOUS FLOODS TO HELP PREVENT FLOODING IN THE FUTURE MAKE SURE LOCAL FIRE STATIONS ARE BETTER PREPARED FOR DIFFRENT DISASTERS

Tuesday, April 2, 2024 at 12:17 PM UTC

implement and revise, as necessary, effective plans that help mitigate and respond to natural disasters common to the area. It is hard to predict highly unusual occurrences.

Thursday, March 28, 2024 at 9:23 PM UTC

Survey all areas in county of homes/buildings and rank their susceptibility to wildfire. Once we know the risk profiles for each property, owners should be allowed to address those risks regardless of homeowner association regulatory impediments.

Thursday, March 28, 2024 at 8:08 PM UTC

Education of hazards and mitigation options, funding

Friday, March 22, 2024 at 5:00 PM UTC

They could ensure there is a licensed HAM radio operator for emergency communications since we do not have one and currently run the risk of being completely cut off from the rest of the world in case of a natural disaster.

Thursday, March 21, 2024 at 7:59 PM UTC

Transylvania County could increase the base flood elevation that new construction is required to build to and update the flood damage prevention ordinance to take into account impacts of development downstream. DOT and roadways should also be built to a best practice standard when building in floodways/floodplains

---

Thursday, March 21, 2024 at 6:01 PM UTC

There are many rural areas that are hard to access for emergency vehicles and that are a good distance from emergency responders. This costs valuable time when an emergency situation arises and things like wildfires can get out of control quickly especially in areas it can take 30 minutes or more for a response by fire or rescue. Smaller satellite fire stations nearer to some of the outlying areas of the county would be helpful with this

---

Thursday, March 21, 2024 at 10:05 AM UTC

Our local county commissioners do nothing to eliminate hazard damage anywhere in the county.

Thursday, March 21, 2024 at 2:30 AM UTC

Be more productive with tax payers money other then round abouts that are un nessaserry and housing that is un affordable and supplying fire departments and ems with the funds to properly provide the resources needed to be effective to do there job adequately and officiant. The acusta trail is a waist of money its gonna allow illegal people to camp and post on people's property.

Wednesday, March 20, 2024 at 10:40 PM UTC

Elevate the road above the 100 year flood plain. Eliminate further development along the French broad river corridor which impacts normal flows and increases bank erosion.

Wednesday, March 20, 2024 at 9:22 PM UTC

None

Wednesday, March 20, 2024 at 9:13 PM UTC

Education of the public

Current emergency preparedness plans

Wednesday, March 20, 2024 at 8:47 PM UTC

Inform and educate the community what hazards are/could be specific to their neighborhood and what they can do to prevent those hazards, as well as surrounding areas.

Answered: 102 **Unanswered:** 25

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?

Tuesday, January 28, 2025 at 2:30 PM UTC

Preserving transportation networks leading in/out of Henderson County - rebuilding highways, checking bridges, etc.

Friday, January 24, 2025 at 3:06 PM UTC

Landslides are the biggest issue in our area at this point as it wasn't an issue until this major storm.

Sunday, January 12, 2025 at 12:09 AM UTC

Communication is vital...some people died because they thought their area wouldn't flood, no official warned them to leave. There could have been better monitoring of the flood conditions so warnings could have gone out in a more accurate and timely manner. That is something that would also require more manpower and equipment, because there was so much widespread flooding. Perhaps more loud warning sirens would help, in areas close to rivers/streams where the flooding was so bad.

Thursday, December 19, 2024 at 9:42 PM UTC

Stop the developing. I'm sure it doesn't need to be said, but I'm going to say it anyways, the removal of trees and installing of pavement is not only damaging the land It is clearly changing weather patterns. We live in a rainforest, I can not believe it's not being protected. The dramatic changes with Finley creek are definitely an indication that it's not.

Friday, November 29, 2024 at 4:09 AM UTC

Continue support for public health services and wide distribution of relevant health information, including countering of disinformation outbreaks.

Wednesday, November 6, 2024 at 11:20 AM UTC

Increased taxes to pay for unnecessary services

Monday, November 4, 2024 at 7:48 PM UTC

Too many folks have too much junk piled up in yards, lots & fields

Tuesday, October 29, 2024 at 2:06 AM UTC

Need more information from flood plain managers that are easy to understand and more reliable information to get resources to assist homeowners

Wednesday, October 23, 2024 at 3:20 PM UTC

communication interruption plan

Thursday, September 26, 2024 at 12:23 AM UTC

In Saluda, when the internet goes out many of the cell phones do not work. It would be nice to have a 24/7 way that we could get info.

Wednesday, September 25, 2024 at 12:25 PM UTC

see previous

Tuesday, September 24, 2024 at 10:13 PM UTC

N/A

Tuesday, September 24, 2024 at 8:44 PM UTC

Flooding of the area on rte 64 between Etowah and Horseshoe. Floods all the time

---

Tuesday, September 24, 2024 at 4:29 PM UTC

I am

Tuesday, September 24, 2024 at 3:45 PM UTC

We need help controlling the population of mosquitoes.

Thursday, September 19, 2024 at 5:10 PM UTC

Protecting the power grid

Wednesday, September 18, 2024 at 3:44 PM UTC

No

Tuesday, September 17, 2024 at 12:44 PM UTC

Develop action plans for all the hazards you cite. Use community organizations (churches, civic clubs, neighborhood organizations, presentations at libraries) to inform citizens.

Sunday, September 15, 2024 at 1:10 PM UTC

It would be nice to know that local government works with utilities to make lines more secure, by running them underground, for example.

Thursday, September 12, 2024 at 12:24 PM UTC

Main focus should be Mud Creek but nobody wants to talk about it

---

Monday, August 5, 2024 at 7:53 PM UTC

stormwater improvements to prevent roadways from failing

Wednesday, July 10, 2024 at 7:50 PM UTC

Most people tend to ignore stuff until something happens and then expect a magical, immediate solution. I got nothin'.

Saturday, July 6, 2024 at 3:52 AM UTC

No

Sunday, June 9, 2024 at 1:13 AM UTC

Theft will be a problem in some areas. Neighborhood watch teams should be trained & activated.

Wednesday, June 5, 2024 at 2:25 PM UTC

Having an agency available to assist in both identifying hazards and available to help with mitigation

---

Wednesday, June 5, 2024 at 2:15 PM UTC

Communication and collaboration with communities and residents is critical to the success of any planning process.

Wednesday, June 5, 2024 at 1:55 PM UTC

Less affluent members of our society will be more heavily impacted. We should also consider the impact that increased extreme weather events are having on wildlife.

Saturday, June 1, 2024 at 9:41 PM UTC

EMP

Saturday, June 1, 2024 at 1:28 PM UTC

Communication between leaders and community.

Saturday, June 1, 2024 at 11:39 AM UTC

No internet connection available.

Tuesday, May 28, 2024 at 11:15 AM UTC

Access to communication and natural disasters is very important. People need to know where to go in what to do. Our local cable company optimum is not always reliable. The majority of us rely on cell phone service.

When a disaster hits our community, is our Mills River government, and staff at Townhall, prepared and ready, to assist those in need? Or do they have to make their way into Hendersonville to get the help they need?

Monday, May 27, 2024 at 6:36 PM UTC

Prevent overbuilding!
Dedicate more areas to green space.

Saturday, May 25, 2024 at 7:28 PM UTC

Ask fire department

Saturday, May 25, 2024 at 7:27 PM UTC

No

Saturday, May 25, 2024 at 1:16 PM UTC

Our basement bloods didn't happen happen until the house development behind us came.

Friday, May 24, 2024 at 1:52 PM UTC

Like anyone is going to chose slower growth and positive change over $$$$

Friday, May 24, 2024 at 1:24 PM UTC

Proper drainage and keeping rivers clear of debris

Friday, May 24, 2024 at 11:52 AM UTC

No

Thursday, May 23, 2024 at 7:48 PM UTC

Finding a way for our elected and appointed officials to obtain credibility and trust with the public so when trying to convince them to do something they do it instead of arguing the merits.

Monday, May 6, 2024 at 3:26 PM UTC

No

Thursday, April 25, 2024 at 11:29 PM UTC

Power is the most important. There are a lot of elderly and without it, they would freeze in the winter.

Wednesday, April 17, 2024 at 3:42 PM UTC

Widen roads and make routes in the county that are elevated above floods.

Wednesday, April 17, 2024 at 4:51 AM UTC

More grants or assistance to property owners to mitigate on their property because high tax s and high cost of living for this area is not allowing people to afford mitigation

Monday, April 15, 2024 at 7:56 PM UTC

Steep slope protection

Friday, April 12, 2024 at 3:07 PM UTC

Teach fire wise program to home owners.

Thursday, April 11, 2024 at 1:42 PM UTC

no opinion

Tuesday, April 9, 2024 at 10:26 AM UTC

drilling new wells

Tuesday, April 9, 2024 at 1:47 AM UTC

this is a joke.

Tuesday, April 2, 2024 at 12:17 PM UTC

not having, or not following, an established plan. Also, not having well trained public servants.

Thursday, March 28, 2024 at 9:23 PM UTC

We have to know the risk profiles of the man made infrastructure and buildings before we can address those risks.

Friday, March 22, 2024 at 5:00 PM UTC

The NCDOT would fare better to stop building over streams and rivers by filling them in and installing culverts and instead build bridges, for the rivers will flood quickly and rapidly wash away infrastructure.

Thursday, March 21, 2024 at 7:59 PM UTC

There are new landslide maps available in several areas from the USGS/NC Geological Survey that show lidar images of slopes where slides have previously occurred or where land may be disturbed. I think this

information needs to be pushed out to the general public to make everyone more aware.

Thursday, March 21, 2024 at 10:05 AM UTC

no

Thursday, March 21, 2024 at 2:30 AM UTC

Propper drainage. Water travels the least path of resistance. Reinforcement of bank ares and water ways.

Wednesday, March 20, 2024 at 9:22 PM UTC

No

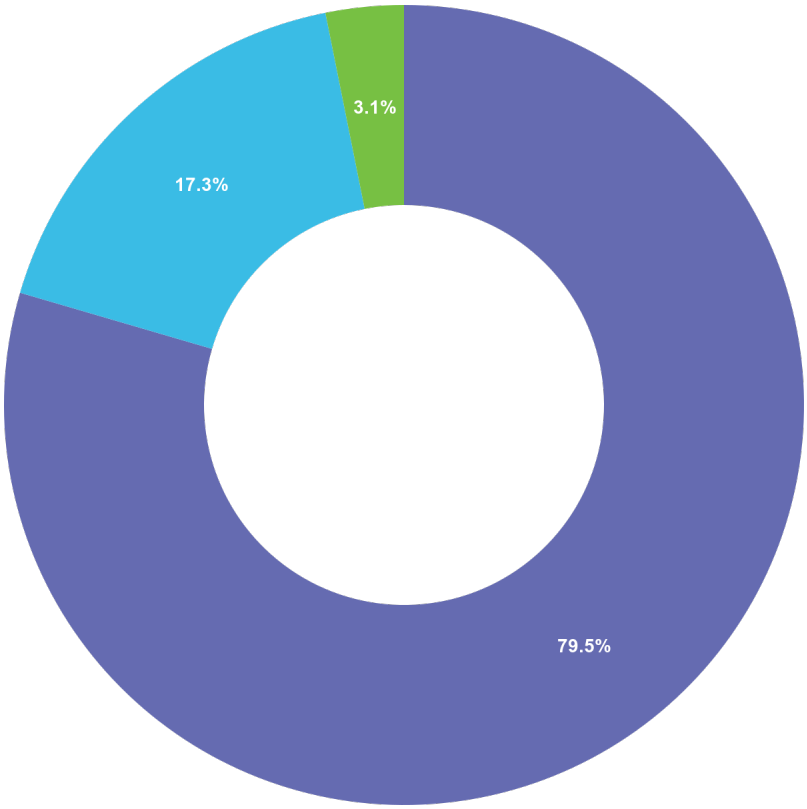
Wednesday, March 20, 2024 at 8:47 PM UTC

FUNDING!

Answered: 56 **Unanswered:** 71

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.

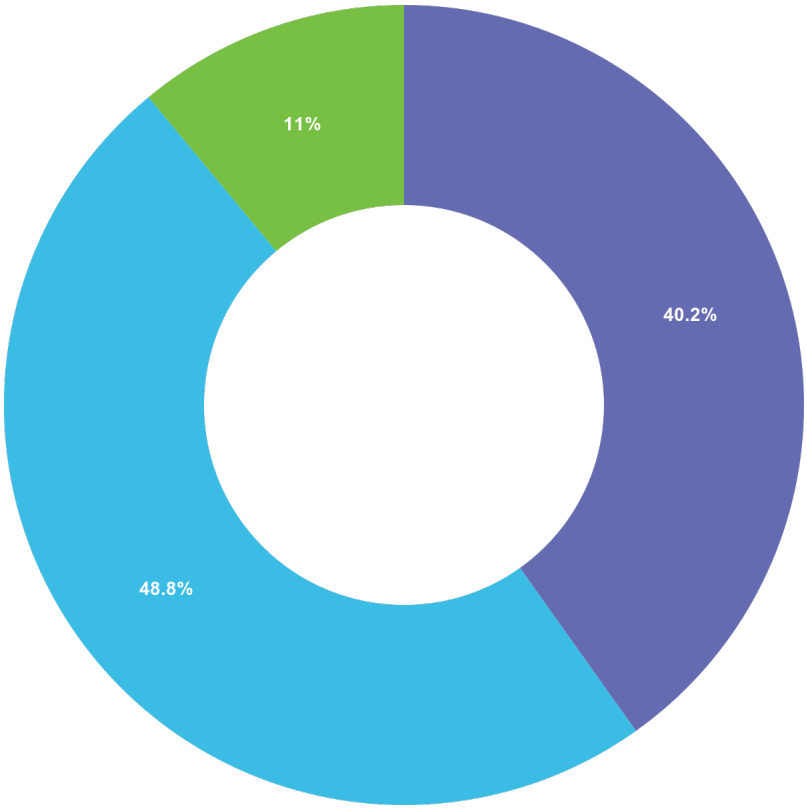
20\. Prevention - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.*



Answered: 127 **Unanswered:** 0

	Choice	Total
	Very important	101
	Somewhat important	22
	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.*

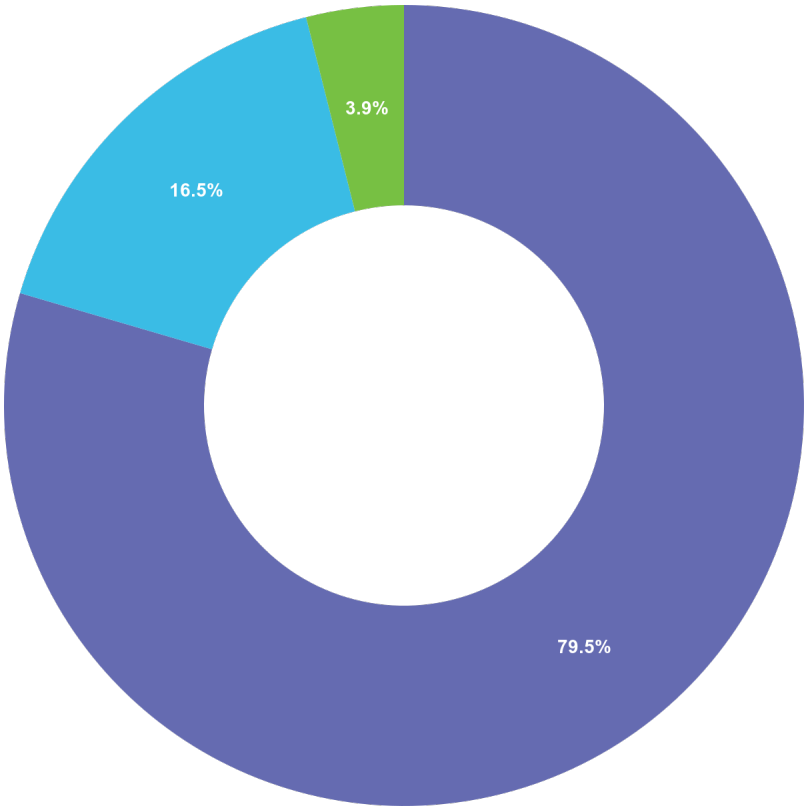


Answered: 127 **Unanswered:** 0

	Choice	Total
●	Very important	51
●	Somewhat important	62
●	Not important	14

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

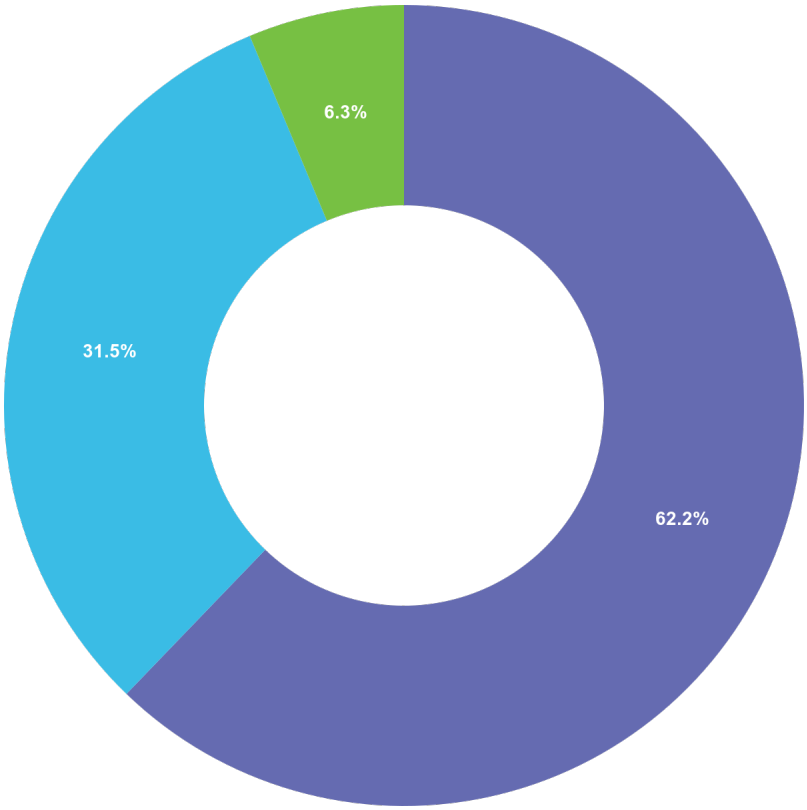
management.*



Answered: 127 **Unanswered:** 0

Choice	Total
Very important	101
Somewhat important	21
Not important	5

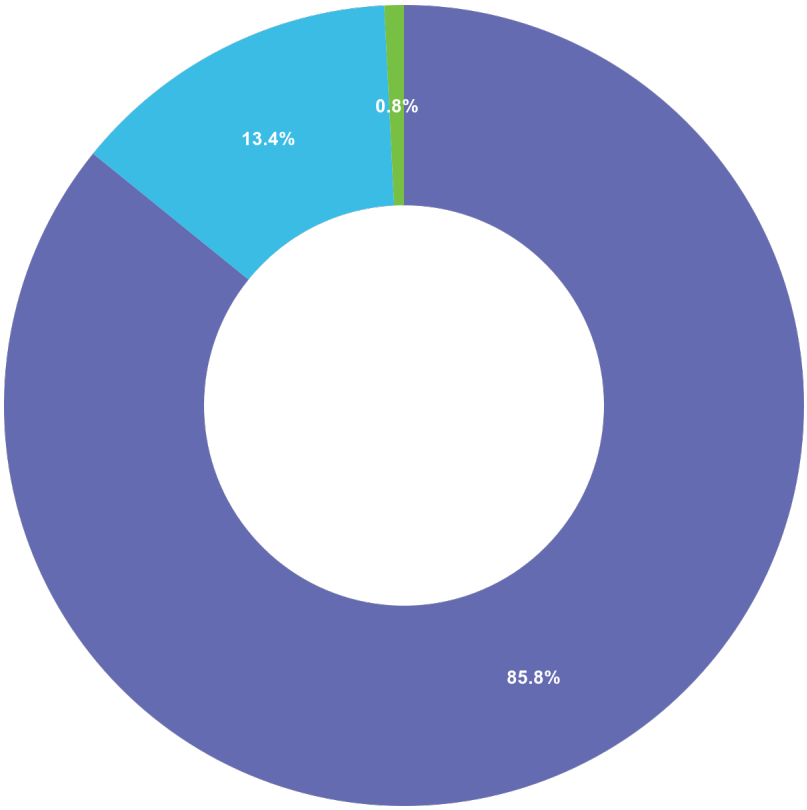
Q23 23\. **Structural Projects** - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.*



Answered: 127 **Unanswered:** 0

Choice	Total
Very important	79
Somewhat important	40
Not important	8

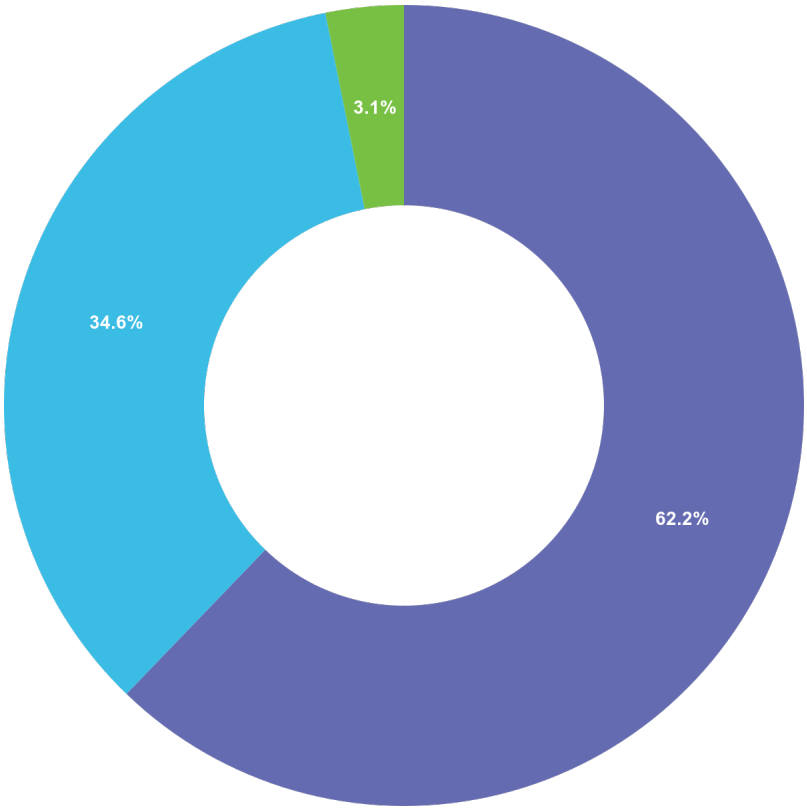
Q24 24\. **Emergency Services - **Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.*



Answered: 127 **Unanswered:** 0

Choice	Total
Very important	109
Somewhat important	17
Not important	1

Q25 25\. **Public Education and Awareness - **Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events.*



Answered: 127 **Unanswered:** 0

Choice	Total
Very important	79
Somewhat important	44
Not important	4

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, January 24, 2025 at 3:06 PM UTC

Rick W Gross @ 28 POPLAR DR Mills River NC 28759 @ rgwhitt53@gmail.com. 828 301 1387. Thanks

---

Sunday, January 12, 2025 at 12:09 AM UTC

Charlene Spinks

charspinks@gmail.com

828-489-7469

Thursday, December 19, 2024 at 9:42 PM UTC

Dawn Sorrento

dawnsorrento@gmail.com

Thursday, December 19, 2024 at 8:42 PM UTC

My name is Baird Blake. I'm the President of Cummings Cove, a 450+ home planned community in Henderson County. I have been in contact with a lot of people, but feel free to contact me if you would like. You can reach me at 317-403-4475 or bairdblake@gmail.com. Thank you.

Wednesday, December 11, 2024 at 6:29 PM UTC

Elizabeth Hill 703-795-2106

Wednesday, December 4, 2024 at 7:19 PM UTC

Stacey Heaps 998 McAlpine Mountain Road, Zirconia, NC 28790

941-356-1602

Sunday, December 1, 2024 at 9:37 PM UTC

Amanda Boyd 828-845-0712

Friday, November 29, 2024 at 4:09 AM UTC

Chris Berg

cshapenote@hotmail.com

Wednesday, November 6, 2024 at 5:52 PM UTC

Karl Ristow, 301.575.4187

Monday, November 4, 2024 at 7:48 PM UTC

gvandiver@yahoo.com

Tuesday, October 29, 2024 at 2:06 AM UTC

Brenda Sherrer, 226 Newport Road, Hendersonville, NC 28736; cell 703-999-2787; 828-595-2504(home)

Wednesday, October 23, 2024 at 3:20 PM UTC

Bryan O'Neill

oneill12@msn.com

954-347-1474

Monday, October 21, 2024 at 1:24 PM UTC

Reece Schuler

401 Hunters Glen Lane

Hendersonville NC 28739

schulerreece@gmail.com

828.779.1788

Thursday, September 26, 2024 at 12:23 AM UTC

Terri Arrington, tarrington7@gmail.com
Retired Public Health/Emergency Mng

Wednesday, September 25, 2024 at 12:25 PM UTC

Christine Thompson email Finneycats.63@gmail.com

Tuesday, September 24, 2024 at 6:33 PM UTC

toni.hoffer@gmail.com

Tuesday, September 24, 2024 at 4:29 PM UTC

Karen Maddox
216 Riverwind Dr
Hendersonville NC 28739
kbmadd70@gmail.com
404-408-2253

Tuesday, September 24, 2024 at 3:45 PM UTC

Rick Fender
Rfenderpc12@gmail.com

Friday, September 20, 2024 at 1:49 PM UTC

This survey could have been designed better. You should always include a "back" button to allow a respondent to change an answer. You could also use a ranking system for the questions with many choices. Your question on whether you have experienced a disaster is too vague--a disaster ever? Or only one in my current county? I have experienced a disaster elsewhere, but with no back button, could not change my answer.

Tuesday, September 17, 2024 at 12:44 PM UTC

Ward Seguin, e-mail wrsmd1@yahoo.com

Thursday, September 12, 2024 at 12:24 PM UTC
Gary Steiner
110 Newman Dr, Hendersonville NC, 28792
(828)243-7492

Sunday, August 25, 2024 at 1:42 PM UTC
brendampalmer58@gmail.com

Thursday, August 22, 2024 at 5:26 PM UTC
Luke Pratt
(904) 229-6787

Saturday, July 6, 2024 at 3:52 AM UTC
Roger Pennington
803-645-6193

Sunday, June 9, 2024 at 1:13 AM UTC
Jennifer Whitehall
828-606-5639 text/call/vm
whitehall_j@msn.com

Wednesday, June 5, 2024 at 2:25 PM UTC
Tom Jarrell, Etowah, NC, tjdjmtn@gmail.com

Wednesday, June 5, 2024 at 2:15 PM UTC
Diane Jarrell
Etowah
Jarrelld215@gmail.com

Monday, June 3, 2024 at 6:19 PM UTC

Ward Seguin

Saturday, June 1, 2024 at 6:11 PM UTC

Rick Snyder

RGS5@msstate.edu

Tuesday, May 28, 2024 at 11:15 AM UTC

Cory Martin

Martin.coryk@gmail.com

Monday, May 27, 2024 at 6:36 PM UTC

Terri Leslie

262-909-7417

Saturday, May 25, 2024 at 7:28 PM UTC

Sandra Goode

828-606-1747

Saturday, May 25, 2024 at 7:27 PM UTC

Wayne Goode

Friday, May 24, 2024 at 12:43 PM UTC

Jack Thyen

245 Banner Farm Road

Mills River, NC. 28759

(864) 316-4904

Thursday, May 23, 2024 at 7:48 PM UTC

Karl Ristow, karlristow@gmail.com, 301.575.4187

Wednesday, April 17, 2024 at 3:42 PM UTC

David White dwhite@wncsource.org

Wednesday, April 17, 2024 at 2:57 PM UTC

Tim Garren- timgarren@vhfd.com

Monday, April 15, 2024 at 7:56 PM UTC

Toby Linville, Henderson County Floodplain Administrator

Thursday, March 28, 2024 at 9:23 PM UTC

Gerald Yunker. Mylonitejy@gmail.com

Thursday, March 28, 2024 at 8:08 PM UTC

Robert Cooper
Chief, Brevard Fire Department
Deputy Chief, Lake Toxaway Fire Rescue
85 Wolf Court, Lake Toxaway, NC 28747
(828) 553-9794
Bobby.Cooper@CityofBrevard.com

Friday, March 22, 2024 at 5:00 PM UTC

Yes please, for our community would benefit from more communication regarding safety hazards and what we can do to mitigate disaster.
info@wsqlradio.com
I am more than happy to help disseminate information which would be helpful for our community in case of disaster.

Answered: 41 **Unanswered:** 86

Appendix E:

Completed Mitigation Actions

Henderson County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Implementation Schedule	2025 Action Implementation Status
Prevention							
P-1	Develop a County Storm water Management Plan	FL	Moderate	General Revenue	Engineering Department	Completed	Adopted Storm water Ordinance 9-1-2010
P-2	Incorporate into the County Zoning and Subdivision Ordinances construction standards for privately owned bridges	ALL	Moderate	General Revenue	Engineering Department	Completed	Private bridge standards are included in Land Development Code 200A-105F.
P-3	Develop a County Storm water Management Plan	FL	High	General Revenue	GIS	Completed	A GIS layer has been developed that includes water and sewer lines.
P-6	Develop a County Storm water Management Plan	D	High	General Revenue	GIS Department/ County EMA	Completed	Henderson County has developed a dam/levee structural database with the assistance of the NC Department of Environment and Natural Resources, Dam Safety Division

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Implementation Schedule	2025 Action Implementation Status
Property Protection							
PP-3	Establish policy to assure all computer equipment and furniture is secured in a manner to avoid toppling during an earthquake.	EQ	Low	General Revenue	Information Technology	Completed	IT policy in place to ensure computer equipment is secured to a desk or rack mounted.
PP-4	Incorporate GIS modeling to show areas of the County prone to more serious damage during earthquake conditions.	EQ	High	General Revenue and Grants	GIS Department	Completed	HAZUS run completed during the 2014 Hazard Mitigation Regional Planning Update.
Natural Resource Protection							
NRP-1	Develop a plan, which will include annual monitoring of sediment transport and erosion, to address the long – term issue of river and stream erosion in the County.	ER	High	General Revenue and Grants	Engineering Department	Completed	Completed; This was accomplished by adding erosion division in October 2007.
NRP-2	Support State enforcement of sedimentation and erosion control regulations.	ER	High	General Revenue and Grants	Engineering Department	Completed	This has been accomplished and will continue to maintain and support.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Implementation Schedule	2025 Action Implementation Status
NRP-3	Coordinate efforts with the U.S. Forestry Service to enforce banning burns.	WF	High	General Revenue	County EMA	Completed	USFS is notified when burning bans are in place and during red flag burning days. This will be continued going forward.
NRP-4	Encourage development and enlargement of buffers and green areas.	WF	High	General Revenue	Planning Dept	Completed	Land Development Code addresses buffers and green areas.
Emergency Services							
ES-1	Establish two – way radio communication for key personnel (i.e. County Manager, Emergency Services providers, Shelter Teams, etc.).	All	High	General Revenue and Grants	County EMA	Completed	New communications system will be installed by September 2014
ES-2	Include 311 systems, pre-scripted messaging in communications system.	All	Moderate	General Revenue and Grants	County EMA	Completed	3-1-1 is not available to Henderson County through AT&T. We have implemented a reverse 9-1-1 mass notification system so this action is complete.
ES-4	Assure adequate training for emergency personnel to respond to HAZMAT events is on-going.	HM	Moderate	General Revenue	County EMA	Completed	Hazardous Materials training is provided on an annual basis through Blue Ridge Community College

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Implementation Schedule	2025 Action Implementation Status
ES-5	Incorporate procedures for handling hazardous materials into GIS modeling.	HM	High	General Revenue	GIS Department	Completed	CAMEO, Aloha and other plume modeling products are available and in use.
Public Education and Awareness							
PEA-1	Hold a County sponsored hazard mitigation seminar for the county residents, including information on preparedness for all hazards significant to Henderson County.	All	Low	General Revenue	County EMA	Completed	Preparedness information included as a regular article in county monthly newsletter. Preparedness Fair held October 2013 at Jackson Park.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County EMA = Henderson County Emergency Management

Village of Flat Rock Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Encourage Village participation in the National Flood Insurance Program and subsequent participation in the Community	FL	High	General Revenue	Village Council	Completed	Completed and in the program where residents have purchased NFIP as required by their lenders.
P-2	Develop a local Flood Damage Presentation Ordinance.	FL	High	General Revenue and Grants	Village Council	Completed	The Flood Damage Ordinance was adopted December 11, 2008. Ordinance last amended November 2013
P-3	Hire and educate a permanent Building Inspector/Code Enforcement Officer to enforce the Village's current Zoning Ordinance, Subdivision Ordinance, and the North Carolina State Building Codes within the planning jurisdiction of the Village of Flat Rock.	All	High	General Revenue	Village Council	Completed	This was achieved by contracting with Henderson County to provide a Building Inspector and the Village has a Code Enforcement officer. Zoning and Planning handled in house. County enforces building

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County EMA = Henderson County Emergency Management Village = Village of Flat Rock

Town of Fletcher Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Develop a Floodplain Management Plan. The Floodplain Management Plan is included in Land Development Code adopted March 2006.Rating System Program.	FL	High	General Revenue	Town Council	Completed	The Floodplain Management Plan is included in Land Development Code adopted March 2006.
P-2	Develop a Storm water Management Ordinance. Encourage Town participation in the Community Rating System.	FL	High	General Revenue and Grants	Town Council	Completed	Complete. The Storm water Management plan is included in Land Development Code adopted March 2006.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County EMA = Henderson County Emergency Management
Village = Village of Flat Rock

City of Hendersonville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Develop a Storm water Management Plan	FL	High	General Revenue and Grants	Engineering Department	Completed	Henderson County participates in the State Storm water Management Plan.
P-5	Update and revise the local Land Use and Development Plan. The most recent plan was approved in 1980.	All	High	General Revenue and Grants	Planning Department	Completed	This has been completed by the implementation of the 2030 Hendersonville Comprehensive Plan in April of 2009. Comp. Plan approved in April of 2009.
P-6	Update and revise the local Subdivision Ordinance	All	High	General Revenue and Grants	Planning Department	Completed	This has been completed by the implementation of the 2030 Hendersonville Comprehensive Plan in April of 2009.
P-7	Work with local governments (especially Henderson County) to develop local Water Shortage Response Guidelines (in different phases) as a part of the Henderson County Emergency Operations Plan.	Dr	High	General Revenue and Grants	Planning Department	Completed	Drought plan developed and included into Henderson County Emergency Operations Plan
Emergency Services							
ES-1	Update and revise the local Subdivision Ordinance.	All	High	General Revenue and Grants	Police Department	Completed	Communications System and center updated

ES-2	Work with local governments (especially Henderson County) to develop local Water Shortage Response Guidelines (in different phases) as a part of the Henderson County Emergency Operations Plan.	All	High	Grants	Police and Fire Department	Completed	A two-way communications system is in place for emergency services.
ES-4	Purchase generators to use at the operations center that controls information technology, communications and protection for fiber optic cable.	All	High	General Revenue and Grants	Information Technology	Completed	New ops center with generator back-up is in place

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County EMA = Henderson County Emergency Management
City = City of Hendersonville

Town of Laurel Park Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Develop a Stormwater Management Plan.	FL	High	General Revenue	Town Council	Completed	The Storm Water Management Ordinance was developed and approved January 15, 2008 and is enforced as required
Property Protection							
PP-1	Encourage Town participation in the National Flood Insurance Program and subsequent participation in the Community Rating System Program.	FL	High	General Revenue	Town Council	Completed	Completed – Town Participates
Natural Resource Protection							
NRP-1	Monitor trees and branches, at risk of breaking in wind, ice, and snow events. This will be accomplished by Pruning or thinning of trees or branches when they pose an immediate threat to property, utility lines or other significant structures or critical facilities in the community.	All	High	General Revenue	Town Council	Completed	The Town of Laurel Park continues to work with Duke Energy on an annual basis to monitor and remove trees and branches at risk of breaking during high winds, ice, and snow events to minimize power line damage during a storm. The Town also assesses and removes hazardous trees on the ROW to ensure access.

Emergency Services							
ES-1	Purchase portable evacuation, detour, and re-route traffic signs for use during an emergency.	All	High	General Revenue and Grants	Town Council	Completed	Signs have been purchased and are ready for use in an emergency.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees
County EMA = Henderson County Emergency Management Town = Town of Laurel Park

Polk County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Encourage communities to participate in the Community Rating System (CRS).	All	High	Local Funds	County ES	Deleted	County decided not to pursue this due to lack of staff time
P-3	Review the subdivision ordinances to determine storm water drainage to minimize flooding potential.	FL	High	Local Funds	Planning and Zoning	Completed.	Completed. This action will be removed during the 2025 update.
P-4	Identify, list, and map all available water sources	WF	High	Local Funds	County ES	Completed	Available water sources have been identified and mapped, so this action is completed
P-6	Municipalities will develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	S/I	Moderate	NCEM/FEMA Local Funds	County ES	Completed	The municipalities have developed programs for mitigation that work in conjunction with the county.
Property Protection							
PP-1	Review and consider adoption of a storm water wetland requirement when developments with a certain number of acres of hard surfaces are constructed.	FL	Moderate	Local Funds	Planning and Zoning	Completed	Complete and incorporated in zoning ordinance

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
PP-2	Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	S/I	Moderate	NCEM/FEMA Local Funds	Public Works	Completed	The county has a program in place to implement mitigation programs and activities to reduce risk.
Emergency Services							
ES-1	Develop and implement a Community Emergency Response Team (CERT)	All	Moderate	NCEM/FEMA Local Funds	LEPC	Deleted	LEPC has decided not to pursue this due to lack of time/funding.
ES-2	Develop and implement hazard mitigation planning page on Polk County Emergency Management web site.	All	Moderate	Local	County ES	Completed.	The county posts its hazard mitigation plan up on the website. This action will be removed during the 2025 update.
ES-4	Provide water from the Broad River along the Hwy. 9 corridor in the unincorporated areas of Polk County.	DR	High	Local Funds	County ES	Completed	Water is provided from the Broad River to unincorporated areas of Polk County.
ES-6	Incorporate a Geographic Information System to maintain building/parcel data for purposes of conducting more detailed hazard risk assessments and for tracking permitting/land use patterns.	All	Moderate	NCDEM/FEMA Local Funds	County ES, Public Works, DENR	2019	Some updates to the dame have been implemented but the dam is still in need of upgrade in some areas.
ES-7	Install county-wide warning system for all hazards.	All	Moderate	NCEM/FEMA Local Funds	Polk County Communications	Completed	This system was installed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Public Education and Awareness							
PEA-3	Develop and Implement a reverse calling system.	All	Low	NCEM/FEMA Local Funds	Polk County Communications	Completed	A reverse calling system has been installed and is ready for use.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County ES = Polk County Emergency Services

Town of Columbus Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Identify, list, and map all water sources available	WF	High	Local Funds	Fire Department	Completed	Available water sources have been identified and mapped, so this action is completed
P-3	Develop and implement a Community Emergency Response Team (CERT).	All	Moderate	NCEM/FEMA Local Funds	LEPC	Deleted	LEPC has decided not to pursue this due to lack of time/funding
P-4	Municipalities will develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.	S/I	Moderate	NCEM/FEMA Local Funds	County ES	Completed	The municipalities have developed programs for mitigation that work in conjunction with the county
Emergency Services							
ES-3	Develop and implement hazard mitigation planning web page on Polk County Emergency Services web site.	All	Moderate	Local	County ES	Completed	The county posts its hazard mitigation plan up on the website. This action will be removed during the 2025 update.
ES-4	Install county-wide warning system for all hazards.	All	Moderate	NCEM FEMA/Local Funds	Polk County Communications	Completed	This system was installed.
Public Education and Awareness Activities							
PEA-2	Develop and Implement a reverse calling system.	All	Low	NCEM/ FEMA/Local Funds	Polk County Communications	Completed	A reverse calling system has been installed and is ready for use.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County ES = Polk County Emergency Services Town = Town of Columbus

City of Saluda Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Work to complete the necessary requirements to join the National Flood Insurance Program.	FL	High	Local Funds	City Public Works	Completed	The City joined the NFIP on 02/19/10.
P-3	Municipalities will develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from winter storms.	S/I	Moderate	NCEM FEMA Local Funds	County ES	Completed	The municipalities have developed programs for mitigation that work in conjunction with the county
Emergency Services							
ES-2	Incorporate a Geographic Information System to maintain building/parcel data for purposes of conducting more detailed hazard risk assessments and for tracking permitting/land use patterns	All	Moderate	NCEM FEMA Local Funds	Polk County MIS	Deleted	Not going to pursue due to lack of staff time
ES-3	Develop and implement a Community Emergency Response Team (CERT).	All	Moderate	NCEM FEMA Local Funds	LEPC	Deleted	LEPC has decided not to pursue this due to lack of time/funding
ES-4	Develop and implement hazard mitigation planning web page on Polk County Emergency Services web site.	All	Moderate	Local	County ES	Completed	The county posts its hazard mitigation plan up on the website. This action will be removed during the 2025 update.
ES-5	Install county-wide warning system for all hazards.	All	Moderate	NCEM FEMA Local Funds	Polk County Communications	Completed	This system was installed.
Public Education and Awareness Activities							
PEA-2	Develop and Implement a reverse calling system.	All	Low	NCEM/FEMA/Local Funds	Polk County Communications	Completed	A reverse calling system has been installed and is ready for use.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures
EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County ES = Polk County Emergency Services City = City of Saluda

Town of Tryon Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Municipalities will develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from winter storms	S/I	Moderate	NCEM FEMA Local Funds	County ES	Completed	The municipalities have developed programs for mitigation that work in conjunction with the county
Emergency Services							
ES-3	Develop and implement a Community Emergency Response Team (CERT).	All	Moderate	NCEM FEMA Local Funds	LEPC	Deleted	LEPC has decided not to pursue this due to lack of time/funding
ES-5	Install county-wide warning system for all hazards.	All	Moderate	NCEM FEMA Local Funds	Polk County Communications	Completed	This system was installed.
Public Education and Awareness Activities							
PEA-2	Develop and Implement a reverse calling system.	All	Low	NCEM FEMA Local Funds	Polk County Communications	Completed	A reverse calling system has been installed and is ready for use.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees County ES = Polk County Emergency Services Town = Town of Tryon

Rutherford County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Encourage power companies or public utilities to continue to be aggressive in the general maintenance and clearing of utility rights-of-way and easements.	All	Moderate	N/A	EMD	Completed	Completed 2012 spraying continues annually
P-2	Document the location and prioritization of critical facilities.	All	Moderate	N/A	EMD	Completed	Completed 2013 mapped by GIS
P-3	Document the location and preparedness of the emergency shelters.	All	High	N/A	EMD	Completed	Completed 2013 and identified in EOP
P-4	Use future growth projections to present alternative utility layout.	All	Low	N/A	EMD	Deleted	Deleted, this action was deemed to be not technically feasible
P-5	Plan for debris collection and disposal.	All	Moderate		EMD	Completed	Completed 2013
P-6	Review all aspects of emergency response to ensure that emergency services are more than adequate to protect public health and safety.	All	Moderate	N/A	EMD	Completed	Completed 2012
P-8	Update and enforce subdivision regulations, particularly regarding subjects such as accessibility, density and streets and roads.	All	Moderate		Planning Department	Completed	Completed at this time
P-10	Utilize drought tolerant farming practices.	DR	Moderate		County Extension Service	Deleted	Deleted, this action was deemed to be outside the scope of the CES.

Property Protection							
PP-1	Encourage power companies or public utilities to continue to place utilities underground in new developments, and to relocate existing overhead utilities underground where feasible.	All	Moderate		EMD	Completed	Completed 2012
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EMD	Completed	Completed 2012
Structural Projects							
SP-2	Build interconnects between the various water systems.	DR	Low		Water System Manager	Completed	Completed

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department

Town of Bostic Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Participate in and enforce the National Flood Insurance Program.	FL	Moderate		Floodplain Administrator	Completed	The town currently participates in the NFIP.
Emergency Services							
ES-2	Provide a two – way communication system for emergency services. Continue to provide two-way communications for emergency services.	All	High	Grants	Police and Fire Departments	Completed	Two-way communication systems have been implemented and are in place.
ES-3	Purchase generators to use as an emergency power supply for water and sewer treatment plants if power is lost during a disaster.	All	High	General Revenue and Grants	Water and Sewer Department	Completed	Generators have been purchased for water and sewer treatment plants
ES-4	Purchase generators to use at the operations center that controls information technology, communications and protection for fiber optic cable.	All	High	General Revenue and Grants	Information Technology	Completed	Completed
ES-5	Develop an action plan to reroute and control traffic during emergency situations.	All	High	General Revenue and Grants	Police Department	Completed	Remote control capability has been implemented throughout the City.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Town = Town of Bostic

Chimney Rock Village Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
P-1	Develop a Floodplain Management Plan.	FL	High	General Revenue and Grants	Town Council	Completed	The Floodplain Management Plan is included in Land Development Code adopted March 2006.
P-4	Identify properties adjacent to the railroad tracks and post in a GIS system for potential buyout of highly vulnerable structures.	HM	Moderate	General Revenue and Grants	Town Council	Deleted	This action was determined to not be applicable so it has been deleted.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Village = Chimney Rock Village

Town of Ellenboro Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
P-1	Participate in and enforce the National Flood Insurance Program.	FL	Moderate		Floodplain Administrator	Deleted	No Floodplain in jurisdiction
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department
Town = Town of Ellenboro

Town of Forest City Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Enforce general and nuisance Ordinances to clear brush and debris.	WF	Moderate		Code Enforcement	Completed	Completed. These ordinances have been put in place and are being enforced.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Town = Town of Forest City

Town of Lake Lure Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Enforce general and nuisance Ordinances to clear brush and debris.	WF	Moderate		Code Enforcement	Completed	Completed. These ordinances have been put in place and are being enforced.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Town = Town of Lake Lure

Town of Ruth Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Encourage Town participation in the National Flood Insurance Program and subsequent participation in the Community Rating System Program.	FL	High	Local Funds	Town Council	Completed	Completed: The Town joined the NFIP on 09/28/18. This action will be removed from the plan for the 2025 update.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Town = Town of Ruth

Town of Rutherfordton Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Enforce general and nuisance Ordinances to clear brush and debris.	WF	Moderate		Code Enforcement	Completed	Completed. These ordinances have been put in place and are being enforced.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department
Town = Town of Rutherfordton

Town of Spindale Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Enforce general and nuisance Ordinances to clear brush and debris.	WF	Moderate		Code Enforcement	Completed	Completed. These ordinances have been put in place and are being enforced.
Emergency Services							
ES-1	Seek training in order to provide capable and quick damage assessment and identify mitigation opportunities presented by disaster events.	All	High	Local Funds	EM Staff	Completed	Completed 2012

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department Town = Town of Spindale

Transylvania County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
P-1	Perform a County Building Inspection Residential Home Plan Review	FL	Moderate	Local Funds	Building Inspections/ Board of Commissioners	Completed	This action is in place, each new building permit request is reviewed by the county building department to ensure current building codes are in place. The owner is given printed material in reference to exterior preparation concerning urban fire interface, water mitigation measures, etc.
Emergency Services							
ES-2	Install a new reverse 911 system	All	High	Local Funds	County communications Director	Completed	2020 Update: The county has updated the community notification system to a hosted solution with IPAWS ability. Annual cost of $13,000.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees EMD = Rutherford County Emergency Management Department ES = Transylvania County Emergency/Services

City of Brevard Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-1	Continue participation in the Community Rating System Program	FL/ER/HU/T	High	Local Funds	CRS Coordinator-Planning Department	Completed	Complete, the city participates in the CRS program and will continue to do so.
P-3	Perform a County Building Inspection Residential Home Plan Review.	FL/HU	Moderate	Local Funds	Building Inspections	Completed	This action is in place, each new building permit request is reviewed by the county building department to ensure current building codes are in place. The owner is given printed material in reference to exterior preparation concerning urban fire interface, water mitigation measures, etc.
Property Protection							
PP-1	Continue enforcement of "No Adverse Impact" requirements for all development in designated Special Flood Hazard Areas.	FL	High	Local Funds	Planning Department	Completed	This requirement is in place and is being enforced. It will continue to be enforced going forward.
Natural Resource Protection							
NRP-1	Continue Enforcement of "Steep Slope" development regulations	LS	High	Local Funds	Planning Department	Completed	This regulation is in place and is being enforced. It will continue to be enforced going forward.
NRP-2	Continue Enforcement of Sedimentation and Erosion Control regulations	ES/LS	High	Local Funds	Planning Department	Completed	This regulation is in place and is being enforced. It will continue to be enforced going forward.

NRP-3	Continue Enforcement of Surface Water Protection Areas	FL	High	Local Funds	Planning Department	Completed	This regulation is in place and is being enforced. It will continue to be enforced going forward.
Emergency Services							
ES-2	Install a new reverse 911 system.	All	High	Local Funds	County Communications Director	Completed	2020 Update: The county has updated the community notification system to a hosted solution with IPAWS ability. Annual cost of $13,000.
Structural Projects							
SP-2	Elevate Island Ford Road between Walnut Hollow Road and S. County Club Road.	FL/HU	High		City Manager	Deleted	This action is being deleted from the city's action plan as it is not a city responsibility.
Public Education and Awareness Activities							
PEA-1	Hold a hazard mitigation seminar, including information on preparedness for all hazards significant to Transylvania County, Brevard, and Rosman and promotion of participation in FireWise.	All	High	NCEM and Local Funds	City Manager	Completed	The event was held on June 18, 2012. Several agencies participated in the event with educational material and speakers for the public to learn about things they could do around their own home to mitigate dangers to themselves and others.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake
LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees TH = Thunderstorms ES = Transylvania County Emergency Services
City = City of Brevard

Town of Rosman Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2025 Action Implementation Status
Prevention							
P-2	Develop a Storm Waste Management Plan	FL	Moderate	Local Funds	Building Inspectors	Completed	That action is in place, each new building permit request is reviewed by the county building department to ensure current building codes are in place. The owner is given printed material in reference to exterior preparation concerning urban fire interface, water mitigation measures, etc.
Emergency Services							
ES-2	Install a new reverse 911 system.	All	High	Local Funds	County Communications Director	Completed	2020 Update: The county has updated the community notification system to a hosted solution with IPAWS ability. Annual cost of $13,000.
Public Education and Awareness Activities							
PEA-1	Hold a hazard mitigation seminar, including information on preparedness for all hazards significant to Transylvania County, Brevard, and Rosman and promotion of participation in FireWise.	All	High	NCEM and Local Funds	City Manager	Completed	The first event was held on June 18, 2012. Several agencies participated in the event with educational material and speakers for the public to learn about things they could do around their own home to mitigate dangers to themselves and others.

FL = Flood DR = Drought ES = Expansive Soils HU = Hurricane T = Tornado WF= Wildfire S/I = Snow/Ice ET = Extreme Temperatures EQ = Earthquake LS = Landslide L = Lightning ER = Erosion HM = HAZMAT D = Dams/Levees TH = Thunderstorms ES = Transylvania County Emergency Services Town = Town of Rosman

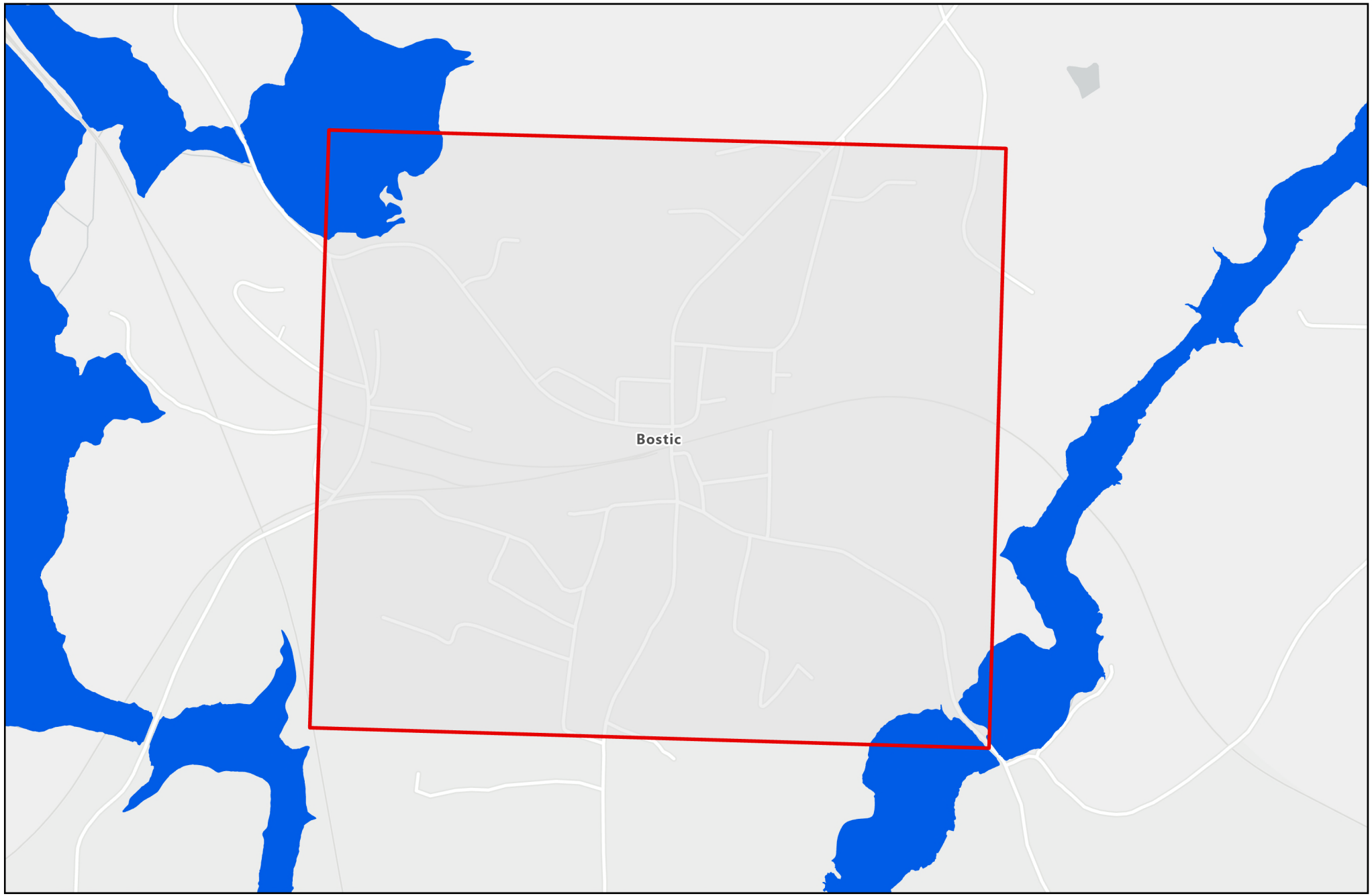
Appendix F
Flood Extent and Hazard Maps

Potential Flood Extent by Jurisdiction

Jurisdiction	USGS National Water Information System (NWIS)	NC Flood Inundation Mapping & Alert Network (FIMAN)
Henderson County	**2,148.6 ft** (8.6 ft NGVD29 Datum + 2,140 ft, 1/22/1906, USGS)	**2,103.8 ft** (15.5 ft NAVD88 Datum + 2,088.3 ft, 9/27/2024, USGS)
Flat Rock	No USGS data, approximate highest BFE = 2,177.5 ft	No gages/data near jurisdiction limits
Fletcher	**2,087.02 ft** (14.8 ft NGVD29 Datum + 2,072.22 ft, 7/16/1916, USGS)	**2,081.6 ft** (10.6 ft NAVD88 Datum + 2,071 ft, 9/27/2024, USGS)
Hendersonville	**2,087.98 ft** (16 ft NGVD29 Datum + 2,071.98 ft, 7/16/1916, USGS)	**2,092.2 ft** (10.1 ft NAVD88 Datum + 2,082.1 ft, 11/30/2010, USGS)
Laurel Park	No USGS data, approximate highest BFE = 2,217.1 ft	No gages/data near jurisdiction limits
Mills River	**2,102.01 ft** (13.62 ft NAVD88 Datum + 2,088.39 ft, 8/30/1940, USGS)	**2,103.8 ft** (15.5 ft NAVD88 Datum + 2,088.3 ft, 9/27/2024, USGS)
Polk County	No USGS data, approximate highest BFE = 1,760.5 ft	**920.7 ft** (18.3 ft NAVD88 Datum + 902.4 ft, 9/27/2024, USGS)
Columbus	No USGS data, approximate highest BFE = 1,037.9 ft	No gages/data near jurisdiction limits
Saluda	No USGS data, approximate highest BFE = 1,891 ft	No gages/data near jurisdiction limits
Tryon	No USGS data, approximate highest BFE = 1,022.1 ft	No gages/data near jurisdiction limits
Rutherford County	**876.8 ft** (16.8 ft NGVD29 Datum + 860 ft, 8/15/1928, USGS)	**843.6 ft** (21.1 ft NAVD88 Datum + 822.5 ft, 9/27/2024, USGS)
Bostic	No USGS data, approximate highest BFE = 829.5 ft	No gages/data near jurisdiction limits
Chimney Rock Village	**876.8 ft** (16.8 ft NGVD29 Datum + 860 ft, 8/15/1928, USGS)	No gages/data near jurisdiction limits
Ellenboro	No USGS data, approximate highest BFE = N/A	No gages/data near jurisdiction limits
Forest City	No USGS data, approximate highest BFE = 979.9 ft	No gages/data near jurisdiction limits
Lake Lure	**838.28 ft** (23 ft NAVD88 Datum + 815.28 ft, 1916, USGS)	No gages/data near jurisdiction limits
Ruth	No USGS data, approximate highest BFE = 959 ft	No gages/data near jurisdiction limits
Rutherfordton	**20.25 ft** (no datum conversion, 6/4/1957, USGS)	No gages/data near jurisdiction limits
Spindale	No USGS data, approximate highest BFE = 1,045.6 ft	No gages/data near jurisdiction limits
Transylvania County	**3,147.07 ft** (8.69 ft NGVD29 Datum + 3,138.38 ft, 5/27/1973, USGS)	**2,681.2 ft** (8.4 ft NAVD88 Datum + 2,672.8 ft, 9/26/2024, USGS)
Brevard	**2,237.28 ft** (7.28 ft NGVD29 Datum + 2,230 ft, 8/17/1994, USGS)	**2,129.5 ft** (14.4 ft NAVD88 Datum + 2,115.1 ft, 8/16/2021, USGS)
Rosman	**2,188.91 ft** (14.95 ft NAVD88 Datum + 2,173.96 ft, 10/4/1964, USGS)	**2,189.4 ft** (15.6 ft NAVD88 Datum + 2,173.8 ft, 9/27/2024, USGS)

USGS SOURCE https://nwis.waterdata.usgs.gov/nc/nwis/peak
FIMAN SOURCE https://fiman.nc.gov/#/

Bostic - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

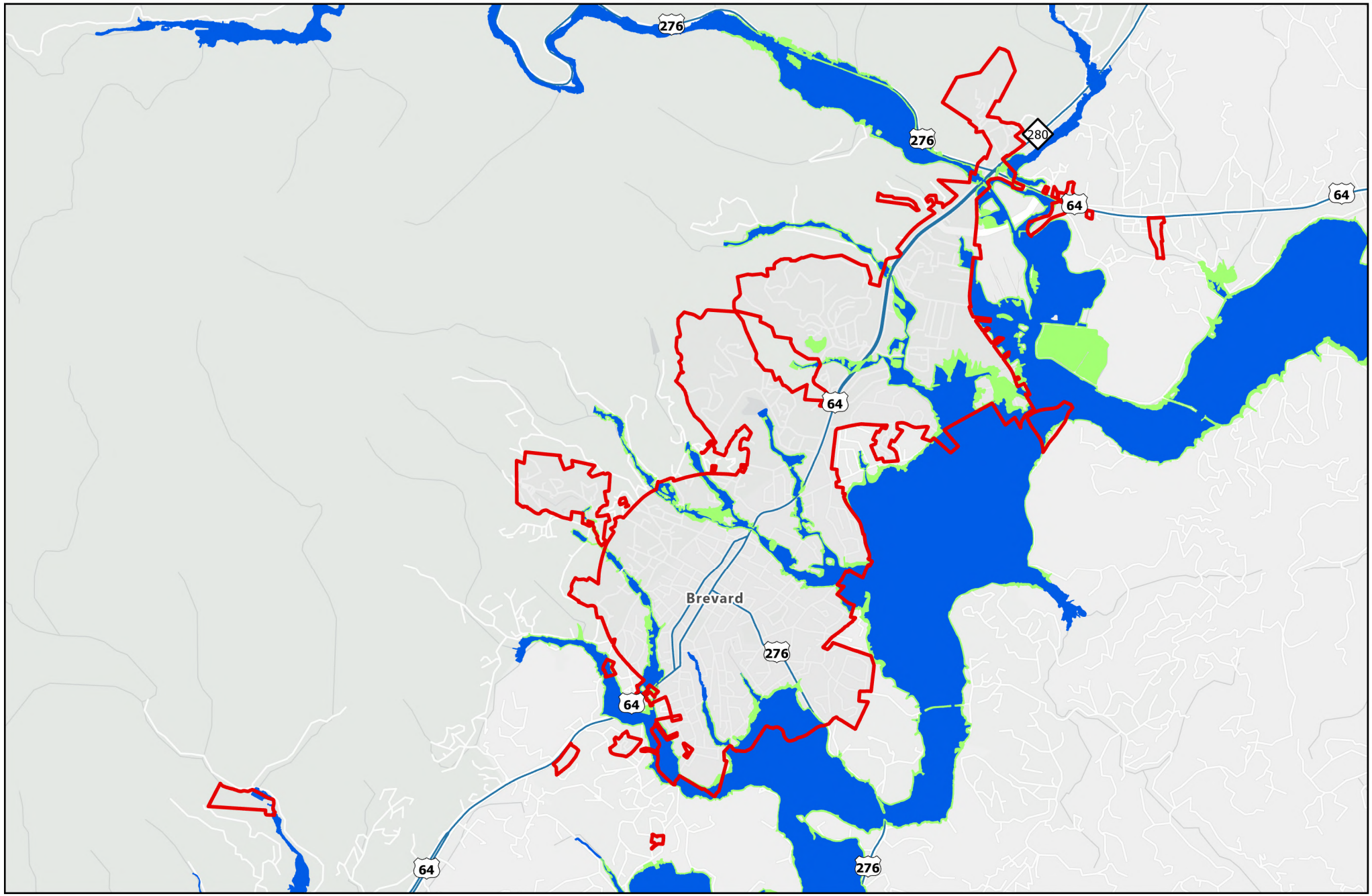
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.15 0.3 0.6 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

N

Brevard - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

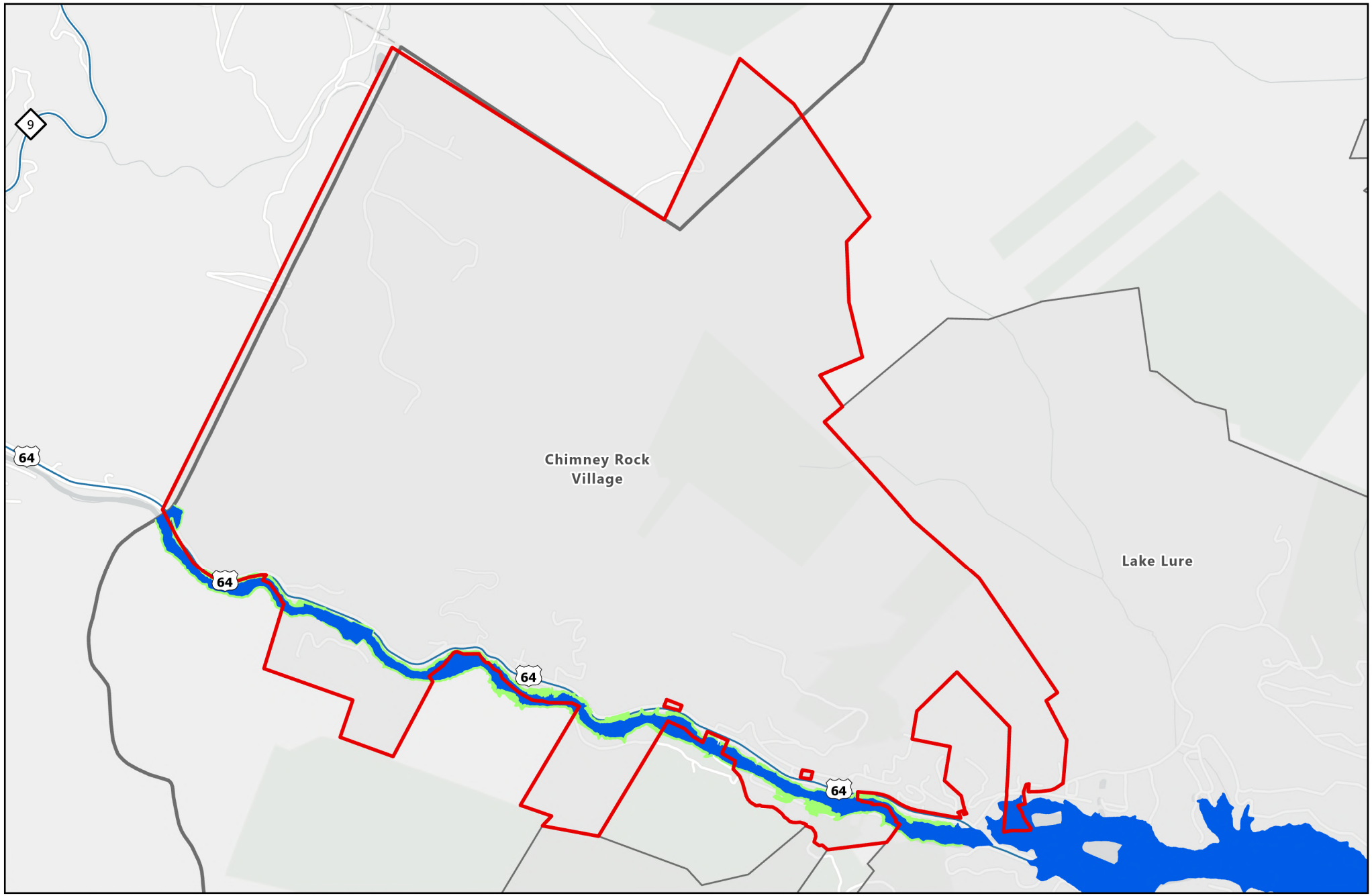
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37175C
Latest Study Effective Date: 4/19/2010
Latest LOMR Effective Date: 6/27/2017

N

Chimney Rock Village - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

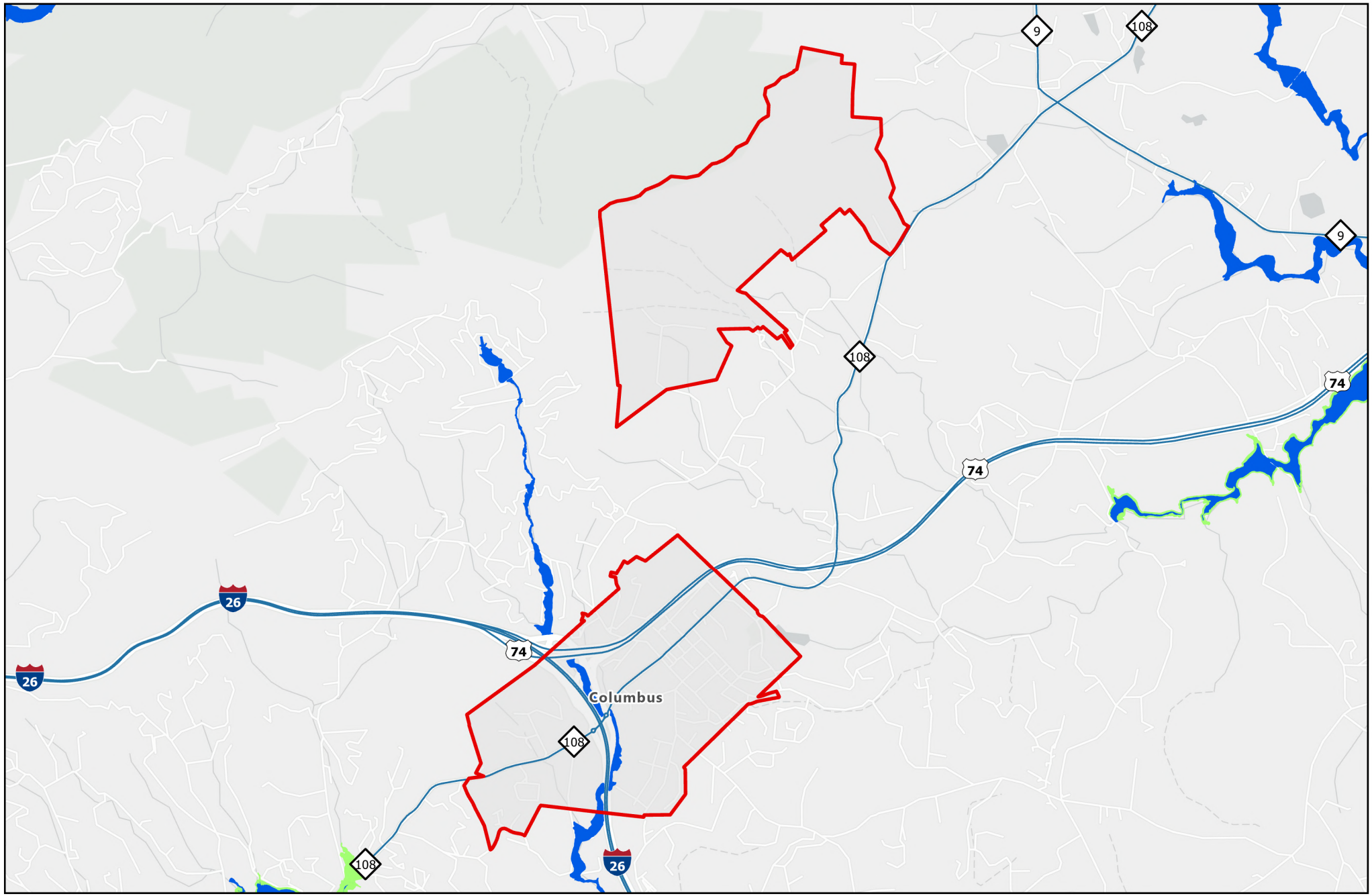
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.3 0.6 1.2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

Columbus - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

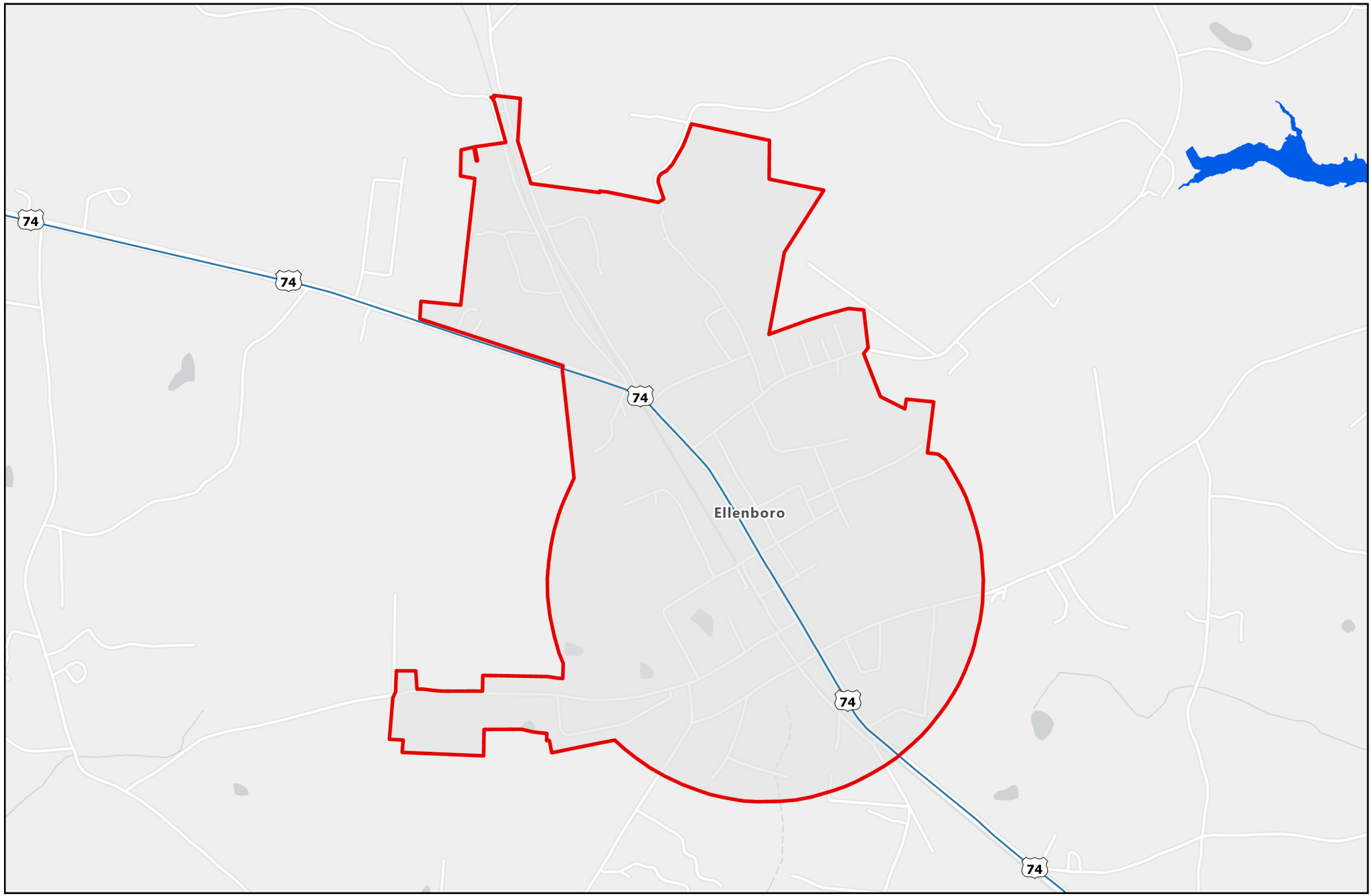
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37149C
Latest Study Effective Date: 10/2/2008
Latest LOMR Effective Date: N/A

N

Ellenboro - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

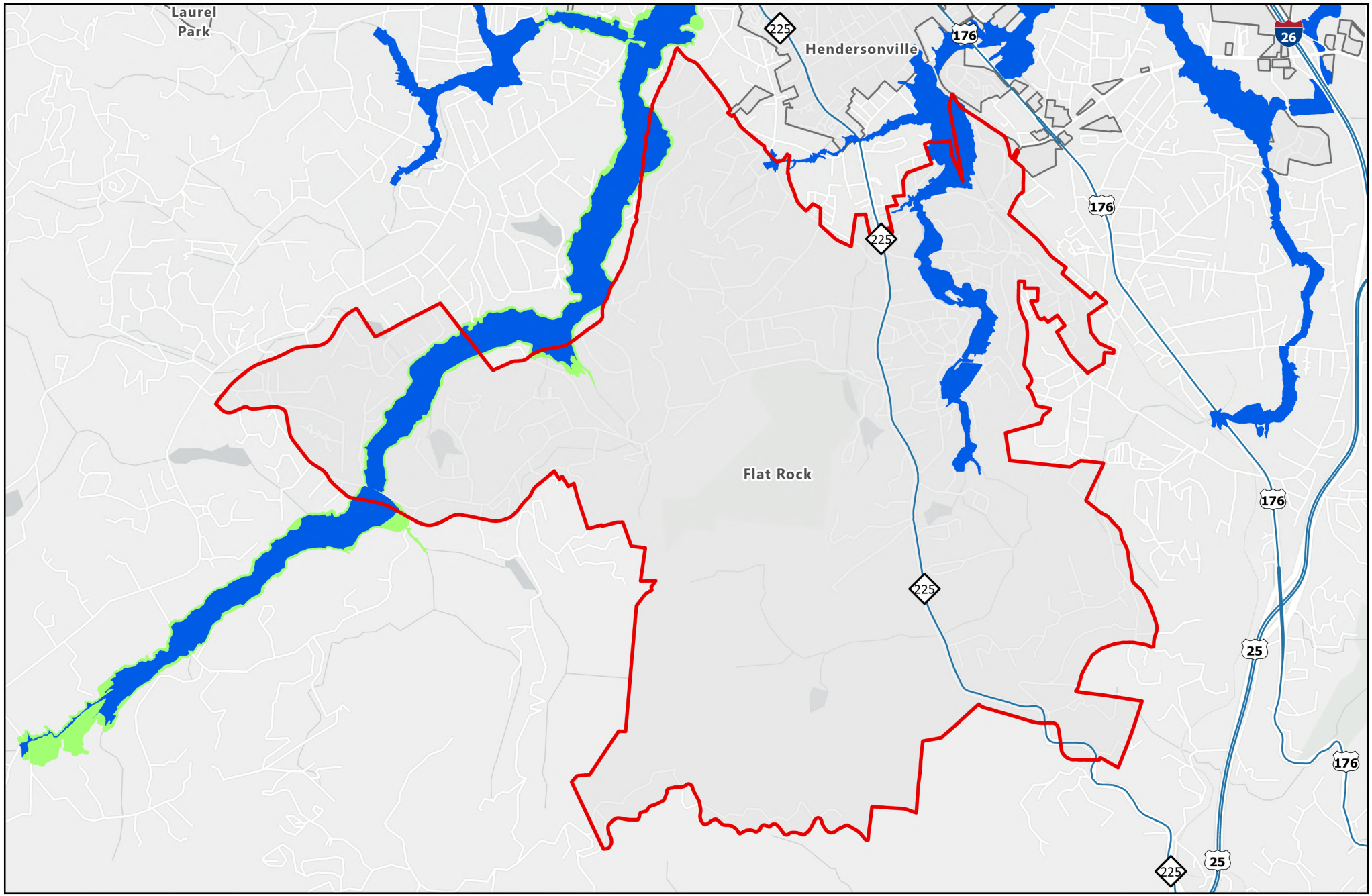
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

N

Flat Rock - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

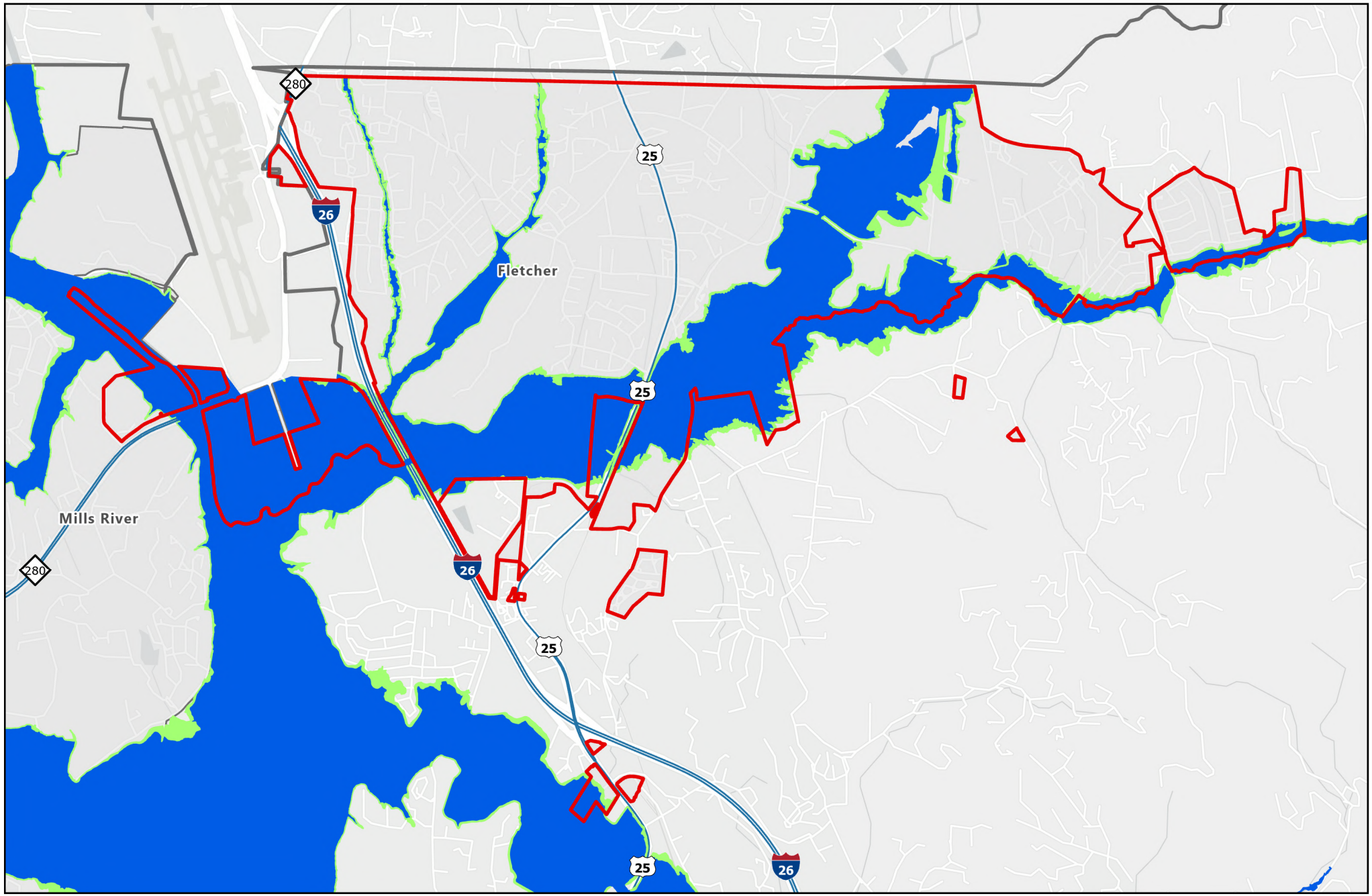
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

N

Fletcher - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

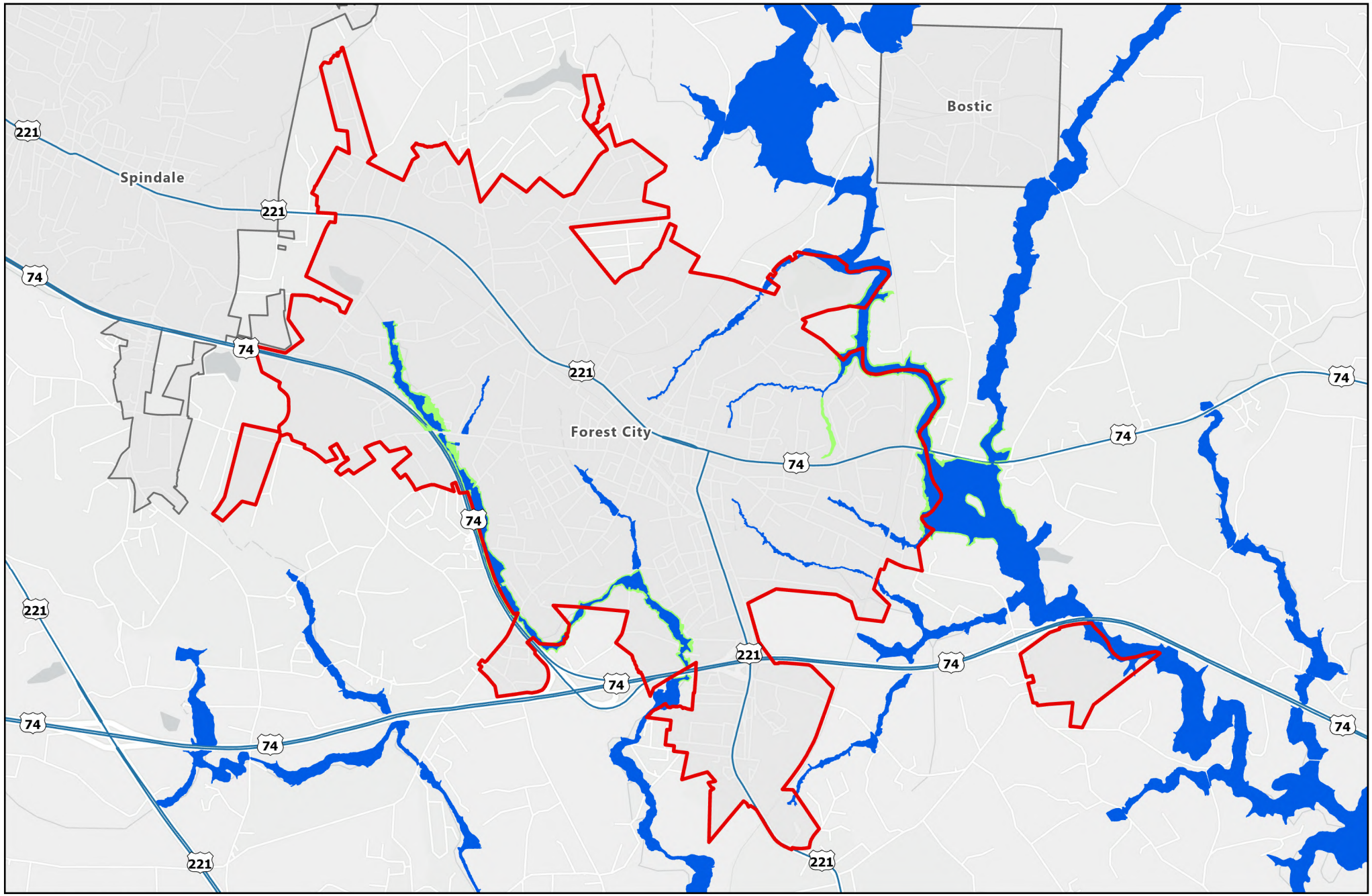
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

N

Forest City - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

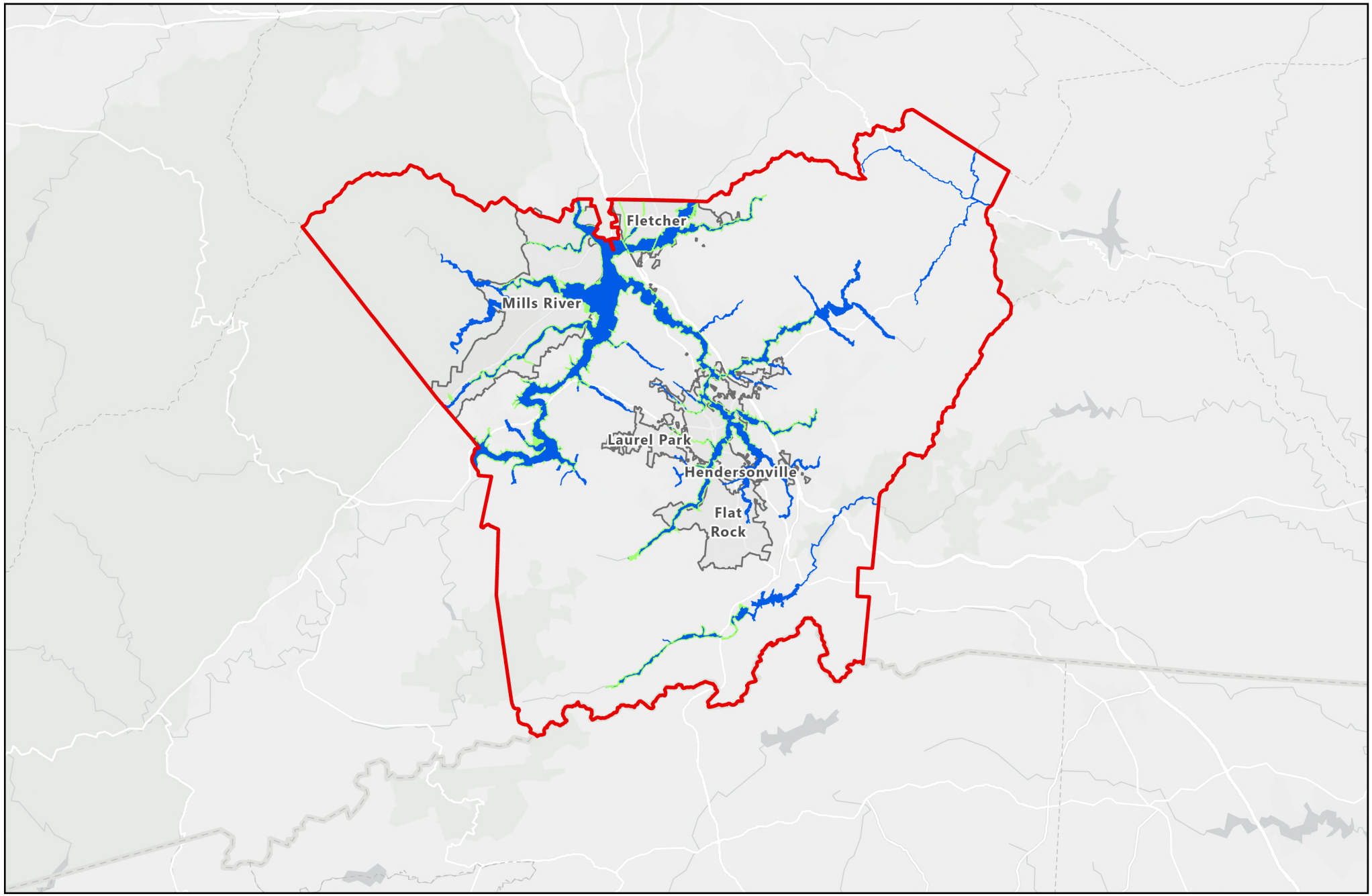
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

Henderson County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

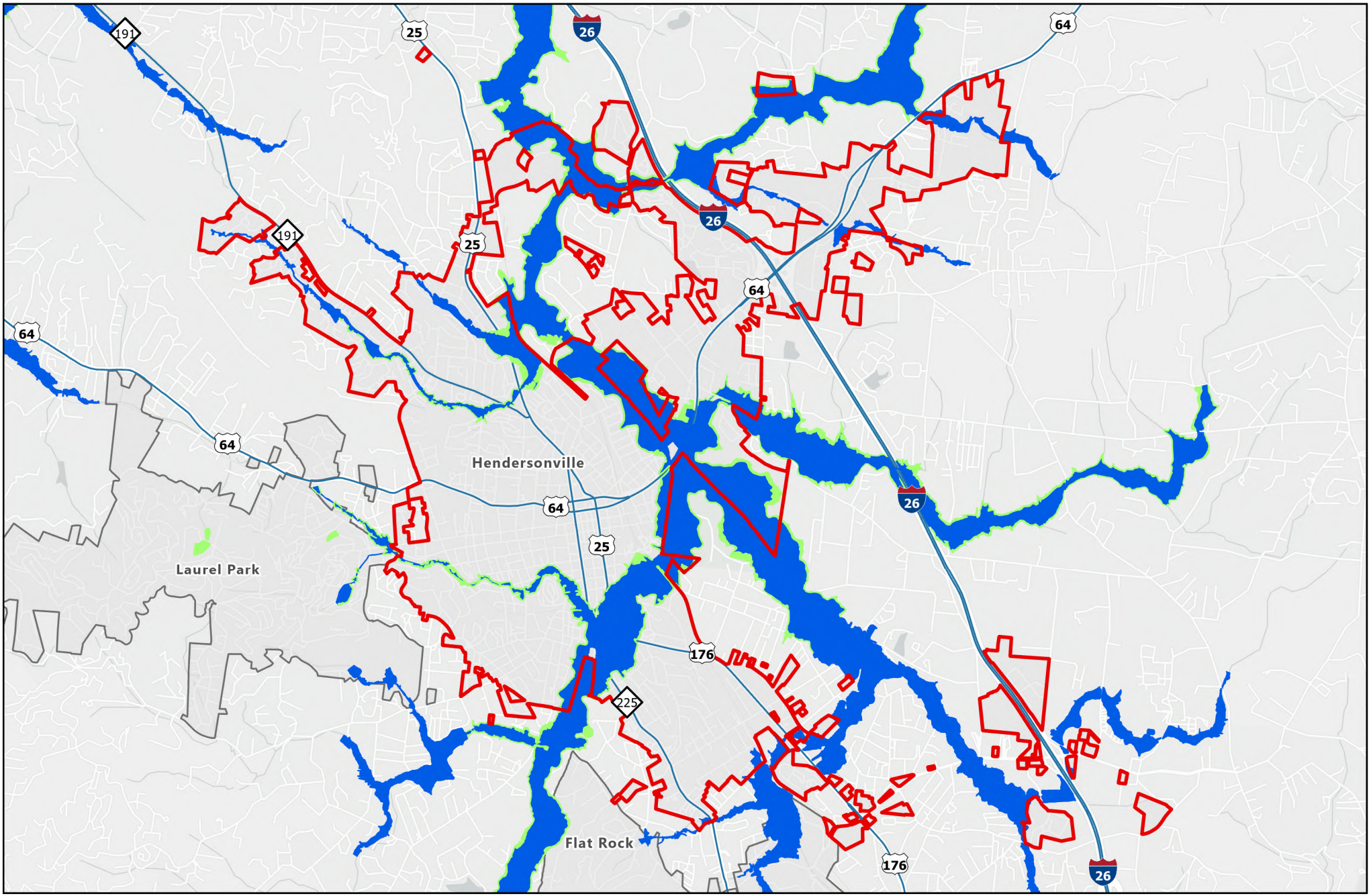
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4.25 8.5 17 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

N

Hendersonville - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

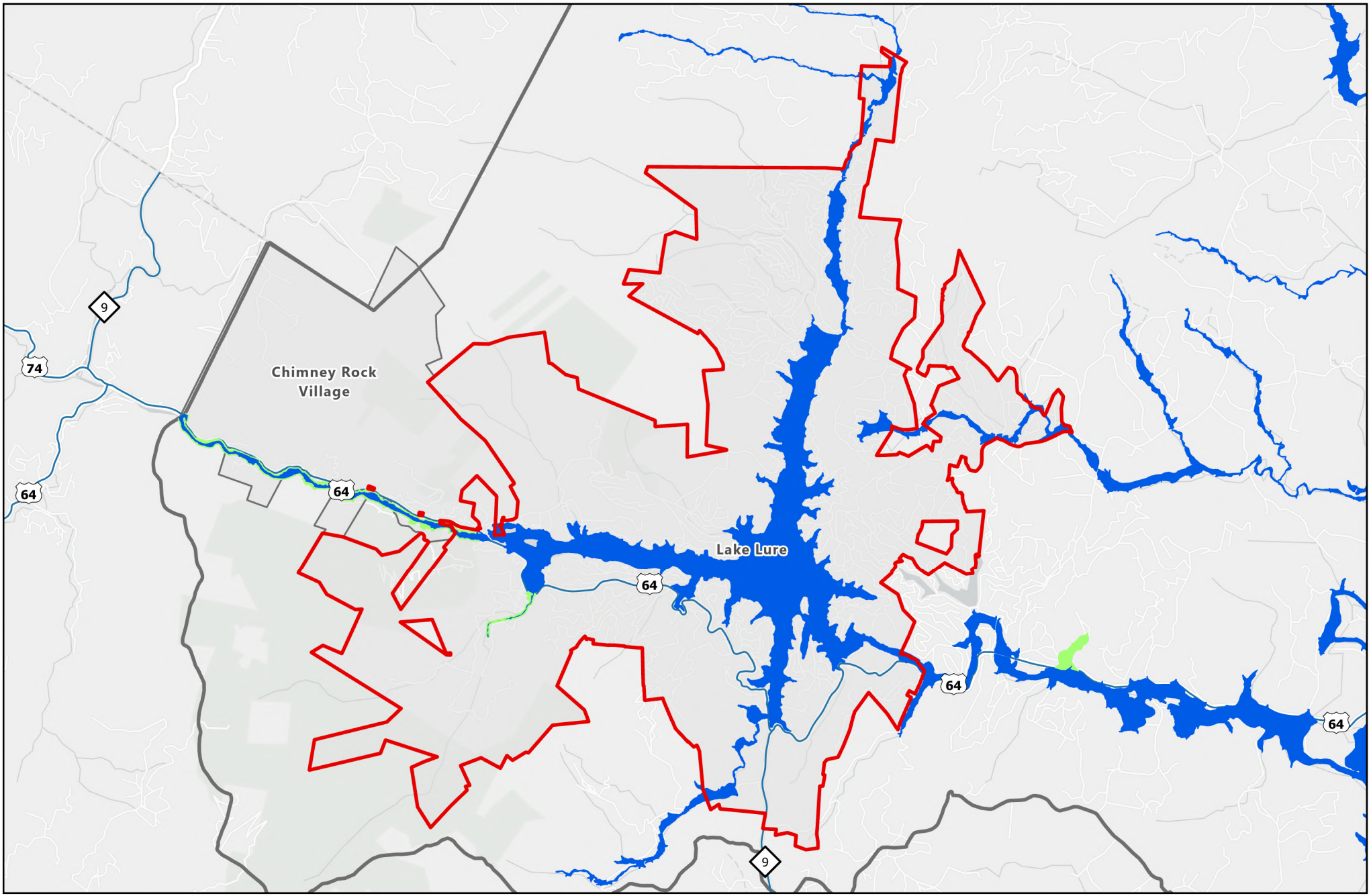
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

N

Lake Lure - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

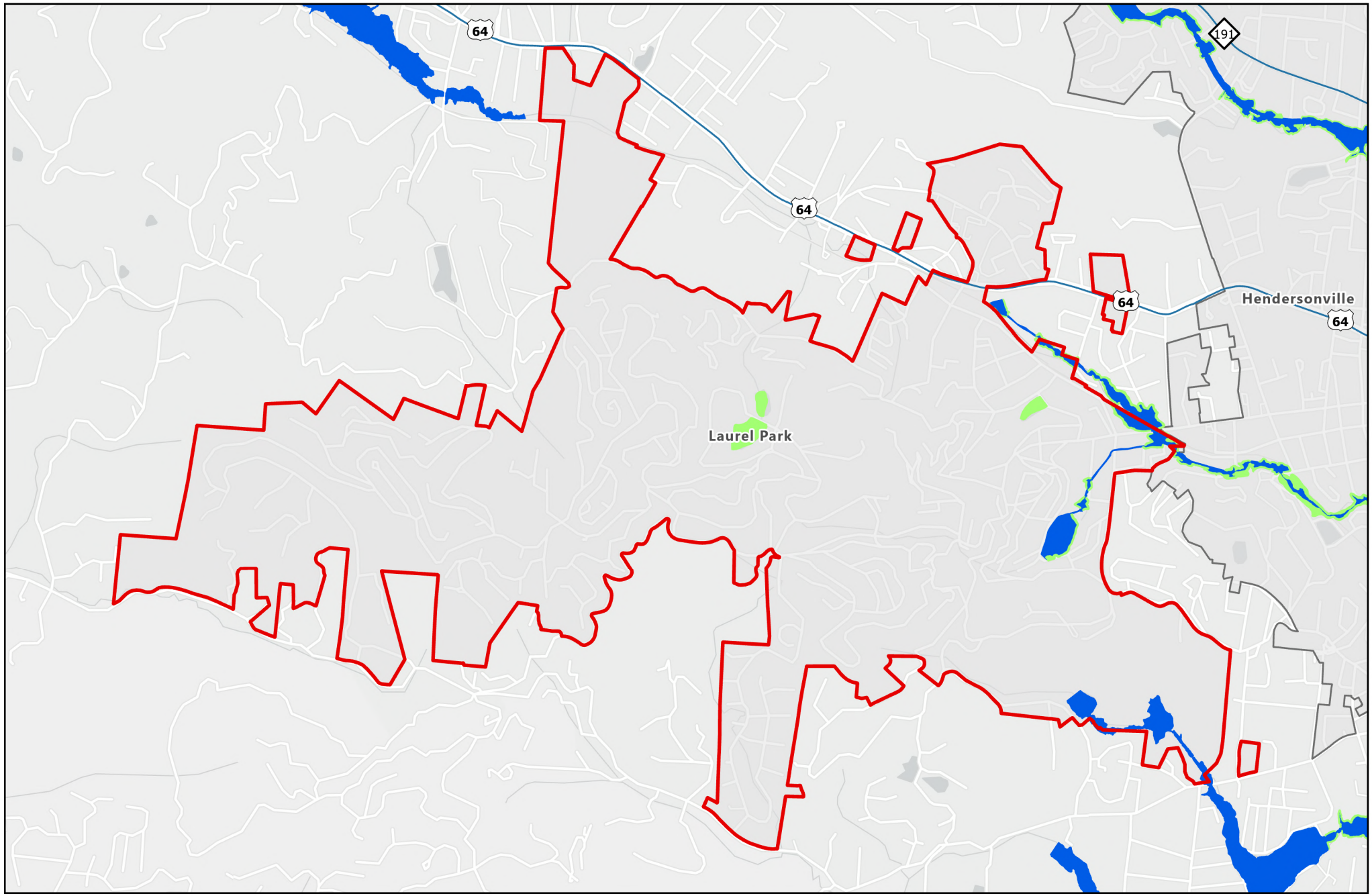
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.75 1.5 3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

Laurel Park - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

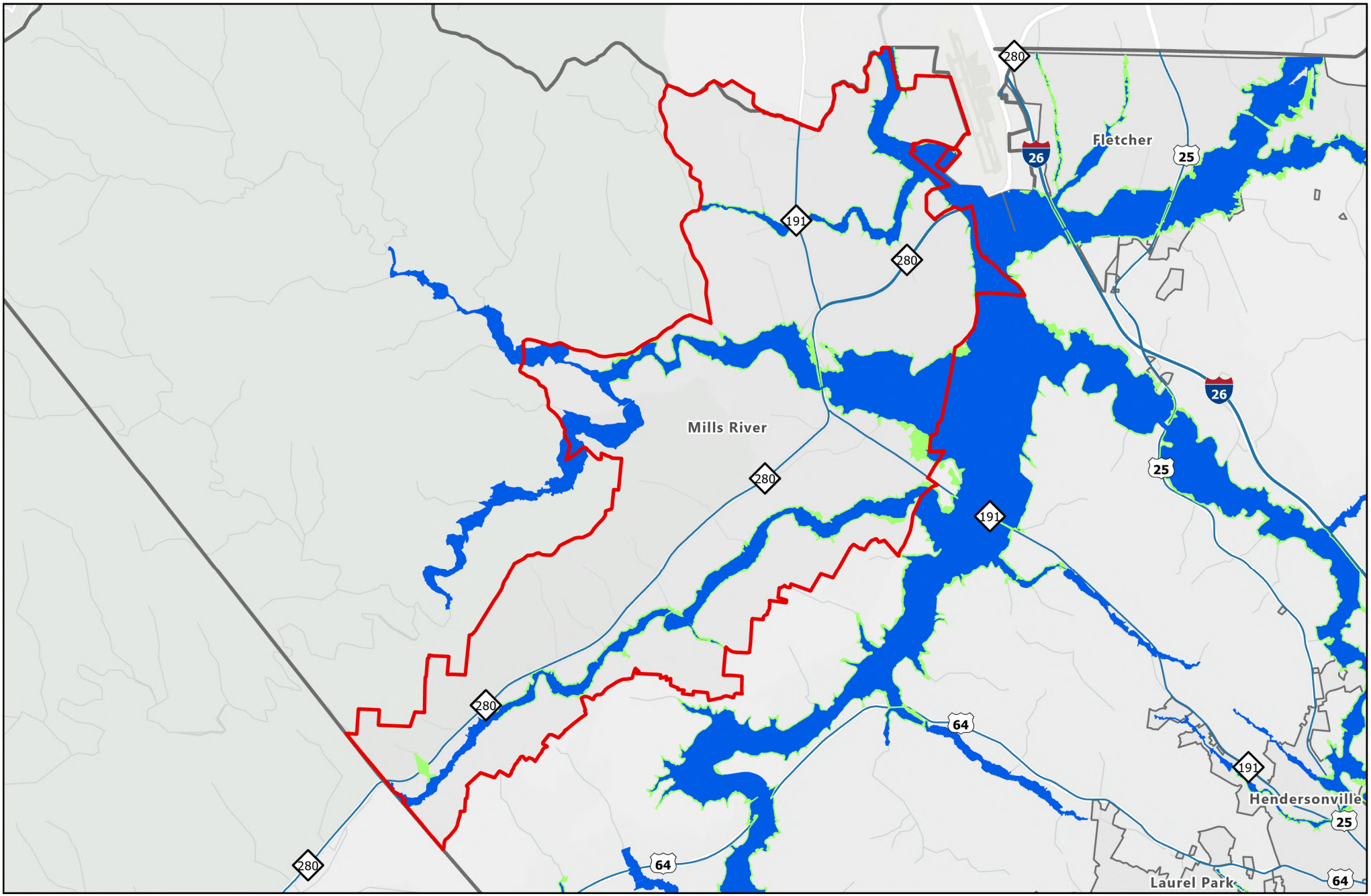
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.3 0.6 1.2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

Mills River - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

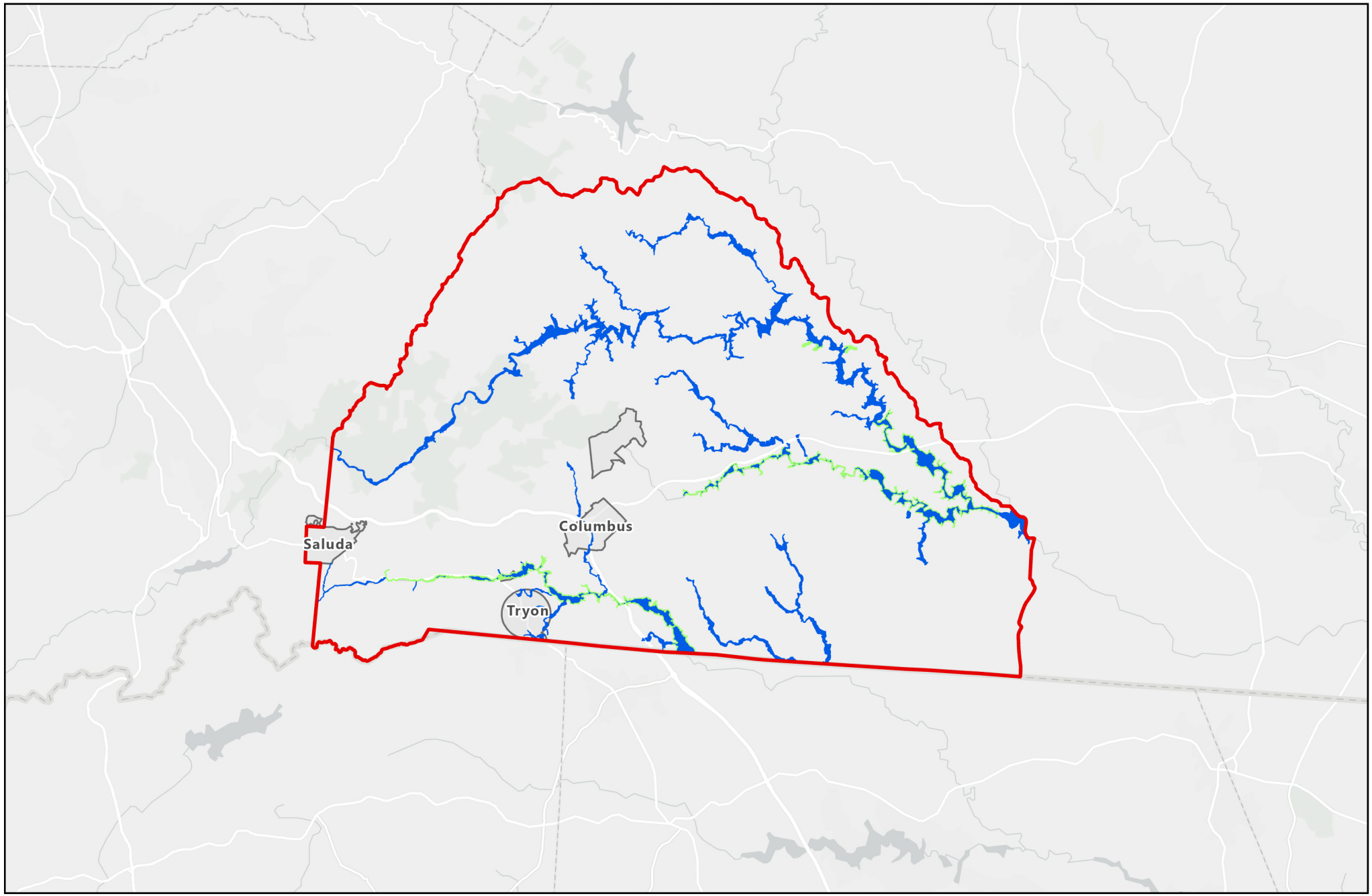
- 500-Year Flood Zone
- 100-Year Flood Zone

0 1 2 4 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37089C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 3/10/2023

N

Polk County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

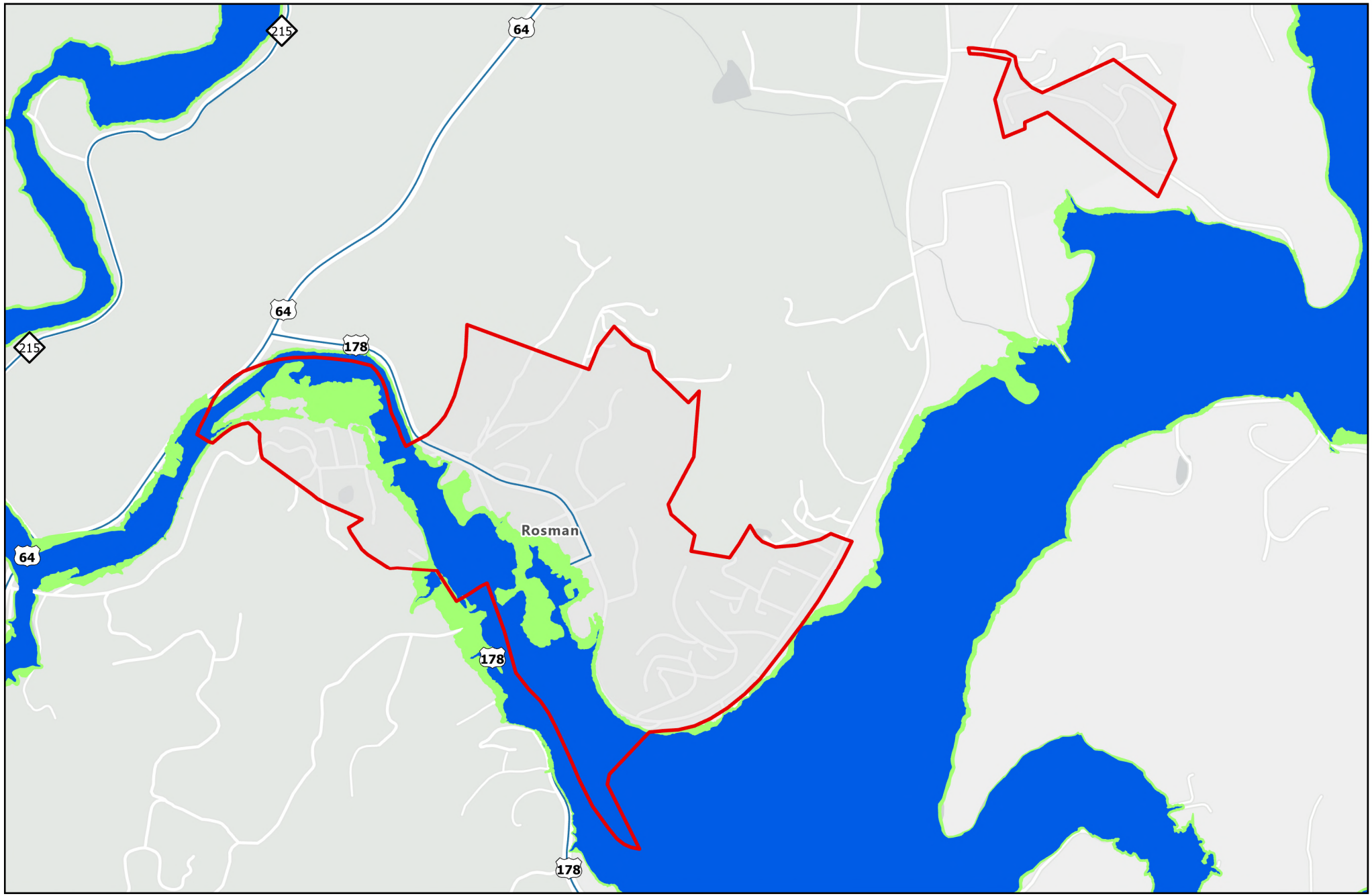
- 500-Year Flood Zone
- 100-Year Flood Zone

0 3.25 6.5 13 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37149C
Latest Study Effective Date: 10/2/2008
Latest LOMR Effective Date: N/A

Rosman - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

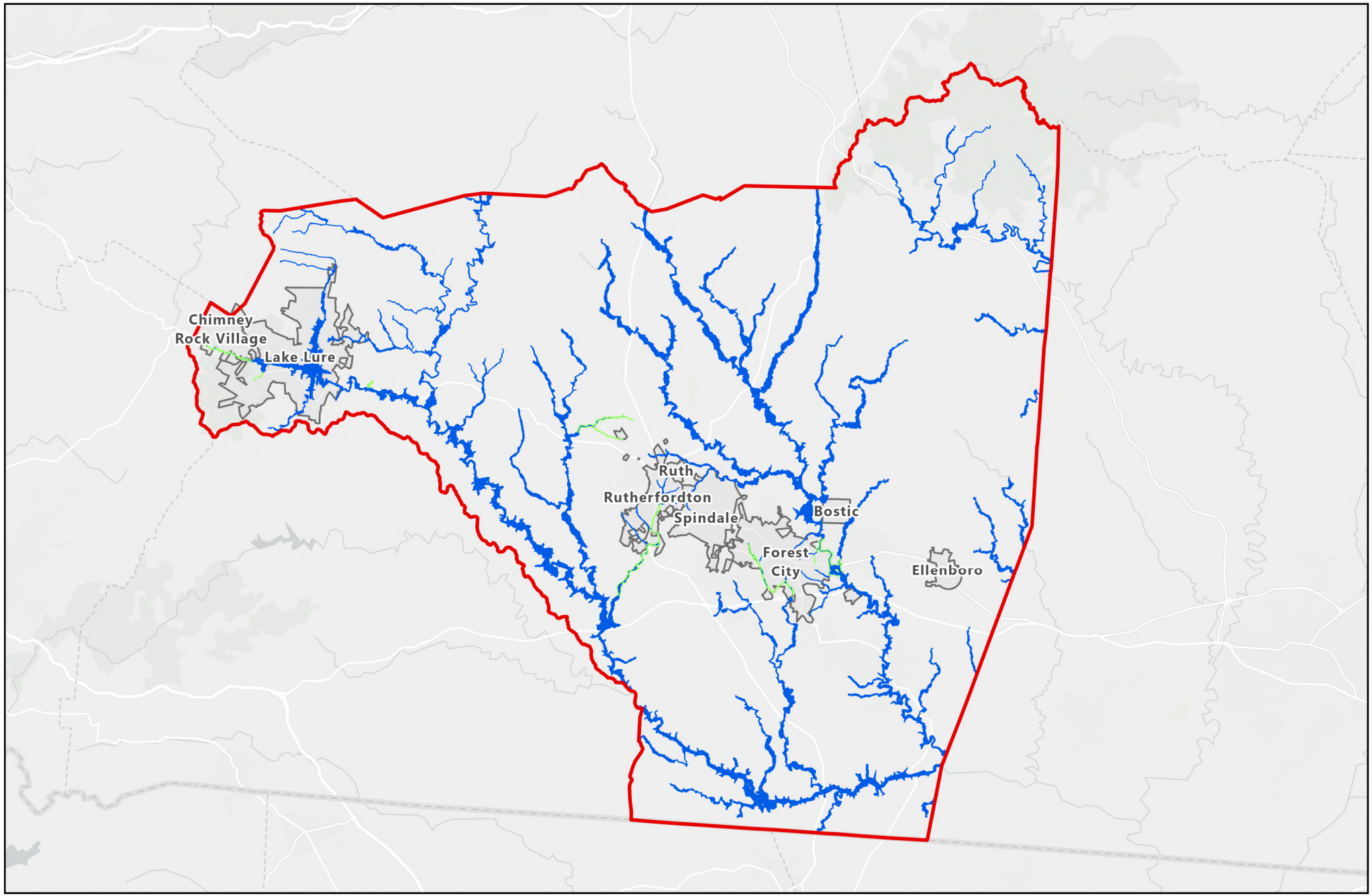
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.17 0.35 0.7 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37175C
Latest Study Effective Date: 4/19/2010
Latest LOMR Effective Date: 6/27/2017

Rutherford County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

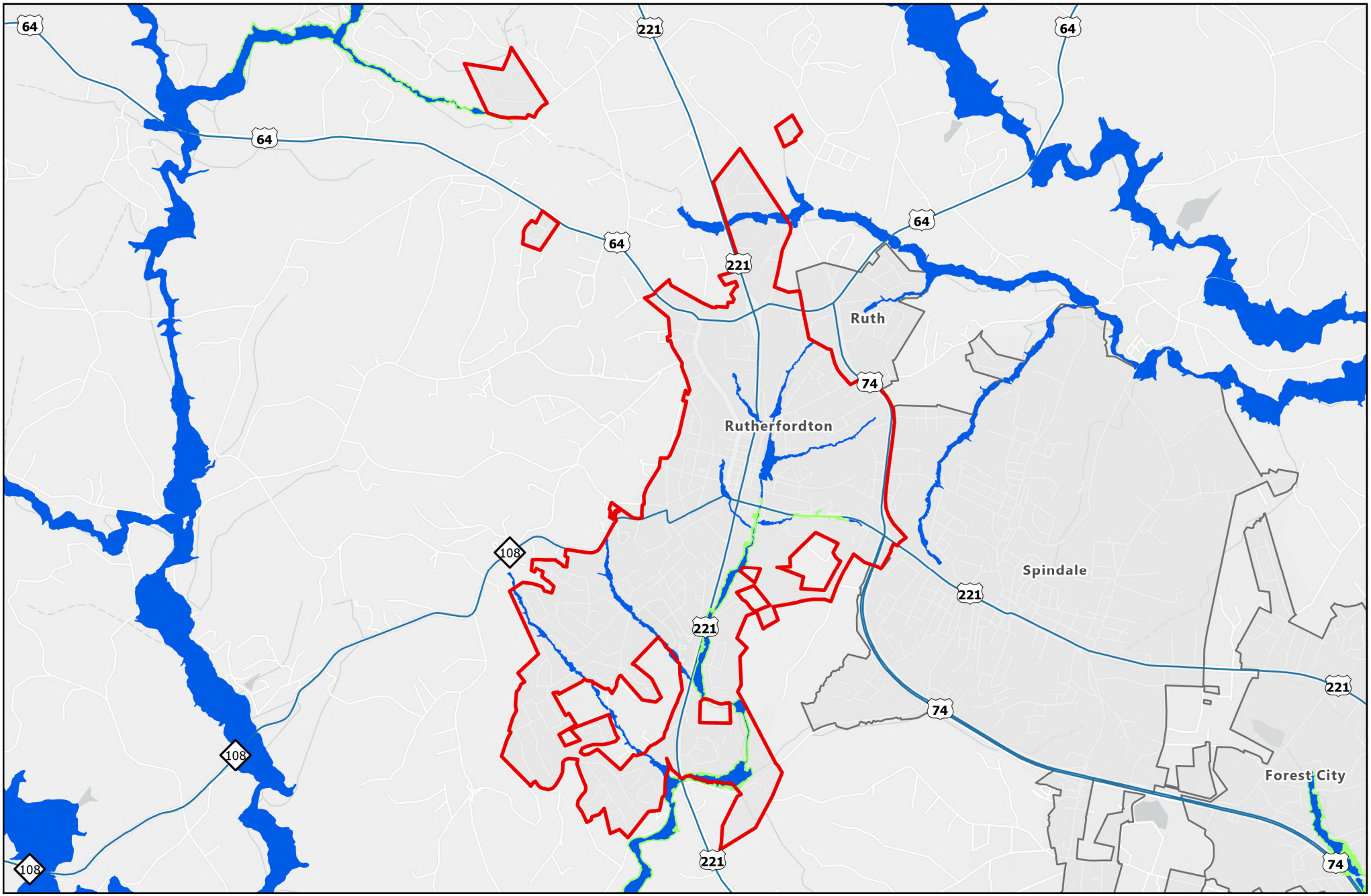
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4.25 8.5 17 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

Rutherfordton - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

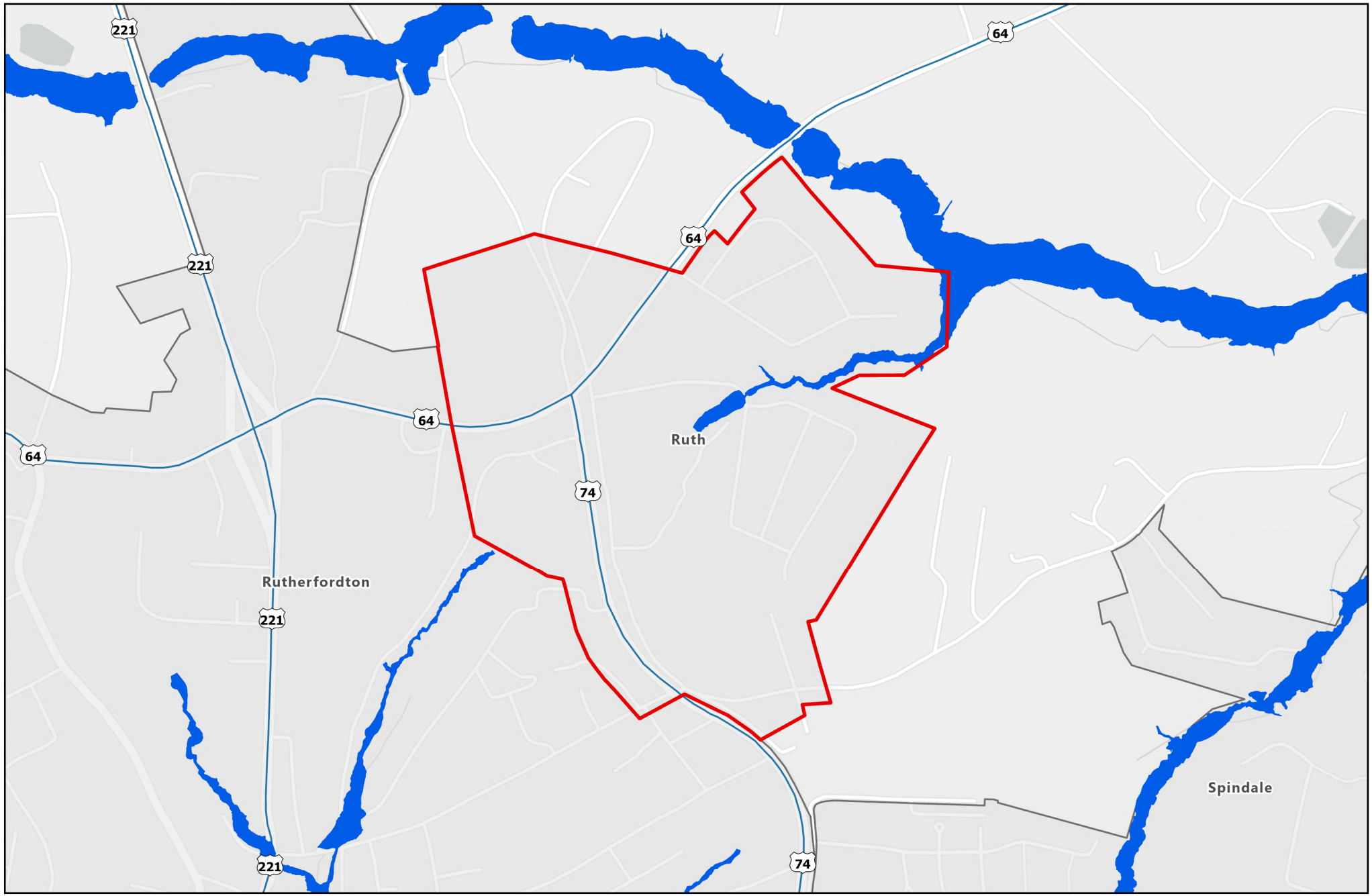
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

N

Ruth - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

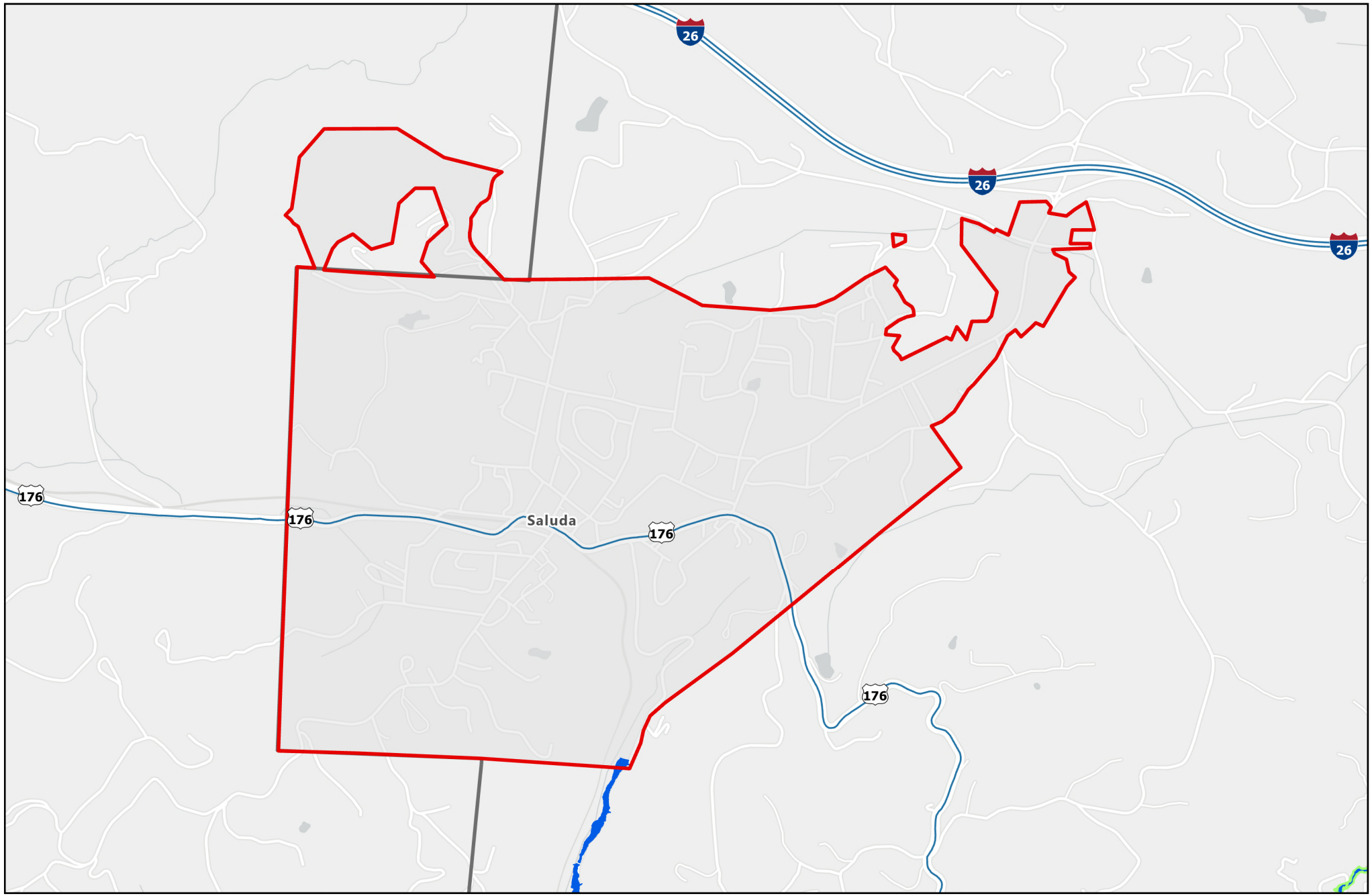
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.15 0.3 0.6 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

Saluda - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

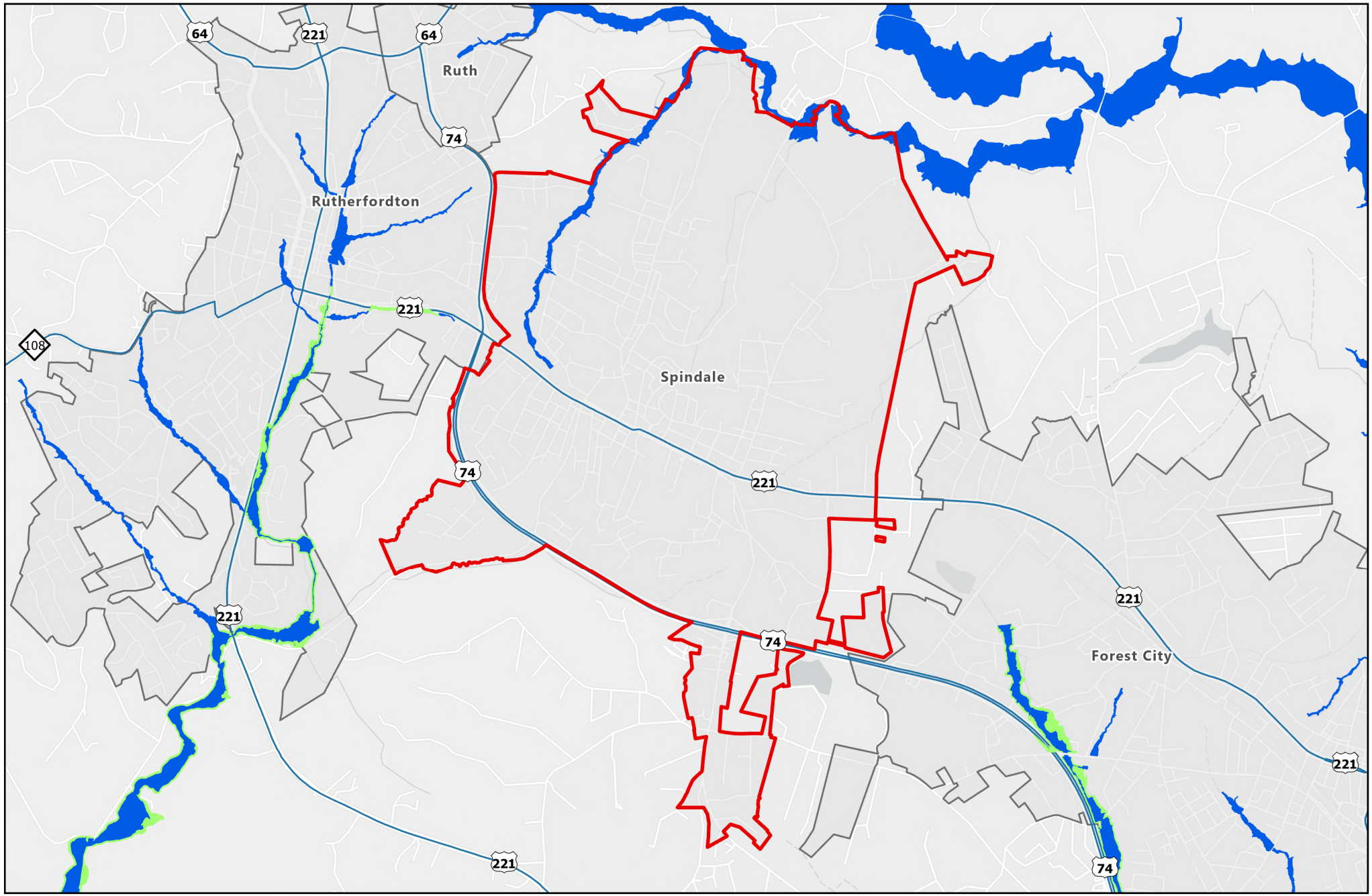
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.25 0.5 1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37149C
Latest Study Effective Date: 10/2/2008
Latest LOMR Effective Date: N/A

N

Spindale - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

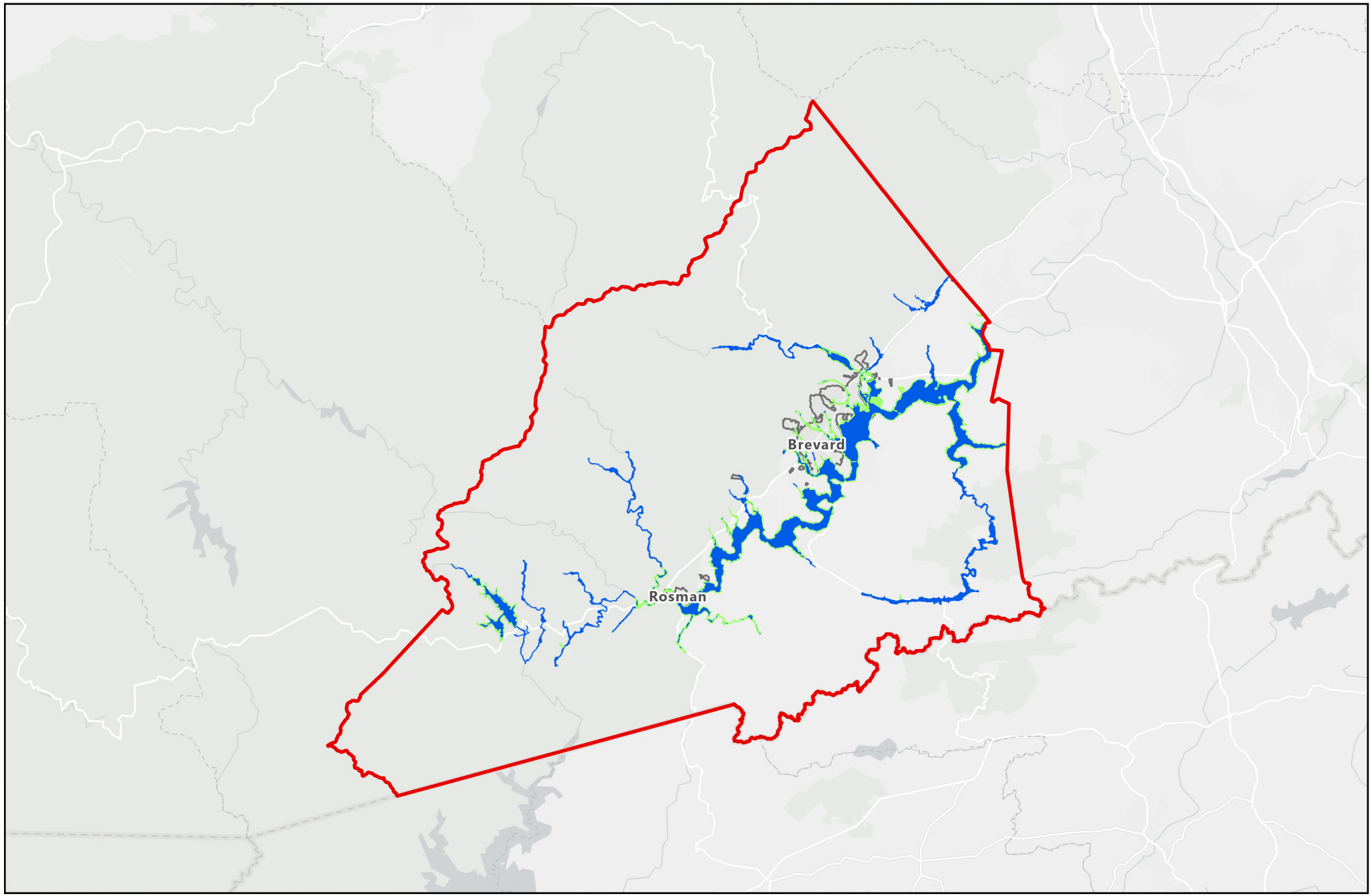
- 500-Year Flood Zone
- 100-Year Flood Zone

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37161C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/16/2014

N

Transylvania County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundaries

Flood Zone

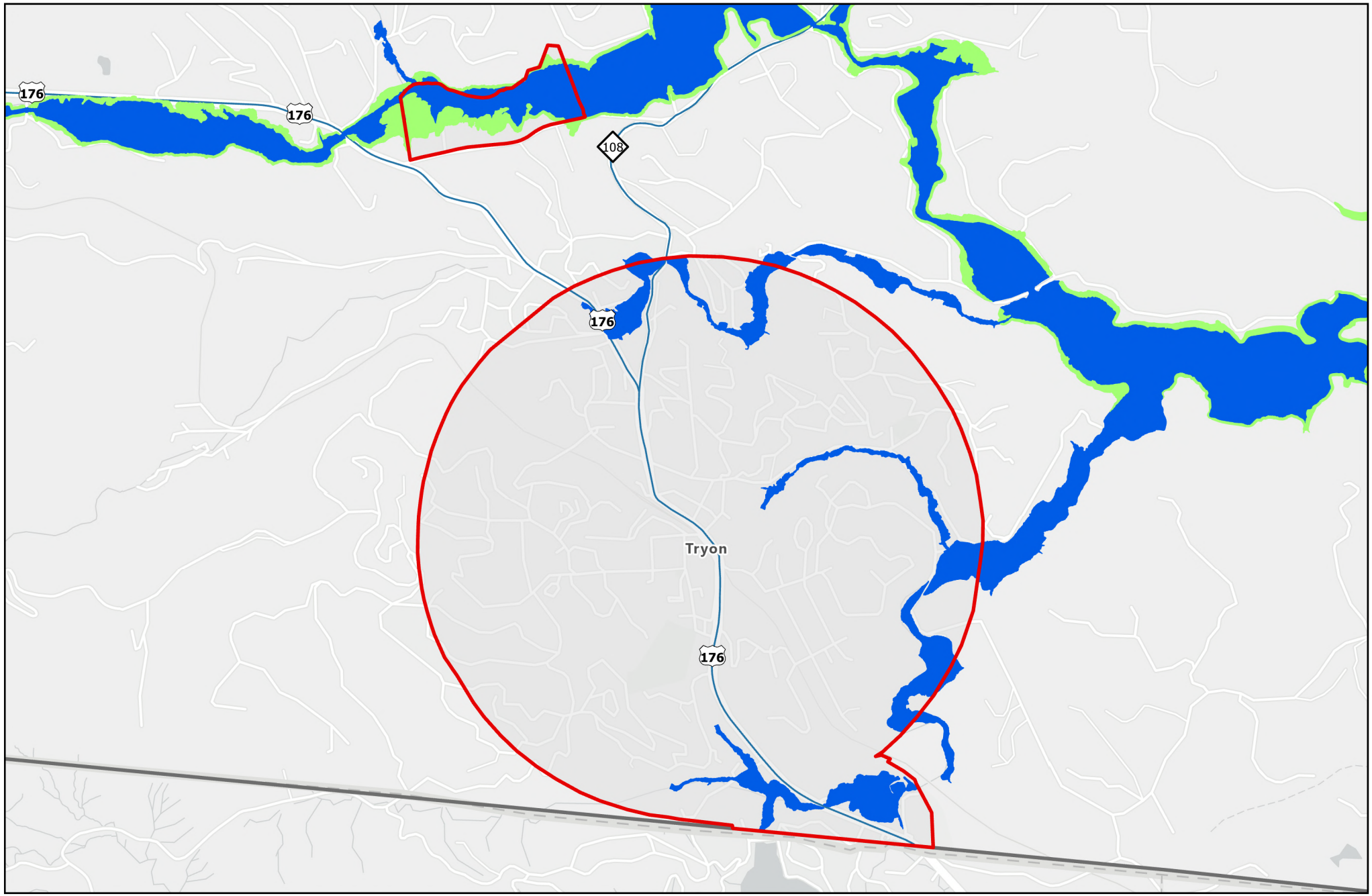
- 500-Year Flood Zone
- 100-Year Flood Zone

0 4.25 8.5 17 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37175C
Latest Study Effective Date: 4/19/2010
Latest LOMR Effective Date: 6/27/2017

N

Tryon - Flood Hazard Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

Flood Zone

- 500-Year Flood Zone
- 100-Year Flood Zone

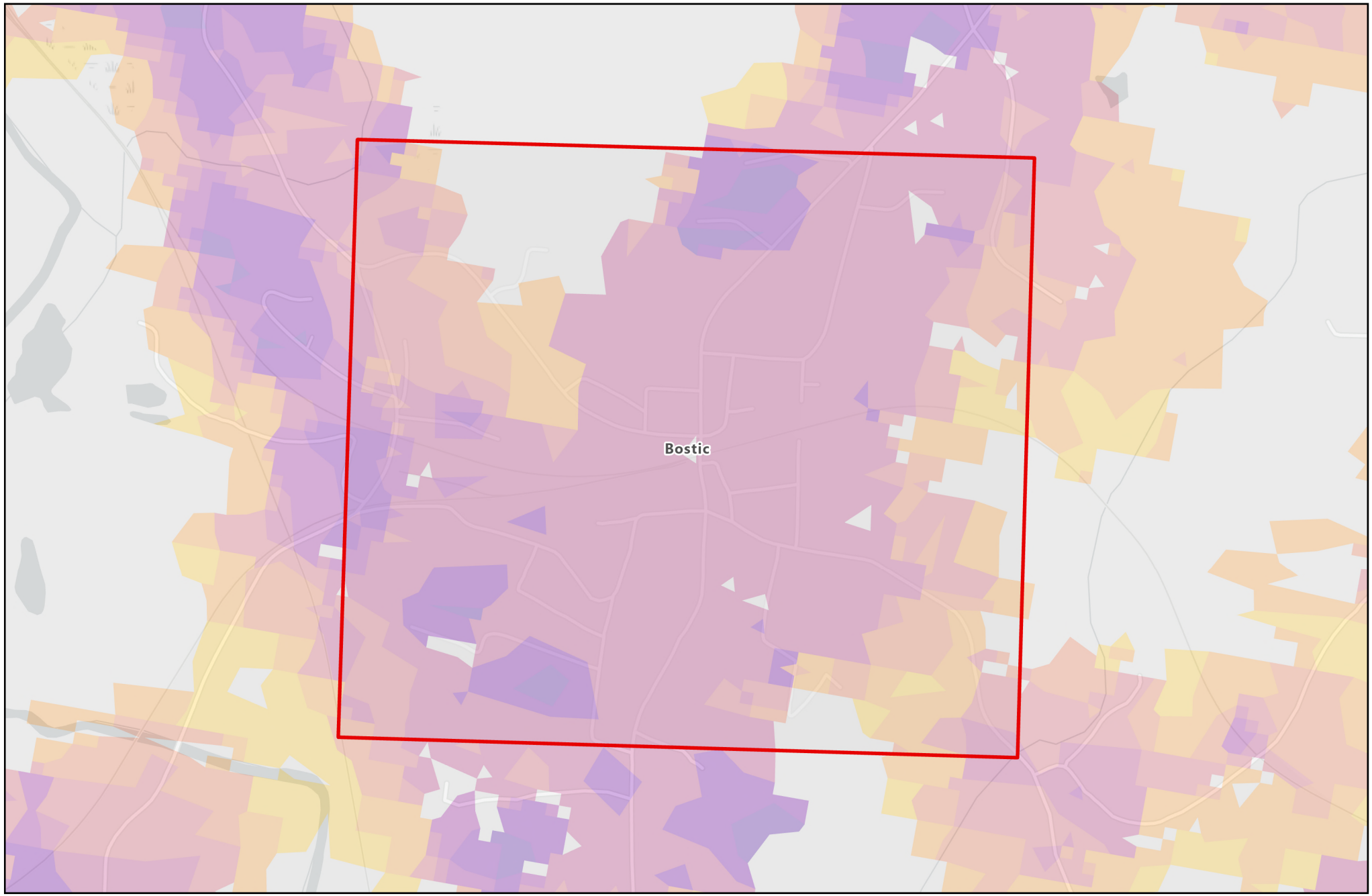
0 0.28 0.55 1.1 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37149C
Latest Study Effective Date: 10/2/2008
Latest LOMR Effective Date: N/A

N

Appendix G
Wildfire Hazard Maps

Bostic - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

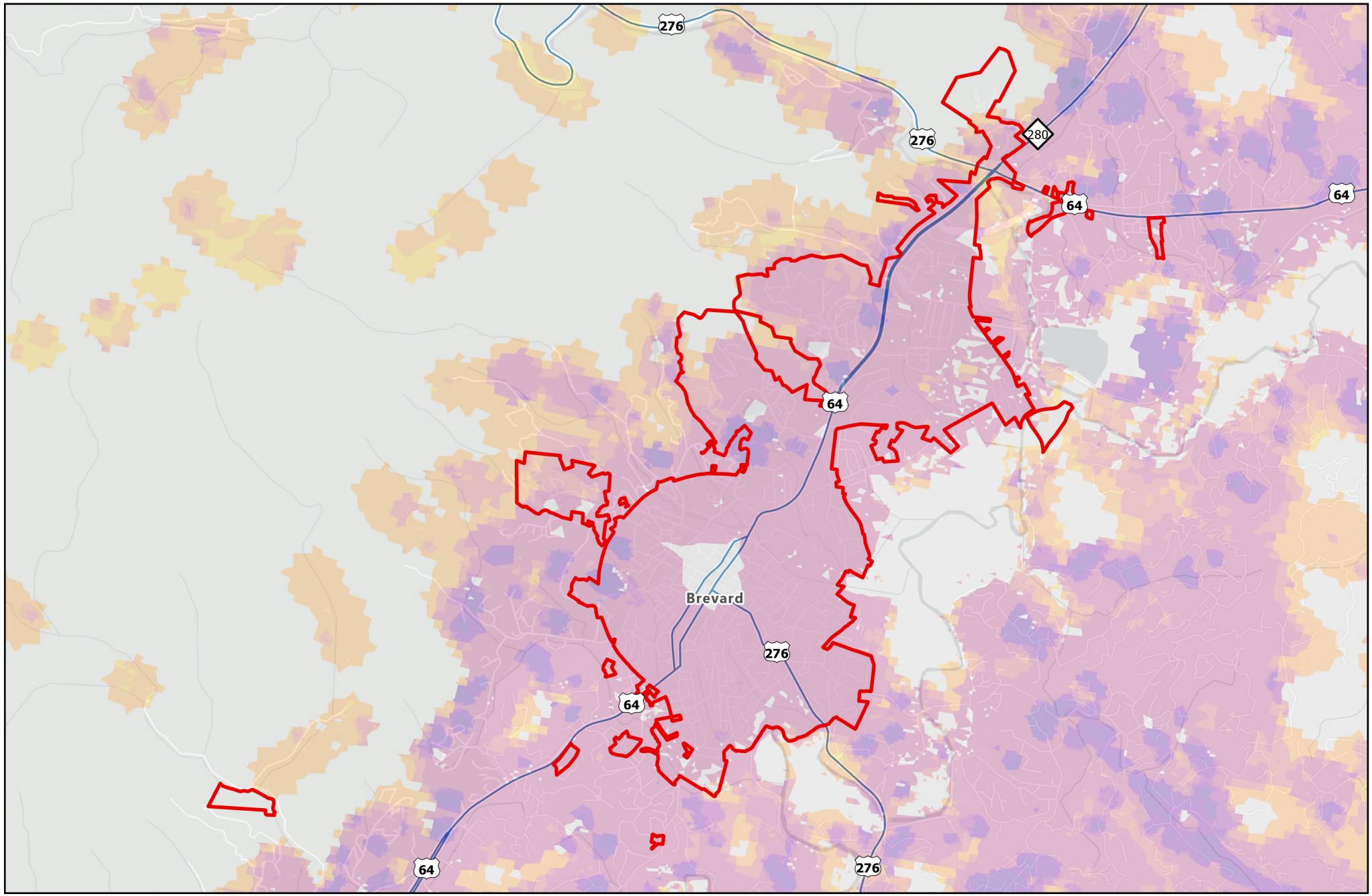
Low High

0 0.15 0.3 0.6 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Brevard - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

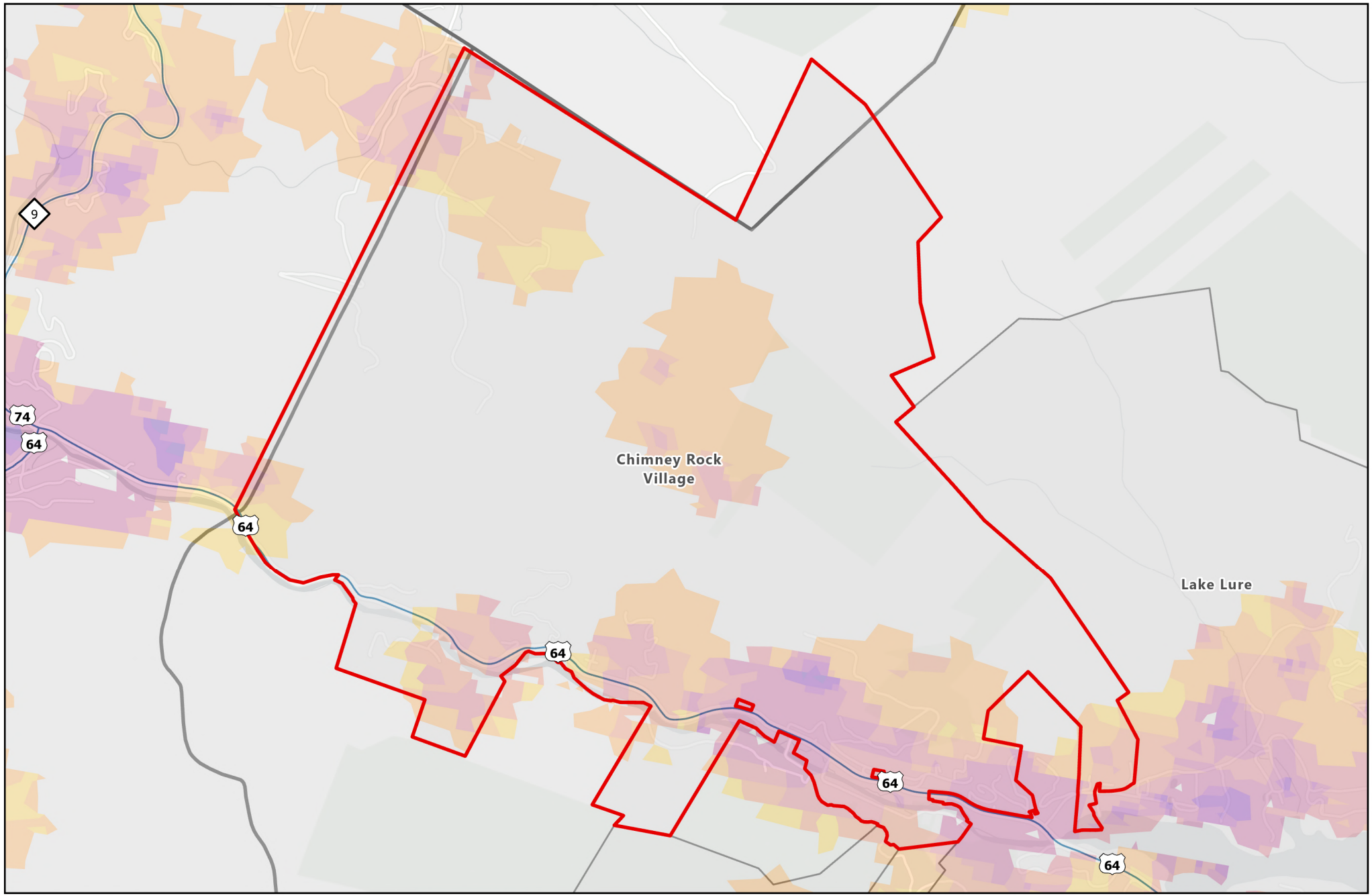
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Chimney Rock Village - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

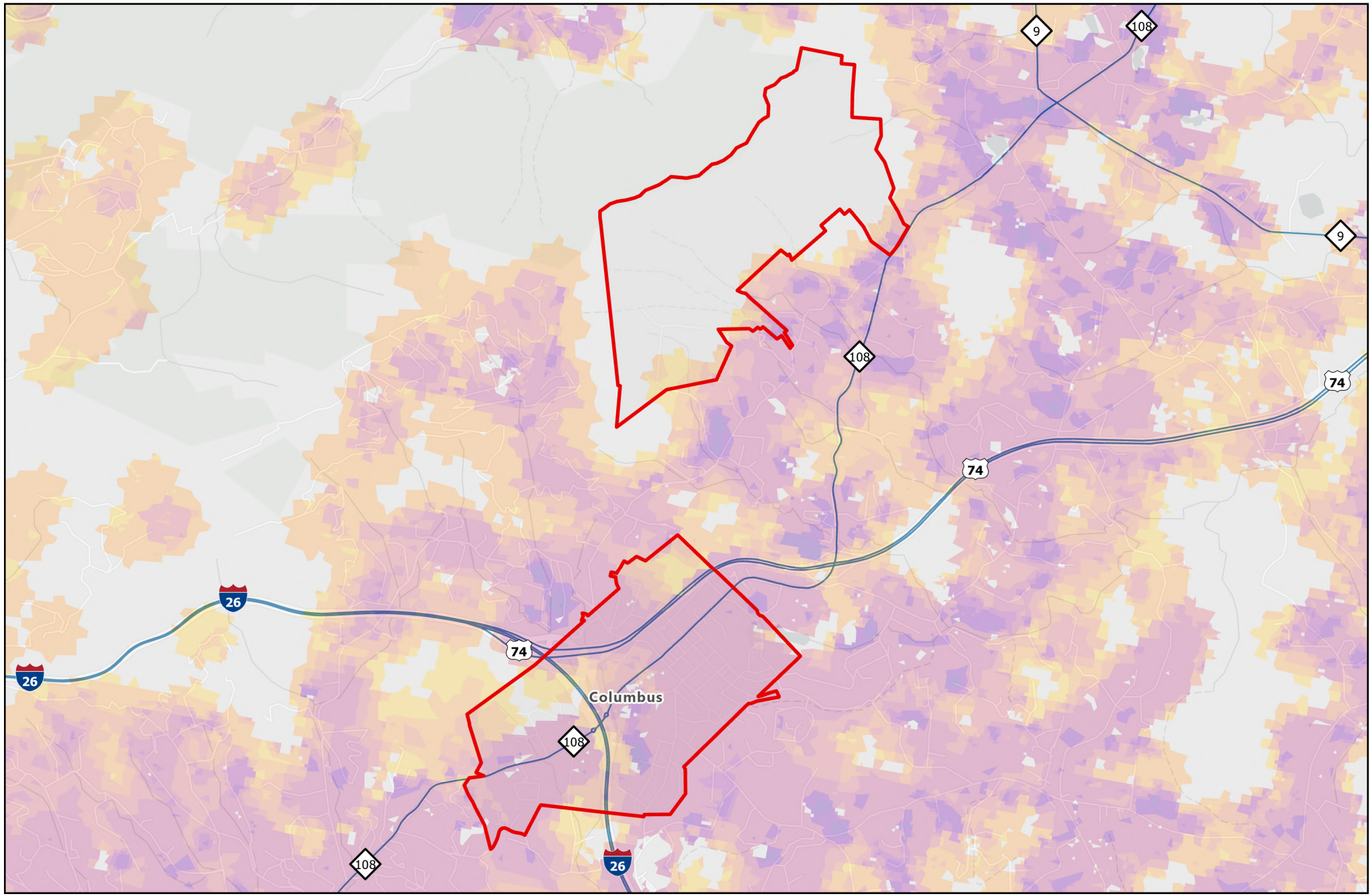
Low High

0 0.3 0.6 1.2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Columbus - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

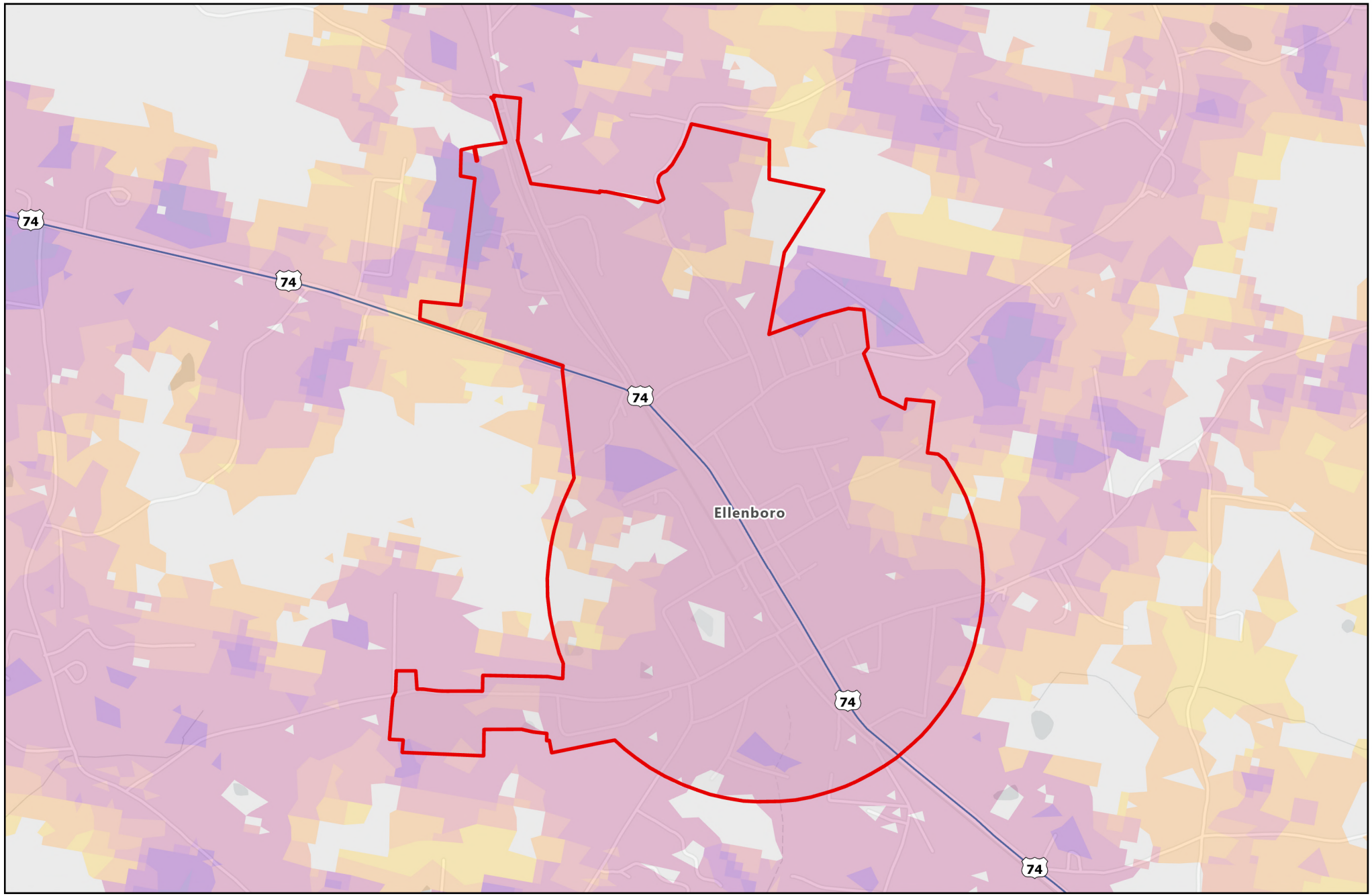
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Ellenboro - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

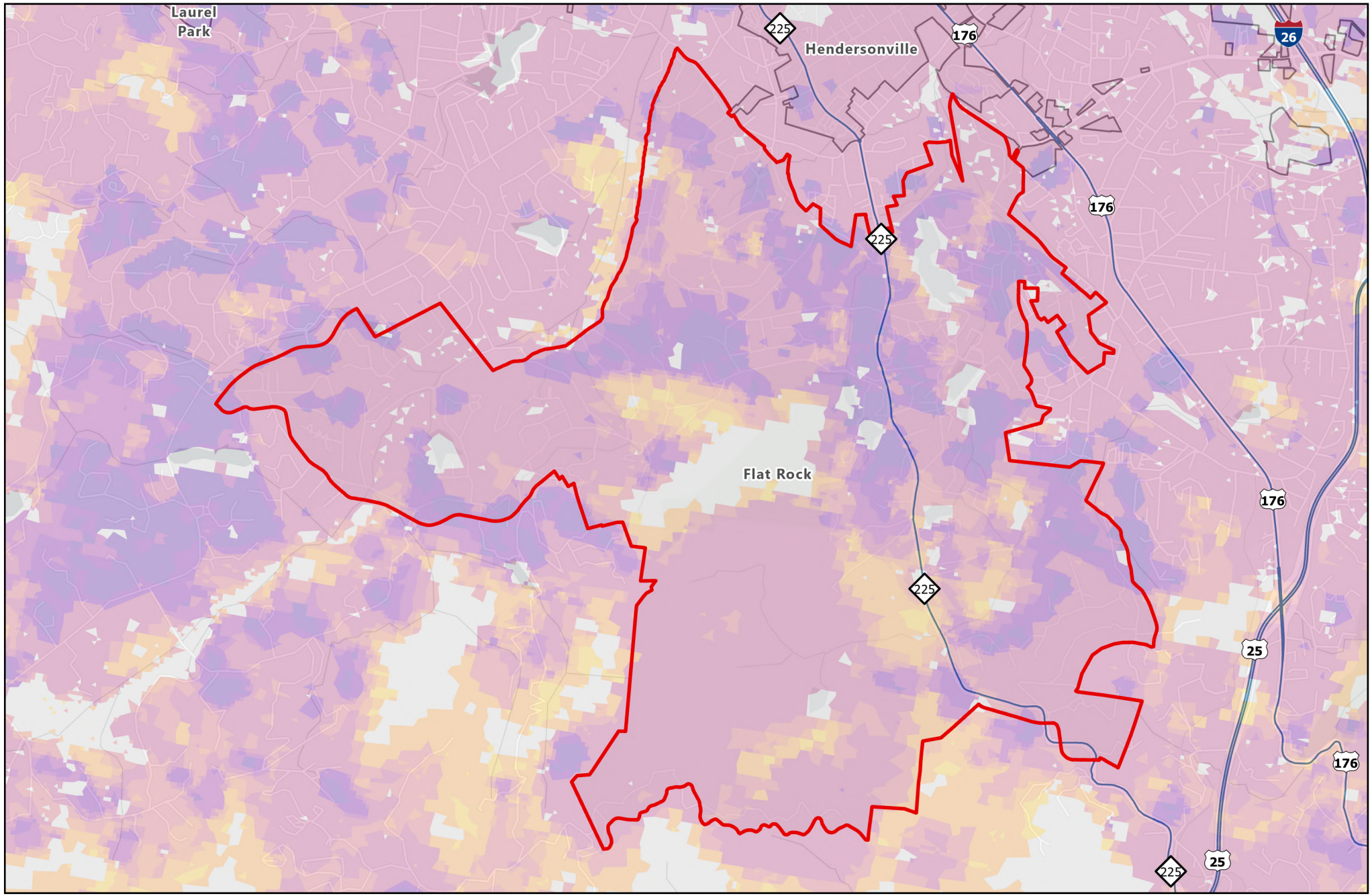
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Flat Rock - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

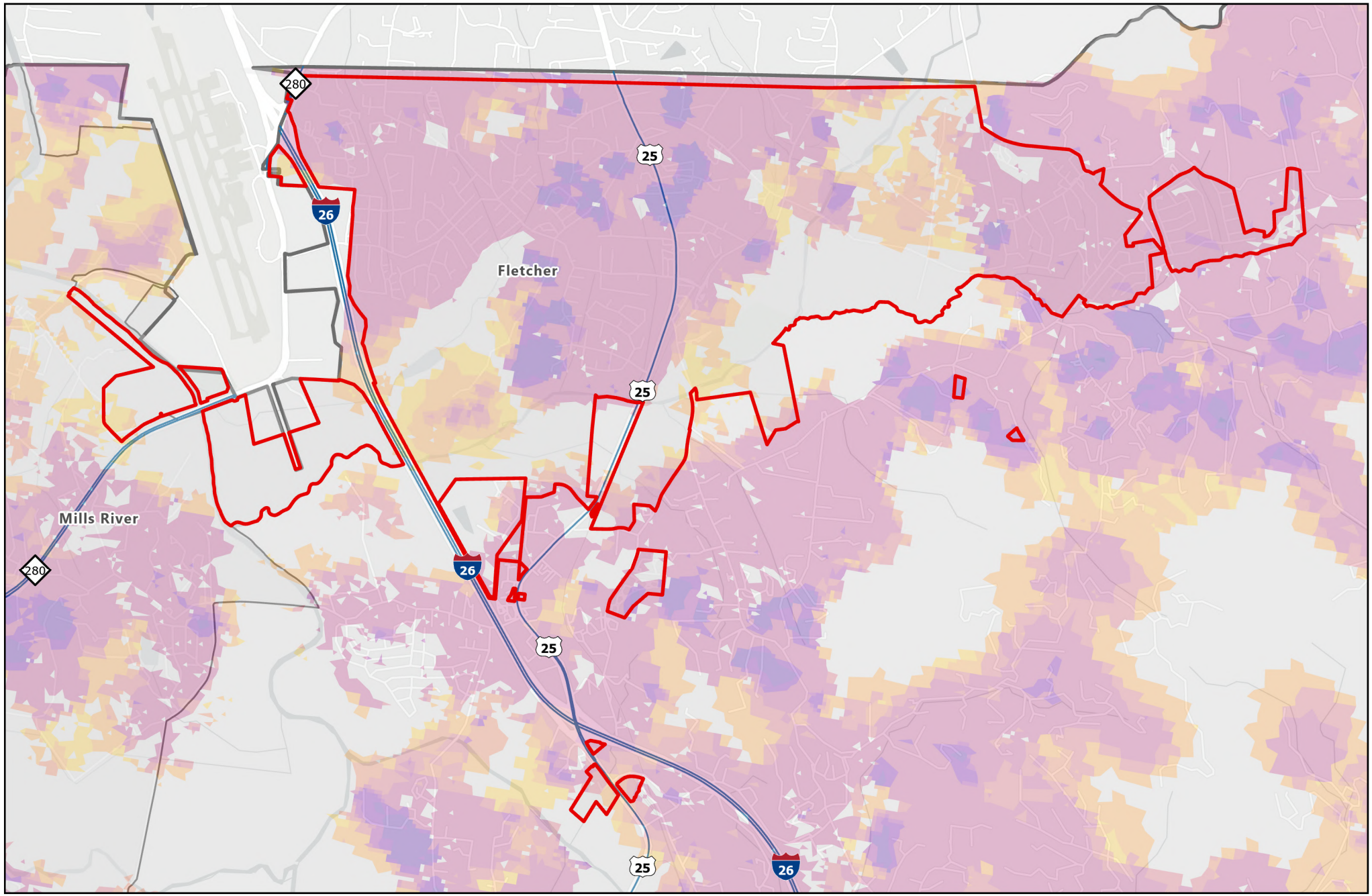
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Fletcher - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

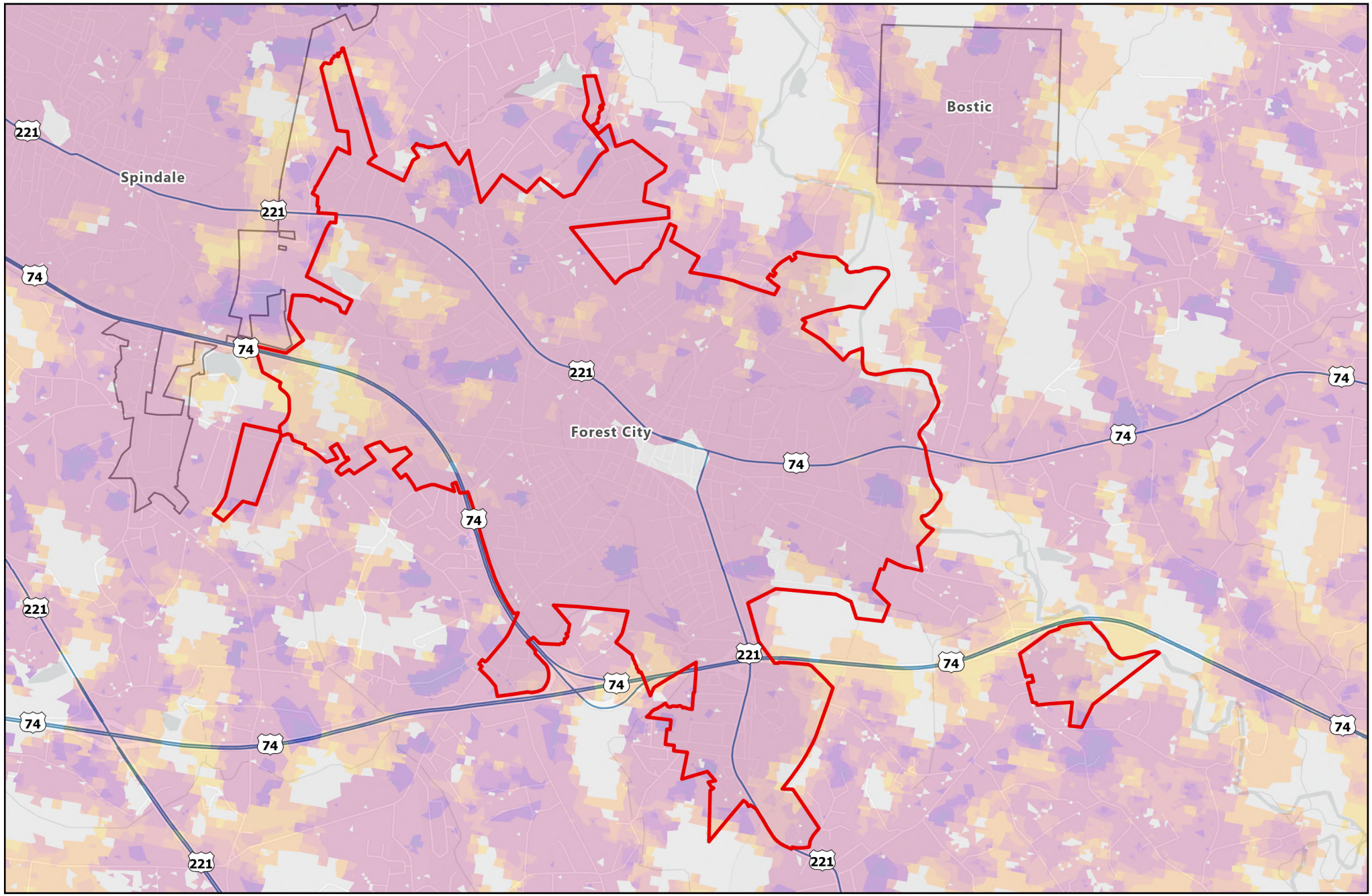
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Forest City - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

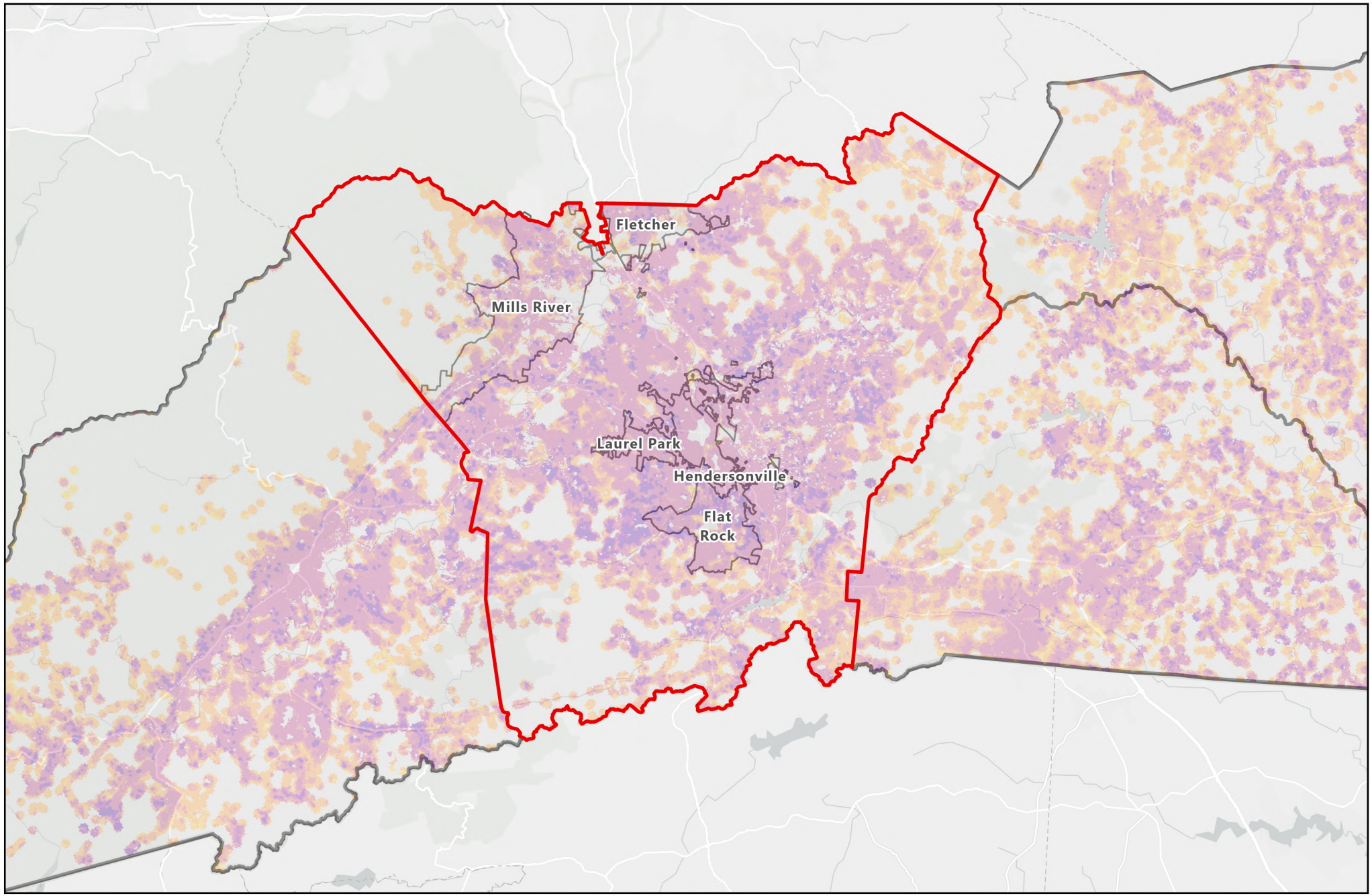
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Henderson County - Wildland Urban Interface (WUI) Risk Areas



Legend

County Boundary

Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

Low High

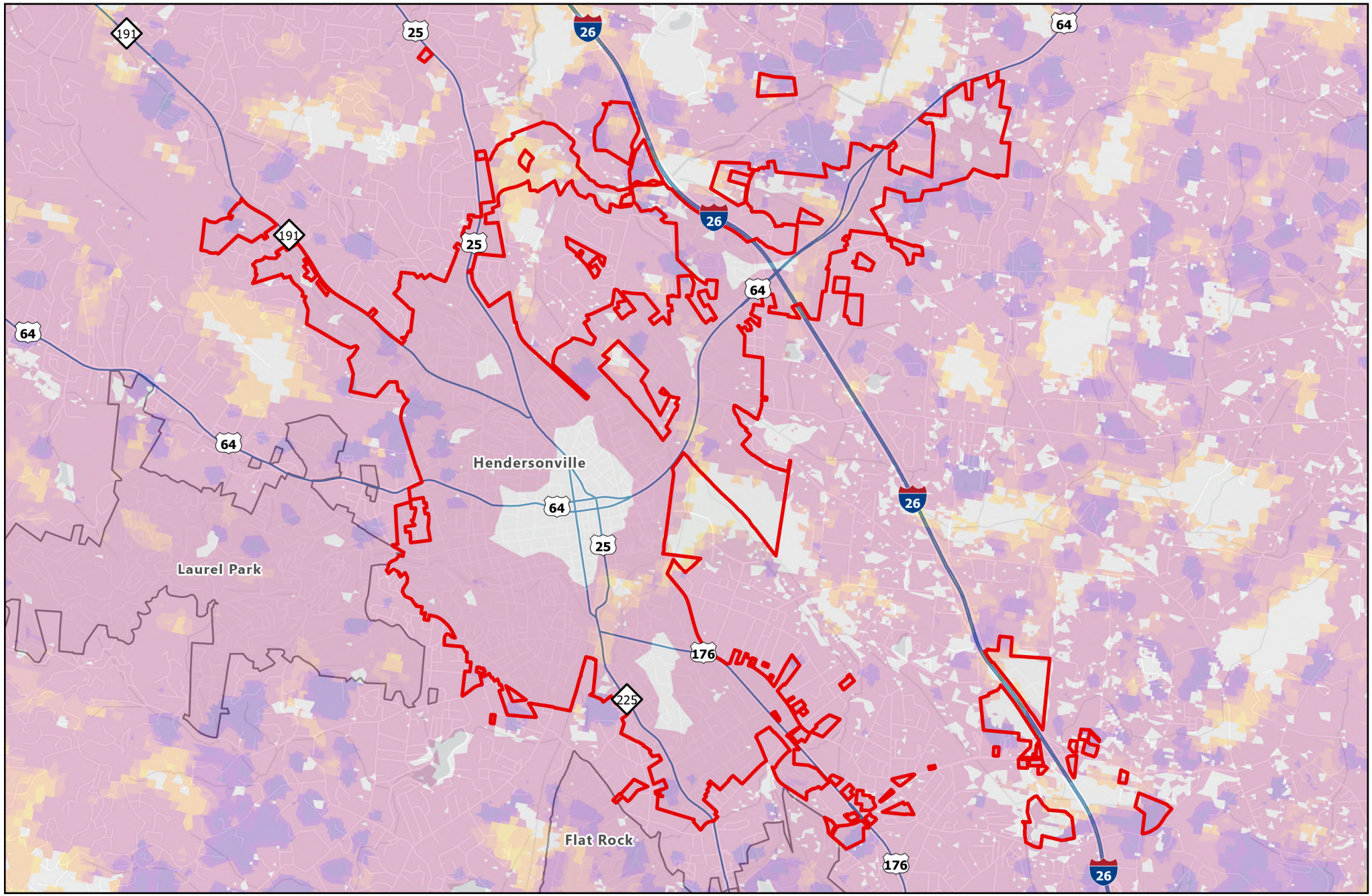
0 4.25 8.5 17 Miles

Data Source: Southern Wildfire Risk Assessment

Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Hendersonville - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

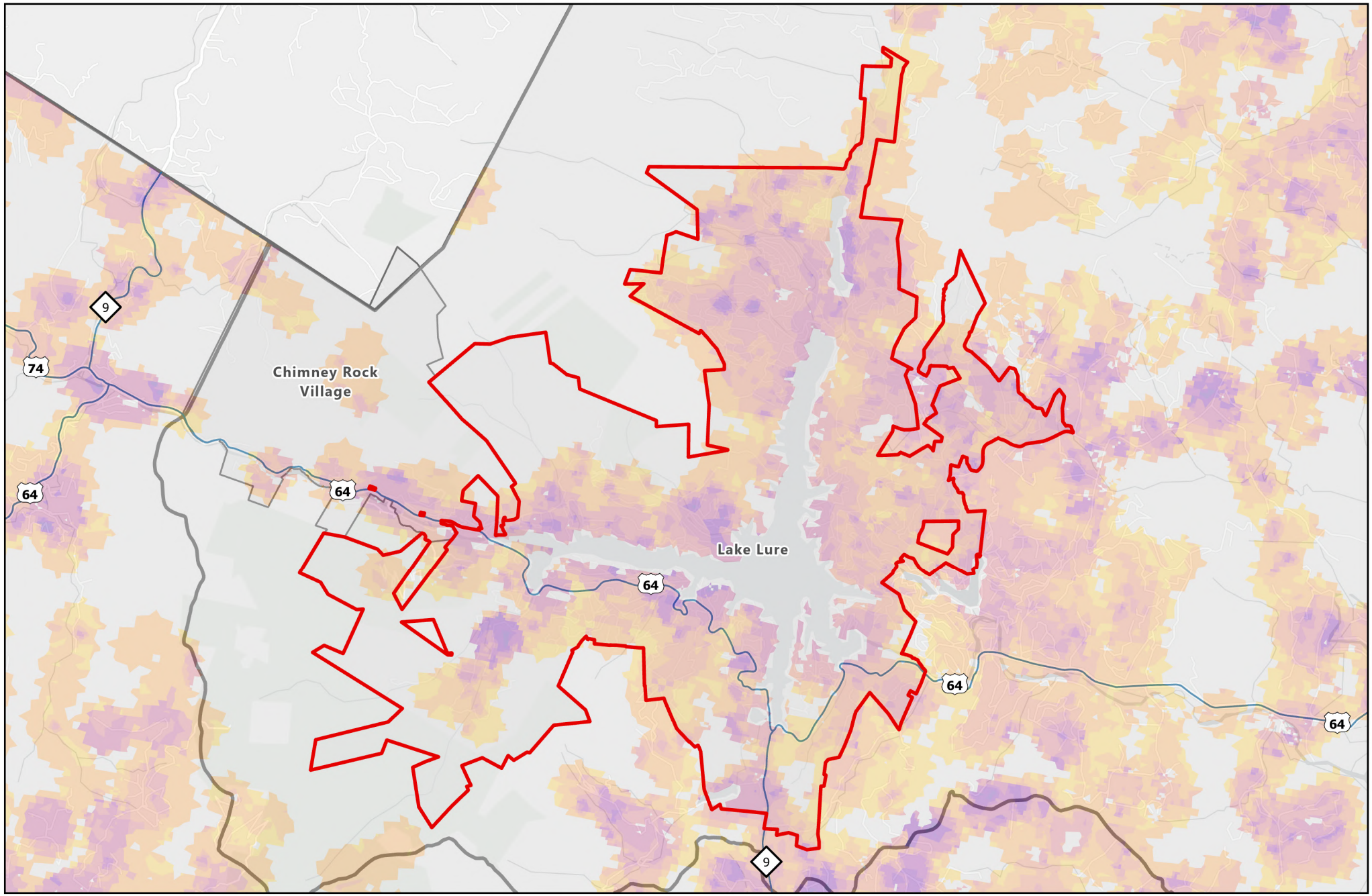
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Lake Lure - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

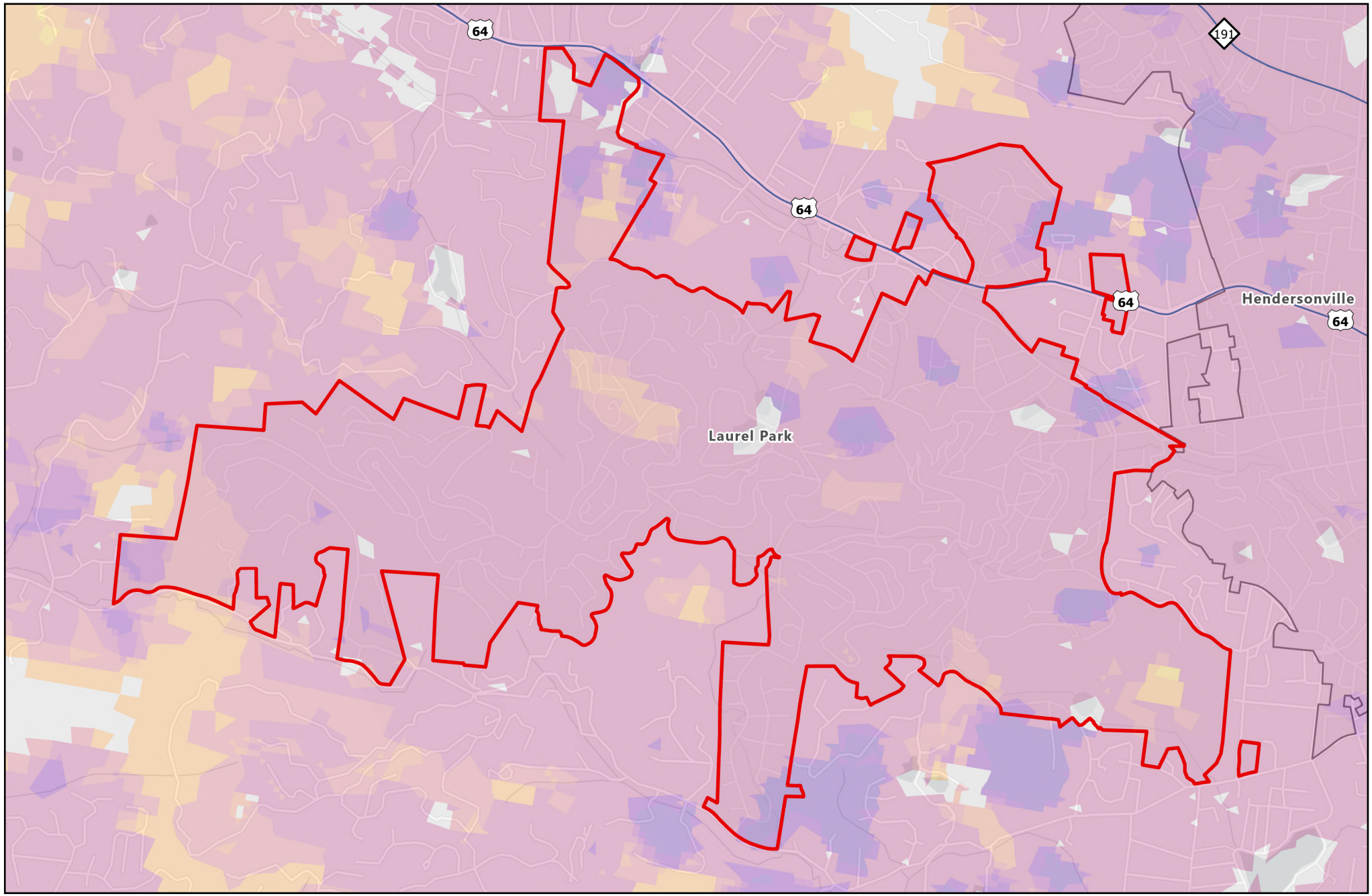
Low High

0 0.75 1.5 3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Laurel Park - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

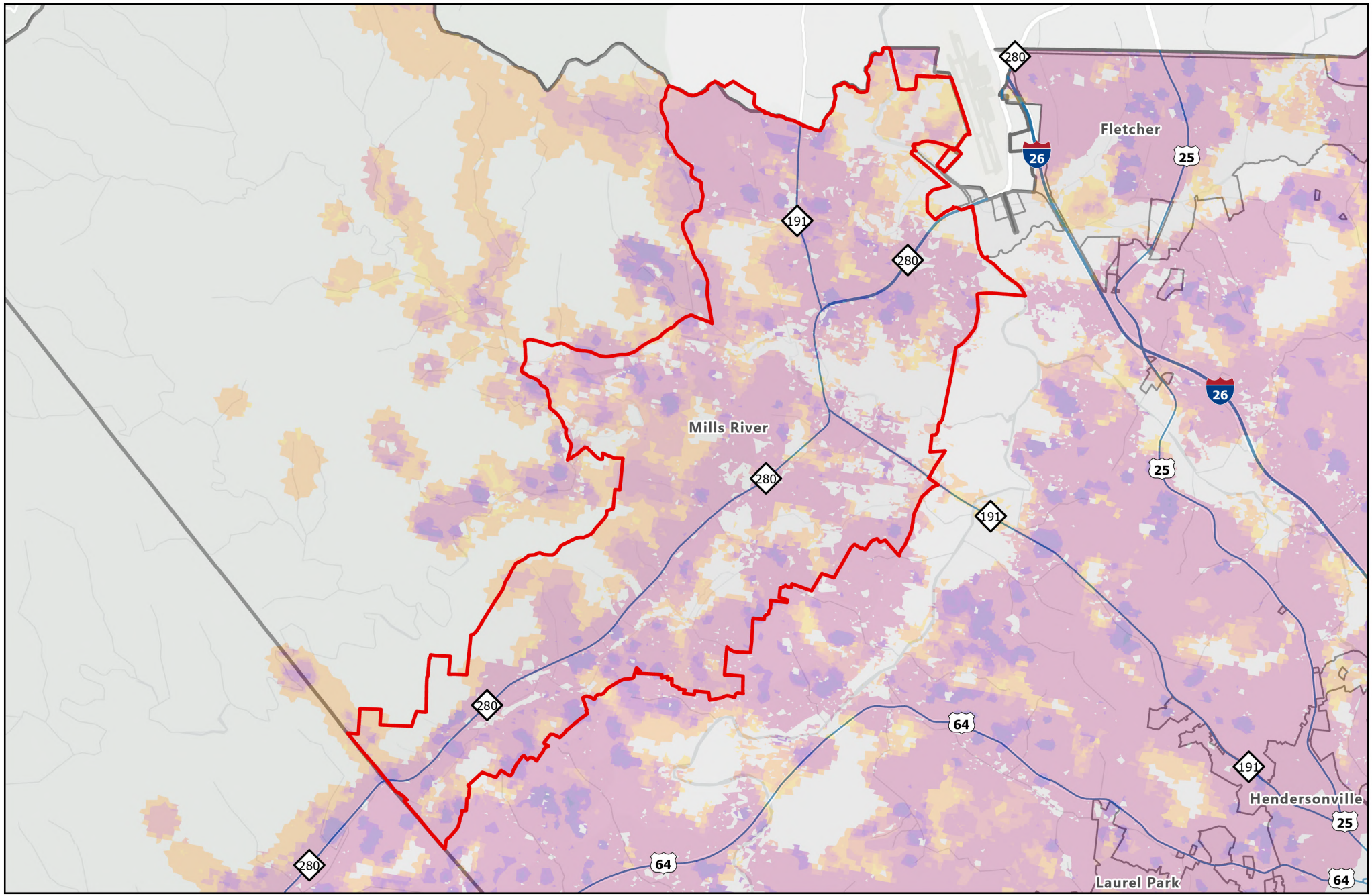
Low High

0 0.3 0.6 1.2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Mills River - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

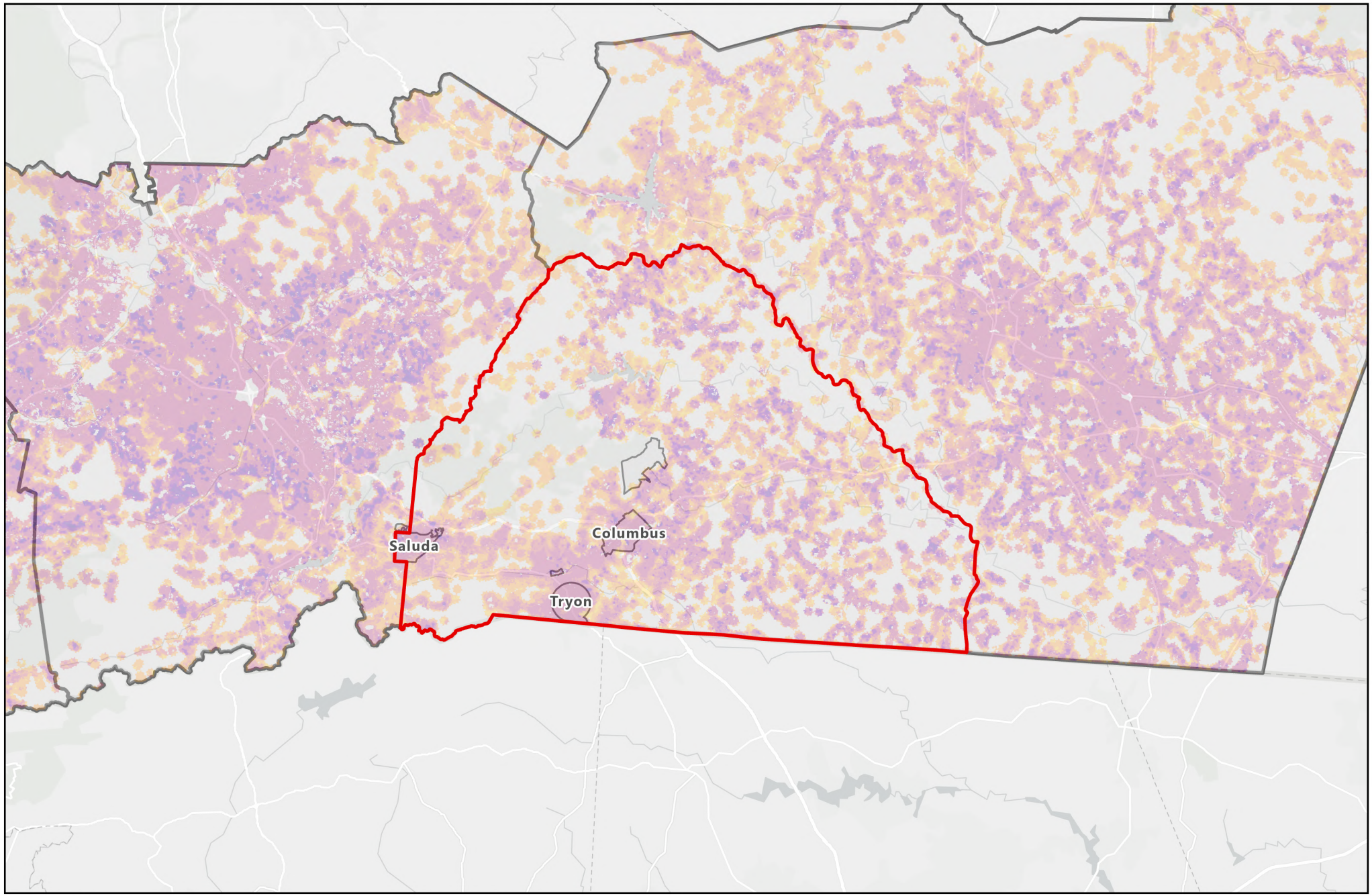
Low High

0 1 2 4 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Polk County - Wildland Urban Interface (WUI) Risk Areas



Legend

County Boundary

Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

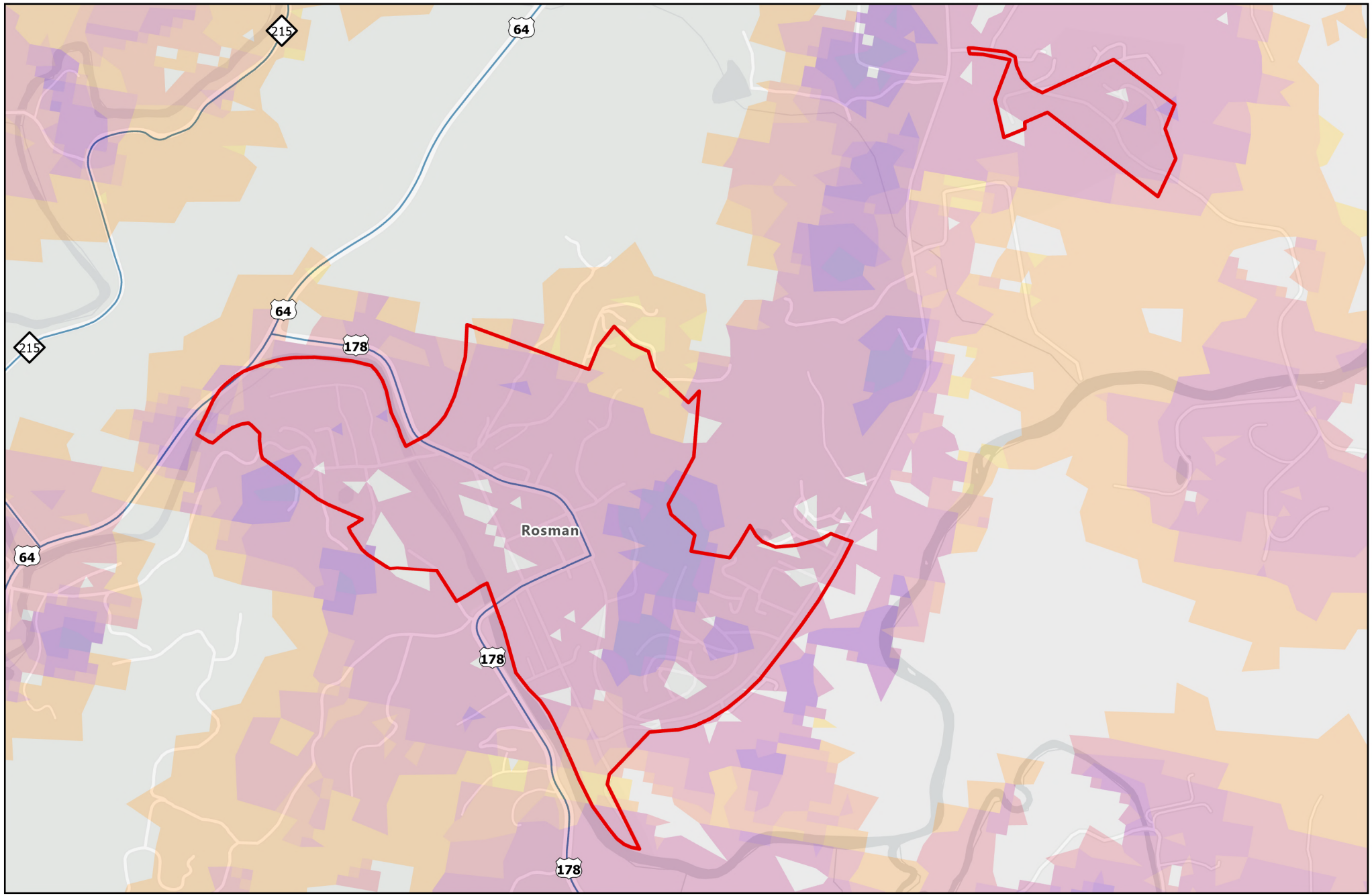
Low High

0 4.25 8.5 17 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Rosman - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

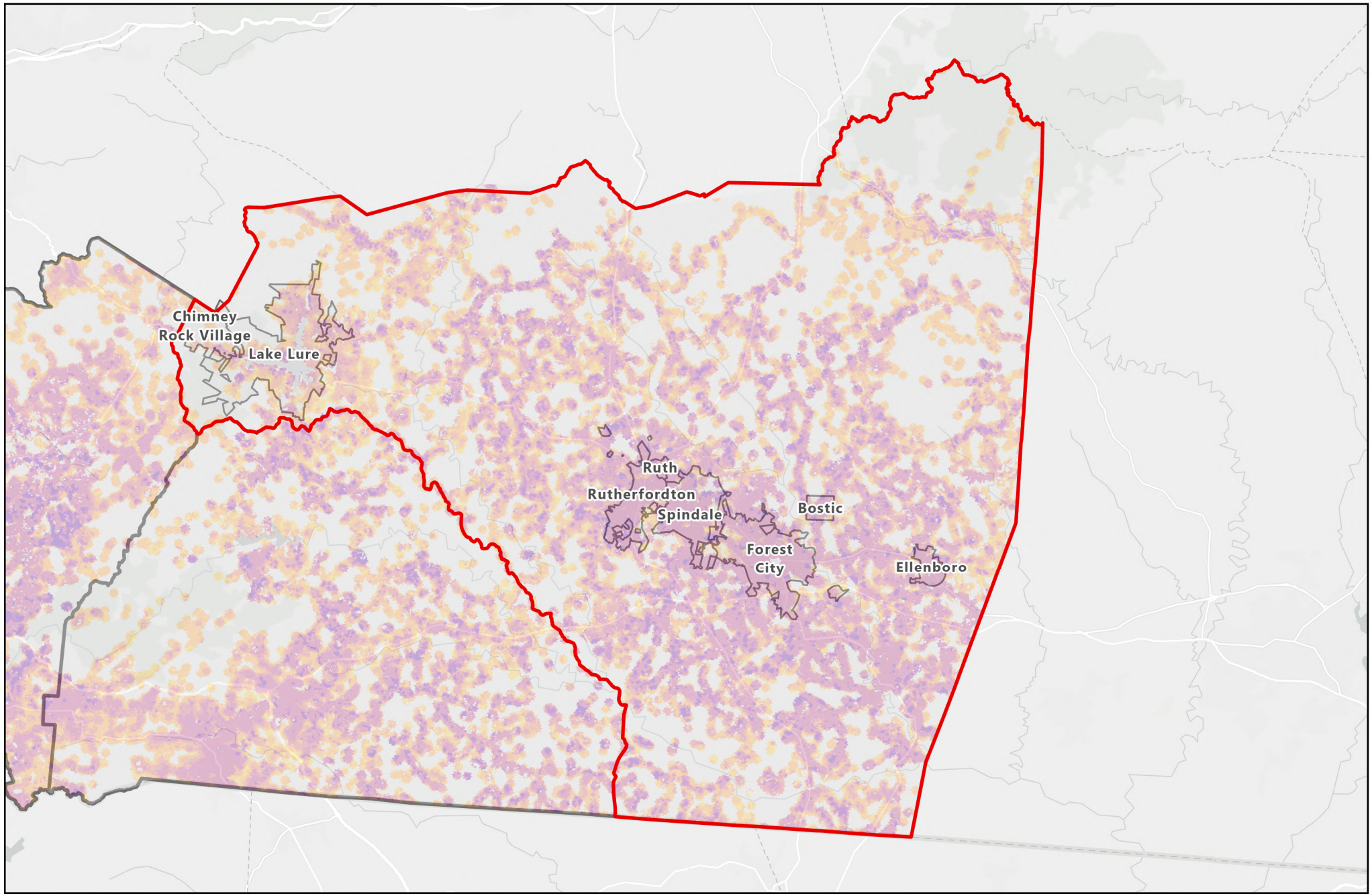
Low High

0 0.17 0.35 0.7 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Rutherford County - Wildland Urban Interface (WUI) Risk Areas



Legend

- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

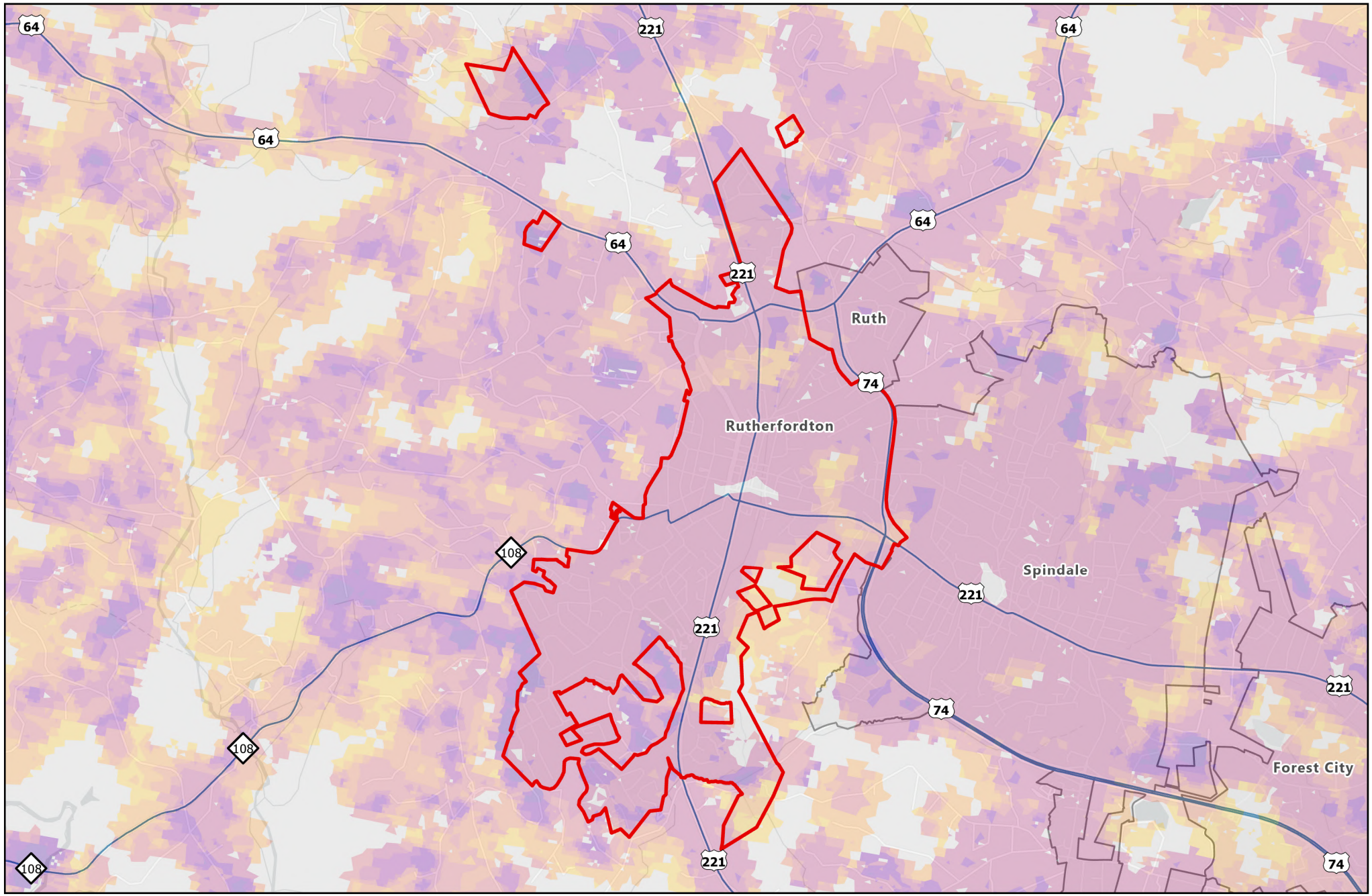
Low High

0 4.25 8.5 17 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Rutherfordton - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

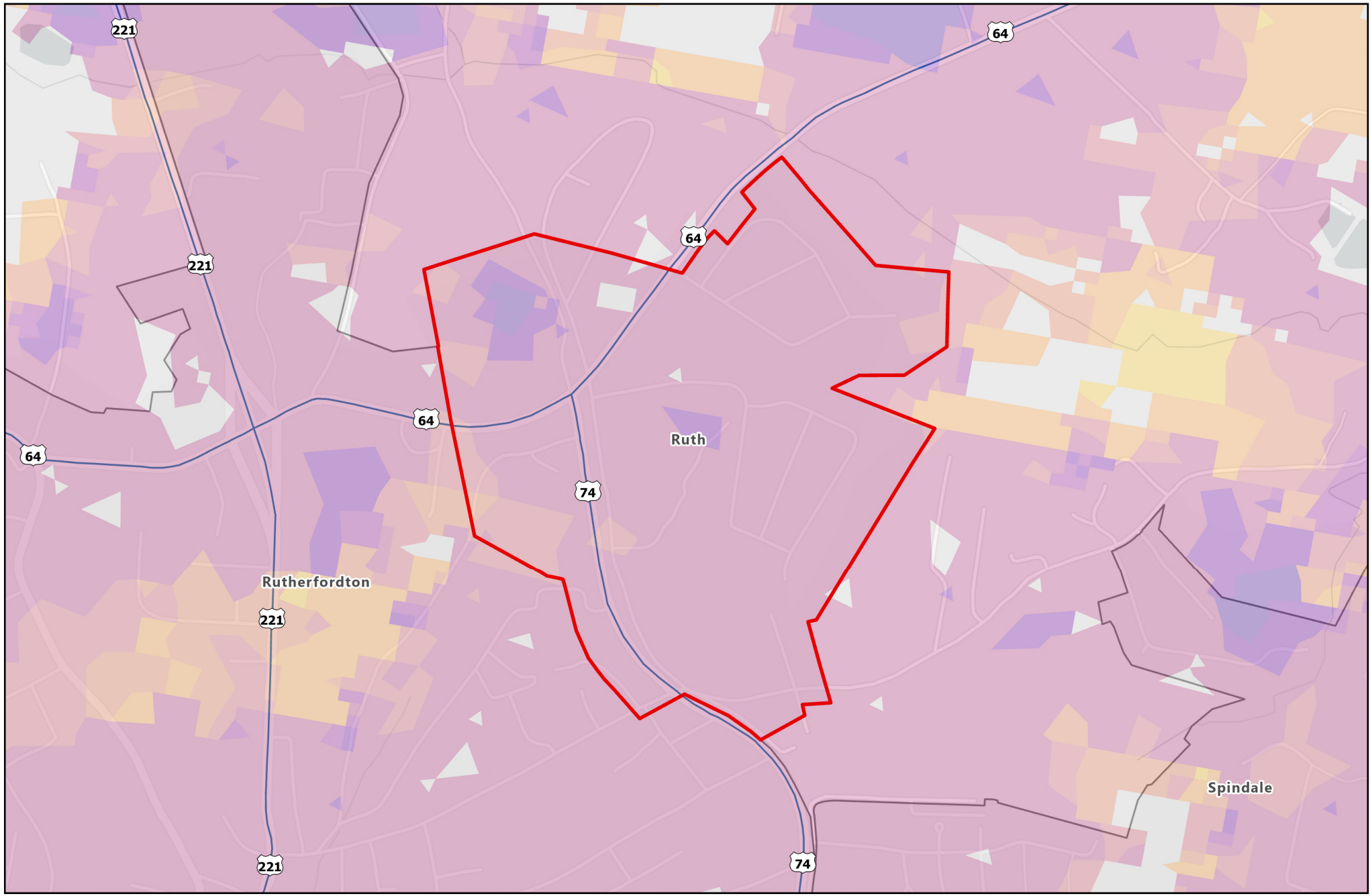
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Ruth - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

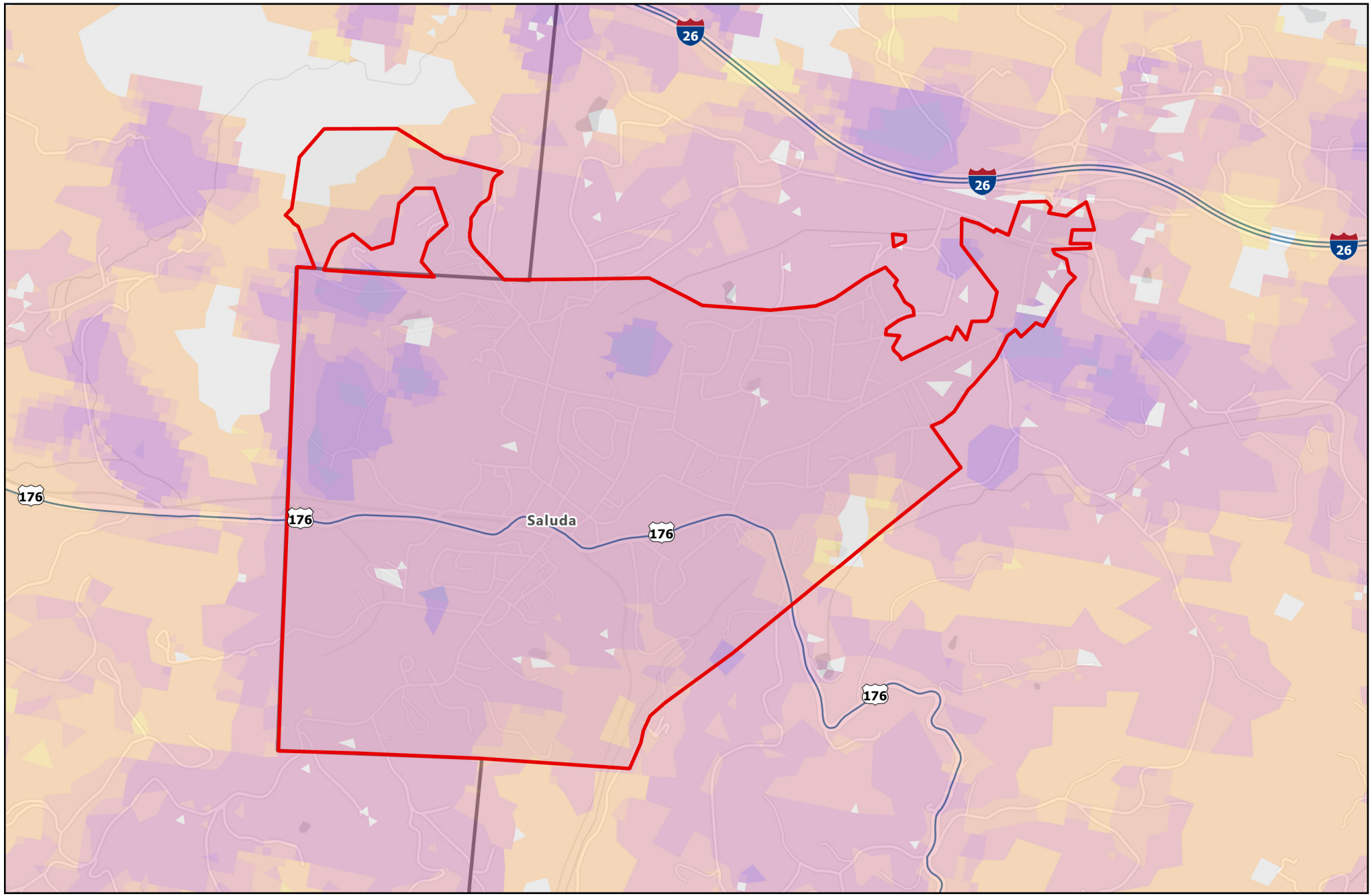
Low High

0 0.15 0.3 0.6 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Saluda - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

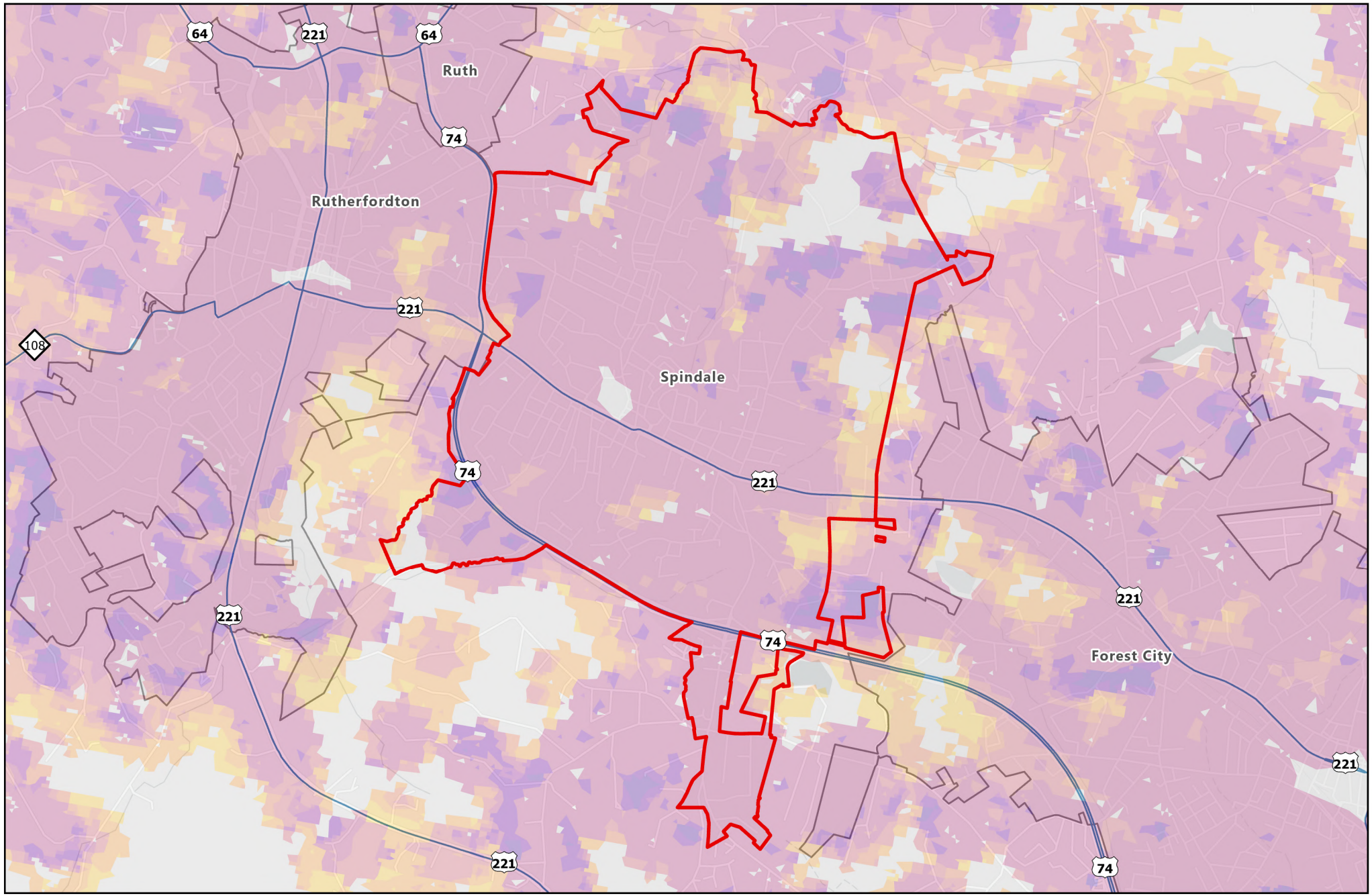
Low High

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Spindale - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

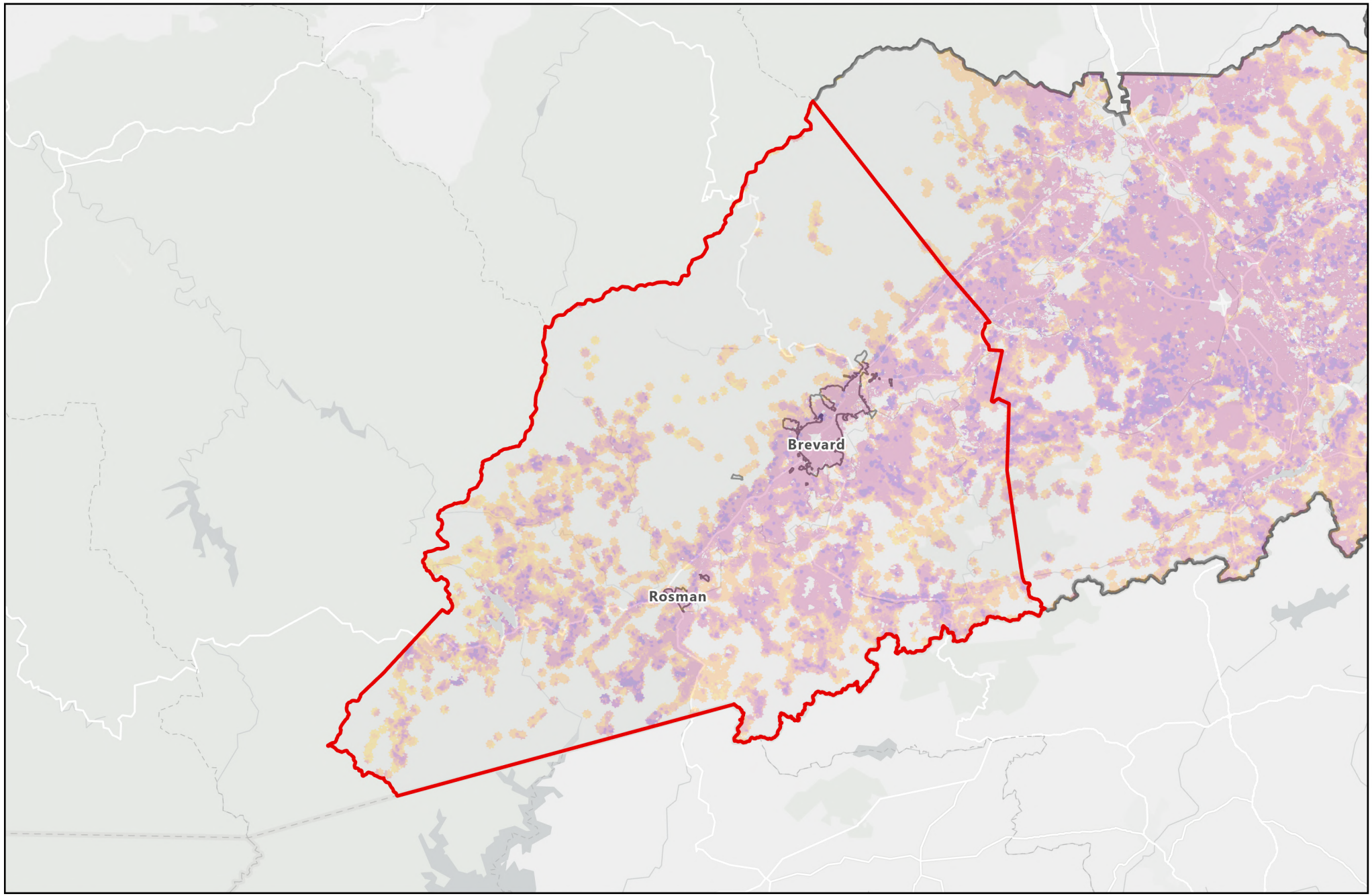
Low High

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Transylvania County - Wildland Urban Interface (WUI) Risk Areas



Legend

- County Boundary
- Municipal Boundaries

WUI Risk Index

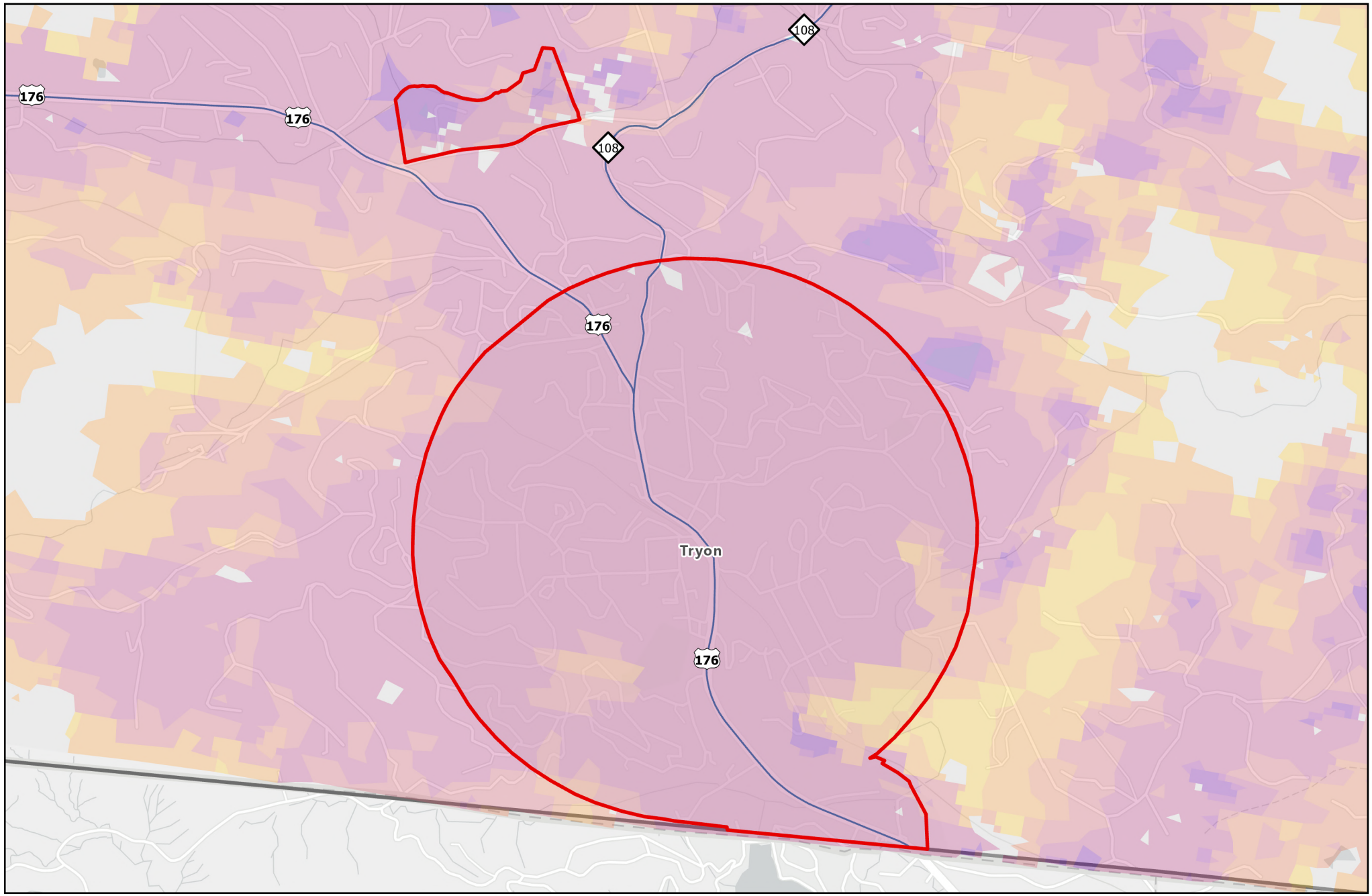
0 (Low) -3 -6 -9 (High)

0 4.25 8.5 17 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Wildland Urban Interface (WUI) Risk Index

N

Tryon - Wildland Urban Interface (WUI) Risk Areas



Legend

- Major Roads
- County Boundary
- Municipal Boundaries

WUI Risk Index

0 -3 -6 -9

Low High

0 0.28 0.55 1.1 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 – Flood
- H.4 – Hail
- H.5 – Heavy Rain
- H.6 – Heavy Snow
- H.7 – High Wind
- H.8 – Ice Storm
- H.9 – Lightning
- H.10 – Sleet
- H.11 – Tornado
- H.12 – Thunderstorm
- H.13 – 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 (1996-2024)

Date	Description
	Henderson County
3/8/1996	Record cold was at least partially responsible for the deaths of two mountain residents. A homeless man died in Hendersonville and an elderly man in Transylvania county wandered from his home and died from hypothermia.
3/15/1997	A woman in Hendersonville succumbed partly from the cold weather when she was locked outside a home overnight.
4/1/1997	Several cold snaps following the relatively warm late winter caused temperatures to dip well into the 20s at times yielding substantial damage to the apple crop and perhaps other crops.
1/7/2017	Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain's valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th.
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.
1/1/2018	A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon.
1/17/2018	A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet.
1/20/2019	Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina.
12/25/2020	Cold air filtering into western North Carolina on the heels of very gusty northwest winds in the wake of an Arctic cold front resulted in widespread temperatures in the teens throughout Christmas night into the morning of the 26th. Winds gusting in the 25 to 35 mph range resulted in wind chill values of -5 or colder, primarily in elevations above about 3000 feet. Meanwhile, elevations above 5000 feet or so saw gustier winds, temperatures in the single digits, and wind chill values of -15 or lower, with values as cold as -30 reported on the highest peaks and ridge tops.
2/2/2021	Very gusty northwest winds developing in the wake of a cold front combined with air temperatures in the teens and single digits to yield wind chill values in the -5 to -20 range across the high elevations of the Blue Ridge mountains from the evening of the 2nd into the morning of the 3rd.
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

Date	Description
	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.
1/16/2024	Gusty northwest winds brought very cold air to the southern Appalachians in the wake of an arctic cold front. Winds gusting from 35 to 50 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 20 below above 3500 feet. Meanwhile, wind chill values of 5 to 10 below were observed in the lower elevations from the French Broad Valley north.
1/20/2024	The second arctic cold front in 4 days brought gusty northwest winds and another shot of very cold air to the southern Appalachians. Winds gusting from 30 to 45 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 25 below above 3500 feet. Meanwhile, wind chill values from 0 to 10 below were observed in the valleys.
Polk County	
1/7/2015	A strong arctic cold front moved through the western Carolinas during the morning and afternoon of the 7th, bringing gusty winds and very cold air to the Piedmont and foothills. By late evening, sustained winds of 5 to 15 mph combined with air temperatures in the teens to yield wind chill values near 0. Although winds gradually diminished overnight, air temperatures fell to around 10 degrees in many areas by daybreak, and wind chills of 0 to 5 above lingered until temperatures began warming during late morning. However, temperatures remained at or below freezing in many areas throughout the 8th. Record daily lows were set in the Charlotte area on the morning of the 8th.
2/18/2015	A strong arctic cold front blasted through the southern Appalachians and adjacent foothills during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 10 to 25 mph combined with air temperatures in the single digits and teens to yield wind chill values in the 0 to -10 range in the valleys. By daybreak on the 19th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from -5 to -20 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The low wind chills continued throughout the 19th, as air temperatures failed to warm above the mid-20s in even the lowest valleys, and the high elevations remained within a few degrees either side of 0. Wind chills remained no higher than the single digits across most of the area until late morning on the 20th.
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.
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.
1/17/2018	A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet.
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.

Date	Description
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.
1/20/2024	The second arctic cold front in 4 days brought gusty northwest winds and another shot of very cold air to the southern Appalachians. Winds gusting from 30 to 45 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 25 below above 3500 feet. Meanwhile, wind chill values from 0 to 10 below were observed in the valleys.
Rutherford County	
1/7/2015	A strong arctic cold front moved through the western Carolinas during the morning and afternoon of the 7th, bringing gusty winds and very cold air to the Piedmont and foothills. By late evening, sustained winds of 5 to 15 mph combined with air temperatures in the teens to yield wind chill values near 0. Although winds gradually diminished overnight, air temperatures fell to around 10 degrees in many areas by daybreak, and wind chills of 0 to 5 above lingered until temperatures began warming during late morning. However, temperatures remained at or below freezing in many areas throughout the 8th. Record daily lows were set in the Charlotte area on the morning of the 8th.
2/18/2015	A strong arctic cold front blasted through the southern Appalachians and adjacent foothills during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 10 to 25 mph combined with air temperatures in the single digits and teens to yield wind chill values in the 0 to -10 range in the valleys. By daybreak on the 19th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from -5 to -20 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The low wind chills continued throughout the 19th, as air temperatures failed to warm above the mid-20s in even the lowest valleys, and the high elevations remained within a few degrees either side of 0. Wind chills remained no higher than the single digits across most of the area until late morning on the 20th.
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.
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.
1/17/2018	A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet.
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.
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

Date	Description
	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.
1/20/2024	The second arctic cold front in 4 days brought gusty northwest winds and another shot of very cold air to the southern Appalachians. Winds gusting from 30 to 45 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 25 below above 3500 feet. Meanwhile, wind chill values from 0 to 10 below were observed in the valleys.
Transylvania County	
3/8/1996	Record cold was at least partially responsible for the deaths of two mountain residents. A homeless man died in Hendersonville and an elderly man in Transylvania county wandered from his home and died from hypothermia.
4/1/1997	Several cold snaps following the relatively warm late winter caused temperatures to dip well into the 20s at times yielding substantial damage to the apple crop and perhaps other crops.
1/7/2015	An arctic cold front moved through the southern Appalachians and adjacent foothills during the morning and afternoon of the 7th, bringing strong winds and very cold air to the region. By late evening, sustained winds of 10 to 20 mph combined with air temperatures in the teens to yield wind chill values in the 0 to -5 range in the valleys. By daybreak on the 8th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from 0 to -15 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The very low wind chills abated throughout the 8th, as temperatures warmed and winds diminished. However, air temperatures remained below freezing throughout the 8th.
2/18/2015	A strong arctic cold front blasted through the southern Appalachians and adjacent foothills during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 10 to 25 mph combined with air temperatures in the single digits and teens to yield wind chill values in the 0 to -10 range in the valleys. By daybreak on the 19th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from -5 to -20 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The low wind chills continued throughout the 19th, as air temperatures failed to warm above the mid-20s in even the lowest valleys, and the high elevations remained within a few degrees either side of 0. Wind chills remained no higher than the single digits across most of the area until late morning on the 20th.
1/7/2017	Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain's valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th.
1/1/2018	A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon.
1/17/2018	A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet.

Date	Description
1/20/2019	Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina.
1/29/2019	An arctic cold front swept through the North Carolina mountains during the afternoon of the 29th, followed by a reinforcing front on the 30th. This led to an extended period of very cold weather and low wind chill across the high elevations. Temperatures remained in the single digits and teens throughout this time, with gusty northwest winds resulting in wind chill values of -5 to -15 across much of the area. Meanwhile, wind chills as low as -30 were reported on the high peaks and ridge tops above 5500 ft. Temperatures and wind speeds finally began to moderate by late morning on the 31st.
3/5/2019	Unseasonably cold air combined with gusty northwest winds in the wake of a cold front to produce very low wind chills in the high elevations of the North Carolina mountains during the night of the 5th into the morning of the 6th. Air temperatures in the teens and winds gusting to 20 to 30 mph generally produced wind chill values of -5 to -10 in areas above 3500 feet. However, locations above 5000 feet, where air temperatures dropped to as low as 0 and where winds gusted to 40 mph or higher, saw wind chills as low as -30.
12/25/2020	Cold air filtering into western North Carolina on the heels of very gusty northwest winds in the wake of an Arctic cold front resulted in widespread temperatures in the teens throughout Christmas night into the morning of the 26th. Winds gusting in the 25 to 35 mph range resulted in wind chill values of -5 or colder, primarily in elevations above about 3000 feet. Meanwhile, elevations above 5000 feet or so saw gustier winds, temperatures in the single digits, and wind chill values of -15 or lower, with values as cold as -30 reported on the highest peaks and ridge tops.
2/2/2021	Very gusty northwest winds developing in the wake of a cold front combined with air temperatures in the teens and single digits to yield wind chill values in the -5 to -20 range across the high elevations of the Blue Ridge mountains from the evening of the 2nd into the morning of the 3rd.
1/16/2024	Gusty northwest winds brought very cold air to the southern Appalachians in the wake of an arctic cold front. Winds gusting from 35 to 50 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 20 below above 3500 feet. Meanwhile, wind chill values of 5 to 10 below were observed in the lower elevations from the French Broad Valley north.
1/20/2024	The second arctic cold front in 4 days brought gusty northwest winds and another shot of very cold air to the southern Appalachians. Winds gusting from 30 to 45 mph combined with air temperatures in the single digits, with some below zero readings observed above 4000 feet, to produce wind chill values between 10 and 25 below above 3500 feet. Meanwhile, wind chill values from 0 to 10 below were observed in the valleys.

Source: NOAA, NCEI

TABLE H.2: DROUGHT EVENTS (1998-2024)

Date	Description
7/1/1998	Dry weather continued through much of the month of July, affecting crops during the critical part of the growing season. Corn and other vegetables sustained the most damage, but a dollar amount was not available at the time of this writing.
10/1/1998	The drought which began during the summer continued through October. The only significant rainfall during the month occurred on the 7-8th. Cities and counties began to restrict water usage and streamflows for several mountain locations were reduced to the lowest seen in 50 years.
11/1/1998	Dry weather persisted into the late fall with rainfall deficits between 5 and 10 inches. This affected late season crops and caused water shortages. Water usage restrictions were initiated in many communities.
8/1/1999	The drought worsened during the month of August as high evaporation rates and little rainfall occurred. The most severe conditions by the end of the month had developed in the foothills and piedmont. Water restrictions began in several communities, and for some, the first time in memory. Hay and late crops dried up in many counties. Ponds and wells began to dry up as well, affecting homeowners, farmers, and businesses such as nurseries. In addition, boaters were running aground on recreational lakes due to low water levels.
9/1/1999	Rainfall continued to be scarce across much of western North Carolina through the month of September, prolonging the drought conditions which existed all summer. However, some areas in the piedmont picked up some rain from the remnants of Hurricane Dennis early in the month and from Hurricane Floyd itself two weeks later. Although this rain brought some relief, more wells ran dry and many more areas began mandatory water restrictions.
10/1/1999	The return of some rainfall as well as lower evaporation rates due to the change of seasons, resulted in the drought easing somewhat. Drought classifications were lowered in some cases, and some places lifted water restrictions. However, the drought had not ended by the end of the month.
8/1/2000	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.
9/1/2000	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.
10/1/2000	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.
11/1/2000	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.
2/1/2001	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.
3/1/2001	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.
4/1/2001	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.
5/1/2001	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.
8/1/2001	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.
11/1/2001	

Date	Description
12/1/2001	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 Western North Carolina.
8/1/2002	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.
5/1/2007	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.
6/1/2007	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.
7/1/2007	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.
8/1/2007	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.
9/1/2007	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. County-based losses for the growing season will be included in next month's Storm Data.
10/1/2007	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. In some areas, the water situation was becoming dire, with Monroe, NC officials reporting that water supplies would be exhausted by early 2008 if significant rain did not occur. Also, private wells were beginning

Date	Description
	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.
11/1/2007	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.
12/1/2007	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 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.
1/1/2008	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.
6/1/2008	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 western Carolinas and northeast Georgia. 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.
7/1/2008	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 Upstate South Carolina and extreme western North Carolina 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.
8/1/2008	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.
9/1/2008	The heavy rain brought by Tropical Storm Fay in late August provided some relief to the drought conditions across the area. This was particularly true across the North Carolina piedmont, where improving conditions were aided by normal September rainfall. However, another dry month resulted in a persistence of extreme to exceptional drought conditions across the North Carolina mountains and foothills. 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 streamflows, 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.

Date	Description
	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.
10/1/2008	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 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.
11/1/2008	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.
11/1/2016	Abnormally dry weather that began early in 2016 and continued through the spring, summer, and early fall resulted in establishment of extreme to exceptional drought conditions across the across the southern and central mountains and southern foothills of North Carolina by November. Total rainfall deficits for the period from July until the end of November were as much as 18 inches below normal, while annual rainfall deficits were two feet or more below normal. The drought conditions worsened farther to the southwest across the state. Drought conditions were exacerbated by an unusually warm late summer and early fall, when it is not unusual to see temperatures 10 to 15 degrees above normal. Stream flows and reservoir levels were well below normal across the area, while the very dry vegetation resulted in volatile wildfire conditions. A strong cold front brought much needed rainfall to the area during the last couple of days of the month, spelling the start of a wetter period that brought an end to the more extreme drought conditions.

TABLE H.3: FLOOD EVENTS (1996-2024)

Location	Date	Description
Henderson County		
Unincorporated Area	1/19/1996	An extremely strong cold front, preceeded by heavy rain all day, moved through the mountains, foothills and piedmont during the night. Heavy rain and flooding accompanied the storm system. Several inches of rain fell across the mountains during the day. At Rosman, the French Broad River flooded causing some evacuations in the downtown area.
Unincorporated Area	1/26/1996	Prolonged rain became heavier following the ice. the rain increased into the night when some thunderstorms moved in from the west. Rainfall became excessive, more then 3 and 4 inches in some cases, causing flooding to begin by mid evening. At Asheville the flooding caused a wall to collapse onto several parked cars causing extensive damage. Numerous roads were closed around the mountains and foothills. Several major rivers flooded including the French Broad and the Oconoluftee. Evacuations were required in several counties because of flooding. In this event the flooding was not severe in the northern mountains.
Unincorporated Area	2/22/2003	An extended period of rainl that resulted in to 2 to 3 inches of rainfall caused portions of the French Broad River to flood from Hendersonville to East Flat Rock. Several roads were flooded near the river.
Unincorporated Area	4/10/2003	Rising water levels along the French Broad River resulted in flooding of a boat dock and a parking lot near Fletcher.
Unincorporated Area	2/6/2004	Flooding along the French Broad continued downstream to affect lowland areas in Henderson County to just south of Asheville.
Unincorporated Area	6/14/2004	An evening of heavy rainfall caused flooding to develop along the Broad River. At least one road was closed due to high water.
Unincorporated Area	9/7/2004	The remnants of Hurricane Frances brought very heavy rainfall to western North Carolina on the 7th and 8th, resulting in widespread severe flooding across the mountains and foothills. Flooding first developed in Transylvania County, as the Little River overflowed its banks during the afternoon. Shortly thereafter, flooding developed along Shaws Creek in Henderson County, and in the Cruso community of Haywood County. As moderate to heavy rainfall continued into the evening hours, flooding gradually worsened and expanded across the area. By the early morning hours of the 8th, flooding was widespread and severe across much of the area, with most creeks and streams in flood. Major flooding developed along the French Broad River, which reached a near-record stage of 25 feet at Blantyre, and 21 feet in Canton. In Haywood County, flooding along the Pigeon River was described as the worst in over 60 years. Hundreds of homes and businesses were damaged or destroyed across the area, necessitating a number of evacuations and rescues. Clyde and Canton endured the brunt of this damage. Numerous roads and bridges were washed out as well.
Unincorporated Area	9/17/2004	Flooding began shortly after midnight across portions of the southern mountains and foothills. Henderson County experienced the most severe flooding, as numerous homes were damaged by flood waters, with damaged homes from the combination of the Ivan and Frances floods numbering in the hundreds. Residents described the small stream flooding experienced in Henderson County as the worst seen in many years. Numerous roads were blocked by high water, including highways 64, 280, and 25. The situation was much less serious in Polk County, although flooding did develop along the Pacolet River and several of its tributaries, as well as some creeks in the Columbus area.
Unincorporated Area	7/7/2005	Several road closures due to high water, mainly in the Hendersonville area, including Blackwell Dr, Fruitland Rd, South Main, Airport Rd, and at least 4 others. A portion of highway 25 was closed north of Hendersonville. Jeffress Rd was also flooded in the Mills River area.
HENDERSONVILLE	7/3/2001	A couple of roads flooded in low places, with a few cars stranded in 4 to 5 feet of water.
BAT CAVE	6/26/2006	Flooding continued along the Rocky Broad River through mid-afternoon.

Location	Date	Description
MILLS RIVER	9/20/2009	Although flash flooding ended across the area around sunrise, persistent moderate to heavy rainfall caused high water conditions to persist in central Henderson County through the morning hours. Flooding also expanded to areas near Mills River, as Butler Bridge Rd was closed about 8 miles northwest of Hendersonville. In addition to the flooding, saturated soil resulted in quite a few fallen trees and isolated small landslides.
MILLS RIVER	9/21/2009	An extended period of moderate to heavy rain resulted in flooding along the Mills River. Portions of South Mills River Rd and River Loop Rd were covered in water. Also, flooding began on the French Broad River near Etowah around this time, covering portions of highway 64, Pleasant Grove Rd, and Willow Rd with water. A total of 35 roads in Henderson and Transylvania Counties were blocked by flood waters. River flooding continued until the evening hours on the 24th.
MILLS RIVER	11/11/2009	Although heavy rain began to taper off during the morning, flooding persisted along a few smaller streams into the late morning in response to 4 to 6 inches of storm total rainfall. In addition, minor flooding developed briefly in spots along the French Broad River.
MILLS RIVER	1/24/2010	Significant urban flooding developed on the Cabarrus side of Kannapolis, with numerous roads closed due to high water. Affected roads included Verona, Fairview, Eddleman, South Little Texas, Pine, and Trinity Church Rd. Evacuations became necessary on Pine St and Verona St.
ETOWAH	2/6/2010	The French Broad River exceeded flood stage at Blantyre early on the 6th, and remained in flood until the afternoon of the 7th.
FLETCHER	11/30/2010	Although heavy rainfall began to diminish during the evening, persistent moderate rain combined with runoff to allow flooding to continue across Henderson County into the overnight hours. Mud Creek and Bat Fork Creek remained in flood throughout the overnight hours as water worked its way down the French Broad River from Transylvania County. Flood waters on the river progressed as far north as Fletcher, which exceeded flood stage during the afternoon of the 1st. Stream flooding continued into the morning hours of December 1st, and the French Broad River remained in flood until the morning hours of the 3rd.
FLETCHER	12/1/2010	Although heavy rainfall began to diminish during the evening, persistent moderate rain combined with runoff to allow flooding to continue across Henderson County into the early morning hours of the 1st. Mud Creek and Bat Fork Creek remained in flood throughout the overnight hours as water worked its way down the French Broad River from Transylvania County. Flood waters on the river progressed as far north as Fletcher, which exceeded flood stage during the afternoon of the 1st. The French Broad River remained in flood until the morning hours of the 3rd.
DRUID HILLS	3/6/2011	Although heavy rain tapered off during mid-morning, stream gauges indicated high|water conditions persisted through the afternoon in the Hendersonville area.
ETOWAH	3/6/2011	Runoff from heavy rainfall over Transylvania County resulted in flooding along the French Broad River in the Etowah area with minor flooding of several roads near the river. The river flooding persisted into the 7th and 8th, with the French Broad cresting at 17.9 feet at Blantyre early on the 7th.
DRUID HILLS	3/9/2011	Although heavy rain was tapering off during the afternoon, stream gauges indicated high water conditions persisted through the evening in the Hendersonville area.
ETOWAH	3/9/2011	Runoff from heavy rainfall over Transylvania County resulted in flooding along the French Broad River in the Etowah area. Just like three days before, several roads near the river were flooded. The flooding persisted into the 10th and 11th, with the French Broad at Blantyre cresting at 17.2 feet late on the 10th.
ETOWAH	1/17/2013	The middle reaches of the French Broad River in Henderson County remained in flood for around 2 days as runoff from heavy rain worked it's way through the river system. This resulted in flooded roads and bottom land close to the river.
ETOWAH	1/31/2013	The middle reaches of the French Broad River in Henderson County remained in flood for almost 2 days as runoff from heavy rain worked it's way through the river system. This resulted in flooded roads and bottom land close to the river.

Location	Date	Description
SMYTH	5/5/2013	A long duration of moderate to heavy rain caused several creeks in central Henderson County to go into flood by the mid-morning hours of the 5th. Mud Creek flooded Balfour Road near the Hendersonville water treatment plant. Fruitland Road was flooded by Clear Creek near the intersection of Lancaster Road. Flooding was reported in many parts of Hendersonville as Mud Creek went above flood stage around 10 am. Flooded roads in town included South King Street, East Caswell Street and White Street. Old Airport Road was flooded by Cane Creek in Fletcher, though the flooding took several hours longer to develop in the northern part of the county.
MILLS RIVER	5/5/2013	Flooding developed on several roads in the Mills River Community by the mid-afternoon hours of the 5th. Flooded roads included Butler Bridge Road, Warlick Road, and Jeffress Road. Mills River also flooded North Mills River Rd by the late evening hours. Butler Bridge was flooded by the French Broad River, but may have been affected by a stream initially. Some roads in the north and west part of the county were flooded well into the next day and beyond as the French Broad River rose to a level of 19.29 feet by the afternoon hours of the 6th and only slowly receded thereafter.
FLETCHER	7/3/2013	The county communication center reported that Jackson Creek had flooded and closed Jackson Road near the intersection of Howard Gap Road. Etowah School Road was flooded by Gash Creek near the intersection of Drexel School Road. Also, Warlick Road was flooded by Boylston Creek not far from the intersection of Turnpike Road.
LAUREL PARK	10/14/2014	Although heavy rain tapered off by late evening, flooding continued along the Mud Creek and Clear Creek basins into the early morning hours. In addition, minor flooding developed along the French Broad River near the Transylvania County during the afternoon of the 15th.
LAUREL PARK	11/23/2014	An automated rain gage on Mud Creek rose above flood stage after 3 to 4 inches of rain fell over several hours. Water covered portions of South King St and South Grove St, as well as South Center Plaza and the intersection of Highway 176 and 25.
VALLEY HILL	10/3/2015	Heavy rain ended, but flooding continued in the Mud Creek basin, with water moving downstream and flooding Balfour Rd through the afternoon and early evening. Some flooding also developed along Bat Fork at Airport Rd.
LAUREL PARK	11/18/2015	After as much as three inches of rain fell over central Henderson County in 24 hours, a stream gauge on Mud Creek near downtown Hendersonville exceeded its established flood stage. This indicated several roads flooded near the intersection of Spartanburg Highway and S Main St.
FLAT ROCK	10/23/2017	Multiple stream gauges indicated flooding developed over portions of central and northern Henderson County after 4-6 inches of rain fell across the county throughout the 23rd. Affected streams included, but were not limited to Mud Creek and Bat Fork Creek in the Hendersonville area and the Rocky Broad River and Cane Creek in the northern part of the county. Roads impacted included the intersection of South Church St and South King St, as well as Airport Rd and Dana Rd in the Hendersonville area; Mills Gap Rd in Fletcher, as well as other fields and low spots along these creeks.
LAUREL PARK	5/16/2018	Stream gauge and county comms reported flooding developed along Mud Creek after 3 to 6 inches of rain fell across Henderson County in about 18 hours. Impacted roads included an access road at the intersection of S Church St and S Main St and Kanuga Rd at Erkwood Dr.
BAT CAVE	5/29/2018	A stream gauge on the Rocky Broad River at Bat Cave indicated the river exceeded its established flood stage, flooding campgrounds and some secondary roads.
VALLEY HILL	12/28/2018	Stream gauges and county comms reported small stream flooding across central and northern Henderson Counties after 4.5 to 5.5 inches of rain fell across the county in about 24 hours. A gauge on Mud Creek near Hendersonville indicated flooding of parking lots and side streets on the south side of downtown Hendersonville, near the intersection of South Church St and South King St. In Fletcher, Cane Creek flooded parts of Howard Gap Rd and Hendersonville Rd.
BOWMAN BLUFF	4/19/2019	Emergency manager and stream gauges indicated flash flooding developed across western and northern Henderson County after 4 to 5 inches of rain fell over the area in just a few hours. Flooding was first reported along Gosh Creek in Etowah, which inundated at least one

Location	Date	Description
		road (Timberline Dr.) Flash flooding also developed along Hoopers Creek and Cane Creek in the Fletcher area, impacting portions of Jackson Rd and Howard Gap Road. One residence was evacuated along Jackson Rd. By early evening, flooding had developed along the Mills River, which sent water over Mills River Rd in a couple of locations. Although the heavy rain and flash flooding ended across the county by the evening of the 19th, minor to moderate river flooding developed along the French Broad from Blantyre to Fletcher and continued through the 21st.
MILLS RIVER	2/6/2020	County comms and stream gauges reported flash flooding developed across Henderson County after 4 to 5 inches of rain fell across the area in about 24 hours, with much of that falling during the morning and afternoon of the 7th. Multiple roads were inundated and closed throughout the county due to a combination of poor drainage and small stream flooding. This included Mud Creek near downtown Hendersonville, which flooded areas near S Church St and S Main St.
MILLS RIVER	2/6/2020	Although heavy rain steadily tapered off across Henderson County during the afternoon, high water conditions persisted into the evening, with multiple roads remaining closed. Meanwhile, river flooding developed along the French Broad from the Transylvania County border to the Fletcher area during this time, eventually reaching moderate stage in the Blantyre area during the evening of the 7th, and not receding below flood stage until the afternoon of the 9th.
LAUREL PARK	10/29/2020	A stream gauge on Mud Creek in Hendersonville indicated flash flooding occurred after 2 to 4 inches of rain fell across the area in around 24 hours. Several low lying spots along the creek were inundated. Additionally, Wash Creek flooded a parking lot and access road at the intersection of S Church St and S Main St.
LAUREL PARK	3/25/2021	A stream gauge reported flooding developed along Mud Creek after 4.5 to 6 inches of rain fell across Henderson County, mostly in about a 12-hour period from the 25th into the early part of the 27th. Impacted roads included an access road at the intersection of S Church St and S Main St and Kanuga Rd at Erkwood Dr.
BEARWALLOW	8/17/2021	Stream gauges indicated flash flooding developed near the upper reaches of the Broad River and also along Mills River in northern Henderson County after 6 to 12 inches of rain fell in around 24 hours over their respective headwaters, with a significant amount of that rain falling in just a few hours from late morning into the afternoon on the 17th. Campgrounds and a few homes were inundated and Highway 64 closed in the Bat Cave area. This flooding prompted evacuations downstream in the Chimney Rock and Lake Lure area in Rutherford County. Multiple roads were also inundated along Mills River in the northwest part of the county.
MILLS RIVER	8/17/2021	Although heavy rainfall tapered off across Henderson County during the late afternoon and evening, stream gauges indicated runoff from the earlier rainfall resulted in flooding persisting along the upper French Broad basin into the early morning hours of the 18th. Multiple roads remained covered and closed along Mills River. In addition, moderate main stem river flooding developed downstream to Blantyre and vicinity during the early morning hours of the 18th. While most of the water receded by daybreak on the 18th, moderate main stem river flooding persisted at Blantyre and vicinity until the early morning of the 20th, and the river did not fall below flood stage until the evening of the 20th.
BAT CAVE	10/7/2021	A stream gauge on the Broad River at Bat Cave indicated flash flooding developed, with over a one-foot rise in less than an hour, after 3 to 6 inches of rain fell across the basin in just a few hours. Multiple campgrounds and a few homes were inundated from Bat Cave and vicinity downstream to the Rutherford County line.
LAUREL PARK	3/23/2022	A stream gauge reported flooding developed along Mud Creek after 3 to 4 inches of rain fell in the Hendersonville area in about a 24-hour period. Impacted roads included an access road at the intersection of S Church St and S Main St and Kanuga Rd at Erkwood Dr.
LAUREL PARK	5/26/2022	A stream gauge reported flash flooding developed along Mud Creek after 2.5 to 4 inches of rain fell in the Hendersonville area in about a 24-hour period, with more than half of that

Location	Date	Description
		falling during the afternoon of the 26th. Impacted roads included an access road at the intersection of S Church St and S Main St and Kanuga Rd at Erkwood Dr.
LAUREL PARK	5/26/2022	Although heavy rain ended across Henderson County during the evening of the 26th, flooding persisted along Mud Creek on the south side of Hendersonville into the early morning hours of the 27th.
LAUREL PARK	12/26/2023	Public reported multiple roads were inundated by floodwater and closed across the south side of Hendersonville after 4 to 6 inches of rain fell in about 24 hours. Portions of South Main St were inundated, including at King St and at Spartanburg Highway due to Mud Creek overflowing its banks. Greenways and outbuildings along Mud Creek were also flooded, with high water conditions continuing into the early morning hours of the 27th. Airport Rd was also flooded and closed due to inundation from Bat Fork.
MILLS RIVER	1/9/2024	County comms and stream gauges reported flash flooding developed across Henderson County after 3 to 6 inches of rain fell across the area in about 12 hours. Multiple roads were inundated and closed throughout the county due to a combination of poor drainage and small stream flooding. This included Boylston Creek, which overflowed at least one road. Mud Creek near downtown Hendersonville flooded areas near S Church St and S Main St as well as parks and greenways along the stream. Bat Fork Creek also overflowed its banks and inundated Airport Rd, New Hope Rd, as well as runways at the Hendersonville Airport. Additionally, Cushion Creek overflowed its banks in the Fletcher area, inundating Jackson Rd and Howard Gap Rd.
NAPLES	1/9/2024	Although heavy rain ended across Henderson County during the afternoon of the 9th, runoff from the rainfall resulted in persistent flooding across the Mud Creek and other streams in Hendersonville and vicinity, including Bat Fork Creek. Multiple roads remained impassable and closed during this time.
ETOWAH	7/21/2024	County comms reported flash flooding developed across northwest Henderson County, primarily in the Mills River and Fletcher areas after 2.5 to 3.5 inches of rain fell from slow moving thunderstorms in just a couple of hours. Multiple roads were inundated and closed due to small stream flooding or poor drainage. These included Boylston Highway near the intersection of Clement Dr, Turnpike Rd near the intersection of Ray Hill Rd, Howard Gap Road near Fletcher Park, and Asheville Highway at I-26.
ETOWAH	7/30/2024	Emergency management reported flash flooding developed across western Henderson County after 3.5 to 6 inches of rain fell from training thunderstorms in just a couple of hours. Big Willow Creek and its tributaries were the main streams impacted. In addition to inundating multiple roads, including Patterson Rd with more than a foot of water, multiple private bridges were washed out, especially along Willow Creek Rd.
BAT CAVE	9/25/2024	A stream gauge on the Broad River at Bat Cave indicated flash flooding developed, with over a one-foot rise in less than an hour, after 3 to 5 inches of rain fell across the basin in less than 6 hours. Multiple campgrounds and the crawl spaces of a few homes were inundated from Bat Cave and vicinity downstream to the Rutherford County line.
VALLEY HILL	9/26/2024	Stream gauges reported and county comms confirmed flash flooding developed along Mud Creek after 3 to 5 inches of rain fell in the Hendersonville area in less than 12 hours, with one to 2 inches of that falling during the early morning of the 26th. Impacted roads included an access road at the intersection of S Church St and S Main St and Kanuga Rd at Erkwood Dr. Greenways and low-lying roads were also inundated farther downstream between Hendersonville and the French Broad River.
VALLEY HILL	9/26/2024	Although rainfall rates diminished considerably during the late morning and early afternoon of the 26th, mostly light to moderate and occasionally heavy showers continued streaming across Henderson County throughout the day. Flooding worsened in the Mud Creek basin during this time owing to the substantial runoff from earlier rainfall, but stream rises became more gradual and steady until very heavy rainfall redeveloped during the evening.

Location	Date	Description
BAT CAVE	9/26/2024	Historic and catastrophic flash flooding developed along multiple streams across Henderson County during the overnight and early morning hours as rainfall rates began to intensify again during the evening. Flash flooding first redeveloped along the Rocky Broad River in the Bat Cave community, but spread to encompass most of the other major streams in the county, including Mud Creek and Bat Fork in the Hendersonville area, as well as Mills River and Cane Creek. The most intense rainfall occurred around sunrise, as the tropical rain bands near the center of Helene swept across the area. Catastrophic flash flooding first developed along the Rocky Broad River and its tributary Reedypatch Creek. Numerous homes were swept away along both streams. Seven fatalities were reported in Henderson County, mostly occurring in homes that were destroyed in the Bat Cave area (F63HOU, F89HOU, M65UNK, M66HOU, F60HOU, F50HOU, M72UNK). Major flooding developed along Mud Creek and Bat Fork, with numerous businesses and other structures inundated in the Hendersonville area. Meanwhile, stream levels on the French Broad River at Fletcher, which was already in moderate flood, began to increase rapidly around sunrise, reaching major flood stage and exceeding the record stage by more than 10 feet (the gauge was installed in 2002). Numerous roads were damaged or washed out throughout the county. Three-day rainfall amounts ranged from 9-15 inches across much of the county to 15-20 inches, with locally higher amounts across the southern and eastern part of the county. Hundreds of landslides also occurred across Henderson County, especially in the eastern part of the county. This contributed further to structural damage.
BAT CAVE	9/27/2024	Although rainfall ended across Henderson County during the morning, catastrophic flooding lingered through the afternoon as runoff from historic rainfall amounts continued to fill waterways. While smaller streams receded by late evening of the 27th, major river flooding continued along the French Broad River until the evening of the 29th. The river remained above flood stage until the evening of the 30th.
Polk County		
LAKE LURE	9/4/1996	Classic flash flooding developed rapidly during the evening as stationary thunderstorms dumped between 10 and 15 inches of rain in a small area of the Hickory Nut Gorge". A wall of water rushed down the valley of the Rocky Broad River carrying campsites, RVs, mobile homes, trees, and debris downstream. Mudslides caused some buildings to be swept into the current. Debris and trash filled the lake for days. Areas below the Lake Lure dam in Polk county flooded and evacuations were required. The only reported injury was where a house collapsed from mudslides near Bat Cave."
COUNTYWIDE	1/7/1998	"A powerful winter storm pumped abundant moisture on very strong southerly winds into western North Carolina. The result was nearly 15 million dollars in damage across the mountains and foothills as up to 15 inches of rain fell on the higher terrain, causing significant to major flooding and flash flooding. The Asheville Airport set a new record for 24 hour rainfall in the month of January with 4.42 inches. Where not specified above, the excessive rain caused creeks and streams to rise well out of their banks. This combined with the enormous amounts of run-off to cause numerous roads and bridges to be covered in water or washed out. The Blue Ridge Parkway in Haywood county sustained considerable damage.
COUNTYWIDE	2/3/1998	A strong slow-moving winter storm moved from the Gulf of Mexico north through the Carolinas on the 3rd and 4th, bringing with it heavy rain, snow and high winds. Snow accumulated between 1 and 3 inches across the higher elevations of the mountains by early afternoon on the 3rd. Newland, Beech Mountain and Jonas Ridge had 4 inches of snow by early evening. Mount Mitchell ended up with 20 inches of snow. Roads were icy across the higher elevations and contributed to some wrecks. Heavy rain in Candler early in the morning caused a mobile home to collapse, destroying its' contents. Flooding developed across portions of the mountains during the afternoon as creeks overflowed, covering roads in many areas. High gradient winds between strong high pressure in the upper Midwest and the passing strong low pressure combined with wet ground conditions to down numerous trees

Location	Date	Description
		and power lines. Power outages and blocked roads were common into the evening hours. A building collapsed in Statesville due to the wind.
COLUMBUS	7/30/2003	Several roads were closed around the city due to flooding. A mudslide developed in the western part of the county.
COUNTYWIDE	8/11/2003	Around 5 inches of rain fell across much of Polk County during the late evening of the 11th, resulting in widespread flooding of streams and roads across the county. One person was trapped in his home due to flooding along the North Pacolet River south of Columbus.
COUNTYWIDE	9/7/2004	After general flooding developed during the afternoon, rainfall rates increased during the late evening, as showers producing very heavy rainfall moved continuously over the Blue Ridge, leading to a period of rapid rises on streams and creeks and subsequent flash flooding. In Polk County, evacuations became necessary along Lake Adger during this time.
COLUMBUS	7/7/2005	Several roads across the county were closed due to flooding, mainly in the Columbus and Mill Spring areas. Portions of highway 9, Big Level Rd, Landrum Rd, Fox Mountain Rd, and Hunting Country Rd were closed.
SALUDA	7/22/2006	Significant flooding developed in Saluda after numerous thunderstorms trained over the area. Several roads were closed, including Ozone Rd.
MT VLY	9/20/2009	Flash flooding developed along the Green River, forcing evacuations and closing Green River Cove Rd. Water reportedly entered several homes along the River, with water up to the windows of one home.
MT VLY	9/20/2009	Although rain rates diminished during mid-morning, flooding persisted in the Green River Cove Rd area through the remainder of the morning, with evacuations becoming necessary. In addition to the flooding, saturated soil resulted in quite a few fallen trees and isolated small landslides.
PEA RIDGE	5/5/2013	Most of the flooding with this duration rain event occurred as a result of rises along the Green River in the northeast part of the county. Several roads that cross or run near the Green River were flooded, including Ken Miller Road, John Watson Road and Abrams Moore Road. Roads within the Green River Highlands subdivision were flooded as well. An NWS employee who lives in the south-central part of the county measured 5.11 inches of rain for the event.
COLUMBUS	7/13/2013	A stream flooded Houston Road near Dimsdale lane, trapping people in their cars (2 NNE Columbus). Two mudslides were also reported around Mill Spring. A 40 foot section of Peniel Road was washed out by Mill Creek between Hugh Champion Road and Highway 9 south. A private road, Hawks Landing Drive, also had a large section washed out in this area. Water reportedly entered a few homes in this area as well.
COLUMBUS	7/20/2013	Hooper Creek flooded Henderson Road, making it impassable to through traffic.
TRYON	7/20/2013	East Howard Street was flooded by a tributary of Vaughn Creek. Also, water was reported to be swiftly moving across a low part of Landrum Road, likely due to a creek (5 SE Columbus). An NWS employee reported 4.35 inches of rain in this area in two hours (4 E Columbus).
MELROSE	12/29/2015	County comms reported flash flooding developed across much of Polk County after 3 to 4.5 inches of rain fell in just a few hours. Multiple roads were affected by multiple streams, while drainage flooding also developed, particularly in urban areas around Tryon and Columbus.
MELROSE	12/29/2015	Although heavy rain tapered off across Polk County shortly after midnight, runoff from the earlier rainfall caused flooding to persist across the area through the pre-dawn hours.
SALUDA	5/18/2018	Multiple sources reported significant flash flooding developed across western Polk County, particularly in the Saluda area after 4 to 7 inches of rain fell across the area in just a few hours. Some of the main impacts were along Cove Creek and its tributaries, where water rescues were required in the area around I-26 and Ozone Dr. Multiple roads in this area, including I-26 itself were flooded due to drainage problems and small streams. A tributary of Cove Creek flooded Howard Gap Rd at Rhododendron Dr. Across the northern part of the county, Lake Adger Parkway was covered with water from Silver Creek. Flooding was also reported along the North Pacolet River along the Highway 176 corridor between Columbus and Saluda. While

Location	Date	Description
		the flooding was significant, the worst impact of the heavy rain was from numerous landslides and slope failures.
SALUDA	5/19/2018	Although heavy rain ended across western Polk County late in the evening on the 18th, high water conditions persisted across the Saluda and Green River area through the overnight and much of the daylight hours on the 19th before the water finally receded.
VALHALLA	5/29/2018	County comms and the media reported that flash flooding developed across western Polk County for the 2nd time in less than two weeks, after 4 to 6 inches of rain fell throughout the 29th into the 30th, with much of that occurring over a couple of hours during the evening. The most significant flooding was along Brights Creek west of Lake Adger, which overflowed its banks and flooded multiple bridges, effectively cutting off the Brights Creek community for a brief time. Highway 64 was closed due to flooding along the North Pacolet, where a mobile home park was also evacuated. Additional closed roads included Green River Cove Rd, Holbert Cove Rd, and Warrior Drive (due to a tributary of the North Pacolet).
SALUDA	10/11/2018	EM reported numerous roads closed due to a combination of urban drainage and small stream flooding throughout the southwest part of Polk County after 5 to 8 inches of rain fell in just a few hours. Among the closed roads was Holbert Cove Rd, which was completely washed out near Saluda.
SUNNY VIEW	12/28/2018	Emergency manager reported flooding along the Green River and some of its tributaries resulted in several road closures in locations around Lake Adger and point downstream. 3 to 4.5 inches of rain fell in the basin in about 24 hours.
VALHALLA	2/6/2020	Media reported flash flooding developed across Polk County after 4 to 6 inches of rain fell across the county in about 24 hours with much of that falling during the morning of the 6th. The main streams impacted were the North Pacolet River and several of its tributaries in the Tryon area and Green Creek and its tributaries in the Mill Spring area. Numerous roads were inundated and impassable/closed due to flooding of these and other streams. The North Pacolet flooded several roads in the Lynn community just north of Tryon. In the Columbus area, Fox Mountain Rd was flooded by White Oak Creek and its tributaries in several spots. Urban and poor drainage flooding was also reported in Columbus, and more than a dozen people were rescued after being trapped by flood water. In the Mill Spring and Green Creek area, Green Creek and its tributaries inundated such roads as Coxe Rd, East Green Creek Rd, and Solen Williams Rd.
VALHALLA	2/6/2020	Although heavy rain tapered off across Polk County throughout the afternoon and evening, runoff from the excessive rainfall that fell throughout the 6th resulted in continued high water conditions into the overnight hours, with multiple roads remaining closed.
VALHALLA	5/19/2020	Media reported flash flooding developed along the North Pacolet watershed after training heavy rain showers and thunderstorms produced several inches of rain in just a few hours. A tributary of the North Pacolet inundated Horseshoe Curve Rd in several spots, while the Pacolet overflowed its banks and flooded River Rd at Golden Rd. Several small landslides were also reported in the area.
VALHALLA	5/19/2020	Although heavy rainfall began to taper off across the North Pacolet basin during the afternoon, high water conditions persisted until early evening. Two day rainfall totals of 4 to 7 inches were reported across the area.
MC GINNIS XRDS	7/24/2021	County comms reported flash flooding developed from a combination of poor drainage and overflowing small streams after 4 to 7 inches of rain fell in the Green Creek area in just a couple of hours. Multiple roads were inundated and closed. A driveway was also washed out, necessitating rescue of a resident.
MILL SPG	11/11/2022	County comms reported flash flooding developed along the Ostin Creek basin after 3 to 4 inches of rain fell in around 24 hours, with around half of that falling during the late morning. Holbert Cove Rd was inundated and closed in at least one spot.
COLLINSVILLE	6/20/2023	Media and county comms reported flash flooding developed along upper portions of the North Pacolet River and multiple tributaries after 6 to 10 inches of rain fell in around 12 hours

Location	Date	Description
		across southwest Polk County, with much of that falling in around 4 hours prior to daybreak. More than a dozen roads were inundated, including multiple roads over Skyuka Creek. A bridge over the Pacolet on Howard Gap Rd collapsed when the river rose to the level of the bridge.
SALUDA	1/9/2024	County comms and newspaper reported flash flooding developed across Polk County after 3 to 5 inches of rain fell across much of the county in around 12 hours. Multiple roads throughout the county were inundated and closed due to either small stream flooding or poor drainage. These included Hunting Country Rd at Carriage Row Rd, Abrams Moore Rd, Coxe Rd at Phillips Dairy Rd, and the intersection of River Rd, Hooker Rd and Scriven Rd.
MELROSE	9/27/2024	Stream gauges and the media reported catastrophic flash flooding developed along the North Pacolet and Green River basins in the western half of Polk County after 15-20 inches of rain fell across the area over three days, with 1.5 to 2.5 inches of that falling in less than three hours on the morning of the 27th as tropical rainbands near the remnant center of Helene swept across the area. Dozens of structures were damaged or destroyed along Green River Cove Rd and along Highway 176 due to flooding along the North Pacolet. In addition to the major stream flooding, the extreme rainfall triggered dozens of landslides across the western third of the county. One of these landslides destroyed a home off Highway 176, killing a 67-year-old woman.
MELROSE	9/27/2024	Although heavy rain ended across Polk County during the morning of the 27th, significant flooding continued along the North Pacolet and Green River basins through the afternoon. Most streams returned to their banks before evening.
Rutherford County		
CHIMNEY ROCK	9/4/1996	
LAKE LURE	9/4/1996	
WEST PORTION	1/7/1998	The Broad River flooded south of Lake Lure. Several roads were under water and some bridges were washed out.
FOREST CITY	7/31/2000	Strong, nearly stationary thunderstorms dumped excessive rain and produced damaging lightning strikes and gusty winds over and near Forest City during the early morning hours. An estimated 5 inches of rain fell in the area causing urban flooding to begin around midnight. Soon after though, numerous creeks flooded, washing away parts of several streets and roads. One lightning strike cause a fire which burned an outbuilding. Some trees were downed from a combination of the heavy rain, wind and lightning.
FOREST CITY	7/3/2001	"Five streets or roads completely shut down by high water, with trees and power lines across roads. A transformer blew. Eagle Lake overflowed, washing out a section of Duke Street. A vehicle with two passengers went in the washout, nearly killing both occupants.
RUTHERFORDTON	7/4/2001	
RUTHERFORDTON	7/24/2001	A park in downtown Rutherfordton was flooded and closed during torrential downpours associated with slow-moving thunderstorms. Some small creeks and roads flooded as well.
FOREST CITY	12/24/2002	Rising creeks flooded some low lying yards and streets.
COUNTYWIDE	3/20/2003	Heavy overnight rainfall resulted in rapid rises and flooding along several creeks and small streams across the county, including the Second Broad River. Although flooding was mostly minor, it was fairly widespread across the county.
NORTH PORTION	7/12/2003	A portion of highway 226 flooded, as did many other roads. Several mudslides also developed.
FOREST CITY	8/4/2003	Several roads were flooded in the Sandy Mush area.
FOREST CITY	8/11/2003	Cane Creek overflowed its banks and flooded a portion of highway 64.
LAKE LURE	9/27/2004	The Rocky Broad River rose rapidly to flood in the Lake Lure and Chimney Rock areas, with water encroaching on highway 64/74a in the Lake Lure community. Other smaller streams also flooded around Lake Lure.

Location	Date	Description
SOUTH CENTRAL PORTION	7/7/2005	Numerous roads closed due to flooding, mainly in the Rutherfordton, Spindale, Forest City and Bostic areas, including portions of highways 321 and 221. Mountain Creek flooded a portion of NC 108. At least 1 family in Rutherford required rescue when water surrounded their home. At least 3 homes and 4 businesses were flooded on South Main in Rutherfordton. Several bridges were washed out, including one on Hines Rd in the far southeast part of the county, and Wells Rd and Terry Rd in Bostic. A cement bridge was washed out on Old Henrietta Rd. Thompson Rd was washed out in the southwest part of the county. Maple Creek Rd in Rutherfordton was underwater in 4 locations.
LAKE LURE	6/26/2006	Flash flooding developed along the Rocky Broad River in the Chimney Rock and Lake Lure area when 6 to 9 inches of rain fell in about an 8 hour period along the eastern escarpment. The river gauge upstream at Bat Cave reached 11 feet at around 11 am. Approximately 15 structures received some damage due to flood water. About 115 people were evacuated from the area, mostly from flooded campgrounds. Highway 64/74 was covered with water and closed. While most of the evacuations were in the Hickory Nut gorge, flooding also developed in the Bills Creek area, prompting additional evacuations.
HOLLIS	8/17/2009	Heavy rain caused flash flooding along Brier Creek, covering portions of Brier Creek Rd. Several residents were trapped by the rising water.
CHIMNEY ROCK	5/5/2013	Campgrounds were evacuated and high water was reported on several roads between Bat Cave and Lake Lure starting a little after 8 am on the 5th.
ROCK SPGS	5/5/2013	Flooding developed along the upper reaches of the Broad River starting during the evening hours of the 5th, lasting through the afternoon hours of the 6th. Flooded roads included Thompson Lake Road and Coxe Road at Cleghorn Mill Road, among others.
WHITEHOUSE	6/29/2014	After 3-5 inches of rain fell during the early morning hours, county comms reported flooding along a small section of Cedar Creek, which flowed over Antioch Rd, forcing closure of the road for a brief time.
RUTHERFORDTON	2/3/2016	After scattered to numerous showers produced 1 to 1.5 inches of rain across western Rutherford County in about 24 hours, an area of widespread heavy rain and embedded thunderstorms moved over the area during the morning and early afternoon of the 3rd, resulting in an additional 1.5 to 2 inches that fell in only a couple of hours. County comms and media reported flash flooding due to poor drainage and overflowing small streams developed as a result, mainly in the Rutherfordton abnd Union Mills areas. Flooding of Tryon Rd was reported near Clubhouse Dr, possibly as a result of a tributary of Cleghorn Creek overflowing its banks. Flooding was also reported near the intersection of Ridgecrest St and Maple Creek Rd. Painters Gap Rd was flooded due to Mountain Creek overflowing its banks.
WHITEHOUSE	8/13/2017	Sheriffs department reported isolated flash flooding developed along Mountain Creek in the northwest part of the county after more than 3 inches of rain fell over the area in a short period of time. A portion of Padgett Rd was washed out and closed due to flood water.
CHIMNEY ROCK	5/29/2018	A stream gauge on the Rocky Broad River at Bat Cave indicated moderate flooding developed along the river through the Hickory Nut Gorge. Several side roads and a few homes off of Highway 64 were flooded. In addition, there were multiple small slope failures in Chimney Rock State Park, one of which collapsed a retaining wall along the edge of the main parking lot. Total rainfall amounts of 7-10 inches occurred in the area from the 29th through the 30th.
CHIMNEY ROCK	5/29/2018	In the midst of a more general flood event after which the level briefly began receding, a stream gauge on the Rocky Broad River at Bat Cave indicated a rapid increase in the river level as a series of heavy rain showers moved over the area during the late afternoon and evening. The river continued rising through the evening, cresting shortly after midnight.
CHIMNEY ROCK	9/30/2018	A stream gauge on the Rocky Broad River at Bat Cave exceeded its established flood stage after 4 to 8 inches of rain fell on the 29th into the early part of the 30th, with the bulk of that falling in just a few hours late on the 29th. Pedestrian bridges and side roads were flooded along the river from the Henderson County line to Chimney Rock Village. Also, public reported a bridge washed out over Buffalo Creek near where it flows into Lake Lure.

Location	Date	Description
CHIMNEY ROCK	10/11/2018	A stream gauge on the Rocky Broad River at Bat Cave exceeded its established flood stage eventually cresting in moderate flood stage after 4 to 6 inches of rain fell in just a few hours. Several side roads and some campgrounds and pedestrian bridges were flooded along the river from the Henderson County line through Chimney Rock village.
CHIMNEY ROCK	10/11/2018	Although heavy rain ended across Rutherford County during the morning, flooding continued along the Rocky Broad River in the Chimney Rock area into the afternoon.
RUTHERFORDTON	2/6/2020	Media reported Mountain Creek and at least one of its tributaries overflowed its banks and inundated Miller Rd and Maple Creek Rd. More than 6 inches of rain fell across the basin in about 24 hours, with much of that falling during the morning of the 6th. Water from Mountain Creek also inundated the foundation of a mobile home along Maple Creek Rd.
UREE	5/19/2020	Highway dept reported a culvert draining a tributary of the Broad River failed, causing a section of Highway 64 to collapse near Rock Branch Rd. Media reported the Broad River overflowed its banks further downstream, flooding Coxe Rd.
UREE	5/19/2020	Although heavy rainfall tapered off across the Broad River basin during the afternoon, high water conditions persisted along the river into the early evening hours. Two day rainfall totals of 4 to 6 inches were reported across the area.
CHIMNEY ROCK	10/7/2021	Flash flooding developed across northwest Rutherford County after 3 to 6 inches of rain fell across the area in just a few hours. Flash flooding first developed along the Broad River near the Henderson County line, where a stream gauge in the Bat Cave community indicated flooding of campgrounds and a few structures between Bat Cave and Chimney Rock. In addition, emergency management reported significant flash flooding along Cedar Creek in the Single Hollow community, particularly along Bills Creek Rd, where a camping trailer and a vehicle were swept down the creek, requiring swift water rescues of the occupants. Around a dozen homes were also damaged in this area. A debris flow may also have been responsible for some of the damage in the Cedar Creek basin.
CHIMNEY ROCK	10/7/2021	Although heavy rain tapered off across Rutherford County during the late morning, runoff from the earlier excessive rainfall resulted in high water conditions persisting along the Broad River, especially downstream of Lake Lure. Other smaller streams were also impacted, including Cedar Creek and Cove Creek.
CHIMNEY ROCK	9/25/2024	A stream gauge on the Broad River at Bat Cave indicated flash flooding developed, with over a one-foot rise in less than an hour, after 3 to 5 inches of rain fell across the basin in less than 6 hours. Multiple campgrounds and the crawl spaces of a few structures were inundated from the Henderson County line down to Lake Lure.
CHIMNEY ROCK	9/26/2024	Historic, catastrophic flash flooding developed along the Broad River during the overnight and early morning hours as rainfall rates began to intensify again during the evening. The most intense rainfall occurred around sunrise, as the tropical rain bands near the center of Helene swept across the area. Dozens of structures were swept downstream and dozens more damaged during this time. Much of the Chimney Rock community was destroyed, with considerable debris swept downstream and deposited into Lake Lure. Dozens of landslides also occurred across this part of Rutherford County, especially in the upper part of the Hickory Nut Gorge. This contributed further to structural damage. Almost all of the residents of the community evacuated well before the worst of the flooding developed, but one 53-year-old woman died when her home was swept away.
CHIMNEY ROCK	9/27/2024	Although heavy rain and flash flooding ended across Rutherford County by afternoon, flooding continued along the Broad River from the Henderson County line to a few miles downstream of Lake Lure through the afternoon. Water had largely receded to its banks by evening.
Transylvania County		
Unincorporated Area	1/19/1996	An extremely strong cold front, preceeded by heavy rain all day, moved through the mountains, foothills and piedmont during the night. Heavy rain and flooding accompanied the storm system. Several inches of rain fell across the mountains during the day. At Rosman, the French Broad River flooded causing some evacuations in the downtown area.

Location	Date	Description
Unincorporated Area	1/26/1996	Prolonged rain became heavier following the ice. the rain increased into the night when some thunderstorms moved in from the west. Rainfall became excessive, more then 3 and 4 inches in some cases, causing flooding to begin by mid evening. At Asheville the flooding caused a wall to collapse onto several parked cars causing extensive damage. Numerous roads were closed around the mountains and foothills. Several major rivers flooded including the French Broad and the Oconoluftee. Evacuations were required in several counties because of flooding. In this event the flooding was not severe in the northern mountains.
Unincorporated Area	9/28/1996	
ROSMAN	11/8/1996	Heavy rain caused flash flooding on the Pigeon River and Big East Fork River resulting in several evacuations. The French Broad River crested above flood stage around 10.5 feet and the Davidson River came out of its banks. A few small bridges were washed out across Avery County.
COUNTYWIDE	12/1/1996	
ROSMAN	3/14/1997	
ROSMAN AREA	3/14/1997	The southern part of the mountains received rainfall of 4 to 6 inches in 6 to 12 hours on relatively wet ground causing a gradual rise in streams. Flooding resulted in several flood-prone areas. Minor flooding was reported on the French Broad River at Rosman, and the nearby Davidson and Pigeon Rivers. Some roads were closed and a few bridges were under water. Flooding also occurred on small streams near Highlands, an area that does not flood as often. High water around Mountain Home and in Transylvania county persisted into the next day. Some drivers had to be rescued when they drove into flooded areas.
COUNTYWIDE	1/7/1998	"A powerful winter storm pumped abundant moisture on very strong southerly winds into western North Carolina. The result was nearly 15 million dollars in damage across the mountains and foothills as up to 15 inches of rain fell on the higher terrain, causing significant to major flooding and flash flooding. The Asheville Airport set a new record for 24 hour rainfall in the month of January with 4.42 inches. Where not specified above, the excessive rain caused creeks and streams to rise well out of their banks. This combined with the enormous amounts of run-off to cause numerous roads and bridges to be covered in water or washed out. The Blue Ridge Parkway in Haywood county sustained considerable damage.
ROSMAN	1/7/1998	Excessive rain in conjunction with significant flooding of the French Broad and North Transylvania Rivers resulted in 40 to 50 mobile homes and 2 bridges destroyed. In addition, 34 roads were under water through noon on the 8th.
COUNTYWIDE	2/3/1998	A strong slow-moving winter storm moved from the Gulf of Mexico north through the Carolinas on the 3rd and 4th, bringing with it heavy rain, snow and high winds. Snow accumulated between 1 and 3 inches across the higher elevations of the mountains by early afternoon on the 3rd. Newland, Beech Mountain and Jonas Ridge had 4 inches of snow by early evening. Mount Mitchell ended up with 20 inches of snow. Roads were icy across the higher elevations and contributed to some wrecks. Heavy rain in Candler early in the morning caused a mobile home to collapse, destroying its' contents. Flooding developed across portions of the mountains during the afternoon as creeks overflowed, covering roads in many areas. High gradient winds between strong high pressure in the upper Midwest and the passing strong low pressure combined with wet ground conditions to down numerous trees and power lines. Power outages and blocked roads were common into the evening hours. A building collapsed in Statesville due to the wind.
COUNTYWIDE	11/26/1999	A strong storm system moving through the southeastern U.S. caused locally heavy rain (up to 7 inches in a small part of the mountains) and gusty winds. The result was standing water on highways and roads, some minor flooding of small streams, and several downed trees. There were numerous traffic accidents during this part of the holiday weekend as a result of the rain.

Location	Date	Description
		The Davidson and French Broad Rivers flooded slightly in Transylvania county, causing some brief road closures.
COUNTYWIDE	9/22/2003	Flooding began around Rosman in urban and poor drainage areas, after which flooding developed quickly along creeks. The French Broad River rose above flood stage at Rosman just after 7 pm, and remained in flood through 11 pm. At the height of the flooding, some vehicles were half-submerged in flood waters. Numerous mud slides also developed. Flooding developed late in the evening across other portions of the county, including along the Davidson River in Pisgah National Forest.
Unincorporated Area	11/19/2003	The French Broad River flooded several roads near Rosman. Other streams and creeks flooded in the same general area, and the French Broad eventually increased to a level that required evacuation of apartments and houses along the river.
Unincorporated Area	2/6/2004	After an extended period of heavy rainfall, the French Broad River gradually rose and overflowed its banks near Rosman, flooding some low lying spots around town. Flooding eventually developed downstream at Blantyre.
CEDAR MTN	6/21/2004	The Little River overflowed its banks, flooding Cedar Lane and forcing evacuations of homes along the river. Trees and power lines were taken down by mudslides.
Unincorporated Area	9/7/2004	The remnants of Hurricane Frances brought very heavy rainfall to western North Carolina on the 7th and 8th, resulting in widespread severe flooding across the mountains and foothills. Flooding first developed in Transylvania County, as the Little River overflowed its banks during the afternoon. Shortly thereafter, flooding developed along Shaws Creek in Henderson County, and in the Cruso community of Haywood County. As moderate to heavy rainfall continued into the evening hours, flooding gradually worsened and expanded across the area. By the early morning hours of the 8th, flooding was widespread and severe across much of the area, with most creeks and streams in flood. Major flooding developed along the French Broad River, which reached a near-record stage of 25 feet at Blantyre, and 21 feet in Canton. In Haywood County, flooding along the Pigeon River was described as the worst in over 60 years. Hundreds of homes and businesses were damaged or destroyed across the area, necessitating a number of evacuations and rescues. Clyde and Canton endured the brunt of this damage. Numerous roads and bridges were washed out as well.
SOUTH PORTION	9/7/2004	After general flooding developed during the afternoon, rainfall rates increased during the late evening, as showers producing very heavy rainfall moved continuously over the Blue Ridge, leading to a period of rapid rises on streams and creeks and subsequent flash flooding. In Polk County, evacuations became necessary along Lake Adger during this time.
Unincorporated Area	9/16/2004	Flooding began across the county around midnight, as Rosman was evacuated when the French Broad River began to flood. Overnight, flooding spread across much of the remainder of the county, with evacuations required in the Duckworth and Pisgah Forest areas. Numerous roads were closed due to flood damage, including portions of highway 276, which were closed for several days.
BREVARD	9/27/2004	Heavy rain bands associated with the remnants of Hurricane Jeanne produced the third flood episode in three weeks across western North Carolina. However, flooding was much less severe and more short-lived than what was experienced during Frances and Ivan. In Transylvania County, several small streams and creeks rose quickly, covering a few roads with water.
Unincorporated Area	12/23/2004	The Davidson River left its banks for a couple of hours following heavy rainfall of 4 to 6 inches overnight.
Unincorporated Area	6/12/2005	Flooding developed first along the Davidson River in Pisgah National Forest, forcing a road closure. A section of highway 64 was closed near Sapphire. Other road closures included Richland Creek Rd in Lake Toxaway.
ROSMAN	7/13/2005	Severe urban flooding developed in Rosman, with several streets closed, including Main Street. Water entered several buildings.
BREVARD	7/19/2005	Flat Creek Valley Rd was barricaded due to flooding.

Location	Date	Description
Unincorporated Area	11/29/2005	Davidson River came out of its banks and flooded roads in the Pisgah National Forest. There was also street flooding reported in the Rosman area, and a rock slide blocked highway 215 near the Blue Ridge Parkway.
LAKE TOXAWAY	3/4/2008	Moderate to heavy rain produced 4-5 inches of rainfall across the southern half of Transylvania county during the morning and early afternoon, resulting in flash flooding across the area by mid-afternoon. A portion of highway 64 was closed in the Lake Toxaway area due to high water. The French Broad River exceeded its established flood stage at its headwaters near Rosman, peaking at just above 9 feet. Several roads were flooded, including Depot St.
ROSMAN	3/4/2008	Flooding continued near the headwaters of the French Broad River for a few hours after heavy rainfall ended.
JOHN ROCK	9/20/2009	Wilson Rd was closed due to flooding along the French Broad River. Davidson River Rd was also closed when the Davidson River overflowed its banks. In addition, Green Rd and Barclay Rd were covered with water from overflowing streams.
JOHN ROCK	9/20/2009	Although flash flooding ended across the area around sunrise, persistent moderate to heavy rainfall caused high water conditions to persist in the French Broad valley through the morning hours. In addition to the flooding, several small mudslides occurred and quite a few trees fell in the saturated soil.
ECUSTA	9/21/2009	Flooding developed near the headwaters of the French Broad River which covered Main St in Rosman with about a foot of water. Water also entered an apartment building. Also, the Davidson River flooded near Brevard, flooding a portion of Davidson River Rd and Wilson Rd. Turkey Creek flooded Deavor Rd in Pisgah Forest. A total of 35 roads in Henderson and Transylvania Counties were blocked by flood water.
BLANTYRE	11/11/2009	Several roads were closed in the Brevard area, apparently due to flooding along creeks and streams that backed up due to a combination of heavy rain and flooding along the French Broad River. Closed roads included Green Rd to the southwest of Brevard, and Cascade Lake Rd and Wilson Rd on the southeast side of town.
ECUSTA	1/24/2010	The Little River exceeded its established flood stage, flooding the intersection of Merrill Rd and Cascade Lake Rd. Other roads that were closed due to flooding were Hannah Ford Rd about 5 miles southwest of Brevard, Wilson Rd on the east side of town and Davidson River Rd about 3 miles northeast of Brevard.
ECUSTA	1/24/2010	Although heavy rain ended across the county by midnight, runoff from the day's heavy rainfall resulted in a continuation of high water, while new flooding developed along the French Broad River in the eastern portion of the county during this time. River flooding persisted until late on the 27th. Major flooding was observed briefly at the Blantyre river gauge.
GRANGE	11/30/2010	Very heavy rainfall resulted in flooding of many of the major streams across the southern half of Transylvania County. Flooding first began along the Little River east of Brevard, with Cascade Lake Rd under water in several spots. Wilson Rd was also flooded northeast of Brevard.
BLANTYRE	11/30/2010	As the afternoon progressed, flooding expanded to include the upper reaches of the French Broad River. Low water crossings at Island Ford Rd and Green Rd were flooded first, but by evening, water was entering buildings near the town center of Rosman. The stream gauge on the river at Rosman exceeded established flood stage by more than a foot before water began retreating during the evening. Flooding also continued to worsen along the Little River during this time, while expanding to include the Davidson River and other streams by evening.
ECUSTA	11/30/2010	Although the heavy rainfall began to abate during the mid-evening, run-off from the previous heavy rain, combined with persistent moderate rain, caused flooding to continue. Floodwaters also progressed downstream along the French Broad River, and its tributaries, including the Little River and the Davidson River through the overnight hours. It was estimated that as many as 50 roads were closed or water-covered at the height of the flooding. Stream flooding ended early on the morning of December 1st, though river flooding lasted until the morning of the

Location	Date	Description
		3rd. Rainfall totals ranged up to 9 inches at Lake Toxaway, with many observers reporting 6 or more inches in and around Brevard.
ECUSTA	12/1/2010	Although the heavy rainfall began to abate during the mid-evening hours of November 30th, run-off from the previous heavy rain, combined with persistent moderate rain, caused flooding to continue. Floodwaters also progressed downstream along the French Broad River, and its tributaries, including the Little River and the Davidson River through the overnight hours. It was estimated that as many as 50 roads were closed or water-covered at the height of the flooding. Stream flooding ended early on the morning of December 1st, though river flooding lasted until the morning of the 3rd. Rainfall totals ranged up to 9 inches at Lake Toxaway, with many observers reporting 6 or more inches in and around Brevard.
SELICA	3/6/2011	The French Broad River and some of its tributaries overflowed their banks. The main areas affected were between Rosman and Brevard, and the Davidson River area in the eastern part of the county. Closed roads included Hannah Ford Rd, Green Rd, Island Ford Rd, Davidson River Rd.
GRANGE	3/6/2011	The Little River and some of its tributaries flooded areas in the eastern part of the county, including parts of Cascade Lake Rd.
SELICA	3/6/2011	Although heavy rain began to diminish, stream gauges indicated high water conditions persisted on the French Broad River and its tributaries in the eastern part of the county into the afternoon. River flooding persisted into the 7th and 8th, cresting at 17.9 feet at Blantyre early on the 7th.
GRANGE	3/9/2011	For the second time in three days, a heavy rain event resulted in flash flooding along the Little River. Cascade Lake Rd was the main road affected by flood water.
PENROSE	3/9/2011	Although heavy rain began to diminish, stream gauges indicated high water conditions persisted on the French Broad River and its tributaries in the eastern part of the county into the evening and overnight. River flooding persisted into the 10th and 11th, with the French Broad at Blantyre creasting at 17.2 feet on the 10th.
CALHOUN	4/16/2011	Widespread 2.5 to 4 inch rainfall caused the Little River to go above flood stage, flooding portions of Cascade Lake Rd and Merrill Lane.
CALHOUN	4/16/2011	Although heavy rain tapered off during the late morning, high water conditions continued along the Little River into the afternoon.
BLANTYRE	4/16/2011	Flooding developed along the French Broad River near Blantyre during the early afternoon, flooding several roads along the river. til 3 pm. Flooding persisted along the river until the 18th.
BLANTYRE	11/28/2011	Flooding developed initially in the eastern part of the county, along Cascade Lake Rd near Merrill Lane, as a result of a combination of heavy rain and back water effects from a large log jam on the French Broad River. The log jam was just downstream of the confluence of the French Broad and Little Rivers.||Flooding along the river, and across much of central and eastern Transylvania County, increased through the afternoon, including along Hannah Ford Rd about 4 miles southwest of Brevard. The French Broad River at Blantyre reached flood stage at|2:15 pm, and didn't go below flood stage until 5:15 pm on the 29th. The Little River at Penrose hit flood stage at 2:30 pm.
ROSMAN	11/28/2011	An automated river gauge on the French Broad River at Rosman reached the flood stage of 9 feet. Flooding was reported in several low lying places in town at about this time.
BLANTYRE	11/28/2011	Flooding in the county worsened during the late afternoon and evening hours with C Green, Island Ford and Davidson River Roads, among others, flooded by 450 pm. Flooding occurred both along rivers and streams in the county.
BLANTYRE	11/28/2011	Streams began to recede during that late evening hours after heavy rain ended. However, flooding continued along the French Broad River and Little River through the day on the 29th.
PISGAH FOREST	1/17/2013	The middle reaches of the French Broad River in Transylvania County remained in flood for around 2 days as runoff from heavy rain worked it's way through the river system. This resulted in flooded roads and bottom land close to the river.

Location	Date	Description
SELICA	1/30/2013	A nearly stationary band of very heavy rain dropped 3 to 4 inches of rain across much of the county. Widespread flash flooding developed along streams as well as the headwaters of the French Broad River. Several Roads were closed in Rosman, including East Main St, Depot St and Broad St. A motorist had to be rescued from a submerged car on East Main Street. Calvert Rd was flooded about two miles northeast of Rosman. East Fork Road was flooded near the Middle Fork Road intersection. The road was under water for at least three hours.
NORTH BREVARD	1/30/2013	Flash flooding quickly developed in the Brevard area during the late afternoon hours after 2 to 3 inches of rain fell in the period of a couple hours. Several roads in and near Brevard were flooded. Davidson River Road was flooded by the Davidson River at Old Hendersonville Road. A truck became stuck in the flood waters, and the driver had to be rescued by a swift water rescue team. Water eventually covered the entire vehicle. Elsewhere around Brevard, the county emergency manager reported that water was running across Greenville Highway on the southeast side of Brevard. Aiken St and Silversteen Dr were also flooded in town. A sink hole opened up on Whitmire Street, closing part of the road. High water continued through the night near the French Broad River.
BALSAM GROVE	1/30/2013	Old Wagon Road was flooded. Part of the embankment was washed out along Highway 215 near Macedonia Church Rd, closing one lane of the highway about 4.5 miles north of Rosman.
CALHOUN	1/30/2013	Crab Creek flooded a portion of Cascade Lake Road.
PISGAH FOREST	1/31/2013	The middle reaches of the French Broad River in Transylvania County remained in flood for almost 2 days as runoff from heavy rain worked it's way through the river system. This resulted in flooded roads and bottom land close to the river.
CHERRYFIELD	5/5/2013	Several inches of rain fell across Transylvania county, mainly on the 5th. Most of the resulting flooding occurred along the French Broad River or as a result of backwater effects of streams flowing into the river. Among the effects of the heavy rain, the Little River flooded parts of Cascade Lake Road north of Merrill Rd near Crab Creek. Hannah Ford Rd and Island Ford Rd were flooded by the French Broad River. Barclay Rd was flooded by the French Broad River 2 miles south of Brevard. Crab Creek Road was flooded by the French Broad River just southeast of Penrose. The French Broad at Blantyre rose above flood stage around 3 pm on the 5th, crested at 19.3 feet at 545 pm on the 6th, and fell below flood stage at 730 pm on the 8th.
CALHOUN	6/24/2013	The Little River came up quickly overnight, flooding Cascade Lake Road near Crab Creek Rd.
QUEBEC	7/4/2013	Silversteen Road was washed out at the intersection of Diamond Creek Road by the West Fork French Broad River.
GRANGE	10/14/2014	A stream gauge on the Little River exceeded established flood stage after 3 to 4 inches if rain fell in just a few hours. Cascade Lake Rd was covered by more than a foot of water in spots.
GRANGE	11/23/2014	A stream gauge on the Little River indicated the river rose above flood stage, flooding a portion of Cascade Lake Rd.
GRANGE	10/3/2015	After as much as 5 inches of rain fell over several hours, a stream gauge on the Little River exceeded flood stage early afternoon on the 3rd and remained in flood through much of the overnight. A portion of Cascade Lake Rd was flooded in the Dupont Forest area.
CALHOUN	10/28/2015	After 3 to 5 inches of rain fell across eastern Transylvania County in about a 24 hour period, a stream gauge on the Little River exceeded established flood stage, indicating a portion of Cascade Lake Rd was covered with water.
ROSMAN	11/18/2015	After as much as 3 inches of rain fell in about 24 hours over eastern Transylvania County, while more than 4 inches fell across the western part of the county, stream gauges indicated minor flooding developed along the Little River, as well as near the headwaters of the French Broad River. A portion of Cascade Lake Road was flooded by the Little River near Penrose, while some roads were flooded by the French Broad in the Rosman area, including Main St.
DAVIDSON RIVER	12/24/2015	After as much as 5 inches of rain fell across Transylvania County in more than 24 hours, automated stream gauges indicated flooding developed across small streams in the eastern part of the county. A gauge on the Little River indicated the river overflowed its banks and

Location	Date	Description
		flooded Cascade Lake Rd. A stream gauge on the Davidson River in Pisgah Forest also exceeded flood stage, indicating flooding of Davidson River Rd and Wilson Rd and also Deavor Rd due to backwater into Turkey Creek.
DAVIDSON RIVER	12/24/2015	Although heavy rain began to taper off across Transylvania County during the afternoon, runoff from the rainfall resulted in persistent flooding along the Davidson River and Little River into the evening, with portions of Cascade Lake Rd, Davidson River Rd, Wilson Rd, and Deavor Rd under water.
ROSMAN	12/29/2015	Stream gauges and Emergency Manager reported flash flooding developed along the French Broad River basin in Transylvania County after 2.5 to 4 inches of rain fell across the county in just a few hours. Flash flooding was first reported along the French Broad at Rosman, where several roads were covered with water, and 10 residents were evacuated along Depot St. Flooding then developed downstream along the basin, as stream gauges on the Little River and Davidson River exceeded their flood stages. Merril Rd and Cascade Lake Rd were flooded by the Little River in the eastern part of the county. Additionally, at least one mudslide occurred in the Rosman area.
ROSMAN	12/29/2015	Although heavy rain tapered off across Transylvania County during the pre-dawn hours, runoff resulted in flooding continuing along upper portions of the French Broad River, as well as some of its smaller tributaries through the late morning hours. River flooding also developed along the French Broad near the Henderson County line during this time, and persisted for several days.
QUEBEC	2/3/2016	After scattered to numerous showers produced 1.5 to 3 inches of rain across Transylvania County in about 24 hours, an area of widespread heavy rain moved over the area during the morning of the 3rd, resulting in an additional 1.5 to 2 inches that fell in only a couple of hours. Stream gauges and county comms center reported flash flooding developed during the late morning and early afternoon along upper portions of the French Broad River and several tributaries, including the Davidson River, South Fork Flat Creek, and the Little River. Quite a few roads were flooded and closed in the Rosman, Brevard, Lake Toxaway, and Penrose areas due to water from these streams.
POWELLTOWN	10/23/2017	Stream gauges indicated flooding developed along the upper French Broad basin after moderate to heavy rain falling throughout the 23rd resulted in 4 to 7 inches of total rainfall. A gauge on the French Broad River at Rosman exceeded the established flood stage, flooding several roads in and around Rosman. The Davidson River flooded in the Pisgah Forest area, impacting Davidson River Rd and Wilson Rd. The Little River also exceeded flood stage and affected Cascade Lake Rd in the eastern part of the county.
CALHOUN	1/11/2018	A stream gauge on the Little River in eastern Transylvania County exceeded its established flood stage and remained in minor flood conditions for almost 24 hours. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by flood water in spots. Total rainfall of 4 to 5 inches fell over the basin in around 24 hours. Minor river flooding also developed along the French Broad River near Blantyre and persisted for a couple of days.
CALHOUN	2/11/2018	A stream gauge on the Little River near Penrose exceeded its established flood stage after more than 2 inches of rain fell across the basin in less than 12 hours. Total rainfall of 3 to 5 inches fell across the area on the 11th and 12th and the river stayed above flood stage for almost 24 hours. Minor river flooding also occurred along the French Broad River near Blantyre from the 11th through the 14th.
GRANGE	5/16/2018	County comms reported and stream gauges indicated flooding developed along the Little River and near the headwaters of the French Broad River after moderate to heavy rain produced widespread 3 to 6 inch rainfall amounts in about 12 hours. The Little River flooded Cascade Lake Rd at Merrill Rd, while the French Broad washed out part of Wilson Rd and also flooded portions of Hannah Ford and Island Ford Rd.
CALHOUN	5/17/2018	Less than 18 hours after an earlier flood event ended along the Little River, a stream gauge exceeded its established flood stage once again after another round of heavy rain and

Location	Date	Description
		remained in minor flood conditions for almost 24 hours. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by more than a foot of water in spots. Total rainfall in the basin was 2 to 3 inches from the 17th through early on the 18th. The long duration of the flooding was partly due to backwater affects from the French Broad River, which remained in moderate flood stage near Blantyre for much of this time frame.
CALHOUN	5/29/2018	A stream gauge on the Little River exceeded its established flood stage and remained in minor flood conditions for more than 48 hours. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by more than a foot of water in spots. Total rainfall from of around 5 inches fell uniformly over the basin from the 29th through the 30th. The long duration of the flooding was partly due to backwater affects from the French Broad River, where moderate flooding was occurring near Blantyre for much of this time frame.
ROSMAN	12/28/2018	Stream gauges near the headwaters of the French Broad River as well as multiple tributaries, including Davidson River and Little River, exceeded their established flood stages after 4 to 6 inches of rain fell throughout the basin from the afternoon of the 27th through the 28th. The French Broad River flooded portions of Hannah Ford Rd and Island Ford Rd, as well as Depot St and Highway 276 in Rosman. Davidson River flooded Davidson River Rd and Wilson Rd in Pisgah Forest. Little River also flooded Merrill Lane. While flood waters receded on most streams by late on the 28th, flooding persisted on the Little River for another day, while river flooding continued on the French Broad downstream of Brevard and Pisgah Forest until January 1st.
CALHOUN	2/21/2019	A stream gauge on the Little River exceeded its established flood stage around midnight on the 21st and remained in minor flood conditions until the afternoon of the 23rd. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by more than a foot of water in spots. Total rainfall of 3 to 4 inches fell throughout the basin in a 24 to 36 hour period. The long duration of the flooding was partly due to backwater affects from the French Broad River, where minor flooding was occurring near Blantyre for much of this time frame (and continued into the 26th).
BREVARD	4/9/2019	Fire dept reported flash flooding developed form the west side of Brevard to the Selica community after up to 3 inches of rain fell in around an hour. A mobile home on Selica Rd was inundated by 4-6 feet of flood waters from Spanish Oak Branch. Flood waters entered a crawl space at a home across the street from the mobile home. A 24- inch culvert was washed out along Spanish Oak Branch near the intersection of Bryson Rd and Twinview Dr, which stranded a residence. Floodwaters at the confluence of Spanish Oak Branch and Glady Branch inundated two driveways along Island Ford Rd, stranding the residences and covering a vehicle up to its hood. Additionally, urban flooding was reported on the west side of Brevard, with water entering several businesses and causing multiple road closures.
ROSMAN	4/19/2019	Stream gauges and county comms reported flooding developed along the headwaters of the French Broad River and some of its tributaries after 4.5 to 7.5 inches of rain fell within the basin, with most of that falling in around 6 hours. F;looding first developed along the Little River, which flooded Cascade Lake Rd near Merrill Ln. Flash flooding then developed along the French Broad River near Rosman, where Depot St, a portion of Highway 178 near Chestnut St, and Hannah Ford Rd between Rosman and Brevard. Flooding then developed along the Davidson River during mid-afternoon, which inundated portions of Davidson River Rd and Wilson Rd in the Pisgah Forest area. County comms confirmed closure of these and other roads due to a combination of poor drainage and small stream flooding. Although the heavy rain and flash flooding ended across the county by the evening of the 19th, moderate river flooding developed along the French Broad at Blantyre and continued through the 21st.
CALHOUN	1/11/2020	A stream gauge on the Little River exceeded its established flood stage after 2 to 3 inches of rain fell throughout the basin in about an 18-hour period. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by more than a foot of water in spots.

Location	Date	Description
MIDDLE FORK	2/6/2020	County comms reported flash flooding developed across Transylvania County after 4 to 6 inches of rain fell across the county in about 24 hours, with much of the falling during the morning and afternoon of the 6th. Multiple roads were flooded and closed throughout the county due to a combination of poor drainage and small stream flooding of several tributaries of the French Broad River, including Little River, which overflowed onto Merrill Rd.
POWELLTOWN	4/13/2020	A stream gauge on the French Broad River above Highway 178 at Rosman exceeded minor flood stage after 4 to 6 inches of rain fell in the headwaters across the Balsams in just a few hours. At this level flooding of Champion Park and sections of Highway 178 Depot St and Main St occurs with flood water approaching several homes and businesses. Flash flooding also developed along Davidson River in Pisgah Forest with several low lying roads inundated including Davidson River Rd.
POWELLTOWN	4/13/2020	Although heavy rainfall had ended by around sunrise across Transylvania County, stream gauges indicated flooding persisted near the headwaters of the French Broad River as well as portions of the Davidson River into late morning. Meanwhile, river flooding developed downstream along the French Broad near Blantyre during the afternoon of the 13th and continued through the morning of the 15th.
ECUSTA	9/13/2020	A stream gauge on the Davidson River indicated the river briefly exceeded established flood stage after 3 to 4 inches of rain fell over the basin in about 30 hours. At this stage, the river overflows its banks and inundates part of Davidson River Rd and Wilson Rd, while backwater effects into Turkey Creek cause Deavor Rd to be flooded.
CALHOUN	9/17/2020	A stream gauge on the Little River exceeded its established flood stage after 2 to 3 inches of rain fell throughout the basin in about a 20-hour period. The main impact was to lowlands along the stream and to Cascade Lake Rd, which was covered by more than a foot of water in spots. Minor river flooding also developed on the French Broad at Blantyre during the evening of the 17th and continued for almost 48 hours.
GRANGE	10/29/2020	Stream gauges reported flash flooding developed along the major headwater streams in Transylvania County after 4 to 5 inches of rain fell across much of the southern and western part of the county in around 24 hours. The Little River overflowed its banks and flooded Merrill Rd in the eastern part of the county. The French Broad River inundated multiple roads in the Rosman area, including Depot St, where some homes has to be evacuated, as well as Hannah Ford Rd, E Main St, and Highway 178. The Davidson River also overflowed its banks in the Pisgah Forest area, flooding portions of Davidson River Rd and Wilson Rd, and indicating backwater flooding of Turkey Creek which inundated Deavor Rd.
CALHOUN	10/29/2020	Although heavy rainfall tapered off across the French Broad basin during the morning of the 29th, flooding continued along the Little River in response to continued runoff. Minor river flooding also developed along the French Broad in the Blantyre area during this time and continued into the early morning hours of November 1st.
ROSMAN	3/25/2021	Stream gauges near the headwaters of the French Broad River as well as multiple tributaries, including Davidson River and Little River, exceeded their established flood stages after 4.5 to 6.5 inches of rain fell throughout the basin throughout the 25th into the early morning hours of the 26th. The French Broad River flooded portions of Hannah Ford Rd and Island Ford Rd, as well as Depot St and Highway 276 in Rosman. Davidson River flooded Davidson River Rd and Wilson Rd in Pisgah Forest. Little River also flooded Merrill Lane. While flood waters receded on most streams during the morning of the 26th, flooding persisted into the afternoon on the Little River, while minor to moderate river flooding continued on the French Broad downstream of Brevard and Pisgah Forest through the 28th.
POWELLTOWN	8/16/2021	Stream gauges indicated and an NWS flood survey confirmed significant flash flooding developed near the upper reaches of the French Broad River after as much as a foot of rain fell in the headwaters in less than six hours. Multiple structures along the river were inundated in the town of Rosman, including on Depot St, Highway 178, Main St, and Chestnut St. This was the worst flooding along this portion of the French Broad in almost 30 years, while the stream

Location	Date	Description
		gauge at Rosman registered its 4th-highest level on record. (Continuous observations at that site date back to 1935). Newspaper reported significant flash flooding also occurred upstream of Rosman along the North Fork of the French Broad in the Balsam Grove community, where vehicles were swept downstream and multiple structures were damaged or destroyed. In addition, flash flooding developed along the Davidson River in Pisgah Forest, briefly inundating portions of Davidson River Rd and Deavor Rd.
BALSAM GROVE	8/17/2021	Stream gauges indicated significant flash flooding developed for the second day in a row near the upper reaches of the French Broad River after 3 to 6 inches of rain fell in the headwaters in just a few hours. This was on top of the 6-12 inches that fell durimg the morning of the 16th. Flooding was slightly worse in the Rosman and Balsam Grove area than what was observed on the 16th, with the stream gauge at Rosman reaching its second highest level on record (4 October 1964). Multiple structures along the river were once again inundated, including on Depot St, Highway 178, Main St, and Chestnut St in Rosman. Flash flooding again developed along the Davidson River in the Pisgah Forest area, overflowing portions of Davidson River Rd and Deavor Rd and inundating several businesses near the intersection of Highways 64 and 276.
ROSMAN	8/17/2021	Although heavy rain ended across the upper French Broad basin during the late afternoon and early evening, runoff from the storm total 8 to 20 inch rainfall resulted in persistent and expanding flooding throughout Transylvania County. In addition to the continued problems at Rosman and along the Davidson River in Pisgah Forest and vicinity, moderate main stem river flooding developed downstream to Blantyre and vicinity during the early morning hours of the 18th, with backwater effects also resulting in minor flooding along the Little River. While most of the water receded by sunrise on the 18th, moderate main stem river flooding persisted at Blantyre and vicinity until the early morning of the 20th, and the river did not fall below flood stage until the evening of the 20th.
SELICA	3/23/2022	County comms reported several tributaries of the French Broad River overflowed their banks in the Brevard area after 2.5 to 4 inches of rain fell. Several roads were inundated, including Wilson Rd and Barclay Rd.
ROSMAN	5/26/2022	An automated stream gauge on the French Broad River at Rosman indicated the river briefly exceeded flood stage after 3.5 to 5 inches of rain fell over the headwaters in 12-18 hours, with more than half of that falling during the late morning and afternoon of the 26th. The main impacts were inundation of Depot St and W Main St in Rosman.
POWELLTOWN	5/27/2022	Stream gauges indicated minor flooding developed during the early morning hours of the 27th after 3.5 to 5 inches of rain fell across northern Transylvania county in about 24 hours. The French Broad River at flooded Depot St and E Main St in Rosman. The Davidson River inundated Davidson River Rd and Wilson Rd in Pisgah Forest. Deavor Rd also flooded due to backwater effects along Turkey Creek. Minor river flooding developed downstream across eastern Transylvania County later on the 27th and continued through much of the 29th.
ROSMAN	1/9/2024	Although heavy rain ended across Transylvania County during the afternoon of the 9th, runoff from the rainfall resulted in persistent flooding across the French Broad and adjacent basins, including Davidson River and Little River. Multiple roads remained impassable and closed during this time.
ECUSTA	9/26/2024	A stream gauge on Davidson River in the Pisgah Forest area indicated flash flooding developed after 4 to 5 inches of rain fell across the basin in less than 24 hours, with 1 to 2.5 inches of that falling in less than 3 hours. Davidson River Rd and Wilson Rd were inundated in Pisgah Forest. In addition, backwater effects along Turkey Creek also resulted in flooding of Deavor Rd.
ROSMAN	9/26/2024	Stream gauges and county comms reported major flash flooding developed along the headwaters of the French Broad basin after 15-22 inches of rain fell across much of the county over three days. Flash flooding first developed along the French Broad River near Rosman, where Depot St, a portion of Highway 178 near Chestnut St, and Hannah Ford Rd between Rosman and Brevard were inundated. Dozens of homes were damaged in Rosman alone, with

Location	Date	Description
		some structures destroyed after bring inundated with several feet of water. The stream gauge on the French Broad at Rosman crested at 15.5 feet, which exceeded the record by more than a half foot (October 1964). Flooding later developed along the Davidson River toward daybreak, which damaged multiple campgrounds, low water crossings, and some structures in the Davidson River area of Pisgah National Forest, while also inundating and entering structures along portions of Davidson River Rd, Old Hendersonville Rd, Deavor Rd, and Wilson Rd in the Pisgah Forest area. Dozens of water rescues occurred in this area. Due to a combination of very heavy rainfall and backwater effects from the French Broad, the Little River inundated and damaged roads and campgrounds in Dupont State Forest and the Cedar Mountain area.
ROSMAN	9/27/2024	Although heavy rain and flash flooding ended across Transylvania County by afternoon, flooding continued along the upper French Broad River and its tributaries as water from extreme rainfall continued to funnel downstream through the watershed. While most of the streams, including the headwaters of the French Broad returned to their banks by evening, major flooding continued downstream in Blantyre and vicinity until the 29th, and the river did not fall below flood stage until the early morning hours of October 1st.

TABLE H.4: HAIL EVENTS (1963-2024)

Location	Date	Size	Description
Henderson County			
Unincorporated Area	7/23/1963	2”	
Unincorporated Area	5/14/1966	1.5	
Unincorporated Area	6/28/1974	0.75	
Unincorporated Area	5/17/1982	0.75	
Unincorporated Area	5/30/1982	1	
Unincorporated Area	7/13/1985	1.75	
Unincorporated Area	7/13/1985	1.75	
Unincorporated Area	9/8/1985	0.75	
Unincorporated Area	5/1/1987	0.75	
Unincorporated Area	6/3/1987	1.25	
Unincorporated Area	5/16/1988	0.75	
Unincorporated Area	6/18/1988	0.75	
Unincorporated Area	7/10/1988	0.75	
Unincorporated Area	7/15/1988	1.75	
Unincorporated Area	7/26/1989	0.75	
Unincorporated Area	11/15/1989	1.25	
Unincorporated Area	8/21/1990	0.75	
Hendersonville	3/31/1993	0.88	
S Portion	3/31/1993	0.75	
Hendersonville	5/13/1993	0.88	
HENDERSONVILLE	3/19/1996	0.75	A marginally severe thunderstorm caused large hail.
HENDERSONVILLE	8/24/1996	0.75	
FLETCHER	6/2/1997	1	Severe weather carried over from the morning in the foothills and into the piedmont, and developed in the mountains. Large hail caused much (although unknown dollar amounts) damage. The storms were quite slow moving, especially around Asheville and near Hendersonville, and caused hail for some time. In the city of Shelby, a man was struck and injured by lightning while mowing.
FLAT ROCK	7/4/1997	1.75	Large hail occurred on the Henderson/Polk county line.

Location	Date	Size	Description
MILLS RIVER	7/9/1997	1.75	Isolated severe thunderstorms produced large hail ranging from golf ball to tennis ball size. A house was flooded in Mills River. A microburst in Rutherford College blew 12 to 14 roofs of flea market buildings.
HENDERSONVILLE	9/11/1997	0.75	Unusually cold temperatures aloft enabled a couple of thunderstorms that developed across the mountains in the early to middle afternoon to become severe. Large hail fell on Sugar Mountain in Avery county and accumulated to a depth of 2 inches. Large hail also fell in abundance in Henderson county, covering I-26 for some time near Flat Rock and Hendersonville. Extensive damage occurred to the apple crop which was near it peak. Other field crops were severely damaged or destroyed and a couple of car dealerships sustained damage as well.
BAT CAVE	4/3/1998	1	A strong spring storm system moved northeast through the Tennessee Valley on the 3rd. A couple thunderstorms along the occluded front that passed across the mountains became severe and produced hail up to quarter size. Other severe thunderstorms developed along a thermal-moisture boundary in the piedmont and produced hail up to 2 inches in diameter.
ASHEVILLE	5/7/1998	1	Supercell thunderstorms developed in a highly sheared atmosphere in eastern Tennessee then moved east across the mountains, foothills and western piedmont of North Carolina. These long-lived, cyclic supercells produced a considerable amount of large hail and some damaging winds in the mountains.
HENDERSONVILLE	6/24/1998	1.75	Multi-cell thunderstorms again developed in the early evening and moved south across the southern mountains and piedmont. A few became severe and produced large hail up to golf ball size, as well as damaging winds. Wind damage was confined to downed trees and power lines. The hardest hit area was northeast of Brevard where roads were blocked.
DANA, MILLS RIVER	5/13/1999	0.88	Scattered thunderstorms developed during the afternoon and evening of the 13th and a few pulsed to severe levels. In Henderson county, golf ball size hail covered Highway 280 and a large tree fell onto a house in Hendersonville, causing significant damage to the house and outdoor furniture. There was a public report of a sighting of a very weak tornado that appeared to make a brief touchdown, but caused no damage, north of Marion.
GERTON	8/20/1999	1.75	An isolated severe thunderstorm produced golf ball size hail in two counties.
GERTON, HENDERSONVILLE	5/13/2000	1	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.
HENDERSONVILLE	5/24/2001	0.75	
BAT CAVE	6/4/2001	0.75	Public report of dime-sized hail.
HENDERSONVILLE	6/4/2001	0.88	Fire department reported nickel-sized hail in Hendersonville.
FLETCHER	5/2/2003	1	
HENDERSONVILLE	5/2/2003	1	
HENDERSONVILLE	5/3/2003	0.75	
FRUITLAND	5/3/2003	0.75	
FLETCHER	5/3/2003	1.5	Hail was reported across much of the western half of the county, and was responsible for major damage to the county's apple crop.
BAT CAVE	5/15/2003	1.5	Hail broke some light fixtures at the post office.
ASHEVILLE RGNL ARPT	7/16/2003	0.75	
ETOWAH	7/18/2003	0.75	Large hail caused damage to vehicles.

Location	Date	Size	Description
MILLS RIVER	8/22/2003	0.75	
HENDERSONVILLE	6/6/2005	0.88	
HENDERSONVILLE	6/20/2005	0.75	
HENDERSONVILLE	4/3/2006	0.88	
HENDERSONVILLE	4/19/2006	0.75	Hail reported near the intersection of Sugarloaf Rd and Ridge Rd.
FLETCHER	4/19/2006	0.75	
HENDERSONVILLE	6/11/2006	0.75	Penny hail reported near the border with Polk.
HENDERSONVILLE	6/23/2006	0.88	
MOUNTAIN HOME	7/4/2006	0.88	
MILLS RIVER	7/4/2006	0.75	
HENDERSONVILLE	7/15/2006	0.88	Nickel size hail on the Polk County line.
MOUNTAIN HOME	7/21/2006	0.75	
HENDERSONVILLE	7/22/2006	0.75	Reported near Flat Rock.
ETOWAH	8/30/2006	1	Numerous trees blown down, including some 70 foot pine trees, centered around the area near the intersection of Cummings Cove Rd and Big Willow Rd. Nickel to quarter size hail was also reported.
HENDERSONVILLE	8/30/2006	1	
HENDERSONVILLE	10/11/2006	1	Reported on the Polk/Henderson County line.
HENDERSONVILLE	5/3/2007	0.75	Isolated severe thunderstorms affected the French Broad Valley during the afternoon hours.
FLETCHER	6/24/2007	0.88	Reported near the intersection of Youngs Gap Rd and Burney Mountain Rd on the Buncombe County line.
ETOWAH	7/27/2007	0.75	Reported Watagnee Trail.
FLETCHER	8/24/2007	0.75	Several severe storms affected western North Carolina during the afternoon hours.
HENDERSONVILLE	8/26/2007	1	Quarter size hail near exit 49 on I-26.
MILLS RIVER	6/22/2008	0.75	Reported near the Mount Pisgah campground.
EAST FLAT ROCK	6/27/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
MOUNTAIN HOME	7/6/2008	0.75	Several severe storms affected western North Carolina during the afternoon hours.
EAST FLAT ROCK, HENDERSONVILLE, DANA	7/7/2008	0.88	Hail was reported at Blue Ridge Community College.
MILLS RIVER	7/8/2008	1	Several severe storms affected western North Carolina during the afternoon and evening hours.
GOODLUCK	9/30/2008	0.88	Hail was reported near the intersection of Youngs Gap Rd and Lindsey Loop. Large hail also caused significant damage to the apple crop in the area around Saint Pauls Rd and Old Clear Creek Rd.
FLETCHER	4/24/2009	0.75	Large hail was reported in the upper French Broad Valley.
DANA	6/8/2009	0.88	Airmass thunderstorms produced a few areas of large hail and damaging winds over the North Carolina Mountains during the late afternoon and evening hours. There was also an isolated instance of flash flooding.
MILLS RIVER	6/10/2009	1.75	Golf ball size hail was reported in areas from Mills River to Mountain Home.
ETOWAH	7/25/2009	0.75	A few thunderstorms developed over the upper French Broad Valley during the evening hours. One storm produced large hail.

Location	Date	Size	Description
HOOPERS CREEK	9/9/2009	1	A persistent upper low triggered thunderstorms over the North Carolina mountains and foothills during the early morning hours of the 9th. A few of the storms produced large hail. Thunderstorms redeveloped in this same area early in the afternoon and more severe weather was reported.
BLUE RIDGE	9/9/2009	1.75	The large hail caused significant damage to apple crops in this part of Henderson County.
EDNEYVILLE	9/9/2009	1	Hail up to size of quarters fell near Edneyville.
LEAD	5/6/2010	1	A few thunderstorms developed over western North Carolina mountains during the early evening hours as a weak cold front moved into the region. Some of the thunderstorms produced large hail.
VALLEY HILL	5/6/2010	1	Marble to quarter size hail was reported on Crab Creek Rd, about 4.5 miles southwest of Hendersonville.
VALLEY HILL	5/6/2010	0.75	A few thunderstorms developed over western North Carolina mountains during the early evening hours as a weak cold front moved into the region. Some of the thunderstorms produced large hail.
VALLEY HILL	5/6/2010	0.88	This was the third report of hail at this spotter's house for the day.
MILLS RIVER	5/28/2010	1	Quarter size hail was reported in Mills River and up to 2 miles west of town.
MILLS RIVER	4/9/2011	0.88	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.
MILLS RIVER	5/12/2011	0.75	Scattered airmass thunderstorms developed over the North Carolina mountains during the afternoon hours. A few of the storms produced large hail.
ETOWAH	6/2/2011	1	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.
BOWMAN BLUFF	6/2/2011	0.88	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.
HENDERSONVILLE	6/2/2011	0.75	Small hail was reported over much of the west side of Hendersonville.
SMYTH	6/2/2011	1.75	Several reports were received of hail up to golf ball size falling from Mountain Home to the northeast side of Hendersonville.
VALLEY HILL	6/9/2011	1	Nickel to quarter size hail fell near the Valley Hill FD.
CAROLINA HILLS	6/10/2011	0.75	Dime size hail was reported on Pattys Chapel Rd.
BOWMAN BLUFF	6/12/2011	0.88	Nickel size hail fell in the Jeter Mountain area.
DRUID HILLS	9/2/2011	0.75	While the wind shear was fairly weak over western North Carolina, a very unstable atmosphere and hot temperatures resulted in scattered thunderstorm activity over the region. A few of the storms produced areas of damaging straight-line winds and even some large hail as they drifted slowly to the south.
HOLLY SPGS	4/3/2012	1	Nickel to quarter size hail fell near the intersection of highway 280 and Hunters Ridge Rd.
MILLS RIVER	4/5/2012	0.75	Thunderstorms developed over the mountains during the afternoon hours. A couple of the storms produced hail up to the size of quarters.
FLAT ROCK	4/26/2012	1	Quarter size hail was reported on Little River Rd.

Location	Date	Size	Description
HENDERSONVILLE	4/26/2012	0.88	Thunderstorms developed during the afternoon along an outflow boundary from an MCS that crossed the region earlier in the day. The afternoon and evening storms produced large hail and some straight-line wind damage.
MILLS RIVER	4/26/2012	1.75	Multiple public reports of quarter size to golf ball size hail were received from the Mills River and Fletcher areas.
EDNEYVILLE	4/26/2012	0.75	Thunderstorms developed during the afternoon along an outflow boundary from an MCS that crossed the region earlier in the day. The afternoon and evening storms produced large hail and some straight-line wind damage.
MILLS RIVER	5/1/2012	0.75	Thunderstorms developed over the North Carolina mountains during the afternoon hours. Several of the storms produced hail.
FLETCHER	5/1/2012	2.5	Tennis ball size hail caused severe damage to at least one vehicle near the intersection of highway 25 and I-26.
FLETCHER	5/1/2012	1.75	Golf ball size hail damaged vehicles near Fletcher. Quarter size hail also fell along a path from Fletcher to 3 miles east of town.
EDNEYVILLE	5/1/2012	0.88	Thunderstorms developed over the North Carolina mountains during the afternoon hours. Several of the storms produced hail.
ETOWAH	7/1/2012	1	After a day where temperatures rose to record levels, including 104 degrees at the Charlotte Douglas International Airport, numerous severe storms developed over western North Carolina during the afternoon and evening hours. The wind shear was fairly weak, but there was considerable instability. This allowed some of the storms to organize into small bowing clusters, though the dominant mode was pulse severe.
DANA	8/22/2012	0.75	Scattered thunderstorms developed along the Blue Ridge Mountains and drifted slowly to the southwest. The storms produced heavy rain and some lightning damage.
TUXEDO	4/29/2014	1	Spotter reported quarter size hail near Tuxedo.
EAST FLAT ROCK	4/29/2014	0.88	Public reported hail up to nickel size that lasted a few minutes.
ETOWAH	5/27/2014	0.88	Public reported nickel size hail.
ETOWAH	6/13/2014	1	Spotter reported quarter size hail.
HORSE SHOE	6/19/2014	0.75	Public reported 3/4-inch hail.
FIVE PTS	6/19/2014	0.88	Spotter reported dime to nickel size hail.
FLAT ROCK	6/19/2014	1	Public reported a lot of hail up to quarter size on the north side of town.
HORSE SHOE	6/20/2014	0.75	Public reported 3/4-inch size hail fell between Etowah and Horse Shoe.
BARKER HGTS	8/21/2014	0.75	Public reported brief 3/4-inch hail.
GERTON	5/11/2015	1	Spotter reported quarter size hail.
MILLS RIVER	6/2/2015	0.75	Public reported dime to penny size hail in the Mills River area.
BRICKTON	6/21/2015	1	Public reported quarter size hail on I-26 at the Henderson/Buncombe County line.
SMYTH	7/6/2016	1	Spotter reported marble to quarter size hail.
HILLGIRT	7/30/2016	0.75	Public reported (via Social Media) 3/4-inch hail.
HILLGIRT	5/19/2017	1	Spotter reported quarter size hail on Heritage Circle.
LEAD	5/19/2017	1	Public reported quarter size hail off Pinnacle Mountain Rd.
LEAD	5/19/2017	0.88	Public reported nickel size hail along Pinnacle Falls Ln.
UPWARD	5/19/2017	1	Public reported quarter size hail.
TUXEDO	6/13/2017	0.88	FD reported nickel size hail.
HENDERSONVILLE	7/8/2017	1.75	Public reported up to golf ball size hail.
BOWMAN BLUFF	7/18/2017	1	Public reported quarter size hail off Cummings Rd.

Location	Date	Size	Description
RUGBY	6/3/2018	1	Public reported quarter size hail at Highway 191 and North Rugby Rd.
MILLS RIVER	6/20/2018	0.75	Public reported (via Social Media) 3/4-inch hail in the Mills River area.
OTTANOLA	7/21/2018	2	Spotter reported two-inch diameter hail on Sugarloaf Mountain Rd.
BOWMAN BLUFF	8/21/2019	0.88	Public reported up to nickel size hail at a golf course off Cummings Rd.
EDNEYVILLE	9/8/2021	1	Public reported dime to quarter sized hail about one mile south of Edneyville.
VALLEY HILL	7/1/2022	0.75	Spotter reported up to penny size hail.
UPWARD	8/30/2022	1	Public reported quarter size hail just north of Saluda.
RUGBY	8/12/2023	1.75	Public reported golf ball size hail.
LEAD	5/24/2024	1	Public reported (via Social Media) quarter size hail in the Green River Rd area.
HILLGIRT	8/30/2024	0.88	Public reported nickel size hail on Highway 280.
BALFOUR	8/30/2024	0.75	Public reported penny size hail.
Polk County			
Unincorporated Area	6/5/1970	1.5	
Unincorporated Area	6/4/1985	2.75	
Unincorporated Area	6/5/1985	0.88	
Unincorporated Area	6/5/1985	1.75	
Unincorporated Area	6/7/1985	1	
Unincorporated Area	7/10/1985	1	
Unincorporated Area	7/10/1985	1	
Unincorporated Area	7/16/1985	0.75	
Unincorporated Area	5/1/1987	0.75	
Unincorporated Area	5/17/1988	1.75	
Unincorporated Area	6/18/1988	0.75	
Unincorporated Area	6/5/1989	0.75	
Unincorporated Area	5/1/1990	1	
Saluda	3/31/1993	0.75	
SALUDA	6/24/1996	1	
COLUMBUS	6/2/1997	0.75	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one

Location	Date	Size	Description
			insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
TRYON	6/14/1997	0.88	Severe thunderstorms blew down trees and power lines in Henderson county and caused large hail near the South Carolina border in Polk county. The most damage occurred around Shelby where trees were blown down in 15 locations near town. At least one tree fell on a vehicle and another fell on a house.
SALUDA, COLUMBUS	7/4/1997	1.75	Severe thunderstorms moved into the mountains from Tennessee in the early evening on the Fourth, before moving into or redeveloping in the foothills and western piedmont later in the evening. Damaging winds raked much of western North Carolina, downing trees and power lines, and a few reports of hail as large a golf balls were reported. Several counties reported trees and power lines down countywide, often blocking roads and damaging homes and/or vehicles. Outflow from the storms propagated southeast into the Charlotte metro area before midnight, producing gusty winds between 35 and 45 mph for a short period of time. Dollar amounts for much of the damage were not available at the time of this writing.
COLUMBUS	5/3/1998	0.75	A severe thunderstorm downed a few trees on the southeast side of Charlotte during the afternoon. Other isolated severe thunderstorms downed a of couple trees in Avery county and produced dime size hail in Polk county in the early and late evening.
COLUMBUS	8/20/1999	1.75	An isolated severe thunderstorm produced golf ball size hail in two counties.
TRYON	5/13/2000	0.75	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 amount 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.
MILL SPG	6/25/2001	1	Quarter-sized hail observed in Mill Spring.
SALUDA	7/5/2001	0.75	Trained spotter reported dime-sized hail.
COLUMBUS	3/16/2002	0.88	The hail caused several traffic accidents in the Columbus area.
COLUMBUS	5/2/2003	0.75	
COLUMBUS	5/15/2003	1	
TRYON	7/5/2005	0.75	

Location	Date	Size	Description
TRYON	4/3/2006	0.75	
MILL SPG	4/19/2006	0.75	
COLUMBUS	5/20/2006	0.88	
SALUDA	7/15/2006	0.88	
SALUDA	10/11/2006	1	Reported on the Polk/Henderson County line.
COLUMBUS	4/19/2007	0.88	Nickel size hail reported at the intersection of highway 9 and Landrum Rd.
COLUMBUS	4/19/2007	0.88	A few severe thunderstorms developed over the mountains and western foothills of North Carolina during the afternoon hours.
SALUDA	4/26/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
SALUDA	6/27/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
COLUMBUS	6/27/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
BEULAH	7/6/2008	0.75	Hail was reported on Toney Rd.
SUNNY VIEW	9/30/2008	0.88	Hail was reported in the Sunny View community.
MILL SPG	9/30/2008	1	A strong cold front triggered several severe storms over western North Carolina during the afternoon and evening hours.
SUNNY VIEW	6/9/2009	0.88	Widely scattered multicell storms produced a few areas of wind damage and large hail over western North Carolina.
MC GINNIS XRDS	7/28/2009	0.75	An old mesoscale convective vortex spawned numerous showers and thunderstorms over western North Carolina. A few of the storms produced large hail and damaging winds. Severe urban flooding developed during the evening hours on the south side of Charlotte.
MC GINNIS XRDS	8/27/2009	0.75	A spotter reported penny size hail and measured a wind gust of 56 MPH.
COLUMBUS	9/9/2009	0.88	Penny to nickel size hail was reported near the intersection of highway 74 and I-26 on the west side of the town of Columbus.
MELVIN HILL	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.
TRYON	10/26/2010	1	Scattered supercell thunderstorms developed over the western Carolinas and northeast Georgia as strong wind shear and moderate instability overspread the region ahead of a strong cold front. A number of tornadoes were spawned by the storms. Two strong tornadoes affected the western piedmont and foothills of North Carolina.
BEULAH	5/11/2011	1	Scattered thunderstorms developed over the North Carolina mountains during the afternoon hours. Some of the storms produced hail as they drifted to the south.
BEULAH	5/26/2011	0.75	Numerous showers and thunderstorms affected the western Carolinas and northeast Georgia during the afternoon and evening hours. Some of the thunderstorms were severe, producing large hail and damaging straight line wind.
SUNNY VIEW	6/2/2011	1	Quarter size hail fell at Lake Adger Rd and Coopers Gap Rd.
COLLINSVILLE	6/16/2011	0.75	An isolated thunderstorm developed over the southern North Carolina foothills. The storm produced a little small hail.
SUNNY VIEW	5/1/2012	0.75	Thunderstorms developed over the North Carolina mountains during the afternoon hours. Several of the storms produced hail.
SUNNY VIEW	5/1/2012	1.75	Hail up to golf ball size destroyed crops just south of the Rutherford County line.
SUNNY VIEW	5/1/2012	0.75	A second round of penny size hail fell along highway 9.
SUNNY VIEW	5/1/2012	0.75	Yet a third round of penny size hail was reported on highway 9.

Location	Date	Size	Description
SALUDA	7/18/2012	1	Quarter size hail was reported near mile marker 60 on I-26.
SUNNY VIEW	5/22/2013	1	Quarter size hail fell along highway 9 in the Sunny View community.
SUNNY VIEW	5/22/2013	0.75	The relative of an NWS employee reported penny size inch hail on highway 9 at the Rutherford County line.
MILL SPG	8/23/2013	0.75	Hail up to the size of pennies was reported in the Mill Spring community.
COLLINSVILLE	6/8/2014	1	Public reported quarter size hail on the state line southwest of Green Creek.
SANDY PLAINS	8/12/2014	0.75	Public reported 3/4 inch hail.
COLLINSVILLE	8/5/2015	0.88	HAM radio operator reported nickel size hail on Highway 9 near the South Carolina border.
MELVIN HILL	5/1/2016	1	Public reported quarter size hail in the Green Creek community.
COLUMBUS	5/31/2016	1	Public reported quarter size hail via social media.
COLUMBUS	5/31/2016	0.75	Public reported 3/4 inch hail via social media.
SALUDA	3/1/2017	0.75	Spotter reported 3/4 inch hail.
SALUDA	6/15/2017	0.75	Spotter reported 3/4 inch hail in the Saluda area.
COLUMBUS	5/10/2018	0.75	Public reported penny sized hail along Highway 108 just east of Columbus.
MILL SPG	5/10/2018	1	EM reported quarter size hail in the Mill Spring area as multiple strong to severe storms trained over Polk County.
MILL SPG	5/10/2018	1.75	EM reported quarter size hail in the Mill Spring area as multiple strong to severe storms trained over Polk County. Public reported quarter to golf ball size hail on Highway 74.
SANDY PLAINS	5/10/2018	0.75	Public reported an extended period of up to 3/4 inch hail as multiple strong to severe storms trained over Polk County.
BEULAH	5/10/2018	0.75	Former NWS employee reported penny size hail.
RODDY STORE	5/10/2018	1	Public reported quarter size hail as multiple strong to severe storms trained over Polk County.
MC GINNIS XRDS	5/6/2022	1	Cocorahs observer reported pea to quarter sized hail.
Rutherford County			
Unincorporated Area	6/25/1979	1.75	
Unincorporated Area	6/4/1985	0.75	
Unincorporated Area	6/5/1985	1.75	
Unincorporated Area	6/5/1985	1.75	
Unincorporated Area	7/10/1985	1	
Unincorporated Area	5/17/1988	0.75	
Unincorporated Area	7/26/1989	0.75	
Unincorporated Area	5/1/1990	1.75	
Unincorporated Area	5/1/1990	1	
Rutherfordton	3/31/1993	0.75	

Location	Date	Size	Description
Bostic	5/13/1993	0.88	
Rutherfordton	5/13/1993	0.88	
RUTHERFORDTON	5/29/1996	0.88	
RUTHERFORDTON	6/2/1997	2	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
FOREST CITY	6/2/1997	2	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
FOREST CITY	6/2/1997	0.75	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
SUNSHINE	6/2/1997	0.75	Severe weather carried over from the morning in the foothills and into the piedmont, and developed in the mountains. Large hail caused much (although unknown dollar amounts) damage. The storms were quite slow moving, especially around Asheville and near Hendersonville, and caused hail for some time. In the city of Shelby, a man was struck and injured by lightning while mowing.
THERMAL CITY, GILKEY, UNION MILLS	5/26/1998	0.88	Mutli-cell thunderstorms developed in a hot and humid airmass just ahead of a cold front sagging south across North Carolina during the evening of the 26th. Several storms became severe and produced widespread hail and wind damage. Hail and wind lasted 15-20 minutes at some locations. Numerous trees and power lines were downed, some on homes, and numerous power outages occurred. In the town of

Location	Date	Size	Description
			Gilkey, in Rutherford county, a storage building was blown into the woods. Four homes were damaged by fallen trees in Union Mills and windows were blown out.
CHIMNEY ROCK, LAKE LURE	5/13/2000	1	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.
RUTHERFORDTON	6/25/2001	1	Numerous trees and power lines down, with several reports of quarter-sized hail, along a path from Rutherfordton to Forest City. A tree fell across a truck in Chase.
HENRIETTA	3/16/2002	0.75	
FOREST CITY	5/7/2002	0.75	
FOREST CITY	7/3/2002	0.75	
RUTHERFORDTON	7/4/2002	0.75	
SUNSHINE	7/4/2002	0.75	
RUTHERFORDTON	4/29/2003	1.5	
SPINDALE	4/29/2003	1	
LAKE LURE	5/2/2003	0.75	
RUTHERFORDTON, ELLENBORO	5/3/2003	1.75	
LAKE LURE	5/15/2003	0.75	Numerous vehicles were damaged.
THERMAL CITY, BOSTIC, SUNSHINE	7/12/2003	1	
LAKE LURE	5/8/2004	0.75	
ELLENBORO	5/9/2004	0.75	
RUTHERFORDTON	6/12/2004	1	
FOREST CITY	6/19/2005	0.75	
RUTHERFORDTON	7/5/2005	0.75	
RUTHERFORDTON, HENRIETTA	4/3/2006	0.75	
FOREST CITY	5/13/2006	0.75	
RUTHERFORDTON	5/20/2006	0.75	
SUNSHINE	5/26/2006	0.75	
FOREST CITY	6/12/2006	1	
RUTHERFORDTON	7/21/2006	0.75	
FOREST CITY	4/19/2007	0.75	Reported of off highway 221 in the Harris area.
SUNSHINE	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.
SUNSHINE	6/14/2007	0.88	Scattered severe storms affected western North Carolina during the afternoon and early evening hours.
FOREST CITY	6/16/2007	0.75	Scattered severe storms developed over the Foothills and western Piedmont of North Carolina during the afternoon hours.
FOREST CITY	6/24/2007	0.75	Reported on Jack McKinney Rd in the Harris community.
ALEXANDER MILLS	6/27/2007	0.75	Several severe storms affected western North Carolina during the afternoon and evening hours.
SUNSHINE	8/23/2007	1.75	Severe severe storms affected western North Carolina during the evening hours.

Location	Date	Size	Description
RUTHERFORDTON	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.
LAKE LURE	6/26/2008	0.75	Hail was reported at the Lake Lure Marina.
CLIFFSIDE	7/21/2008	0.75	Several severe storms affected western North Carolina during the afternoon and evening hours.
FOREST CITY	7/22/2008	0.75	Several severe storms affected western North Carolina during the afternoon and evening hours.
UREE	9/30/2008	0.75	Hail reported on highway 64 west of Green Hill.
CAROLEEN	9/30/2008	0.75	Hail was reported along Middle Street in Caroleen.
HARRIS	9/30/2008	1	Reported on Howard Cole Rd.
ALEXANDER MILLS	9/30/2008	0.75	Hail was reported on Big Allen Rd in the Danieltown area.
CLIFFSIDE JCT	9/30/2008	0.75	Hail was reported near the intersection of highway 120 and Family Dr.
CHIMNEY ROCK	6/9/2009	1.5	The largest hail fell on the northwest side of Lake Lure. In town, hail up to the size of pennies was reported.
RUTHERFORDTON	6/18/2009	1.75	A swath of hail, up to the size of golf balls, fell from Rutherfordton to Harris Hanrietta Rd about 11 miles southeast of town.
RUTHERFORDTON	7/23/2009	0.75	Scattered thunderstorms developed over the North Carolina Foothills. A few of the storms produced large hail and wind damage.
ALEXANDER MILLS	9/9/2009	1.75	Golf ball size hail was reported on Bethany Church Rd on the southwest side of Forest City.
RUTHERFORDTON	5/28/2010	1	Hail up to quarter size was reported near the intersection of Coxe Rd and Baber Rd.
RUTHERFORDTON	5/28/2010	1	A weak upper low triggered numerous thunderstorms over western North Carolina. Several of the storms produced damaging wind and large hail.
GILKEY	6/28/2010	1	Quarter size hail was reported on Piney Knob Rd.
ELLENBORO	7/26/2010	0.75	Numerous showers and thunderstorms developed over the western Carolinas ahead of a cold front. Most of the severe weather affected South Carolina and Georgia, but a fair number of pulse severe storms also affected the mountains and foothills of North Carolina.
ROCK SPGS	8/5/2010	1	Quarter size hail fell at the River Creek Campground.
GILKEY	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.
GILKEY	4/9/2011	1.75	Hail up to golf ball size hail damaged the gutters and smashed the windshield of a car at a spotter's house about 4 miles northwest of Rutherfordton. Golf ball size hail was reported into Rutherfordton as well.
ELLENBORO	4/9/2011	2	Two inch diameter hail fell along highway 74 about 2 miles southwest of Ellenboro.
FOREST CITY	4/9/2011	1.25	Quarter to half dollar size hail fell from Forest City to the Ellenboro area.
ELLENBORO	5/11/2011	0.88	Scattered thunderstorms developed over the North Carolina mountains during the afternoon hours. Some of the storms produced hail as they drifted to the south.
ELLENBORO	5/11/2011	0.75	Scattered thunderstorms developed over the North Carolina mountains during the afternoon hours. Some of the storms produced hail as they drifted to the south.
WHITEHOUSE	5/13/2011	1.5	Ping pong ball size hail was reported just south of the McDowell County line.
HOLLIS	5/13/2011	1	Quarter size hail fell along Jonestown Rd.

Location	Date	Size	Description
WHITEHOUSE	5/23/2011	0.75	Isolated thunderstorms developed along the lee trough over the North Carolina foothills during the afternoon hours. The storms mainly produced large hail, including a report of tennis ball size hailstones.
HOLLIS	5/23/2011	1	Isolated thunderstorms developed along the lee trough over the North Carolina foothills during the afternoon hours. The storms mainly produced large hail, including a report of tennis ball size hailstones.
HOLLIS	5/23/2011	1	Quarter size hail was reported near the Cleveland County line.
WHITEHOUSE	6/2/2011	1	Quarter size hail fell in the vicinity of the Shingle Hollow community.
FOREST CITY	6/2/2011	1	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.
ROCK SPGS	6/5/2011	1	Penny to quarter size hail was reported at River Creek campground.
WHITEHOUSE	6/12/2011	0.75	Dime size hail was reported near Shingle Hollow.
SPINDALE	6/26/2011	0.88	An isolated thunderstorm produced wind damage over the southern foothills of North Carolina.
WHITEHOUSE	6/27/2011	0.75	Scattered thunderstorms developed during the afternoon hours along the North Carolina Blue Ridge. One of the storms produced wind damage is it moved into the foothills.
CLIFFSIDE JCT	9/2/2011	1	While the wind shear was fairly weak over western North Carolina, a very unstable atmosphere and hot temperatures resulted in scattered thunderstorm activity over the region. A few of the storms produced areas of damaging straight-line winds and even some large hail as they drifted slowly to the south.
LAKE LURE	4/26/2012	1	Quarter size hail fell about 4 miles northwest of Shingle Hollow.
ROCK SPGS	5/1/2012	1	Quarter size hail fell at River Creek campground.
RUTHERFORDTON	5/1/2012	1	Thunderstorms developed over the North Carolina mountains during the afternoon hours. Several of the storms produced hail.
RUTHERFORDTON	6/24/2012	1	Scattered storms developed over western North Carolina during the late afternoon hours, and a couple of those briefly became severe.
GILKEY	9/28/2012	0.75	Scattered thunderstorms developed over western North Carolina along a weak cold front. Most of the storms remained below severe limits, though there was one report of large hail.
LAKE LURE	7/25/2013	1.75	Golf ball size hail fell in the Shingle Hollow community and quarter size hail in the Green Hill community.
GILKEY	8/1/2013	1	Quarter size hail was reported in the Green Hill community.
CHIMNEY ROCK	5/25/2014	0.88	Park Service Employee reported up to nickel size hail at Chimney Rock State Park.
LAKE LURE	5/25/2014	1	Public reported up to quarter size hail in the Lake Lure area.
WHITEHOUSE	6/16/2014	1	Spotter reported dime to quarter size hail.
CAROLEEN	6/19/2014	0.88	FD reported quarter size hail.
WHITEHOUSE	6/20/2014	1	Spotter reported dime to quarter size hail that lasted a few minutes.
UREE	7/27/2014	0.75	Public reported 3/4 inch hail near the intersection of Redbird Dr and Pheasant St.
WHITEHOUSE	6/19/2015	0.88	FD reported dime to nickel size hail.
UNION MILLS	9/10/2015	1	Public reported quarter size hail.
SUNSHINE	5/1/2016	1.75	Public reported up to golf ball size hail.
ELLENBORO	7/23/2017	1	Public reported quarter size hail in the Ellenboro area.

Location	Date	Size	Description
HARRIS SPICERS ARPT	6/1/2018	0.75	Public reported pea to penny size hail.
FOREST CITY	7/21/2018	1.75	County comms and the public (via Social Media) reported quarter to golf ball size hail in the Shiloh community and in the Harris area.
CLIFFSIDE	8/1/2019	0.75	Fire dept reported brief 3/4 inch hail.
THERMAL CITY	8/21/2019	1	Public reported hail as large as quarters.
CLIFFSIDE JCT	5/6/2022	1.75	Public reported golf ball size hail.
GILKEY	8/21/2022	0.88	Public reported nickel size hail on Frog Hollow Rd.
LAKE LURE	7/1/2023	0.88	Public reported (via Social Media) nickel size hail near Lake Lure.
GILKEY	7/2/2023	1	Public reported (via Social Media) dime to quarter size hail in the Gilkey community.
ALEXANDER MILLS	7/3/2023	0.88	Public reported nickel size hail near the intersection of Highways 221 and 74.
LAKE LURE	5/8/2024	2.75	Fire marshall reported baseball size hail in the Lake Lure area.
GILKEY	5/8/2024	1.75	Public reported golf ball size hail on Highway 64 in Green Hill.
FOREST CITY	5/8/2024	1	County comms and public reported quarter size hail in Forest City.
Transylvania County			
Unincorporated Area	5/15/1970	1	
Unincorporated Area	4/3/1974	0.75	
Unincorporated Area	6/7/1985	0.75	
Unincorporated Area	7/9/1985	1	
Unincorporated Area	7/9/1985	1	
Unincorporated Area	6/24/1986	2.75	
Unincorporated Area	5/1/1987	0.75	
Unincorporated Area	5/14/1988	0.75	
Unincorporated Area	6/24/1988	0.75	
Unincorporated Area	6/25/1988	0.75	
Unincorporated Area	5/2/1990	1	
Unincorporated Area	5/2/1990	1	
Unincorporated Area	7/2/1991	1	
Lake Toxaway	3/31/1993	1.75	
Pisgah Forest	3/31/1993	0.75	
Pisgah Forest	6/9/1995	0.75	
LAKE TOXAWAY	3/15/1996	0.75	
BREVARD	4/20/1996	0.75	

Location	Date	Size	Description
LAKE TOXAWAY	5/24/1996	0.75	
COUNTYWIDE	7/4/1997	1.25	Severe thunderstorms moved into the mountains from Tennessee in the early evening on the Fourth, before moving into or redeveloping in the foothills and western piedmont later in the evening. Damaging winds raked much of western North Carolina, downing trees and power lines, and a few reports of hail as large a golf balls were reported. Several counties reported trees and power lines down countywide, often blocking roads and damaging homes and/or vehicles.
LAKE TOXAWAY	1/8/1998	1	Thunderstorms developed in response to an upper level cold pool that moved across western North Carolina in the wake of the powerful storm earlier in the day. Several of the storms became severe, dropping large hail in a few mountain counties as well as portions of the western piedmont. The hail accumulated to a depth of 1 to 2 inches at Lake Toxaway, in Transylvania county.
BREVARD	5/27/1998	1	A frontal boundary in the area again provided the focus for thunderstorm development during the afternoon of the 27th. Many storms became severe across western North Carolina and produced hail ranging in size between dimes and quarters. Severe straight-line winds downed numerous trees and power lines, some on houses, in Sylva and Brevard.
ROSMAN	5/19/2001	0.75	General public reported dime-sized hail at Rosman, while police in Brevard estimated winds there at severe strength just moments later.
CONNESTEE	4/17/2002	0.75	Hail to the size of dimes associated with slow-moving thunderstorms accumulated to depths of 1.5 to 3 feet along some roads and at a golf course.
ROSMAN	7/1/2002	1.25	Several vehicles received damage.
LAKE TOXAWAY	6/11/2003	0.75	
BREVARD	8/8/2003	0.75	
BALSAM GROVE	5/10/2005	0.75	
BREVARD	6/20/2005	0.75	Reported at Pisgah Forest.
BREVARD	6/20/2005	0.88	
BREVARD	6/20/2005	0.5	Mainly pea size hail fell for about 30 minutes and accumulated to a depth of 3 incehs in the Penrose area. The hail was still on the ground the next day. County reported damage to apple crops. There was a rumor of golfball size hail in this area as well, but this could not be confirmed.
BREVARD	8/4/2005	0.75	
PENROSE	4/3/2006	0.75	
BREVARD	4/19/2006	0.75	
BREVARD	4/19/2006	0.88	
ROSMAN	5/20/2006	0.88	
ROSMAN	5/25/2006	0.75	Hail covered the ground.
BALSAM GROVE	5/28/2006	0.75	
CEDAR MTN	6/11/2006	0.75	Hail covered the ground.
BREVARD	7/1/2006	0.75	
LAKE TOXAWAY	7/2/2006	0.75	
BALSAM GROVE	7/4/2006	0.88	
ROSMAN	8/10/2006	0.75	
BREVARD	5/11/2007	0.75	Reported at the USFS Cradle of Forestry.
PENROSE	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.

Location	Date	Size	Description
BREVARD	6/12/2007	1	Scattered severe storms developed over western North Carolina for a second day in a row. The storms mainly produced large hail.
PISGAH FOREST	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.
ROSMAN	6/23/2007	1	Isolated severe storms developed during the evening hours over the Mountains and western Foothills of North Carolina.
BREVARD	5/9/2008	1.75	Severe storms developed over western North Carolina during the evening hours and produced large hail.
BREVARD	5/9/2008	0.75	Severe storms developed over western North Carolina during the evening hours and produced large hail.
BREVARD	6/10/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
BALSAM GROVE	7/21/2008	0.88	Nickel size hail was reported on highway 215.
GRANGE	6/9/2009	0.88	Widely scattered multicell storms produced a few areas of wind damage and large hail over western North Carolina.
GRANGE	6/16/2009	0.88	Hail was reported on Cascade Lakes Rd.
OAKLAND	7/27/2009	0.75	Hail was reported on highway 64.
CEDAR MTN	9/9/2009	1	A persistent upper low triggered thunderstorms over the North Carolina mountains and foothills during the early morning hours of the 9th. A few of the storms produced large hail. Thunderstorms redeveloped in this same area early in the afternoon and more severe weather was reported.
PENROSE	5/6/2010	0.75	A few thunderstorms developed over western North Carolina mountains during the early evening hours as a weak cold front moved into the region. Some of the thunderstorms produced large hail.
GRANGE	5/6/2010	1.25	Hail was reported at the Cascade Lake Recreation area.
BOHAYNEE	5/15/2010	1	Hail up to the size of quarters fell from Cash Rd to Whitewater Church Rd about 3 miles south of Sapphire. The hail accumulated to a depth of 3 inches.
POWELLTOWN	6/15/2010	0.75	Thunderstorms erupted in the lee trough over the North Carolina foothills during the early afternoon hours. The storms produced areas of damaging straight-line winds and large hail over much of the foothills and western piedmont.
REID	6/15/2010	0.75	Thunderstorms erupted in the lee trough over the North Carolina foothills during the early afternoon hours. The storms produced areas of damaging straight-line winds and large hail over much of the foothills and western piedmont.
PENROSE	7/25/2010	0.75	Dime size hail was reported off of highway 276.
POWELLTOWN	4/28/2011	0.88	An historic tornado outbreak affected areas from the Deep South to the Mid-Atlantic states April 27-28. A strong tornado touched down in Rabun County late on the 27th, with additional tornadoes affecting the North Carolina foothills during the early morning hours of the 28th. At least three supercell thunderstorms crossed the western Carolinas and northeast Georgia during this time. A greater number of supercells and tornadoes affected areas to the west of the Appalachians. Scattered areas of straight line wind damage and large hail also accompanied the storms.
QUEBEC	5/11/2011	0.88	Nickel size hail was reported about 3 miles east of Lake Toxaway.
NORTH BREVARD	5/11/2011	0.88	Scattered thunderstorms developed over the North Carolina mountains during the afternoon hours. Some of the storms produced hail as they drifted to the south.
SEESHORE	5/11/2011	1	Scattered thunderstorms developed over the North Carolina mountains during the afternoon hours. Some of the storms produced hail as they drifted to the south.
ECUSTA	5/12/2011	1.75	Golf ball size hail was reported at the Davidson River campground.
POWELLTOWN	5/12/2011	1	Scattered airmass thunderstorms developed over the North Carolina mountains during the afternoon hours. A few of the storms produced large hail.

Location	Date	Size	Description
SEGA LAKE	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.
ECUSTA	6/2/2011	0.75	Penny size hail fell near the intersection of highway 64 and highway 280.
NORTH BREVARD	6/9/2011	1	Numerous thunderstorms again developed over western North Carolina as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds.
BALSAM GROVE	6/21/2011	0.75	Numerous pulse-type thunderstorms developed over the North Carolina mountains during the early afternoon hours. The storms spread eastward as the afternoon progressed. Some of the storms produced large hail and damaging wind. A more organized area of thunderstorms moved across the Charlotte metro area during the late evening hours.
JOHN ROCK	6/21/2011	0.75	Numerous pulse-type thunderstorms developed over the North Carolina mountains during the early afternoon hours. The storms spread eastward as the afternoon progressed. Some of the storms produced large hail and damaging wind. A more organized area of thunderstorms moved across the Charlotte metro area during the late evening hours.
NORTH BREVARD	3/15/2012	1	Hail up to quarter size hail fell in Brevard. On the east side of town, the hail was several inches deep in places and covered roads.
POWELLTOWN	3/24/2012	1	Hail up to the size of quarters covered the ground.
SAPPHIRE	4/26/2012	0.88	Thunderstorms developed during the afternoon along an outflow boundary from an MCS that crossed the region earlier in the day. The afternoon and evening storms produced large hail and some straight-line wind damage.
OAKLAND	5/1/2012	0.88	Nickel size hail at Gorges State Park.
JOHN ROCK	5/2/2012	0.88	Up to nickel size hail was reported at the Pisgah Inn on the Blue Ridge Parkway.
ROSMAN	7/9/2012	0.88	Scattered thunderstorms developed along a southward moving cold front during the afternoon hours. A few of the thunderstorms caused wind damage and dropped large hail.
OAKLAND	8/8/2012	0.75	Penny size hail was reported in Gorges State Park.
LAKE TOXAWAY	4/11/2013	1	Hail up to the size of quarters fell in the Lake Toxaway area.
BALSAM GROVE	5/20/2013	1	Up to quarter size hail was reported in the Balsam Grove area.
BALSAM GROVE	5/20/2013	0.75	Penny size hail was reported on Pari Drive.
LAKE TOXAWAY	5/20/2013	1	Quarter size hail was reported at Gorges State Park.
SEGA LAKE	6/19/2014	0.75	Spotter reported pea size to 3/4 inch hail.
PENROSE	8/20/2014	0.75	Spotter reported penny size hail between Little River and Penrose.
REID	9/20/2017	0.75	Spotter reported 3/4 inch hail in the Lake Toxaway area.
OAKLAND	9/20/2017	1	Public reported up to quarter size hail in the Burlingame community.
BREVARD	4/9/2019	1.25	Public reported (via Social Media) larger than quarter size hail in Brevard.
CEDAR MTN	5/5/2020	1.75	Spotter reported golf ball size hail resulting in vehicle damage just outside of Dupont State Forest.
CEDAR MTN	7/1/2023	1	Public reported up to quarter size hail in the Cedar Mountain area.

TABLE H.5: HEAVY RAIN EVENTS (1999-2024)

Location	Date	Description
Henderson County		
COUNTYWIDE	11/25/1999	A strong storm system moving through the southeastern U.S. caused locally heavy rain (up to 7 inches in a small part of the mountains) and gusty winds. The result was standing water on highways and roads, some minor flooding of small streams, and several downed trees. There were numerous traffic accidents during this part of the holiday weekend as a result of the rain. The Davidson and French Broad Rivers flooded slightly in Transylvania county, causing some brief road closures.
HENDERSONVILLE	6/15/2003	Heavy rain resulted in over 40 gallons of wastewater flowing into Sandy Creek.
COUNTYWIDE	9/22/2003	A large storm system produced very heavy rainfall across the southern mountains of North Carolina during the early evening, which resulted in some urban and small stream flooding across the area. More significant flooding developed in Transylvania County after 7 pm.
BAT CAVE	8/22/2012	Highway 64/74 was briefly closed with a small mud slide covering one lane to a depth of 6 to 10 inches.
Polk County		
COLUMBUS	6/28/2005	A mudslide was reported on Holbert Cove Rd and a culvert was washed out on Skyuka Mountain Rd.
SALUDA	6/26/2006	Very heavy rainfall of 6 to 8 inches caused mainly nuisance flooding across the southern part of the county. Some roads received minor flooding due to poor drainage, but no known stream flooding occurred. In addition, several small landslides developed across the county, with the most significant affecting a portion of highway 176 near Saluda.
COLUMBUS	1/25/2010	Poor drainage resulted in water entering a building in downtown Columbus after 3 to 4 inches of rain fell in about an 18-hour period.
VALHALLA	5/28/2018	EM reported two broadcast journalists were killed when a tree fell on their vehicle as they were driving on Highway 176. The tree fell due to saturated ground from the more than one foot of rain that fell over western Polk County during the latter half of May.
Rutherford County		
SUNSHINE	7/4/2002	A portion of Missionary Plantation Rd was washed out.
LAKE LURE	8/22/2003	Heavy rain caused a mudslide to develop.
LAKE LURE	6/14/2004	A prolonged period of heavy rain combined with gusty winds to cause several trees to fall.
LAKE LURE	8/26/2008	Heavy rain caused a mudslide to develop on a hillside that had been cleared for construction. Water and debris entered a business at the bottom of the hill, causing some damage.
RUTH	11/11/2009	Water entered the basement of a home on North Main St, apparently due to flooding caused by poor drainage after 3 to 5 inches of rain fell over an extended period.
Transylvania County		
COUNTYWIDE	11/25/1999	A strong storm system moving through the southeastern U.S. caused locally heavy rain (up to 7 inches in a small part of the mountains) and gusty winds. The result was standing water on highways and roads, some minor flooding of small streams, and several downed trees. There were numerous traffic accidents during this part of the holiday weekend as a result of the rain. The Davidson and French Broad Rivers flooded slightly in Transylvania county, causing some brief road closures.
COUNTYWIDE	9/22/2003	A large storm system produced very heavy rainfall across the southern mountains of North Carolina during the early evening, which resulted in some urban and small stream flooding across the area. More significant flooding developed in Transylvania County after 7 pm.
EAST FORK	11/28/2011	East Fork River Rd was partially flooded near the East Fork Baptist Church.

TABLE H.6: HEAVY SNOW EVENTS (1996-2024)

Date	Description
	Henderson County
12/18/1996	Heavy snow accumulated 3 to 5 inches with 6 inches at high elevations in the mountains.
1/10/1997	Heavy snow fell in the mountains resulting in accumulations of 3 to 6 inches. Over 200 car wrecks were reported in western North Carolina during the snow. Icy roads the next morning contributed to many accidents with one indirect fatality near Statesville, well away from the high accumulations of precipitation.
12/29/1997	Snow began during the day of the 29th and lasted well into the 30th as a strong storm system moved northeast through the Carolinas. Snowfall ranged from 2-6 inches in the lower elevations, to generally 4-12 inches in the higher elevations. Some of the highest peaks ended up with between 15 and 23 inches.
12/30/1997	Widespread, wind-blown heavy snow developed as a strong storm system intensified in the northeastern U.S. and directed cold, moist air in a strong northwest flow, into the mountains. By the evening of the 31st, 4-6 inches of new snow accumulated basically along and south of Interstate 40, with over 12 inches common north of there. Very windy conditions accompanied the heavy snow, creating near blizzard conditions at times, especially at elevations above 3000 feet. Snow depths in the highest elevations due to the snow of the past three days were near 3 feet.
1/27/1998	A deep cut-off low drifted across western North Carolina, drawing abundant moisture into air just cold enough to support snow. A heavy wet snow began in the pre-dawn hours on the 28th and moved north across the mountains. Snow accumulated quickly during the day, before tapering to a light snow in the evening. Light snow continued into the following morning, especially north of Asheville. Snowfall totals ranged from 4 to 8 inches at lower elevations to between 1 and 3 feet at high elevations. To make matters worse, strong winds combined with the snow to create near blizzard conditions at times in the higher elevations. Tens of thousands of people were without power for up to 3 days as numerous trees and power lines were downed. Thousands of motorists were stranded on roads and highways. Interstate 40 through the mountains was closed for several hours and the National Guard had to be called in to rescue people stranded on the highway.
1/31/1999	Portions of the central and southern mountains received a more prolonged period of moderate to heavy wet snow, mixed at times with sleet and freezing rain, which accumulated to between 4 and 6 inches by early evening. Light snow continued in some places until midnight.
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 with as much as 10 inches reported in Jackson county. Generally, 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Rowan county failed to meet heavy snow criteria with accumulations of up to 3 inches. 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. The one exception was across southern Union county where freezing rain lasted all night and through much of the morning on the 23rd. 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.
4/8/2000	A cold and moist northwest flow behind a cold front produced light snow across the mountains. Accumulations were generally a dusting to one inch, but the highest mountains north of Asheville received 2 to 3 inches.
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.
12/3/2000	A developing surface cyclone off the Carolina Coast spread abundant moisture into western North Carolina, which was still mired in a cold, winter-like temperature regime. The result was another

Date	Description
	widespread snowfall. Accumulations ranged from a dusting in the northern foothills to more than 6 inches in western Macon County and 5 inches in Henderson County. Most accumulations were in the 1 to 3-inch range.
12/17/2000	A dynamic system affected western North Carolina during the 16th and 17th, bringing a variety of weather to the region, from freezing rain in mountain valleys to large hail and damaging winds across much of the region
12/19/2000	The latest in a sprightly succession of Arctic cold fronts crossed the region on the 18th and 19th. Abundant low-level moisture and an upper level disturbance riding over the new surge of cold air provided the ingredients for the latest round of snow. The heaviest snow accumulations, in general, were north and west of Asheville, especially near the Tennessee border. The northern half of Mitchell County recorded 5 to 6 inches of new snow...as did the higher-terrain Highlands/Cashiers area of southern Jackson and Transylvania counties in the southern mountains. Buncombe, Transylvania and Macon counties each reported numerous 4 inch accumulations, with most other mountain locations reporting between 1 and 3 inches. Foothill locations, especially those closest to the mountains, racked up some impressive totals as well, with Marion and Morganton each reporting 2 to 3 inches. Farther east, in the northwest piedmont, accumulations were limited to less than 2 inches. More than 200 traffic accidents were reported from the region due to the wintry weather.
1/1/2001	Light snow fell on and off through the afternoon, increased in intensity about 3 pm in the west, and during the early evening in the eastern mountain counties. Though accumulations were light, hundreds of auto accidents resulted. Most accidents in Henderson County were between 3 pm and 6 pm.
3/20/2001	Low pressure developed off the South Carolina coast and steadily strengthened as it moved northward across the coastal waters of North Carolina, the Virginia tidewater and eventually out to sea. Rapid strengthening occurred as a strong upper level disturbance rotated around an upper low that was crossing the southeast states. As the cyclone strengthened, abundant moisture was wrapped around the storm and thrown back against the higher terrain of the Carolinas, resulting in high winds and very heavy snow. The heaviest snow accumulations were in far western North Carolina.
1/3/2002	Snow continued during the early morning hours on the 3rd and finally added up to heavy snowfall accumulations across this portion of the North Carolina mountains. Snowfall amounts ranged from 3 to 6 inches across the area by noon.
2/3/2002	Light snow fell from late afternoon into late evening, resulting in 1 to 2.5 inches accumulations in some areas, and a few slick roads.
12/4/2002	Snow began falling around sunrise across the mountains of North Carolina, and had accumulated to 3 to 6 inches by evening.
1/16/2003	Light snow began across the mountains of North Carolina during the afternoon of the 16th, and gradually intensified with time. By early morning of the 17th, 4 to 8 inches of snow had accumulated. As much as a foot was reported on some of the highest peaks.
2/6/2003	Light snow began falling across the western mountains of North Carolina during the afternoon of the 6th, and gradually increased in intensity and coverage during the evening and overnight hours. General snowfall amounts of 4 to 5 inches were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border.
4/10/2003	Light snow began across the North Carolina mountains during the early morning hours of the 10th, but due to a warm ground, accumulations were confined to the highest elevations through 8 AM. However, the snow intensified dramatically during the middle and late part of the morning, and by early afternoon, 2-4 inches had accumulated in valley locations near the Blue Ridge. In the higher elevations, 4 to 6 inch totals were common, while 8 to 12 inches accumulated on some of the highest peaks along the Tennessee border. The heavy, wet snow caused numerous trees and power lines to fall, and power outages were widespread.
1/25/2004	Light snow developed early in the morning across the mountains, foothills, and northern piedmont of North Carolina. The snow intensified throughout the morning and afternoon, and by early evening 3 to 5 inches had accumulated across much of the area. Accumulations as high as 8 inches occurred in mountainous areas along the Tennessee border.

Date	Description
2/26/2004	Snow intensity increased during the late morning across the North Carolina mountains, and continued through the afternoon. Total accumulations of 3 to 5 inches occurred, but much of it melted rapidly.
2/28/2005	The wet snow became heavier across the mountains and northern foothills during the early morning hours on the 28th. Most locations below 3000 feet changed back to rain before the precipitation ended. A quick 3 to 7 inches of snow accumulated across much of this area. Isolated heavier totals up to 13 inches occurred along the Blue Ridge, north of I-40, while the lower elevations of the foothills generally received only 1 to 3 inches.
2/1/2007	Light to moderate snow developed across the North Carolina mountains during the pre-dawn hours. The snow became heavy at times toward sunrise. By mid-morning, as much as 3 inches of snow had accumulated across the area. Snow, heavy at times continued across the portions of the southern and central mountains through the morning hours, with most locations reporting heavy snowfall totals by mid-morning. Total accumulations ranged from 2 to 4 inches across the area.
1/16/2008	Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall during the early morning hours across the southern mountains and foothills, and total accumulations of 2-4 inches were reached across much of the area shortly after midnight.
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 so far south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. ||Snow, heavy at times began across the southern and central mountains during the late afternoon, and began to quickly accumulate. By early evening, some areas had picked up 4 inches of snowfall. Heavy snow continued most of the night. The precipitation changed over to sleet and freezing rain before ending, but only trace amounts of ice occurred. Total accumulations ranged from 4-8 inches across the Tennessee border counties, to more than a foot in the upper French Broad Valley. The heavy wet snow caused numerous trees to fall, especially in the interior and southwest valleys, resulting in fairly widespread power outages.
2/12/2010	As low pressure tracked along the northern Gulf Coast, light snow developed during the late afternoon across the southern North Carolina mountains. The snow gradually increased in intensity through the remainder of the afternoon and into the early evening. Numerous traffic accidents occurred during the evening rush. Snow, heavy at times, continued through the evening, with heavy accumulations reached in most areas. The snow ended a little before midnight. Total accumulations averaged around 3 inches.
3/2/2010	Snow began to fall during the pre-dawn across the mountains of the western Carolinas. After sunrise, snow became moderate to heavy at times, resulting in accumulations of 1 to 4 inches across most of the area by late morning. Snow, heavy at times, continued into the afternoon across the mountains, with heavy accumulations realized in most areas by early afternoon. By early evening, total snowfall ranged from 4 to 8 inches across the area, with localized amounts as high as 10 inches, especially in the higher elevations.
12/25/2010	A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the mountains beginning around sunrise on Christmas, and continuing through the morning. Snow, heavy at times, continued through the afternoon across the central and southern mountains. By Christmas evening, most locations had 6 to 10 inches of fresh snowpack. Although snow ended in most areas during the evening of the 25th, a strong northwest flow resulted in development of numerous snow showers along the Tennessee border on the 26th through the 27th. Many of these snow showers managed to add to snowfall totals, mainly in the higher elevations of the Nantahala Mountains and the Balsams, where total accumulations of more than a foot became common. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, mainly in the high elevations.
1/10/2011	Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This

Date	Description
	added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days.
1/22/2016	An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported.
1/6/2017	As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread the southern Appalachians throughout the 6th. Although the precip may have started as rain in the lower valleys, it primarily fell as snow. It was initially light in most areas, but became heavy during mid-to-late evening, continuing into the overnight. By the time the heavier snowfall rates tapered off around sunrise, total accumulations ranged from 5 to 7 inches. Locally higher amounts of as much as 10 were observed across the higher elevations of the foothills counties.
12/8/2018	A mixture of rain and snow developed across the North Carolina mountains during the afternoon of the 8th, transitioning to all snow in most areas by early evening. The snow became heavy at times during the evening into the overnight. By the time the snow tapered off during the morning of the 9th, widespread storm total accumulations of 10-15 inches were reported. Locally higher amounts also occurred, with some locations near the South Carolina border seeing around 20 inches. Meanwhile, warm air filtering into the lower elevations of the Tuckasegee River Valley resulted in a transition to rain during the morning of the 9th, and total accumulations there were only in the 2 to 4 inch range.
2/6/2021	Snow developed across the mountains of southern North Carolina during the afternoon and evening of the 6th as a cold front approached from the Tennessee and Ohio Valleys. The snow continued through the overnight hours before tapering off during the morning of the 7th. Total accumulations ranged from 2 to 6 inches across the area.
1/15/2022	Moisture overspread the southern Appalachians late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow increased in intensity throughout the overnight, with snowfall rates of around an inch per hour becoming common during the pre-dawn hours. Heavy snowfall criteria of 3 to 5 inches was reached in many areas by daybreak, with accumulating snow continuing through the morning hours before tapering off to occasional snow showers that continued to produce light accumulations through the afternoon. Total snowfall ranged from 6 to 10 inches across much of the area, although amounts in excess of a foot were reported near the eastern escarpment of the Blue Ridge. Some of the valleys of far southwest North Carolina saw lesser amounts as temperatures warmed above freezing during the morning. Travel was very difficult to nearly impossible across much of the area throughout the 16th and much of the 17th.
Polk County	
1/16/2008	Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall during the early morning hours across the southern mountains and foothills, and total accumulations of 2-4 inches were reached across much of the area shortly after midnight.
3/1/2009	Rain changed to snow across the southwest foothills of North Carolina during the late afternoon. The snow became heavy at times, particularly along the I-85 corridor. By mid-evening, 1-4 inches of accumulation was reported across much of the area. Snow, heavy at times, and accompanied by occasional lightning, continued into the evening hours. By the time the snow tapered off, accumulations of 3-6 inches were common across the area. However, localized amounts of up to 8 inches were reported along the I-85 corridor. The heavy wet snow, combined with gusty winds, caused quite a few trees and power lines to

Date	Description
	fall, resulting in numerous power outages. Some customers were without power for several days. One tree fell on and damaged a home in Gaffney. In addition, there were numerous traffic accidents.
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.
2/12/2010	As low pressure tracked along the northern Gulf Coast, light snow developed during the late afternoon across the southern North Carolina mountains. The snow gradually increased in intensity through the remainder of the afternoon and into the early evening. Numerous traffic accidents occurred during the evening rush. Snow, heavy at times, continued through the evening, with heavy accumulations reached in most areas. The snow ended a little before midnight. Total accumulations averaged around 3 inches.
12/25/2010	A developing coastal storm system brought light to moderate snow to the foothills and northwest piedmont of North Carolina starting late on Christmas morning. By mid-afternoon, most locations enjoyed a rare white Christmas, with 1 to 4 inches of snow reported. Snow, heavy at times, continued until around midnight. Snow was mixed with rain at times over the southern foothills and northwest piedmont. By the time snow tapered off to flurries and light snow showers early on the 26th, snowfall totals ranged from 5 to 9 inches across the northern foothills, with 4 to 7 inches over the southern foothills and northwest piedmont.
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.
1/22/2016	An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported.
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.

Date	Description
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.
12/8/2018	A mixture of rain and snow developed across the mountains and southern foothills of North Carolina during the afternoon and evening of the 8th, transitioning to all snow in most areas by early evening. The snow became heavy at times during the evening into the overnight. By the time the snow tapered off during the morning of the 9th, total accumulations ranged from 6 to 10 inches across much of the area. Locally higher occurred closer to the higher elevations.
2/6/2021	Snow developed across the mountains of southern North Carolina during the afternoon and evening of the 6th as a cold front approached from the Tennessee and Ohio Valleys. The snow continued through the overnight hours before tapering off during the morning of the 7th. Total accumulations ranged from 2 to 6 inches across the area.
1/15/2022	Moisture overspread the southern Appalachians late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow increased in intensity throughout the overnight, with snowfall rates of around an inch per hour becoming common during the pre-dawn hours. Heavy snowfall criteria of 3 to 5 inches was reached in many areas by daybreak, with accumulating snow continuing through the morning hours before tapering off to occasional snow showers that continued to produce light accumulations through the afternoon. Total snowfall ranged from 6 to 10 inches across much of the area, although amounts in excess of a foot were reported near the eastern escarpment of the Blue Ridge. Some of the valleys of far southwest North Carolina saw lesser amounts as temperatures warmed above freezing during the morning. Travel was very difficult to nearly impossible across much of the area throughout the 16th and much of the 17th.
1/16/2022	Moisture overspread the North Carolina foothills late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow continued into the overnight, becoming moderate to occasionally heavy, with snowfall rates of up to an inch per hour reported. Winds frequently gusting to 30 to 40 mph resulted in near-blizzard conditions at times. Heavy snowfall criteria of 2 to 4 inches was reached just before sunrise at many locations. Slight warming of the air aloft resulted in snow changing to sleet in many areas during mid-to-late morning. While much of the precipitation tapered off by noon, occasional snow showers continued to produce light accumulations during the afternoon and evening. Total snowfall was generally in the 4 to 7 inch range, with light sleet accumulations reported in many areas. Locally higher snowfall of up to 10 inches was reported across Polk County. Travel was difficult to nearly impossible throughout the 16th and much of the 17th, as cold temperatures slowed melting.
Rutherford County	
2/1/2007	Light to moderate snow developed across the North Carolina mountains during the pre-dawn hours. The snow became heavy at times toward sunrise. By mid-morning, as much as 3 inches of snow had accumulated across the area. Snow, heavy at times continued across the portions of the southern and central mountains through the morning hours, with most locations reporting heavy snowfall totals by mid-morning. Total accumulations ranged from 2 to 4 inches across the area.
1/16/2008	Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall during the early morning hours across the southern mountains and foothills, and total accumulations of 2-4 inches were reached across much of the area shortly after midnight.
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 so far south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. ||Snow, heavy at times began across the southern and central mountains during the late afternoon, and began to quickly accumulate. By early evening, some

Date	Description
	areas had picked up 4 inches of snowfall. Heavy snow continued most of the night. The precipitation changed over to sleet and freezing rain before ending, but only trace amounts of ice occurred. Total accumulations ranged from 4-8 inches across the Tennessee border counties, to more than a foot in the upper French Broad Valley. The heavy wet snow caused numerous trees to fall, especially in the interior and southwest valleys, resulting in fairly widespread power outages.
2/12/2010	As low pressure tracked along the northern Gulf Coast, light snow developed during the late afternoon across the southern North Carolina mountains. The snow gradually increased in intensity through the remainder of the afternoon and into the early evening. Numerous traffic accidents occurred during the evening rush. Snow, heavy at times, continued through the evening, with heavy accumulations reached in most areas. The snow ended a little before midnight. Total accumulations averaged around 3 inches.
3/2/2010	Snow began to fall around sunrise across the North Carolina mountains along the Blue Ridge escarpment. Snow became moderate to heavy at times during the late morning and early afternoon, resulting in accumulations of 1 to 4 inches across most of the area. Snow, heavy at times, continued into the afternoon across the Blue Ridge, with heavy accumulations realized in most areas by mid-afternoon. By early evening, total snowfall ranged from 3 to 6 inches. Localized snowfall amounts as high as 10 inches occurred, especially in the higher elevations along the escarpment.
12/25/2010	A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the mountains beginning around sunrise on Christmas, and continuing through the morning. Snow, heavy at times, continued through the afternoon across the central and southern mountains. By Christmas evening, most locations had 6 to 10 inches of fresh snowpack. Although snow ended in most areas during the evening of the 25th, a strong northwest flow resulted in development of numerous snow showers along the Tennessee border on the 26th through the 27th. Many of these snow showers managed to add to snowfall totals, mainly in the higher elevations of the Nantahala Mountains and the Balsams, where total accumulations of more than a foot became common. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, mainly in the high elevations.
1/10/2011	Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days.
3/6/2014	An intensifying cyclone off the Southeast coast and cold air damming combined to produce heavy snow and occasional sleet along and near the eastern Blue Ridge escarpment. Rain mixed with sleet developed across the Blue Ridge mountains and North Carolina foothills during the evening, then changed to mainly sleet in most areas. Up to a quarter inch of sleet accumulated during the late evening and early morning hours. Precipitation then changed mostly to rain in most areas, before transitioning to snow during the pre-dawn hours of the 7th. As heavy snow continued to fall across the foothills and Blue Ridge mountains in North Carolina throughout the morning, heavy accumulations of snow became common. The region of heavy snowfall accumulation was confined to a very narrow corridor along the Blue Ridge south of I-40, but became more widespread across the northern mountains and foothills. Total snowfall accumulation generally ranged from 4-6 inches in these areas, with locally higher amounts reported in some high elevation locations near the Blue Ridge. This was in addition to the quarter inch or so of sleet that fell earlier in the morning. Meanwhile, accumulations were quite a bit lower in the areas of the northern mountains adjacent to the Tennessee border. The snow changed back to rain in most areas before ending late in the morning.
1/22/2016	An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in

Date	Description
	intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported.
1/6/2017	As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread the southern Appalachians throughout the 6th. Although the precip may have started as rain in the lower valleys, it primarily fell as snow. It was initially light in most areas, but became heavy during mid-to-late evening, continuing into the overnight. By the time the heavier snowfall rates tapered off around sunrise, total accumulations ranged from 5 to 7 inches. Locally higher amounts of as much as 10 were observed across the higher elevations of the foothills counties.
12/8/2018	A mixture of rain and snow developed across the North Carolina mountains during the afternoon of the 8th, transitioning to all snow in most areas by early evening. The snow became heavy at times during the evening into the overnight. By the time the snow tapered off during the morning of the 9th, widespread storm total accumulations of 10-15 inches were reported. Locally higher amounts also occurred, with some locations near the South Carolina border seeing around 20 inches. Meanwhile, warm air filtering into the lower elevations of the Tuckasegee River Valley resulted in a transition to rain during the morning of the 9th, and total accumulations there were only in the 2 to 4 inch range.
1/15/2022	Moisture overspread the southern Appalachians late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow increased in intensity throughout the overnight, with snowfall rates of around an inch per hour becoming common during the pre-dawn hours. Heavy snowfall criteria of 3 to 5 inches was reached in many areas by daybreak, with accumulating snow continuing through the morning hours before tapering off to occasional snow showers that continued to produce light accumulations through the afternoon. Total snowfall ranged from 6 to 10 inches across much of the area, although amounts in excess of a foot were reported near the eastern escarpment of the Blue Ridge. Some of the valleys of far southwest North Carolina saw lesser amounts as temperatures warmed above freezing during the morning. Travel was very difficult to nearly impossible across much of the area throughout the 16th and much of the 17th.
1/16/2022	Moisture overspread the North Carolina foothills late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow continued into the overnight, becoming moderate to occasionally heavy, with snowfall rates of up to an inch per hour reported. Winds frequently gusting to 30 to 40 mph resulted in near-blizzard conditions at times. Heavy snowfall criteria of 2 to 4 inches was reached just before sunrise at many locations. Slight warming of the air aloft resulted in snow changing to sleet in many areas during mid-to-late morning. While much of the precipitation tapered off by noon, occasional snow showers continued to produce light accumulations during the afternoon and evening. Total snowfall was generally in the 4 to 7 inch range, with light sleet accumulations reported in many areas. Locally higher snowfall of up to 10 inches was reported across Polk County. Travel was difficult to nearly impossible throughout the 16th and much of the 17th, as cold temperatures slowed melting.
Transylvania County	
12/18/1996	Heavy snow accumulated 3 to 5 inches with 6 inches at high elevations in the mountains.
1/10/1997	Heavy snow fell in the mountains resulting in accumulations of 3 to 6 inches. The highest totals were reported from Graham and Jackson counties. Over 200 car wrecks were reported in western North Carolina during the snow. Icy roads the next morning contributed to many accidents with one indirect fatality near Statesville, well away from the high accumulations of precipitation.
12/29/1997	Snow began during the day of the 29th and lasted well into the 30th as a strong storm system moved northeast through the Carolinas. Snowfall ranged from 2-6 inches in the lower elevations, to generally 4-12 inches in the higher elevations. Some of the highest peaks ended up with between 15 and 23 inches.

Date	Description
12/30/1997	Widespread, wind-blown heavy snow developed as a strong storm system intensified in the northeastern U.S. and directed cold, moist air in a strong northwest flow, into the mountains. By the evening of the 31st, 4-6 inches of new snow accumulated basically along and south of Interstate 40, with over 12 inches common north of there. Very windy conditions accompanied the heavy snow, creating near blizzard conditions at times, especially at elevations above 3000 feet. Snow depths in the highest elevations due to the snow of the past three days were near 3 feet.
1/18/1998	Snow fell across mainly the high elevations of the mountains and northern foothills. The snow began lightly, accumulating at least 1-3 inches across the entire area by the early morning of the 19th. However, several high elevation locations began to receive heavy snow by midnight. Before the snow ended at 6 am on the 19th, some of these locations had between 4 and 7 inches.
1/27/1998	A deep cut-off low drifted across western North Carolina, drawing abundant moisture into air just cold enough to support snow. A heavy wet snow began in the pre-dawn hours on the 28th and moved north across the mountains. Snow accumulated quickly during the day, before tapering to a light snow in the evening. Light snow continued into the following morning, especially north of Asheville. Snowfall totals ranged from 4 to 8 inches at lower elevations to between 1 and 3 feet at high elevations. To make matters worse, strong winds combined with the snow to create near blizzard conditions at times in the higher elevations. Tens of thousands of people were without power for up to 3 days as numerous trees and power lines were downed. Thousands of motorists were stranded on roads and highways. Interstate 40 through the mountains was closed for several hours and the National Guard had to be called in to rescue people stranded on the highway.
3/26/1999	A deep cold core low pressure center in the mid and upper levels of the atmosphere moved slowly across the Southern Appalachians during the day, triggering heavy snow accompanied by thunder at times. Most areas received 2 to 4 inches of heavy wet snow. However, a small area consisting of Swain, northern Jackson, northern Haywood and Madison counties received between 4 and 10 inches of snow. The heavy snow ended for most of the counties around 1 pm. Although Buncombe and Yancey counties continued to experience the heavy snow until around 5 pm.
1/20/2000	A cold front crossed the mountains overnight, and low pressure formed along the front in the foothills by morning. Cold air was already in place across the region, so precipitation fell in the form of snow. By noon on the 20th, 3 to 6 inches of snow had fallen from Madison to Avery counties. Elsewhere across the central mountains, northern foothills and northwest piedmont, 1 to 3 inches of snow fell. There were isolated reports of 4 inches from the highest peaks in Swain and Haywood counties. The combination of snow and wind in the wake of the front caused some trees to fall, especially in Caldwell county. One tree fell across a mobile home and caused $24K in damage. Several other trees fell across roads.
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 with as much as 10 inches reported in Jackson county. Generally 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Rowan county failed to meet heavy snow criteria with accumulations of up to 3 inches. 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. The one exception was across southern Union county where freezing rain lasted all night and through much of the morning on the 23rd. 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.
4/8/2000	A cold and moist northwest flow behind a cold front produced light snow across the mountains. Accumulations were generally a dusting to one inch, but the highest mountains north of Asheville received 2 to 3 inches.

Date	Description
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.
12/17/2000	"A dynamic system affected western North Carolina during the 16th and 17th, bringing a variety of weather to the region, from freezing rain in mountain valleys to large hail and damaging winds across much of the region. A number of meteorological factors came together to produce such interesting atmospheric phenomena: a very strong cold front that would eventually usher in the coldest air in nearly two years into the state, strong mid-level and upper-level jets, a potent upper level disturbance, a temporary surge of warm, moist air into the region and the antecedent cold air trapped in lower valleys of the higher terrain in the mountains.
12/19/2000	The latest in a sprightly succession of Arctic cold fronts crossed the region on the 18th and 19th. Abundant low level moisture and an upper level disturbance riding over the new surge of cold air provided the ingredients for the latest round of snow. The heaviest snow accumulations, in general, were north and west of Asheville, especially near the Tennessee border. The northern half of Mitchell County recorded 5 to 6 inches of new snow...as did the higher-terrain Highlands/Cashiers area of southern Jackson and Transylvania counties in the southern mountains. Buncombe, Transylvania and Macon counties each reported numerous 4 inch accumulations, with most other mountain locations reporting between 1 and 3 inches. Foothill locations, especially those closest to the mountains, racked up some impressive totals as well, with Marion and Morganton each reporting 2 to 3 inches. Farther east, in the northwest piedmont, accumulations were limited to less than 2 inches. More than 200 traffic accidents were reported from the region due to the wintry weather.
1/1/2001	A powerful upper level disturbance interacted with left-over cold air and abundant low level moisture to wring out snow showers across the North Carolina mountains from midday New Years Day through the early morning hours on the 2nd. Highest accumulations were in Haywood County, with several reports of 3 inch accumulations.
3/20/2001	"Low pressure developed off the South Carolina coast and steadily strengthened as it moved northward across the coastal waters of North Carolina, the Virginia tidewater and eventually out to sea. Rapid strengthening occurred as a strong upper level disturbance rotated around an upper low that was crossing the southeast states. As the cyclone strengthened, abundant moisture was wrapped around the storm and thrown back against the higher terrain of the Carolinas, resulting in high winds and very heavy snow. The heaviest snow accumulations were in far western North Carolina. The highest accumulations were 24 to 30 inches at Sugar Mountain, Beech Mountain and Newland in Avery County, at Mount Mitchell in southern Yancey County and in a narrow swath along the border between Madison and Haywood counties. However, accumulations of over a foot were reported from most mountain counties, including Buncombe, Haywood, Jackson, Macon, Mitchell, and Transylvania. Accumulations of over a foot also extended into the extreme western foothills, where Jonas Ridge and Little Switzerland each recorded between 12 and 16 inches of snow. East of the higher terrain, snowfall amounts ranged from 2 to 5 inches from northern Caldwell county southward to Morganton, Marion, Lake Lure and Tryon. Isolated 2 inch amounts came from as far east as Casar in northern Cleveland County. Wind damage was far more widespread than the heavy snow, for most foothill and piedmont areas experienced numerous downed trees and power lines, although damage appeared to take on a more scattered character as one moved east away from the higher terrain. The highest wind gust was an estimated 80 knots from a cooperative observer at Flat Top Mountain in southeast Buncombe County."
1/3/2002	Snow continued during the early morning hours on the 3rd and finally added up to heavy snowfall accumulations across this portion of the North Carolina mountains. Snowfall amounts ranged from 3 to 6 inches across the area by noon.
2/3/2002	Light snow fell from late afternoon into late evening, resulting in 1 to 2.5 inches accumulations in some areas, and a few slick roads.

Date	Description
1/16/2003	Light snow began across the mountains of North Carolina during the afternoon of the 16th, and gradually intensified with time. By early morning of the 17th, 4 to 8 inches of snow had accumulated. As much as a foot was reported on some of the highest peaks.
2/6/2003	Light snow began falling across the western mountains of North Carolina during the afternoon of the 6th, and gradually increased in intensity and coverage during the evening and overnight hours. General snowfall amounts of 4 to 5 inches were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border.
4/10/2003	Light snow began across the North Carolina mountains during the early morning hours of the 10th, but due to a warm ground, accumulations were confined to the highest elevations through 8 AM. However, the snow intensified dramatically during the middle and late part of the morning, and by early afternoon, 2-4 inches had accumulated in valley locations near the Blue Ridge. In the higher elevations, 4 to 6 inch totals were common, while 8 to 12 inches accumulated on some of the highest peaks along the Tennessee border. The heavy, wet snow caused numerous trees and power lines to fall, and power outages were widespread.
1/25/2004	Light snow developed early in the morning across the mountains, foothills, and northern piedmont of North Carolina. The snow intensified throughout the morning and afternoon, and by early evening 3 to 5 inches had accumulated across much of the area. Accumulations as high as 8 inches occurred in mountainous areas along the Tennessee border.
2/26/2004	Snow intensity increased during the late morning across the North Carolina mountains, and continued through the afternoon. Total accumulations of 3 to 5 inches occurred, but much of it melted rapidly.
2/28/2005	The wet snow became heavier across the mountains and northern foothills during the early morning hours on the 28th. Most locations below 3000 feet changed back to rain before the precipitation ended. A quick 3 to 7 inches of snow accumulated across much of this area. Isolated heavier totals up to 13 inches occurred along the Blue Ridge, north of I-40, while the lower elevations of the foothills generally received only 1 to 3 inches.
2/1/2007	Light to moderate snow developed across the North Carolina mountains during the pre-dawn hours. The snow became heavy at times toward sunrise. By mid-morning, as much as 3 inches of snow had accumulated across the area. Snow, heavy at times continued across the portions of the southern and central mountains through the morning hours, with most locations reporting heavy snowfall totals by mid-morning. Total accumulations ranged from 2 to 4 inches across the area.
1/16/2008	Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall during the early morning hours across the southern mountains and foothills, and total accumulations of 2-4 inches were reached across much of the area shortly after midnight.
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 so far south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. ||Snow, heavy at times began across the southern and central mountains during the late afternoon, and began to quickly accumulate. By early evening, some areas had picked up 4 inches of snowfall. Heavy snow continued most of the night. The precipitation changed over to sleet and freezing rain before ending, but only trace amounts of ice occurred. Total accumulations ranged from 4-8 inches across the Tennessee border counties, to more than a foot in the upper French Broad Valley. The heavy wet snow caused numerous trees to fall, especially in the interior and southwest valleys, resulting in fairly widespread power outages.

Date	Description
2/12/2010	As low pressure tracked along the northern Gulf Coast, light snow developed during the late afternoon across the southern North Carolina mountains. The snow gradually increased in intensity through the remainder of the afternoon and into the early evening. Numerous traffic accidents occurred during the evening rush. Snow, heavy at times, continued through the evening, with heavy accumulations reached in most areas. The snow ended a little before midnight. Total accumulations averaged around 3 inches.
3/2/2010	Snow began to fall during the pre-dawn across the mountains of the western Carolinas. After sunrise, snow became moderate to heavy at times, resulting in accumulations of 1 to 4 inches across most of the area by late morning. Snow, heavy at times, continued into the afternoon across the mountains, with heavy accumulations realized in most areas by early afternoon. By early evening, total snowfall ranged from 4 to 8 inches across the area, with localized amounts as high as 10 inches, especially in the higher elevations.
12/12/2010	Moderate to heavy snow developed ahead of a cold front over the central and southern mountains during the late evening and early morning hours. The snow continued through the morning hours with many areas seeing accumulations of 3 to 6 inches. Although snow generally ended in most areas by late morning of the 12th, snow showers developing within northwest flow behind the front resulted in additional accumulations across the higher elevations along the Tennessee border. By the time these snow showers tapered off on the morning of the 14th, some of these areas had more than a foot of snow. Very gusty winds and cold temperatures resulted in wind chill values below 0 in many areas during the overnight and early morning hours.
12/25/2010	A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the mountains beginning around sunrise on Christmas, and continuing through the morning. Snow, heavy at times, continued through the afternoon across the central and southern mountains. By Christmas evening, most locations had 6 to 10 inches of fresh snowpack. Although snow ended in most areas during the evening of the 25th, a strong northwest flow resulted in development of numerous snow showers along the Tennessee border on the 26th through the 27th. Many of these snow showers managed to add to snowfall totals, mainly in the higher elevations of the Nantahala Mountains and the Balsams, where total accumulations of more than a foot became common. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, mainly in the high elevations.
1/10/2011	Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days.
1/6/2017	As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread the southern Appalachians throughout the 6th. Although the precip may have started as rain in the lower valleys, it primarily fell as snow. It was initially light in most areas, but became heavy during mid-to-late evening, continuing into the overnight. By the time the heavier snowfall rates tapered off around sunrise, total accumulations ranged from 5 to 7

Date	Description
	inches. Locally higher amounts of as much as 10 were observed across the higher elevations of the foothills counties.
12/8/2018	A mixture of rain and snow developed across the North Carolina mountains during the afternoon of the 8th, transitioning to all snow in most areas by early evening. The snow became heavy at times during the evening into the overnight. By the time the snow tapered off during the morning of the 9th, widespread storm total accumulations of 10-15 inches were reported. Locally higher amounts also occurred, with some locations near the South Carolina border seeing around 20 inches. Meanwhile, warm air filtering into the lower elevations of the Tuckasegee River Valley resulted in a transition to rain during the morning of the 9th, and total accumulations there were only in the 2 to 4 inch range.
2/6/2021	Snow developed across the mountains of southern North Carolina during the afternoon and evening of the 6th as a cold front approached from the Tennessee and Ohio Valleys. The snow continued through the overnight hours before tapering off during the morning of the 7th. Total accumulations ranged from 2 to 6 inches across the area.
1/15/2022	Moisture overspread the southern Appalachians late on the 15th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. Snow increased in intensity throughout the overnight, with snowfall rates of around an inch per hour becoming common during the pre-dawn hours. Heavy snowfall criteria of 3 to 5 inches was reached in many areas by daybreak, with accumulating snow continuing through the morning hours before tapering off to occasional snow showers that continued to produce light accumulations through the afternoon. Total snowfall ranged from 6 to 10 inches across much of the area, although amounts in excess of a foot were reported near the eastern escarpment of the Blue Ridge. Some of the valleys of far southwest North Carolina saw lesser amounts as temperatures warmed above freezing during the morning. Travel was very difficult to nearly impossible across much of the area throughout the 16th and much of the 17th.

TABLE H.7: HIGH WIND EVENTS (1996-2024)

Date	Description
	Henderson County
1/18/1996	An extremely strong cold front, preceded by heavy rain all day, moved through the mountains, foothills, and piedmont during the night. High winds affected the mountains first and then the foothills and piedmont as the front swept through. Prefrontal southeast winds were extremely high in the mountains with Flat Top mountain reporting gusts to 72 knots during the early evening. This was the highest wind in 20 years of record. Numerous trees and power lines were blown down in western North Carolina with a large number of power outages as a result. The gradient wind caused considerable damage in the foothills and piedmont as the front moved through.
9/15/1999	A tight pressure gradient between powerful Hurricane Floyd across eastern North Carolina and strong high pressure over the Ohio Valley and Great Lakes pulled cooler and very dry air south across the mountains and foothills of North Carolina on strong north winds. Henderson and Transylvania counties were particularly hard hit as winds gusting over 50 mph at times downed numerous trees and power lines - some on homes and vehicles. A person was injured in a car while driving near Zirconia when a tree fell on the vehicle. A large tent providing shelter at a fair in Henderson county was damaged. Numerous brush fires that started were fanned by the high winds. The Asheville Regional airport reported winds sustained at 45 mph with gusts to 54 mph around 9 am EST on the 16th. The wind abated in the mountains around noon.
11/2/1999	A strong storm system moved northeast through the Tennessee River Valley early on the 2nd. Strong southwest winds ahead of the system reached damaging levels and blew down trees and power lines in several locations. Some traffic accidents occurred when drivers ran cars into downed trees in the road. Later in the day, after the cold front passed, a gusty northwest wind blew a few trees down along the Blue Ridge Parkway 3 miles southeast of Spruce Pine.
4/8/2000	High winds following a cold front blew down a number of trees and power lines. Scattered power outages occurred as well.
4/8/2000	High winds following a cold front blew down a number of trees and power lines. Scattered power outages occurred as well.
2/16/2001	A strong cold front crossed the region on the 16th, accompanied by gusty winds. Persistent high gradient winds following the frontal passage resulted in downed trees and power lines. Some of the resulting power outages were long-lived, and there was even some structural damage reported.
3/6/2001	
3/20/2001	
10/13/2001	A strong pressure gradient developed across the mountains as a cold front crossed the region, followed by strong cold advection into the mountains. A 50-knot low level jet contributed to the high winds, the effects of which were enhanced by valley channeling.
11/29/2001	
2/4/2002	High winds starting picking up during the late morning, and by noon reached damaging levels in some areas. Scattered to numerous trees and power lines were blown down, depending on the county. Some structural damage resulted - mostly from trees falling on vehicles and buildings. After a brief respite around sunset, the wind picked up again to damaging levels during mid and late evening.
3/10/2002	Strong winds following a cold front reached damaging levels in a few locations. Most damage was limited to downed trees and power lines, which blocked roads for a while in some areas.
9/27/2002	Winds associated with Isidore increased in the early morning hours across the North Carolina mountains, resulting in more widespread damage to trees and power lines. Widespread power outages were reported. Numerous roads were blocked by fallen trees, and a church tent was blown down and destroyed in Brevard.
12/13/2002	Damaging winds were caused by a gravity wave as it propagated out of upstate South Carolina, and across the southern mountains and foothills of North Carolina. Numerous trees and power lines were blown down, and roads and highways were blocked in Asheville and Hendersonville. Power outages lasted for much of the day across portions of Buncombe County.
1/23/2003	High winds resulted in numerous trees and power lines being blown down across the mountains and foothills. In Mars Hill, the roof of a store was badly damaged. In Columbus, store signs were blown out.

Date	Description
10/14/2003	High winds developed just ahead of and behind a cold front across the mountains and foothills of North Carolina. Numerous trees and power lines were blown down.
11/13/2003	High winds developed behind a cold front across the mountains and foothills of North Carolina. Sustained winds of 40 mph developed during the pre-dawn hours, and persisted for much of the day, especially in the highest elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged.
3/7/2004	Strong winds developed across the mountains just ahead of and along a strong cold front. Numerous trees and power lines were blown down. Weak thunderstorms may have contributed to the high winds across the northern mountains, but damage extended to areas far away from those affected by the storms.
7/5/2004	A small area of high winds developed across the mountains and the higher terrain of the foothills in the wake of a thunderstorm complex. Numerous trees and power lines were blown down.
9/7/2004	High winds associated with the remnants of Hurricane Frances produced fairly widespread damage to trees and power lines across portions of the North Carolina mountains, and the higher elevations of the foothills.
9/16/2004	High winds developed across the mountains, as the remnants of Hurricane Ivan moved just west of the area. Locations near the southern exposure of the Blue Ridge were the hardest hit, with major damage occurring in and around Highlands, Cashiers, Brevard, and southern Henderson County. Thousands of trees were blown down, including 90,000 apple trees in Henderson County. Numerous trees fell on structures and vehicles. A 55-year-old man was killed shortly after midnight near Hendersonville, when a tree fell through his house. Hundreds of structures in Henderson County were damaged by fallen trees and debris. A woman in Highlands was injured when a tree limb hit her in the head.
9/17/2004	As the remnants of Ivan retreated toward the mid-Atlantic region, high pressure building in behind the circulation caused a resurgence of strong winds across the mountains and foothills. This resulted in additional tree and power line damage.
12/1/2004	The counties reported damage from high winds, mainly trees and power lines, with some structural damage possible, mainly from falling trees.
1/22/2005	High winds developed across the mountains behind a strong cold front that swept through the region during the evening. Numerous trees were blown down. There were scattered power outages throughout the mountains.
4/2/2005	High winds developed across the mountains and foothills during the evening, and continued through the overnight hours before subsiding during the late morning of the 3rd. Numerous trees, power poles, and power lines were blown down, resulting in fairly widespread power outages. The northern foothill counties appeared to the hardest hit. In McDowell County, several homes and vehicles were damaged by falling trees. In Caldwell County, the roof of the County office building was damaged in Lenoir, and at least two homes were damaged by falling trees in the northern part of the county.
1/14/2006	Strong winds developed behind a cold front across the mountains and foothills of North Carolina during the late morning, and continued through the remainder of the day. There was widespread damage to trees and power lines, with quite a few power outages. The hardest hit areas were along and near the Blue Ridge south of I-40. There were tens of thousands of power outages, 14,000 in Henderson County alone. The area around Lake Lure was especially hard hit, with numerous trees and lines down.
12/1/2006	Numerous trees were blown down, mainly near the Blue Ridge escarpment during the mid and late morning. Some of the trees fell on power lines, resulting in outages.
4/15/2007	Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on.
4/16/2007	After abating somewhat in the early morning hours, there was a resurgence in damaging winds across the Blue Ridge Mountains and surrounding areas during the daylight hours. Thousands of trees and numerous power lines fell across the area, with many trees falling on roads and damaging homes and vehicles. A 59-year-old man was killed when the vehicle he was driving on Turnpike Rd near Mills River was crushed by a fallen tree. In Saluda, a

Date	Description
	75-year-old man was critically injured when a tree fell on his car. He died several days later. A utility worker was also seriously injured in in the Hickory Grove area of Polk County, when a falling tree pinned him to his vehicle. At the height of the event, about 30,000 customers were without power in Henderson County alone, with power outages numbering in the hundreds of thousands across the area as a whole. Some customers remained without power until the 19th.
2/10/2008	As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon.
5/11/2008	Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone.
12/31/2008	High winds developed near the Blue Ridge around sunrise, peaking in the mid to late morning, before tapering off during the afternoon. Numerous trees and power lines were blown down, with some scattered power outages.
12/9/2009	After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars.
2/11/2012	Strong winds developed across the upper French Broad Valley and along parts of the eastern escarpment of the Blue Ridge as northwest flow developed across the region. The winds blew down numerous trees and power lines in McDowell County, with at least one tree falling on a vehicle. Multiple business signs were blown in Marion. Parts of western Rutherford County and Henderson County were also affected by damaging winds.
10/29/2012	As ï¿½ï¿½ï¿½superstorm Sandyï¿½ï¿½ï¿½ approached the northeast coast, strong northwest winds developed across the North Carolina mountains during the early morning of the 29th and continued throughout the day. The strongest winds developed across the upper French Broad Valley and the Green River Gorge area, where numerous trees fell during the day.
12/21/2012	Although gusty northwest winds were observed across much of the mountains beginning during the evening of the 20th, with a few trees blown down through the morning of the 21st, stronger winds developed during the afternoon of the 21st. A scattering of downed trees occurred through the afternoon, with a few power outages reported. However, the strongest winds occurred during the overnight hours. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Multiple trees fell on structures, especially in Buncombe and Henderson counties. Trees falling on power lines also resulted in quite a few power outages.
3/29/2014	Strong northwest winds developed across the mountains and portions of the foothills behind a cold front late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times (a peak gust of 62 mph was measured by the ASOS at the Asheville Regional Airport at around 730 AM). Gusts in excess of 80 mph likely occurred across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages, especially across the mid/upper French Broad Valley and surrounding locations. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening.
2/24/2016	Very strong west/northwest winds developed across the mountains of southwest North Carolina, northeast Georgia, and Upstate South Carolina behind a cold front during the morning, and continued through the afternoon and into the evening before diminishing. Numerous trees were blown down across the area, some of which fell on and took down power lines, resulting in scattered power outages.
9/11/2017	As Tropical Storm Irma moved north/northwest across the Florida Panhandle and southwest Georgia, strong winds developed over the mountains of southwest North Carolina. Although gusts only occasionally exceeded 50 mph in most locations, the prolonged nature of the event, combined with saturated soils resulting from heavy rainfall resulted in many trees falling on roads, power lines, vehicles, and structures. Many were without power for a day or more. While the most significant damage was confined to these areas, there were also reports of

Date	Description
	significant tree damage across much of the remainder of the North Carolina mountains above 4000 feet or so, where winds likely gusted in excess of 60 mph fairly frequently.
3/2/2018	As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs.
1/20/2019	Northwest winds in the wake of a strong cold front increased after sunrise and became damaging across the middle French Broad Valley and across the higher elevations of Rutherford and McDowell counties. Numerous trees and power lines were blown down in this area, with some minor structural damage also reported. The winds began to diminish during the afternoon.
Polk County	
12/1/2006	Numerous trees were blown down, mainly near the Blue Ridge escarpment during the mid and late morning. Some of the trees fell on power lines, resulting in outages.
4/15/2007	Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on.
4/16/2007	After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds.
2/10/2008	As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon.
5/11/2008	Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone.
5/12/2008	Strong winds developed during the early morning hours behind a cold front over the North Carolina mountains just to the east of the Blue Ridge. Several trees and power lines were blown down, some onto houses.
10/29/2012	As ï¿½ï¿½ï¿½superstorm Sandyï¿½ï¿½ï¿½ approached the northeast coast, strong northwest winds developed across the North Carolina mountains during the early morning of the 29th and continued throughout the day. The strongest winds developed across the upper French Broad Valley and the Green River Gorge area, where numerous trees fell during the day.
10/29/2012	As ï¿½ï¿½ï¿½superstorm Sandyï¿½ï¿½ï¿½ approached the northeast coast, strong northwest winds developed across the North Carolina mountains during the early morning of the 29th and continued throughout the day. The strongest winds developed across the upper French Broad Valley and the Green River Gorge area, where numerous trees fell during the day.
12/21/2012	Although gusty northwest winds were observed across the foothills beginning during the evening of the 20th, with a few trees blown down through the 21st, the strongest winds developed during the evening and overnight hours of the 21st. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Trees falling on power lines also resulted in quite a few power outages.
3/29/2014	Strong northwest winds developed across the mountains and portions of the foothills behind a cold front late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times (a peak gust of 62 mph was measured by the ASOS at the Asheville

Date	Description
	Regional Airport at around 730 AM). Gusts in excess of 80 mph likely occurred across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages, especially across the mid/upper French Broad Valley and surrounding locations. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening.
9/11/2017	As Tropical Storm Irma moved north/northwest across the Florida Panhandle and southwest Georgia, strong winds developed over the mountains of southwest North Carolina. Although gusts only occasionally exceeded 50 mph in most locations, the prolonged nature of the event, combined with saturated soils resulting from heavy rainfall resulted in many trees falling on roads, power lines, vehicles, and structures. Many were without power for a day or more. While the most significant damage was confined to these areas, there were also reports of significant tree damage across much of the remainder of the North Carolina mountains above 4000 feet or so, where winds likely gusted in excess of 60 mph fairly frequently.
Rutherford County	
12/1/2006	Numerous trees were blown down, mainly near the Blue Ridge escarpment during the mid and late morning. Some of the trees fell on power lines, resulting in outages.
4/15/2007	Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on.
4/16/2007	After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds.
2/10/2008	As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon.
5/11/2008	Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone.
5/12/2008	Strong winds developed during the early morning hours behind a cold front over the North Carolina mountains just to the east of the Blue Ridge. Several trees and power lines were blown down, some onto houses.
1/7/2009	Strong winds developed around noon along the I-85 corridor and persisted through the afternoon. Numerous trees were blown onto roads and power lines, resulting in quite a few power outages across the area. Some trees fell on automobiles, and one tree fell on a trailer in the Gaffney area, causing significant damage. Wet ground resulting from heavy rain during the preceding days likely contributed to the tree damage.
12/9/2009	After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars.
2/10/2010	Strong west and northwest winds developed during the afternoon over the foothills and northwest piedmont in the wake of a cold front. Numerous trees and power lines were downed throughout the afternoon and early evening. A tree fell through a mobile home in Lenoir. Another tree fell on a home 5 SW Marion. A tree fell and power lines fell on a moving vehicle in Salisbury, briefly trapping the occupants. One person was injured by flying debris at a construction site in Lenoir.
2/10/2010	Strong west and northwest winds developed during the afternoon over the foothills and northwest piedmont in the wake of a cold front. Numerous trees and power lines were downed throughout the afternoon and early

Date	Description
	evening. A tree fell through a mobile home in Lenoir. Another tree fell on a home 5 SW Marion. A tree fell and power lines fell on a moving vehicle in Salisbury, briefly trapping the occupants. One person was injured by flying debris at a construction site in Lenoir.
2/11/2012	Strong winds developed across the upper French Broad Valley and along parts of the eastern escarpment of the Blue Ridge as northwest flow developed across the region. The winds blew down numerous trees and power lines in McDowell County, with at least one tree falling on a vehicle. Multiple business signs were blown in Marion. Parts of western Rutherford County and Henderson County were also affected by damaging winds.
12/21/2012	Although gusty northwest winds were observed across the foothills beginning during the evening of the 20th, with a few trees blown down through the 21st, the strongest winds developed during the evening and overnight hours of the 21st. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Trees falling on power lines also resulted in quite a few power outages.
3/29/2014	Strong northwest winds developed across the mountains and portions of the foothills behind a cold front late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times (a peak gust of 62 mph was measured by the ASOS at the Asheville Regional Airport at around 730 AM). Gusts in excess of 80 mph likely occurred across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages, especially across the mid/upper French Broad Valley and surrounding locations. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening.
4/2/2016	Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County.
9/11/2017	As Tropical Storm Irma moved north/northwest across the Florida Panhandle and southwest Georgia, strong winds developed over the mountains of southwest North Carolina. Although gusts only occasionally exceeded 50 mph in most locations, the prolonged nature of the event, combined with saturated soils resulting from heavy rainfall resulted in many trees falling on roads, power lines, vehicles, and structures. Many were without power for a day or more. While the most significant damage was confined to these areas, there were also reports of significant tree damage across much of the remainder of the North Carolina mountains above 4000 feet or so, where winds likely gusted in excess of 60 mph fairly frequently.
3/2/2018	As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs.
1/20/2019	Northwest winds in the wake of a strong cold front increased after sunrise and became damaging across the middle French Broad Valley and across the higher elevations of Rutherford and McDowell counties. Numerous trees and power lines were blown down in this area, with some minor structural damage also reported. The winds began to diminish during the afternoon.
Transylvania County	
1/7/1998	High winds caused trees to fall on 6 houses, shingles blown off roofs, and destruction of storage buildings.
9/15/1999	A tight pressure gradient between powerful Hurricane Floyd across eastern North Carolina and strong high pressure over the Ohio Valley and Great Lakes pulled cooler and very dry air south across the mountains and foothills of North Carolina on strong north winds. Henderson and Transylvania counties were particularly hard hit as winds gusting over 50 mph at times downed numerous trees and power lines - some on homes and vehicles.
11/2/1999	A strong storm system moved northeast through the Tennessee River Valley early on the 2nd. Strong southwest winds ahead of the system reached damaging levels and blew down trees and power lines in several locations. Some traffic accidents occurred when drivers ran cars into downed trees in the road. Later in the day, after the cold front passed, a gusty northwest wind blew a few trees down along the Blue Ridge Parkway 3 miles southeast of Spruce Pine.

Date	Description
2/16/2001	A strong cold front crossed the region on the 16th, accompanied by gusty winds. Persistent high gradient winds following the frontal passage resulted in downed trees and power lines. Some of the resulting power outages were long-lived, and there was even some structural damage reported.
3/6/2001	
3/20/2001	
11/29/2001	High winds developed overnight as a strong low-level jet, boosted by weak convection, brought damaging wind gusts to the surface. Damaging winds started in a few counties late in the evening, peaking between midnight and 6 am in most locations. Damage was mostly limited to downed trees and power lines, with resulting power outages, but in Madison County, a barn was blown into the road near Laurel.
2/4/2002	High winds starting picking up during the late morning, and by noon reached damaging levels in some areas. Scattered to numerous trees and power lines were blown down, depending on the county. Some structural damage resulted - mostly from trees falling on vehicles and buildings. After a brief respite around sunset, the wind picked up again to damaging levels during mid and late evening.
9/27/2002	Winds associated with Isidore increased in the early morning hours across the North Carolina mountains, resulting in more widespread damage to trees and power lines. Widespread power outages were reported. Numerous roads were blocked by fallen trees, and a church tent was blown down and destroyed in Brevard.
1/23/2003	High winds resulted in numerous trees and power lines being blown down across the mountains and foothills. In Mars Hill, the roof of a store was badly damaged. In Columbus, store signs were blown out.
10/14/2003	High winds developed just ahead of and behind a cold front across the mountains and foothills of North Carolina. Numerous trees and power lines were blown down.
11/13/2003	High winds developed behind a cold front across the mountains and foothills of North Carolina. Sustained winds of 40 mph developed during the pre-dawn hours, and persisted for much of the day, especially in the highest elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged.
3/7/2004	Strong winds developed across the mountains just ahead of and along a strong cold front. Numerous trees and power lines were blown down. Weak thunderstorms may have contributed to the high winds across the northern mountains, but damage extended to areas far away from those affected by the storms.
7/5/2004	A small area of high winds developed across the mountains and the higher terrain of the foothills in the wake of a thunderstorm complex. Numerous trees and power lines were blown down.
9/7/2004	High winds associated with the remnants of Hurricane Frances produced fairly widespread damage to trees and power lines across portions of the North Carolina mountains, and the higher elevations of the foothills.
9/16/2004	High winds developed across the mountains, as the remnants of Hurricane Ivan moved just west of the area. Locations near the southern exposure of the Blue Ridge were the hardest hit, with major damage occurring in and around Highlands, Cashiers, Brevard, and southern Henderson County. Thousands of trees were blown down, including 90,000 apple trees in Henderson County. Numerous trees fell on structures and vehicles. A 55-year-old man was killed shortly after midnight near Hendersonville, when a tree fell through his house. Hundreds of structures in Henderson County were damaged by fallen trees and debris. A woman in Highlands was injured when a tree limb hit her in the head.
9/17/2004	As the remnants of Ivan retreated toward the mid-Atlantic region, high pressure building in behind the circulation caused a resurgence of strong winds across the mountains and foothills. This resulted in additional tree and power line damage.
1/22/2005	
4/2/2005	High winds developed across the mountains and foothills during the evening, and continued through the overnight hours before subsiding during the late morning of the 3rd. Numerous trees, power poles, and power lines were blown down, resulting in fairly widespread power outages. The northern foothill counties appeared to the hardest hit. In McDowell County, several homes and vehicles were damaged by falling trees. In Caldwell County, the roof of the County office building was damaged in Lenoir, and at least two homes were damaged by falling trees in the northern part of the county.
1/14/2006	Strong winds developed behind a cold front across the mountains and foothills of North Carolina during the late morning, and continued through the remainder of the day. There was widespread damage to trees and power

Date	Description
	lines, with quite a few power outages. The hardest hit areas were along and near the Blue Ridge south of I-40. There were tens of thousands of power outages, 14,000 in Henderson County alone. The area around Lake Lure was especially hard hit, with numerous trees and lines down.
11/15/2006	Strong southerly winds developed ahead of a cold front, blowing down numerous trees and power lines across portions of the central and southern mountains during the evening and overnight hours on the 15th and 16th.
12/1/2006	Numerous trees were blown down, mainly near the Blue Ridge escarpment during the mid and late morning. Some of the trees fell on power lines, resulting in outages.
4/15/2007	Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on.
4/16/2007	After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds. In Highlands, NC, two homes were heavily damaged by fallen trees, while approximately 100 homes received minor to moderate damage. A tree fell on and severely damaged a home in Otto, NC. Two businesses received significant roof damage in Cashiers, NC. Three construction workers were injured in Mount Holly when an inflatable structure collapsed at a constructions site. Five homes were damaged by fallen trees in Lincoln County, NC alone. Three homes were damaged in Iredell County and in In Catawba County, a 30-foot brick wall on top of a building in Newton was blown down, while sections of a metal roof were torn off a business in Viewmont.
2/10/2008	As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon.
5/11/2008	Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees.
12/9/2009	After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars.
2/24/2016	Very strong west/northwest winds developed across the mountains of southwest North Carolina, northeast Georgia, and Upstate South Carolina behind a cold front during the morning, and continued through the afternoon and into the evening before diminishing. Numerous trees were blown down across the area, some of which fell on and took down power lines, resulting in scattered power outages.
9/11/2017	As Tropical Storm Irma moved north/northwest across the Florida Panhandle and southwest Georgia, strong winds developed over the mountains of southwest North Carolina. Although gusts only occasionally exceeded 50 mph in most locations, the prolonged nature of the event, combined with saturated soils resulting from heavy rainfall resulted in many trees falling on roads, power lines, vehicles, and structures. Many were without power for a day or more. While the most significant damage was confined to these areas, there were also reports of significant tree damage across much of the remainder of the North Carolina mountains above 4000 feet or so, where winds likely gusted in excess of 60 mph fairly frequently.
3/2/2018	As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs.

Date	Description
2/24/2019	Strong west to northwest winds developed across the northern mountains of North Carolina in the wake of a cold front. Although winds became very gusty immediately after the cold front passed during the afternoon, the damaging winds primarily occurred during the evening and overnight hours, when many trees and power lines were blown down. Multiple outbuildings were also damaged or blown over and at least one tree fell on a structure in Old Fort.
4/12/2020	County comms reported part of the roof was blown off a building at the Pisgah Inn along the Blue Ridge Parkway. Automated wind equipment on the summit of nearby Frying Pan Mountain measured gusts as high as 69 mph.

TABLE H.8: ICE STORM EVENTS (1996-2024)

Date	Description
	Henderson County
1/26/1996	Rain moved in while cold air was still trapped. Significant freezing rain resulted with numerous traffic accidents reported across the entire area. Ice accumulations neared ice storm" conditions in the foothills and northern mountains. The freezing temperatures persisted into the evening as the rain became quite heavy. Many roads were closed for a period."
1/9/1997	
12/24/1998	Freezing rain accumulated to damaging levels around midnight and by morning there were numerous power outages reported due to downed trees and power lines. Road problems were mostly limited to bridges and overpasses.
1/2/1999	A strong winter storm moved from the southern Plains into the Tennessee Valley and collided with strong arctic high pressure nosing south into the western Carolinas. Sleet and freezing rain were the main precipitation types during the afternoon and evening on the 2nd. Sleet became very heavy along and north of Interstate 40 where 4 to 6 inches accumulated. Sleet accumulated to between 1 and 2 inches south of Interstate 40 before changing to freezing rain. Numerous traffic accidents occurred across western North Carolina and there was one fatality (indirect) on Interstate 26 in Polk county. A boat house in Alexander county collapsed under the weight of the sleet. A cooperative observer in Rutherford county estimated damage in his area to be $55K, but official damage estimates for the entire region were not available at the time of this writing.
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.
12/14/2003	Freezing rain began during the early morning hours, and ice accretion of around 1/2 inch had occurred by noon. Numerous trees and power lines fell under the weight of the ice.
2/2/2004	Freezing rain fell during the evening and overnight hours. Ice accretion caused some trees and large limbs to fall. Some trees fell on power lines, causing scattered outages. Sleet was mixed with the freezing rain at times, especially in McDowell County.
2/6/2004	Freezing rain increased in intensity overnight across the foothills and southern mountains. By morning, ice accretion was responsible for numerous fallen trees, as well as widespread power outages.
2/3/2005	Scattered damage to trees and power lines began to occur across the mountains during the pre-dawn hours, and continued into mid-morning, as freezing rain fell.
12/9/2005	As freezing rain continued to fall through the early morning hours, ice accretion became significant enough to cause widespread damage to trees and power lines across Henderson County. The lingering ice caused numerous traffic accidents during rush hour on the morning of the 9th. At least one fatal accident (indirect) occurred near Etowah.
12/15/2005	
2/1/2008	Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st.
2/26/2013	Rain and freezing rain began across the southern mountains shortly after midnight and continued through the pre-dawn hours. Many locations saw mainly rain. However, cold air locked in near the escarpment

Date	Description
	resulted in an all-freezing rain event there. By the time temperatures warmed above freezing during late morning, up to a half inch of ice had accumulated within a few miles of the continental divide. Meanwhile, locations farther away from the Blue Ridge saw only trace amounts of ice. There were scattered downed trees and power lines, resulting in quite a number of power outages, especially in McDowell and Henderson counties.
11/25/2013	Light rain changed to freezing rain around midnight across southeast Blue Ridge areas, with freezing rain continuing off and on through the overnight. Precipitation became heavy at times just prior to sunrise and lasted through mid-morning before changing over to rain. Heavy ice accumulations were reported in the Saluda grade area of Polk County, and across eastern and southern Henderson County. Total ice accumulation of just over 1/4 inch was reported in these areas, which downed several trees and power lines.
2/15/2016	Very light freezing rain, freezing drizzle, and freezing mist developed across the Blue Ridge of western North Carolina during late morning, in assocation with low pressure developing along a warm front across the Gulf Coast states/Tennesse Valley. Owing to about a week of unseasonably cold weather, the precipitation froze to surfaces very quickly, and roads became very slick, resulting in numerous traffic accidents. The freezing rain rates increased during the evening, and moderate to heavy freezing rain continued through the overnight hours. By the pre-dawn hours of the 16th, total ice accretion ranged from one-quarter to one-half inch across the area. This resulted in quite a few trees and power lines, with at least scattered power outages reported.
1/12/2019	Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area.
Polk County	
2/1/2008	Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st.
2/26/2013	Rain and freezing rain began across the southern mountains shortly after midnight and continued through the pre-dawn hours. Many locations saw mainly rain. However, cold air locked in near the escarpment resulted in an all-freezing rain event there. By the time temperatures warmed above freezing during late morning, up to a half inch of ice had accumulated within a few miles of the continental divide. Meanwhile, locations farther away from the Blue Ridge saw only trace amounts of ice. There were scattered downed trees and power lines, resulting in quite a number of power outages, especially in McDowell and Henderson counties.
11/25/2013	Light rain changed to freezing rain around midnight across southeast Blue Ridge areas, with freezing rain continuing off and on through the overnight. Precipitation became heavy at times just prior to sunrise and lasted through mid-morning before changing over to rain. Heavy ice accumulations were reported in the Saluda grade area of Polk County, and across eastern and southern Henderson County. Total ice accumulation of just over 1/4 inch was reported in these areas, which downed several trees and power lines.
2/15/2016	Very light freezing rain, freezing drizzle, and freezing mist developed across the Blue Ridge of western North Carolina during late morning, in assocation with low pressure developing along a warm front across the Gulf Coast states/Tennesse Valley. Owing to about a week of unseasonably cold weather, the precipitation froze to surfaces very quickly, and roads became very slick, resulting in numerous traffic

Date	Description
	accidents. The freezing rain rates increased during the evening, and moderate to heavy freezing rain continued through the overnight hours. By the pre-dawn hours of the 16th, total ice accretion ranged from one-quarter to one-half inch across the area. This resulted in quite a few trees and power lines, with at least scattered power outages reported.
2/17/2021	Moisture and precipitation overspread the western North Carolina late in the evening of the 17th and continued into the morning of the 18th in association with an area of low pressure moving along the Gulf Coast. Enough cold air was trapped along the eastern Blue Ridge escarpment to allow much of this precipitation to fall as freezing rain. By the time the precipitation tapered off during the morning of the 18th, total ice accretion was generally around one quarter inch, although spotty amounts closer to one half inch were reported. Due to warm road temperatures, accretion was primarily limited to elevated surfaces and limited travel difficulties.
Rutherford County	
2/1/2008	Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st.
2/26/2013	Rain and freezing rain began across the southern mountains shortly after midnight and continued through the pre-dawn hours. Many locations saw mainly rain. However, cold air locked in near the escarpment resulted in an all-freezing rain event there. By the time temperatures warmed above freezing during late morning, up to a half inch of ice had accumulated within a few miles of the continental divide. Meanwhile, locations farther away from the Blue Ridge saw only trace amounts of ice. There were scattered downed trees and power lines, resulting in quite a number of power outages, especially in McDowell and Henderson counties.
2/15/2016	Very light freezing rain, freezing drizzle, and freezing mist developed across the Blue Ridge of western North Carolina during late morning, in assocation with low pressure developing along a warm front across the Gulf Coast states/Tennesse Valley. Owing to about a week of unseasonably cold weather, the precipitation froze to surfaces very quickly, and roads became very slick, resulting in numerous traffic accidents. The freezing rain rates increased during the evening, and moderate to heavy freezing rain continued through the overnight hours. By the pre-dawn hours of the 16th, total ice accretion ranged from one-quarter to one-half inch across the area. This resulted in quite a few trees and power lines, with at least scattered power outages reported.
1/12/2019	Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area.
2/17/2021	Moisture and precipitation overspread the western North Carolina late in the evening of the 17th and continued into the morning of the 18th in association with an area of low pressure moving along the Gulf Coast. Enough cold air was trapped along the eastern Blue Ridge escarpment to allow much of this precipitation to fall as freezing rain. By the time the precipitation tapered off during the morning of the 18th, total ice accretion was generally around one quarter inch, although spotty amounts closer to one half inch were reported. Due to warm road temperatures, accretion was primarily limited to elevated surfaces and limited travel difficulties.
Transylvania County	
1/9/1997	

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.
2/3/2005	Scattered damage to trees and power lines began to occur across the mountains during the pre-dawn hours, and continued into mid-morning, as freezing rain fell.
12/15/2005	Ice accretion began to cause damage across the southern mountains and foothills of North Carolina just prior to sunrise. By late morning, the ice storm had become quite serious, as thousands of trees fell across the area, and power outages were widespread. Numerous trees and large limbs fell on and damaged homes and vehicles. It was estimated that three-quarters of Henderson County residents lost power. Most who lost power were without it for at least 24 hours. In some areas, it took as much as 5 days to restore electricity. Despite the devastation, road problems were few and far between, as temperatures hovered right around freezing for most of the event. Duke Power estimated costs for overtime and line repair at 72 million dollars for the event, though these costs are not reflected in the property damage values for the event above. In Henderson County, 2 deaths (indirect) occurred as a result of the ice storm. A woman died of carbon monoxide poisoning after running a generator in a garage. A man died of carbon monoxide poisoning due to a malfunctioning gas stove.
2/1/2008	Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st.
1/12/2019	Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area.

TABLE H.9: LIGHTNING EVENTS (1996-2024)

Location	Date	Description
Henderson County		
TUXEDO	6/14/1996	
EDNEYVILLE	7/14/1996	
HORSE SHOE	8/13/1998	Lightning struck a house and caused a roof fire.
TUXEDO	2/12/2000	A lightning bolt from a morning thunderstorm struck a power line, then traveled into a two story home and ignited a blaze which completely destroyed the home and its contents.
HENDERSONVILLE	7/18/2003	Lightning ignited a house fire.
HENDERSONVILLE	6/27/2005	Lightning ignited a house fire near the Laurel Park Shopping center. The fire destroyed much of the roof.
HENDERSONVILLE	4/27/2006	Lightning struck a house, blowing out one of the walls.
VALLEY HILL	5/8/2009	Lightning struck a home on Kanuga Rd, igniting a fire in the attic.
FRUITLAND	5/28/2009	Lightning struck a home on Good View Dr, igniting a fire that rendered the home unlivable. Location is approximate.
SMYTH	6/6/2011	Lightning started a fire at a barn, destroying the structure.
FRUITLAND	6/21/2011	Lightning struck a mobile home on McMinn Woods Dr, starting a fire that damaged one room of the home.
BRIGHTWATER	7/5/2011	Lightning struck a home on Solomon Circle, igniting a fire that destroyed most of the home. One person received minor injuries from the lightning.
GOODLUCK	7/5/2011	Lightning struck a home on Locust Grove Rd, igniting a fire that caused some minor damage.
BRIGHTWATER	1/11/2012	Lightning struck a home on Nimbus Lane, starting a fire that destroyed the structure.
VALLEY HILL	4/5/2012	Lightning struck a gas line at a home on Kanuga Forest Dr, causing an explosion that collapsed the exterior walls and igniting a fire that completely destroyed the structure.
BLUE RIDGE	8/22/2012	Lightning struck a tree that fell on and heavily damaged a home on Toone Town Terrace. An occupant was briefly trapped inside.
MILLS RIVER	6/27/2016	Spotter reported lightning struck near a home on Chestnut Ridge Rd, igniting a structure fire.
DRUID HILLS	8/17/2016	A radio station took a direct lightning hit, causing major damage to equipment both outside and inside the station. A nearby barn was also struck by lightning about the same time, igniting a fire that burned it down.
ETOWAH	5/7/2023	County comms reported house fire caused by a lightning strike in the Etowah area.
Polk County		
TRYON	7/14/1996	A few trees were blown down in a severe thunderstorm. Storms in and near the mountains caused a great deal of lightning, some of which apparently started fires.
TRYON	6/2/1997	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
SALUDA	8/24/2002	Lightning ignited a fire, destroying a house and much of its contents.
MILL SPG	7/21/2006	Four children and 2 adults were injured when lightning struck their tent.

Location	Date	Description
MC GINNIS XRDS	8/20/2014	FD reported lightning struck a house and ignited a fire on Chesnee Highway.
COLLINSVILLE	7/4/2019	Emergency manager reported lightning caused a structure fire at a home on Jackson Grove Rd.
Rutherford County		
UNION MILLS	7/16/1997	Severe thunderstorms developed mainly in the foothills of North Carolina during the afternoon. Damaging winds up to 75 mph downed trees and power lines. U.S. Highway 74 in Henderson county was blocked for 2 hours due to a large oak tree that fell across the road. Another large tree in Cleveland county fell onto 2 pickup trucks, totalling them. Three houses were damaged by fallen trees, a car was damaged by a collapsed convenience store canopy and trees blocked roads near Indian Trail. Power outages were scattered across the region, some due to lightning. Up to 4300 people were without power in Union county.
ELLENBORO	7/16/1997	A mobile home was destroyed by lightning in Union Mills and a home severely damaged by lightning in Ellenboro. Damage estimates are unknown.
ALEXANDER MILLS	8/20/1999	A line of strong to severe thunderstorms moved west to east across western North Carolina during the early morning hours on the 20th. A very severe thunderstorm produced a long narrow path of wind damage across northern Yancey county. Numerous trees were downed, one on a car, a barn was destroyed and crops were flattened by the wind. There was also significant hail damage to crops. A public report of a roaring noise associated with the wind led some to believe it was a tornado. However, there was not enough evidence to classify the event as such. Trees were also downed in a few other counties and there were a few reports of dime to quarter size hail.
FOREST CITY	7/31/2000	Strong, nearly stationary thunderstorms dumped excessive rain and produced damaging lightning strikes and gusty winds over and near Forest City during the early morning hours. An estimated 5 inches of rain fell in the area causing urban flooding to begin around midnight. Soon after though, numerous creeks flooded, washing away parts of several streets and roads. One lightning strike cause a fire which burned an outbuilding. Some trees were downed from a combination of the heavy rain, wind and lightning.
BOSTIC	6/15/2001	Lightning earlier in the afternoon struck a tree and later caused it to fall across a barn.
GILKEY	4/17/2002	Lightning struck a tree and entered a nearby house, causing a fire. The fire burned a large part of the house.
LAKE LURE	7/4/2002	Lightning caused fires at 6 buildings.
CHIMNEY ROCK	7/18/2003	A person was injured when he was struck by lightning.
RUTHERFORDTON	7/21/2003	A lightning strike ignited a fire at a barn, destroying the barn and its contents.
FOREST CITY	7/31/2003	A man was injured when he was struck by lightning. Lightning also ignited several structure fires in the area, one of which caused significant damage.
BOSTIC	7/31/2003	Lightning sparked several fires.
LAKE LURE	5/8/2004	Lightning ignited several fires and downed some power lines.
RUTHERFORDTON	6/27/2005	Tree trees snapped off by lightning.
CLIFFSIDE	7/9/2009	Lightning struck and injured 5 workers at a power plant near Cliffside. Although most of the injuries were minor, two people were transported to the hospital.
ELLENBORO	4/6/2017	Newspaper reported lightning struck a home in Ellenboro, igniting a fire that caused significant damage.
Transylvania County		
BREVARD	6/4/1999	Lightning was suspected to have started a fire in a home about 12 hours after the actual strike. The home and its contents were destroyed.
BREVARD	7/27/1999	A severe thunderstorm downed several trees and power lines. In addition, a great amount of cloud to ground lightning was produced, which resulted in 3 injuries. One person was injured while in the basement, touching a water heater. Another injury occurred while talking on the phone.

Location	Date	Description
BREVARD	6/6/2002	Lightning ignited a few fires.
SAPPHIRE	8/10/2003	A man was injured in Gorges State Park when the stream he was swimming in was struck by lightning.
CONNESTEE	7/11/2004	Lightning struck a house, igniting a fire which destroyed the house and its contents.
CEDAR MTN	7/6/2008	Lightning ignited a fire which destroyed most of a house on Fox Tower Rd.
DAVIDSON RIVER	8/20/2009	Lightning ignited a fire at a home on Wilson Rd, about two miles east northeast of Brevard, causing damage to the roof and attic.
OAKLAND	5/15/2010	Lightning ignited a fire at a business on highway 64, causing significant damage to a portion of the building. Although the fire was contained, lightning apparently struck this location again at 11:30 pm that evening, causing another fire which destroyed the remainder of the building.
BLANTYRE	2/28/2011	A lightning strike damaged a home on Sandrock Trail.
BREVARD	4/20/2011	Lightning struck a tree at Brevard College, causing minor injuries to two people standing nearby.
DAVIDSON RIVER	5/3/2011	A tree fell after being struck by lightning, damaging a home and destroying an outbuilding in the Williamson Creek area.
NORTH BREVARD	6/13/2012	Lighting started a fire in the basement of a home on Pine Mountain Trail, causing some minor damage before being extinguished by a burst water line.
BLANTYRE	7/19/2016	Media reported a trailer transporting horses was struck by lightning on Turkey Pen Rd. One horse was killed and the trailer severely damaged.

TABLE H.10: SLEET EVENTS (1997-2024)

Date	Description
Henderson County	
1/8/1997	
12/23/1998	Freezing rain and sleet developed early Wednesday morning and persisted through the morning of Christmas Eve. These areas would receive enough glaze by Christmas Eve morning to cause damage.
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.
Transylvania County	
1/8/1997	
12/23/1998	Freezing rain and some sleet developed early Wednesday morning and persisted through the morning of Christmas Eve. Some areas later received enough glaze to cause damage.
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.

TABLE H.11: TORNADO EVENTS (1973-2024)

Location	Date	Description
Henderson County		
Unincorporated Area	10/17/1975	
Unincorporated Area	2/18/1976	
Unincorporated Area	8/17/1977	
DANA	5/7/2023	NWS storm survey found the path of an EF0 tornado that touched down near the intersection of Leslie Way and Sugarloaf Rd and tracked southeast across Sugarloaf Ln and near Naomi Dr. Damage was primarily limited to multiple uprooted trees and snapped large limbs in this area, although minor damage occurred to the roof of one home and to the exterior of a manufactured home. A couple of other houses were damaged by falling trees. The path became more intermittent from there, but additional tree damage was found in a wooded area southeast of Naomi Ln. This was the first confirmed tornado in Henderson County since 21 August 1977, when an F1 tornado tracked from the Dana community into the Green River Game Land area of Polk County.
Polk County		
Unincorporated Area	8/17/1977	
RODDY STORE	10/26/2010	This tornado touched down in the Sandy Plains Rd area just north of White Oak Creek, breaking off the tops of several trees and some large branches. The tornado then skipped east northeast, snapping and uprooting a small but concentrated area of trees in the Coxe Rd area. One large tree fell on a home on Coxe Rd before the tornado lifted.
TRYON	10/8/2017	NWS storm survey found an area of tornado damage in downtown Tryon. This tornado developed from the same storm that produced a tornado just over the state line in the Lake Lanier area of northern Greenville County. The tornado touched down on Melrose Ave, a block west of Pacolet St and continued moving to the north-northeast with continuous damage for a distance of less than a mile. Hundreds of trees were snapped or uprooted, homes had damaged shingles and siding, damaged roofs, while other homes and vehicles were damaged by falling trees. One company had 6 generators damaged with one 2400 pound generated moved 30 feet. The tornado lifted just north of the downtown area.
Rutherford County		
Unincorporated Area	5/27/1973	
Unincorporated Area	5/18/1975	
Unincorporated Area	5/18/1975	
Unincorporated Area	5/5/1989	
RUTHERFORDTON	5/24/2000	A few thunderstorms crossed the mountains, then exploded and quickly became large supercells as they moved into the foothills late in the afternoon. The most damaging of the supercells developed in northern McDowell county and became severe along the Burke/McDowell county line near Lake James, dropping baseball size hail. This severe storm tracked southeast along the county border, producing golf ball to softball size hail all the way to the Rutherford county line. In addition to the very large hail, this supercell was able to generate a few weak (F0) tornadoes. The first tornado briefly touched down near Bridgewater and blew windows out of a house. It may also have been responsible for wind

Location	Date	Description
		damage at a nearby mobile home park where 15 to 25 mobile homes sustained damage from both wind and hail. The second tornado developed in extreme eastern McDowell county and blew down trees across Interstate 40 before crossing into Burke county. Several motorists on Interstate 40 sighted the tornado and had their vehicles damaged by softball size hail. A resident in extreme southwest Burke county, near the Rutherford county line measured a 94-mph gust of wind as the parent supercell moved overhead. A damage survey team did not find any tornadic damage in the vicinity but suspected this may have been the actual mesocyclone on the ground. There was extensive hail damage to homes, vehicles and plants from softball size hail that was seen bounding" down the hillside. The third tornado developed near South Mountain State Park in northeast Rutherford county and blew down numerous trees in the vicinity of the park. This storm went on to produce nickel to baseball size hail in Cleveland county.
FOREST CITY	7/7/2005	This tornado moved into far southern Rutherford County from Spartanburg County in the Jonas Rd area. The metal roof was torn off a barn just across the state line. Otherwise, damage was mainly confined to snapped off an uprooted tree, some of which fell on homes. Near the end of the track, a mobile home was lifted and dropped 50-100 feet from its original position, resulting in severe damage.
FOREST CITY	10/26/2010	This tornado began just southwest of Crowe Dairy Rd, where the tops of several trees were blown out. The tornado intensified as it moved northeast, blowing the porch off a home and scattering debris as far as 50 yards. In addition, part of the roof was lifted off an attached garage and doors were blown in on a shed at this location.
ELLENBORO	1/11/2012	A tornado damage path began near the Ellenboro community, just northeast of the intersection of Pinehurst Rd and Bridge Rd. The track was relatively weak and intermittent for the first mile or so, as it crossed into a wooded area before emerging on Tiney Rd near the Corinth community. The aluminum siding and some roofing was peeled off a shed at this location. The intermittent path continued to the northeast, before becoming more concentrated in the area near Piney Mountain Rd and Piney Mountain Church Rd. The tornado reached its peak intensity as it moved roughly parallel to Piney Mountain Rd, crossing W E Padgett Rd toward Walls Church Rd. Several homes received minor to major damage in this area, while two mobile homes were completely destroyed. Ten people were injured, one seriously. Several outbuildings were also destroyed, while numerous trees and power lines were felled. The tornado began to weaken as it continued northeast, crossing Walls Church Rd and Dycus Rd before lifting just north of Salem Church Rd. The tornado was the first winter tornado in Rutherford County recorded history, and the first significant tornado (F2/EF2 and stronger) to affect the county since 1989.
CLIFFSIDE	10/23/2017	This tornado moved into Rutherford County from Cherokee County, SC near the intersection of Camp Ferry Rd and State Line Rd. The tornado moved northeast, initially paralleling Highway 221A (just to its west). In addition to the uprooting and snapping of numerous trees, some structural damage occurred in the |Cliffside area, with windows blown out of a school while trees fell on several structures. The tornado crossed Highway 221A in the vicinity of the Broad River, then roughly paralleled Highway 120 to the Cleveland County line. Some of the most significant damage occurred in the vicinity of the intersection of Highways 120 and 74, where a camper was overturned and a man was thrown 15-20 yards with no significant injuries. Overhead doors also collapsed at a warehouse building at this location.
ELLENBORO	6/8/2019	Media released drone footage of multiple downed trees around a home on Webb Rd. The trees were arranged in a distinct convergent/rotational pattern, indicating tornado damage.
HENRIETTA	4/10/2021	NWS storm survey found damage associated with a very brief, weak tornado along Scruggs Rd. Damage was primarily limited to one home and the adjacent land, with minor damage to the home as well as downed trees around the home.

Location	Date	Description
ROCK SPGS	9/25/2024	Fire dept reported a brief, weak tornado touched down in the Shingle Hollow community. Multiple trees were blown down and mostly light damage was reported to barn roofs and greenhouses.
Transylvania County		
Unincorporated Area	4/3/1974	
Unincorporated Area	1/10/1975	
Unincorporated Area	6/20/1984	

TABLE H.12: THUNDERSTORM WIND EVENTS (1990-2024)

Location	Date	Description
Henderson County		
Unincorporated Area	4/20/1991	
Unincorporated Area	8/27/1992	
Balfour	6/26/1995	Mobile home destroyed by falling trees.
Fletcher	8/11/1995	Trees and power lines down.
HENDERSONVILLE	5/26/1996	Slow moving severe thunderstorms pounded a small area in the mountains. Walnut size hail was reported in Cullowhee and numerous trees and power lines were downed. Residents were convinced that a tornado hit. In Hendersonville downed trees and power lines blocked streets.
HENDERSONVILLE	7/7/1996	The wind blew 3 large oak trees onto a home. Also, 1700 customers were without power as a result of wind damage.
ETOWAH	8/24/1996	
FLETCHER	2/21/1997	
ETOWAH	2/21/1997	
HENDERSONVILLE	6/14/1997	Severe thunderstorms blew down trees and power lines in Henderson county and caused large hail near the South Carolina border in Polk county. The most damage occurred around Shelby where trees were blown down in 15 locations near town. At least one tree fell on a vehicle and another fell on a house.
ETOWAH	7/4/1997	Severe thunderstorms moved into the mountains from Tennessee in the early evening on the Fourth, before moving into or redeveloping in the foothills and western piedmont later in the evening. Damaging winds raked much of western North Carolina, downing trees and power lines, and a few reports of hail as large a golf balls were reported. Several counties reported trees and power lines down countywide, often blocking roads and damaging homes and/or vehicles. Outflow from the storms propagated southeast into the Charlotte metro area before midnight, producing gusty winds between 35 and 45 mph for a short period of time. Dollar amounts for much of the damage were not available at the time of this writing.
HENDERSONVILLE	7/4/1997	A man suffered a head injury when a tree fell on him.
BAT CAVE	7/16/1997	Severe thunderstorms developed mainly in the foothills of North Carolina during the afternoon. Damaging winds up to 75 mph downed trees and power lines. U.S. Highway 74 in Henderson county was blocked for 2 hours due to a large oak tree that fell across the road. Another large tree in Cleveland county fell onto 2 pickup trucks, totaling them. Three houses were damaged by fallen trees, a car was damaged by a collapsed convenience store canopy and trees blocked roads near Indian Trail. Power outages were scattered across the region, some due to lightning. Up to 4300 people were without power in Union county.
ETOWAH	6/22/1998	Multi-cell thunderstorms moved across the mountains and into the foothills during the evening hours. Some of the storms became severe and produced mainly wind damage. Winds were estimated as high as 75 mph in Rutherford county early in the evening, resulting in downed trees damaging several homes and a barn destroyed. A National Weather Service co-operative observer measured a 63-mph wind gust on Flat Top Mountain. A tree fell on a house in west Asheville as well as in Hickory. Elsewhere, scattered trees and some power lines were downed.
HENDERSONVILLE	6/24/1998	Multi-cell thunderstorms again developed in the early evening and moved south across the southern mountains and piedmont. A few became severe and produced large hail up to golf ball size, as well as damaging winds. Wind damage was confined to downed trees and power lines. The hardest hit area was northeast of Brevard where roads were blocked.

Location	Date	Description
MILLS RIVER	1/23/1999	Unseasonably warm, moist air and strong winds through a deep layer of the atmosphere combined to produce a line of thunderstorms along a cold front advancing east across North Carolina. Some of these storms became severe, bringing damaging wind speeds to the surface in some of the southern and central mountain counties. Wind speeds were reported in the 60 to 70 mph range with a measured gust recorded on Flat Top Mountain (elev. 4320 ft) to 78 mph. A 9-mile-long damage path through Mills River and northern Henderson county was initially 100 yards wide, then narrowed to between 25 and 50 yards. Numerous trees and power lines were downed.
HENDERSONVILLE	5/13/1999	Scattered thunderstorms developed during the afternoon and evening of the 13th and a few pulsed to severe levels. In Henderson county, golf ball size hail covered Highway 280 and a large tree fell onto a house in Hendersonville, causing significant damage to the house and outdoor furniture. Dime to golf ball size hail was reported in Union county along with a measured wind gust to 85 mph. Quarter size hail was reported late in the evening in Avery county. There was a public report of a sighting of a very weak tornado that appeared to make a brief touchdown, but caused no damage, north of Marion. Due to insufficient data in support of this report, an official tornado event will not be entered..
LAUREL PARK	8/10/2000	Numerous trees were blown down countywide, but especially in the western half. A 250 year old tree fell and damaged 2 vehicles.
HENDERSONVILLE	8/18/2000	Several trees were blown down on Hebron Road.
HENDERSONVILLE	5/22/2001	Trees down on Shepherd Street.
HENDERSONVILLE	7/8/2001	Trained spotter measured a wind gust at Hoopers Creek.
HENDERSONVILLE	7/8/2001	Numerous trees and power lines down. Some trees fell on houses. Over 7000 homes lost power during the storm and remained without power for much of the night.
HENDERSONVILLE	8/10/2001	Severe thunderstorm winds brought down at least two trees in the city. One fell across a mobile home, injuring the occupants inside.
MILLS RIVER	5/2/2002	Some trees were blown down.
HENDERSONVILLE	8/24/2002	Several trees and powerlines were blown down.
HENDERSONVILLE	11/11/2002	Several trees were blown down.
FLETCHER	5/2/2003	Some trees were blown down.
HENDERSONVILLE	5/2/2003	Numerous trees were blown down.
ASHEVILLE RGNL ARPT	7/16/2003	
HENDERSONVILLE	7/18/2003	Several trees were blown down, including two on 4th Avenue.
ASHEVILLE RGNL ARPT	7/21/2003	Numerous power lines and trees were blown down, including nine Bradford Pear trees at a golf course.
EDNEYVILLE	5/20/2005	Trees down along highway 64. Trees were also reported down around Sugarloaf Mountain.
ETOWAH	5/20/2005	Trees down along highway 64.
DANA	8/14/2005	Several trees blown down.
HENDERSONVILLE	6/11/2006	A tree was blown down onto power lines just north of town, with 2 other small trees down in the same area.
BAT CAVE	6/23/2006	Trees and lines down.
MOUNTAIN HOME	7/4/2006	Numerous tree limbs blown down and a large swing set overturned
MILLS RIVER	7/21/2006	Trees and power lines down.
MOUNTAIN HOME	7/21/2006	Trees and power lines down.
ETOWAH	8/30/2006	Numerous trees blown down, including some 70-foot pine trees, centered around the area near the intersection of Cummings Cove Rd and Big Willow Rd. Nickel to quarter size hail was also reported.

Location	Date	Description
HENDERSONVILLE	9/28/2006	Trees blown down on power lines.
EDNEYVILLE	10/11/2006	Several trees blown down.
MILLS RIVER	6/25/2007	Large tree limbs blown down, which took down some power lines.
FLETCHER	7/10/2007	Trees down on Justice St and Wiltshire Ct. One tree fell on and damaged a house on Justice St. Also, 7 doors were blown out of the Fletcher FD building.
HENDERSONVILLE	8/26/2007	Several trees blown down near exit 49 off of I-26, including trees blocking parts of N Main St and upper Ridgewood Bvd, and a tree on a car on Oak St. Also, several large limbs took down power lines.
HENDERSONVILLE	3/4/2008	Numerous trees blown down across the county.
ETOWAH	6/27/2008	Several large tree limbs and power lines were blown down.
EAST FLAT ROCK	6/28/2008	Numerous trees were blown down.
HENDERSONVILLE	7/7/2008	Several trees blown down around Flat Rock and vicinity.
MILLS RIVER	6/10/2009	A tree fell on a home on Amywood Lane in Mills River. Trees were also blown down in Mountain Home.
OTTANOLA	6/10/2009	Trees were blown down from Slick Rock Rd to Sugarloaf Mountain.
FLETCHER	6/18/2009	Several trees were blown down from Fletcher to Hendersonville.
ETOWAH	6/18/2009	Several trees were blown down.
DANA	7/27/2009	Trees were blown down on Deep Gap Rd.
EDNEYVILLE	8/5/2009	Several trees were blown down in the Old Clear Creek Rd. area.
UPWARD	6/25/2010	A tree was blown down near the intersection of I-26 and Upward Rd.
DANA	6/25/2010	A tree was blown down near the intersection of Deep Gap Rd and Deep Gap Loop Rd.
MILLS RIVER	7/11/2010	Numerous trees were blown down in the Mills River area extending from about 4 miles west northwest of Mills River along North Mills River Road, to River Loop Road, to Turnpike Rd, ending about 2 miles southeast of Mills River along Ladson Rd.
RUGBY	7/17/2010	About two dozen trees were blown down on South Rugby Rd.
BRIGHTWATER	7/18/2010	Several large tree limbs were blown down about 3 miles west of Hendersonville and a tree was blown down On Lakeside Dr near Willow Rd.
ETOWAH	10/25/2010	Numerous trees were blown down across the county.
ETOWAH	4/4/2011	Dozens of trees were blown down around a golf course on the north side of Etowah. Other trees and power lines were blown down sporadically toward the Hendersonville area.
HORACE	4/28/2011	Trees and power lines were blown down.
CAROLINA HILLS	6/10/2011	A tree was blown down on Pattys Chapel Rd with another blown down on Asheville Highway in Fletcher.
LAUREL PARK	6/12/2011	Multiple trees were blown down in and around Hendersonville, mainly on the south side of town. One tree fell on a house on Whitted St.
ETOWAH	6/15/2011	Multiple trees were blown down in the Etowah area.
MILLS RIVER	6/18/2011	Multiple trees were blown down from Mills River, across the north side of Hendersonville, to the Dana community, to East Flat Rock. One tree fell on a vehicle on Shady Bottom Rd in Mills River.
GERTON	6/21/2011	A few trees were blown down in the northeast part of the county, including on Bearwallow Mountain and near Bat Cave.
HORACE	6/21/2011	A tree was blown down along Lamb Mountain Rd, about 6 miles south southwest of Bat Cave.
MILLS RIVER	6/22/2011	A tree blew down and blocked highway 191 in Mills River. There were also power lines blown down on Rugby Rd and power lines down on Naples Rd, both a few miles east of Mills River.

Location	Date	Description
ETOWAH	7/4/2012	Trees were blown down in Etowah and surrounding areas.
LAUREL PARK	7/17/2012	Multiple trees and power lines were blown down on 4th Ave W near North Washington St.
BRIGHTWATER	7/27/2012	Numerous trees were blown down across the Hendersonville area. At least seven roads had trees across them. A tree fell on a home on Dana Rd about 1.5 miles north of downtown.
TUXEDO	8/2/2012	Multiple trees were blown down on highway 25 south of Hendersonville and Flat Rock.
HORSE SHOE	8/9/2012	Multiple trees were blown down about 2 miles south southwest of Mills River. A tree was also blown down on South Mills River Rd 2 miles west of town.
HORACE	8/14/2012	A tree was blown down on Summer Road near the Polk County line.
FLETCHER	6/7/2013	Several trees were blown down around Fletcher.
HORSE SHOE	8/12/2013	Multiple trees were blown down on the southwest side of the Mills River community, including on Ray Hill Rd, Turnpike Rd and on Schoolhouse Rd.
GERTON	9/1/2013	Multiple trees and power lines were blown down in the Gerton community.
EDNEYVILLE	9/1/2013	Numerous trees were blown down in the Edneyville area.
GERTON	9/1/2013	A thunderstorm knocked down trees and power lines in the Gerton community, about 20 minutes after another thunderstorm caused wind damage in the same area.
ETOWAH	5/27/2014	County comms reported multiple trees blown down on the south side of Etowah, including on Eade Rd and Pleasant Grove Rd.
ETOWAH	6/20/2014	FD reported multiple trees and power lines blown from between Etowah and Horse Shoe to the southern end of the county.
HOOPERS CREEK	7/27/2014	Law enforcement reported a tree and powerline blown down near Apple Blossom Park Dr (2 ENE Fletcher). County comms reported several trees and power lines down in Mountain Home area.
TUXEDO	9/2/2014	FD reported two trees blown down on Highway 176.
RUGBY	6/2/2015	County comms reported two trees blown down along Rugby Rd.
RUGBY	6/26/2015	County comms reported trees blown down on Rugby Rd.
MOUNTAIN HOME	7/13/2015	County comms reported multiple trees blown down in the Etowah and Mountain Home communities.
MILLS RIVER	7/14/2015	County comms reported multiple trees blown down in the Mills River area.
ETOWAH	8/4/2015	Public reported several dozen trees blown down throughout the Etowah community.
BOWMAN BLUFF	7/14/2016	Spotter reported a few trees blown down on Fairway Noll Rd.
TUXEDO	7/21/2016	County comms reported numerous trees and power lines blown down along Green River Rd.
UPWARD	5/19/2017	Public reported two trees blown down near Dana.
HOLLY SPGS	5/27/2017	County comms reported multiple trees blown down throughout Henderson County.
HENDERSONVILLE	6/13/2017	County comms reported trees blown down in the vicinity of Laurel Park.
EAST FLAT ROCK	6/13/2017	FD reported at least 2 trees blown down with one tree down across Highway 25 and blocking traffic.
VALLEY HILL	7/15/2017	County comms reported a few trees blown down in the Valley Hill area.
LEAD	7/15/2017	County comms reported a few trees blown down in the Green River area.
HOOPERS CREEK	7/23/2017	FD reported multiple trees blown down east of Fletcher.
MILLS RIVER	6/3/2018	Spotter reported multiple large trees blown down along Highway 191 near Mills River, with one tree down on a house.
BARKER HGTS	6/3/2018	County comms reported numerous trees blown down from the east side of Hendersonville to the Dana area.
MILLS RIVER	6/26/2018	County comms reported multiple trees blown down in the Mills River area.
FLETCHER	6/26/2018	County comms reported multiple trees blown down in the Fletcher area.

Location	Date	Description
LEAD	4/14/2019	Public reported a chimney blown off and partial roof damage to a home on Tall Oak Acres.
BOWMAN BLUFF	4/19/2019	County comms reported trees and power lines blown down on River Rd in Etowah and other trees down closer to Hendersonville.
BOWMAN BLUFF	8/21/2019	Public reported three trees blown down at a golf course off Cummings Rd.
MOUNTAIN HOME	10/31/2019	Public reported (via Social Media) a large tree limb blown down through a truck windshield on Naples Rd.
ETOWAH	1/11/2020	County comms reported numerous trees and power lines blown down across Henderson County. Multiple buildings and at least one vehicle were damaged, mainly due to falling trees.
GERTON	7/19/2020	County comms reported trees blown down on Bearwallow Mountain Rd.
FLAT ROCK	7/21/2020	County comms reported trees blown down on Jessee Owenby Rd.
BARKER HGTS	7/22/2020	County comms reported multiple trees and power lines blown down between Hendersonville and Flat Rock.
BALFOUR	7/6/2022	County comms reported four trees and a power line blown down between East Flat Rock and Hendersonville.
VALLEY HILL	7/19/2022	County comms reported numerous trees blown down in Hendersonville and vicinity.
HOOPERS CREEK	8/3/2022	County comms reported multiple trees blown down off Finley Cove Rd.
MILLS RIVER	7/18/2023	Spotter reported a few trees and large limbs blown down in Fletcher Park.
VALLEY HILL	7/29/2023	County comms reported several trees blown down from Mills River to Laurel Park. Some were blown down on power lines.
MOUNTAIN HOME	8/12/2023	Emergency manager and the public reported multiple trees blown down from Laurel Park to near Flat Rock, including on Hebron Rd, Crooked Creek Rd, Crail Farm Rd, and Princess Ann Dr.
RUGBY	9/7/2023	Utility company reported trees blown down on power lines.
EDNEYVILLE	5/8/2024	County comms reported multiple trees blown down at Highway 191 and N. Rugby Rd.
EDNEYVILLE	7/18/2024	County comms reported scattered trees blown down across Edneyville and vicinity.
EAST FLAT ROCK	7/30/2024	County comms reported power lines blown down near St Pauls Rd and Old Clear Creek Rd and a tree down on Sugarloaf Mountain Rd.
RUGBY	8/30/2024	County comms reported several trees and power lines blown down across the Flat Rock area.
Polk County		
Unincorporated Area	6/9/1990	
Unincorporated Area	8/21/1990	
Unincorporated Area	5/15/1994	Strong thunderstorm winds blew down trees and power lines.
MILL SPG	6/24/1996	
MILL SPG	8/21/1996	Downburst winds caused a fair amount of damage around Collettsville where tin was ripped off roofs, trees and power lines were blown down and signs were destroyed. In Mill Spring some power poles and trees were downed.
COLUMBUS	7/4/1997	Two people were injured by tent poles that were sent hurtling through the air by severe thunderstorm winds. Power loss to 35,000 customers also occurred.
MILL SPG	7/28/1997	Thunderstorms developed in a very warm and unstable atmosphere during the afternoon. Several storms became severe and produced damaging straight line winds for the most part. A few reports of large hail were also received. Most of the damage took the form of downed trees and power lines. However, roofs were partially blown off a mobile home in Rutherford

Location	Date	Description
		county and a building in Mt. Holly in Gaston county. A tree fell on a trailer in Haywood county and dime size hail fell for 10 minutes in Marshall.
COLUMBUS	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.
TRYON	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.
COLUMBUS	8/24/2000	An isolated slow-moving severe thunderstorm produced a couple areas of straight-line damaging winds. Power lines were blown down west of Columbus and trees and power lines were downed in the city.
COLUMBUS	8/24/2000	An isolated slow-moving severe thunderstorm produced a couple areas of straight-line damaging winds. Power lines were blown down west of Columbus and trees and power lines were downed in the city.
COUNTYWIDE	5/21/2001	At least 11 trees were blown down county-wide by a morning severe thunderstorm.
COLUMBUS	6/13/2001	Sheriff's department reported numerous trees and power lines down. Between 10 and 20 trees were blown onto Interstate 26. A public report of a roof being torn off a building at a country club was also received.
BEULAH	7/8/2001	Trees down along N.C. 9 near Mill Spring. Stop signs were blown down near Beulah.
COUNTYWIDE	5/13/2002	A few trees were blown down.
COLUMBUS	7/4/2002	A few trees and powerlines were blown down.
SALUDA	9/14/2002	Some trees were blown down.
SUNNY VIEW	9/14/2002	Some trees were blown down.
COLUMBUS	11/11/2002	Several trees were blown down.
COLUMBUS	5/2/2003	Numerous trees and power lines were blown down. A tree fell on a porch, resulting in significant damage.
COUNTYWIDE	6/27/2003	Several trees were blown down.
TRYON	8/22/2003	A tree and some power lines were blown down.
COLUMBUS	5/30/2004	Numerous trees and power lines were blown down.
MILL SPG	6/12/2004	Several trees were blown down.
COUNTYWIDE	6/6/2005	Numerous trees down across the county.
TRYON	6/27/2005	Trees down on highway 176 between Tryon and Saluda.
COLUMBUS	7/28/2005	Trees down in the Collinsville Rd area.
COLUMBUS	4/19/2006	Trees reported split by the wind.
COLUMBUS	6/11/2006	Numerous trees blown down in the Sunny View community.
COLUMBUS	6/23/2006	Large tree limbs blown down in the Green Creek area.
TRYON	7/15/2006	Four trees blown down in Tryon.
TRYON	9/28/2006	Two trees took down power lines on highway 108 in the Lynn community, knocking out power to a large portion of Tryon.
TRYON	8/21/2007	A couple of trees and power lines blown down.
TRYON	3/4/2008	A few trees blown down.
COLUMBUS	3/4/2008	A few trees blown down across the county.
MILL SPG	6/27/2008	Trees were blown down along Wilson Rd.

Location	Date	Description
COLUMBUS	7/6/2008	A tree was blown down on highway 74 near Columbus, and another tree was downed on Fox Mountain Rd.
SUNNY VIEW	5/28/2009	Trees and large tree limbs were blown down along highway 9 near the Sunnyview community, over to the Rutherford County line.
SUNNY VIEW	6/9/2009	Large tree limbs were blown down.
MILL SPG	6/9/2009	A tree was blown down along highway 9 north of Mill Spring, and another tree was downed near the intersection of highway 108 and Toney Rd.
SUNNY VIEW	6/10/2009	Large tree limbs were blown down along highway 9 in the Sunnyview community.
SUNNY VIEW	6/11/2009	Large tree limbs were blown down along highway 9 near the Sunnyview community.
MILL SPG	7/23/2009	Two trees were blown down in the Mill Spring community.
MC GINNIS XRDS	7/28/2009	Trees were blown down on Poors Ford Rd.
SANDY PLAINS	8/5/2009	Several trees were blown down just off highway 9.
SALUDA	6/15/2010	A couple trees were blown down in the Saluda area.
MILL SPG	6/16/2010	Multiple trees were blown down between highway 108 and highway 9.
SUNNY VIEW	7/18/2010	A couple trees were blown down in the Big Level Rd.
VALHALLA	9/27/2010	Numerous trees and large limbs were blown down in and around Tryon, especially in the Harmon Field Rd, highway 176 area. Two homes were damaged by falling trees and several roads were blocked.
SALUDA	4/4/2011	Numerous trees were blown down across the county, with the Tryon area being the hardest hit. Numerous trees fell on roads, and at least one tree fell on a vehicle in Tryon.
TRYON	5/26/2011	Multiple trees were blown down in the Tryon area.
MELROSE	6/18/2011	Trees were blown down on power lines on Howard Gap Rd and on I-26 at mile marker 62. Two more trees fell along highway 108 near Harmon Field Rd.
VALHALLA	8/14/2011	Trees were blown down on Walcott Farm Lane and on Hunting Country Rd. Trees were also blown down on Lanrum Rd and Collinsville Rd to the southeast of Columbus.
MILL SPG	7/1/2012	Multiple trees were blown down to the north of Mill Spring.
COLUMBUS	7/9/2012	Two trees were snapped and two large limbs blown down along I-26 between mile marker 69 and 70.
MT VLY	7/27/2012	County reported trees blown down on Holbert Cove Rd.
MELVIN HILL	7/27/2012	Three trees were blown down in the Green Creek community.
MILL SPG	8/14/2012	A small tree was blown down just outside the reception area for Bright's Creek Golf and Equestrian Community.
COLLINSVILLE	9/3/2012	A tree was blown down on Phillips Rd about 6.5 miles southeast of Columbus.
MELVIN HILL	9/3/2012	A tree was blown down on Coxe Rd in the Green Creek community.
TRYON	1/30/2013	Multiple trees were blown down in the Tryon area.
MELVIN HILL	1/30/2013	Multiple trees were blown down in the Green Creek community.
TRYON	5/22/2013	Trees were blown down on North Trade St.
COLLINSVILLE	5/22/2013	A tree was blown down on Landrum Rd. Several large limbs were blown down nearby on Woody Circle.
COLLINSVILLE	6/9/2013	Trees were blown down on Collinsville Rd and John Weaver Rd in the Green Creek community.
COLUMBUS	7/12/2013	A few trees were blown down from Tryon to the Green Creek community.
COLUMBUS	8/23/2013	Multiple trees were blown down on a home on Red Fox Rd, about 5 miles east northeast of Tryon. A tree was blown down on power lines on Golf Course Rd near Landrum Rd. A fell on a home Collinsville Rd, about 6 miles east southeast of Columbus. A shed was also flipped in the area.

Location	Date	Description
COLLINSVILLE	9/12/2013	Multiple trees were blown down near South Phillips Rd and Bee Hive Rd.
MC GINNIS XRDS	8/20/2014	FD reported multiple trees and power lines blown down along Chesnee Highway, from just east of the center of the Green Creek community to the Rutherford County line.
TRYON	6/16/2015	EM reported 6 to 8 trees blown down in extreme southern Polk County near the intersection of Hunting Country Rd and Red Barn Rd.
BEULAH	6/19/2015	County comms reported multiple trees blown down east of Mill Spring, including along Polk Central Ln, John Shehan Rd, and Moore Rd.
MT VLY	7/8/2015	Public reported multiple trees and power lines blown down.
MILL SPG	7/21/2015	County comms reported a tree blown down just south of Mill Spring and another tree down on Medford Rd.
TRYON	7/21/2015	County comms reported a tree blown down on S River Rd and another tree down on Carriage Way.
MC GINNIS XRDS	8/5/2015	HAM radio operator reported numerous trees blown down in the Green Creek area, from Melvin Hill Rd near the South Carolina border, across Chesnee Rd, to Mcmurray Rd and Stacey Rd near the Rutherford County line.
VALHALLA	7/8/2016	Public reported (via Social Media) trees blown down on Miller Mountain Rd.
COLLINSVILLE	7/1/2017	County comms reported numerous trees blown down on Landrum Rd.
MELVIN HILL	7/8/2017	FD reported multiple trees and some power lines blown down in the Green Creek area, centered around Green Creek Drive.
MILL SPG	5/10/2018	EM reported several trees blown down in the Mill Spring area.
TRYON	5/10/2018	EM reported multiple trees blown down along I-26, with one on a tractor-trailer.
SUNNY VIEW	6/27/2018	County comms reported multiple trees down near the Rutherford County line including on Polk County Line Rd and Rock Springs Rd.
COLUMBUS	6/27/2018	County comms and the public reported numerous trees blown down in the area around Fox Mountain Rd, Smith Dairy Rd, and Huntview Ln.
TRYON, MT VALLEY	4/14/2019	EM reported numerous trees blown down across the county. One tree fell on a mobile home causing significant damaged in the Mill Spring area.
COLUMBUS	7/4/2019	Emergency manager reported numerous trees blown down in central Polk County, including the Columbus area. Trees fell on two homes on Red Fox Road near Columbus.
SANDY PLAINS	2/6/2020	Newspaper reported numerous trees blown down across Polk County, with some down on roads.
SUNNY VIEW	4/13/2020	Public reported trees and large limbs blown down on Bill Jackson Road.
COLUMBUS	6/20/2020	Spotter reported multiple trees blown down with a few snapped.
MT VLY	8/31/2021	County comms reported trees blown down on I-26 at mile marker 62, with at least one lane blocked.
MELVIN HILL	5/16/2022	Public reported trees blown down along Melvin Hill Rd and at least one tree snapped on Jolly Ln.
MILL SPG	6/2/2022	Emergency manager reported trees blown down in the Mill Spring area.
RODDY STORE	6/2/2022	Emergency manager reported a few trees blown down around River Crest Parkway.
MILL SPG	7/19/2022	County comms reported a couple of trees blown down in the Mill Spring area.
COLUMBUS	1/12/2023	County comms reported multiple trees blown down across Polk County.
SUNNY VIEW	7/1/2023	Multiple sources reported numerous trees and power lines blown down across northern Polk County, from the Sunny View community to Mill Spring. One tree fell on a residence.
PEA RIDGE	7/3/2023	Law enforcement reported multiple large trees blown down at the intersection of Big Level Rd and Rock Springs Rd.
COLLINSVILLE	7/28/2023	County comms reported a few trees blown down, some onto power lines near Green Creek.
SALUDA	8/12/2023	Utility company reported multiple trees blown down on power lines in the Saluda area.

Location	Date	Description
TRYON	8/12/2023	Utility company reported several trees blown down on power lines in the Tryon area and another tree down on power lines near Columbus.
VALHALLA	8/14/2023	County comms reported power lines blown down on Judge Rd at Warrior Dr. Utility company reported trees blown down on power lines on Thermal View Dr.
MELVIN HILL	6/4/2024	Fire dept reported a couple of trees blown down in the Green Creek area.
MT VLY	8/17/2024	County comms reported numerous trees blown down across Polk county. Utility company reported trees down on power lines on White Oak Mountain Rd, on Skyuka Rd, and at Bill Collins Rd at Smith Waldrop Rd.
Rutherford County		
Unincorporated Area	2/10/1990	
Unincorporated Area	7/24/1991	
Unincorporated Area	6/8/1992	
Rutherfordton	8/16/1994	Trees and power lines were blown down. One mobile home was blown onto its side.
Rutherfordton	5/10/1995	Trees fell on two automobiles.
Rutherfordton	6/9/1995	Trees down in numerous areas of the county.
Northeastern Rutherfo	6/10/1995	Numerous trees down.
RUTHERFORDTON	5/25/1996	A severe thunderstorm developed in the foothills and drifted southwest. It caused large hail in McDowell county and blew down trees in Rutherford county.
HARRIS	6/8/1996	
RUTHERFORDTON	6/13/1996	A powerful severe thunderstorm blew down numerous trees in town. Some fell on cars, destroying one and damaging many others. Other trees fell on houses and some structural wind damage to buildings was reported. Lightning destroyed one steer near Statesville.
UNION MILLS	8/28/1996	A severe thunderstorm moving from the north blew down a few trees.
UNION MILLS	6/2/1997	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
RUTHERFORDTON	7/4/1997	Severe thunderstorms moved into the mountains from Tennessee in the early evening on the Fourth, before moving into or redeveloping in the foothills and western piedmont later in the evening. Damaging winds raked much of western North Carolina, downing trees and power lines, and a few reports of hail as large a golf balls were reported. Several counties reported trees and power lines down countywide, often blocking roads and damaging homes and/or vehicles. Outflow from the storms propagated southeast into the Charlotte metro area before midnight, producing gusty winds between 35 and 45 mph for a short period of time. Dollar amounts for much of the damage were not available at the time of this writing.
CHIMNEY ROCK	7/16/1997	Severe thunderstorms developed mainly in the foothills of North Carolina during the afternoon. Damaging winds up to 75 mph downed trees and power lines. U.S. Highway 74 in

Location	Date	Description
		Henderson county was blocked for 2 hours due to a large oak tree that fell across the road. Another large tree in Cleveland county fell onto 2 pickup trucks, totaling them. Three houses were damaged by fallen trees, a car was damaged by a collapsed convenience store canopy and trees blocked roads near Indian Trail. Power outages were scattered across the region, some due to lightning. Up to 4300 people were without power in Union county.
RUTHERFORDTON, FOREST CITY	7/28/1997	Thunderstorms developed in a very warm and unstable atmosphere during the afternoon. Several storms became severe and produced damaging straight line winds for the most part. A few reports of large hail were also received. Most of the damage took the form of downed trees and power lines. However, roofs were partially blown off a mobile home in Rutherford county and a building in Mt. Holly in Gaston county. A tree fell on a trailer in Haywood county and dime size hail fell for 10 minutes in Marshall.
RUTHERFORDTON	8/5/1997	Powerful severe thunderstorms caused widespread damage across the eastern half of Rutherford county and in southern Cleveland county as they moved east southeast. Especially hard hit were the areas near and east of Forest City and near Boiling Springs. Macrobursts with embedded microbursts downed hundreds of trees which fell on many homes and businesses. Roads and streets were blocked for much of the night. A roof was partially blown off of a manufacturing plant at Caroleen, and at Boiling Springs the roof of a house collapsed and a barn was blown down.
CAROLEEN, FOREST CITY	8/5/1997	Powerful severe thunderstorms caused widespread damage across the eastern half of Rutherford county and in southern Cleveland county as they moved east southeast. Especially hard hit were the areas near and east of Forest City and near Boiling Springs. Macrobursts with embedded microbursts downed hundreds of trees which fell on many homes and businesses. Roads and streets were blocked for much of the night. A roof was partially blown off of a manufacturing plant at Caroleen, and at Boiling Springs the roof of a house collapsed and a barn was blown down.
GILKEY, UNION MILLS	5/26/1998	Multi-cell thunderstorms developed in a hot and humid airmass just ahead of a cold front sagging south across North Carolina during the evening of the 26th. Several storms became severe and produced widespread hail and wind damage. Hail and wind lasted 15-20 minutes at some locations. Numerous trees and power lines were downed, some on homes, and numerous power outages occurred. In the town of Gilkey, in Rutherford county, a storage building was blown into the woods. Four homes were damaged by fallen trees in Union Mills and windows were blown out.
FOREST CITY, ELLENBORO	6/22/1998	Multi-cell thunderstorms moved across the mountains and into the foothills during the evening hours. Some of the storms became severe and produced mainly wind damage. Winds were estimated as high as 75 mph in Rutherford county early in the evening, resulting in downed trees damaging several homes and a barn destroyed. A National Weather Service co-operative observer measured a 63 mph wind gust on Flat Top Mountain. A tree fell on a house in west Asheville as well as in Hickory. Elsewhere, scattered trees and some power lines were downed.
RUTHERFORDTON	7/4/1998	Straight-line winds from a severe thunderstorm moved from Rutherfordton to Forest City, downing trees and power lines. Part of a porch was blown off and never found. Another severe thunderstorm downed several trees just east of downtown Charlotte.
CLIFFSIDE	7/23/1998	Trees were blown down by an isolated severe thunderstorm.
RUTHERFORDTON	7/7/1999	Severe thunderstorms across the foothills of North Carolina produced damaging wind gusts which downed trees and power lines. In the northwest piedmont, trees were downed across Hwys 158 and 801. A large tree fell across a mobile home in Hillsdale. Lightning strikes started fires which destroyed a house roof in Statesville, damaged a house in Kings Creek, and damaged several structures across Catawba county. Excessive rain in northern Burke county caused a flash flood which covered many roads at the base of the mountains.
RUTHERFORDTON	8/23/1999	Clusters of thunderstorms developed during the late afternoon in the foothills of North Carolina. One became severe, producing damaging wind which downed trees and power

Location	Date	Description
		lines from the Lake Lure area to just north of Rutherfordton. Some fires were started due to the downed power lines. Brown Mountain Beach Campground reported damaging winds and large hail, and trees and power lines were downed near Valmead.
LAKE LURE	8/23/1999	Clusters of thunderstorms developed during the late afternoon in the foothills of North Carolina. One became severe, producing damaging wind which downed trees and power lines from the Lake Lure area to just north of Rutherfordton. Some fires were started due to the downed power lines. Brown Mountain Beach Campground reported damaging winds and large hail, and trees and power lines were downed near Valmead.
SPINDALE	8/4/2000	A severe thunderstorm uprooted trees along a 3 to 4 mile stretch of Hwy 108 near the Polk county line. Several trees were downed at Fox Haven Plantation and one large tree fell on a house and two vehicles.
RUTHERFORDTON	8/10/2000	Numerous trees were blown down.
RUTHERFORDTON	8/18/2000	Numerous trees and power lines were downed across the county, but especially along this path. In Forest City, many trees and power lines fell on cars and houses. In Spindale, there were 16 separate reports of downed trees. There were 4200 people left without power in the county.
ELLENBORO	5/21/2001	Trees and power lines down in Ellenboro.
FOREST CITY	5/21/2001	Large limbs torn off trees.
FOREST CITY	6/14/2001	Numerous trees and power lines blown down between Forest City and Sandy Mush, including at Bostic and Cliffside. At a local park in Forest City, a tent was split in two by the wind and portable toilets were blown over. Trees fell on a car and a truck.
RUTHERFORDTON	6/25/2001	
LAKE LURE	7/4/2001	Numerous trees and power lines knocked down.
RUTHERFORDTON	7/4/2001	Numerous trees and power lines blown down between Rutherfordton and Forest City. Power poles were snapped in half. Urban flooding occurred, closing three streets. A car was trapped under downed power lines. Some trees were blown onto houses.
LAKE LURE	7/8/2001	Trees blown down.
RUTHERFORDTON	7/8/2001	Numerous trees blown down onto roads and streets. Power lines down countywide.
LAKE LURE	4/17/2002	A few trees were blown down.
RUTHERFORDTON	4/17/2002	Trees were reported down in the Mt. Vernon community.
CHIMNEY ROCK	5/2/2002	Several trees were blown down.
LAKE LURE	5/2/2002	Some trees were blown down.
FOREST CITY	5/2/2002	Numerous trees and powerlines were blown down.
BOSTIC	5/7/2002	A few trees were blown down.
RUTHERFORDTON	5/13/2002	Numerous trees and powerlines were blown down, some onto vehicles and homes.
RUTHERFORDTON	6/6/2002	Numerous trees were blown down.
FOREST CITY	7/1/2002	Trees were blown down along Newton Cole Rd.
CAROLEEN	7/2/2002	Numerous trees were blown down. Two people were injured on the morning of the 3rd, when a large tree damaged by the storm fell.
FOREST CITY	7/3/2002	Numerous trees and powerlines were blown down. One tree fell on a house. A vehicle collided with a tree that had fallen on Highway 120.
RUTHERFORDTON	7/4/2002	Hundreds of trees and powerlines were blown down across the county. Some trees fell on homes. Some homes received minor roof damage from the wind.
HARRIS	8/24/2002	Numerous trees were blown down. Some blocked roads.
FOREST CITY	11/11/2002	Numerous trees and power lines were blown down in and near Forest City.
LAKE LURE	5/2/2003	Trees and power lines were blown down.

Location	Date	Description
UNION MILLS	5/2/2003	Widespread tree and power line damage occurred in areas from Union Mills, to Rutherfordton, to Spindale. Especially hard hit was Rutherfordton, where some homes and buildings received significant damage.
RUTHERFORDTON	5/3/2003	Numerous trees and power lines were blown down.
RUTHERFORDTON	5/3/2003	Numerous trees and power lines were blown down. Some trees fell on and damaged structures. A portion of a roof was blown off of one building.
ELLENBORO	5/3/2003	Numerous trees and power lines were blown down from Ellenboro to the Cleveland County line.
LAKE LURE	5/15/2003	A microburst blew down numerous hardwood trees in a 25,000 square yard area.
UNION MILLS	6/8/2003	Some trees were blown down.
RUTHERFORDTON	6/15/2003	Some trees and power lines were blown down.
BOSTIC	7/12/2003	Some trees were blown down.
THERMAL CITY	7/12/2003	Large tree limbs were blown down.
SUNSHINE	7/12/2003	Trees and power lines were blown down.
UNION MILLS	7/12/2003	Some trees were blown down.
RUTHERFORDTON	7/16/2003	Trees were blown down.
BOSTIC	7/31/2003	Several trees were blown down.
FOREST CITY	8/4/2003	Numerous trees, large tree limbs, and power lines were blown down.
LAKE LURE	8/22/2003	Numerous trees were blown down.
BOSTIC	5/9/2004	Trees were blown down.
RUTHERFORDTON	5/30/2004	Numerous trees and power lines were blown down. Power outages were widespread in several communities.
CHIMNEY ROCK	6/12/2004	A few trees were blown down.
RUTHERFORDTON	6/12/2004	Trees were blown down along Bostic-Sunshine Rd.
HARRIS	6/12/2004	Trees and power lines were blown down. Power outages were widespread in the area.
HARRIS	6/12/2004	Trees and power lines were blown down in the Sandy Mush area.
LAKE LURE	7/10/2004	Numerous trees were blown down around Bills Creek Rd.
FOREST CITY	6/19/2005	Trees down near Forest City, some on roads and houses, and power lines down on highway 221 south of Rutherfordton.
FOREST CITY	6/27/2005	Trees also down in Spindale around the same time.
RUTHERFORDTON	7/5/2005	Seven trees blown down.
ELLENBORO	7/7/2005	Trees and power lines down.
HARRIS	7/28/2005	A tree and power line down.
FOREST CITY	8/14/2005	Quite a few large trees blown down, especially on Cherry Mountain Rd. One tree fell on a home, causing minor damage. Another tree fell on a vehicle and other trees fell on power lines.
RUTHERFORDTON	6/11/2006	Two small trees blown down on highway 108 near the Polk County line.
LAKE LURE	6/22/2006	Several trees blown down in the Lake Lure area.
FOREST CITY	6/22/2006	Several trees down east of Forest City and a tree down off of highway 74 near Sandymush.
SPINDALE	7/21/2006	Trees down in Green Hill, Spindale, and Bostic.
RUTHERFORDTON	8/3/2006	Top of a tree blown out on Union Rd and another tree down on Pleasant Hill Rd.
RUTHERFORDTON	10/11/2006	Trees down on Big Island Rd.
FOREST CITY	10/11/2006	Trees down in the Ellenboro area.

Location	Date	Description
RUTHERFORDTON	6/8/2007	Several trees blown down in the Rutherfordton area and around Main St in Spindale.
FOREST CITY	6/16/2007	Four trees blown down.
CLIFFSIDE	6/24/2007	Trees blown down along Camp Ferry Rd.
RUTHERFORDTON	8/21/2007	Numerous trees blown down in the northwest part of the county. Trees and power lines were blown down on Main St in Spindale. Trees were also blown down on South Mitchell St in Rutherfordton.
SUNSHINE	8/23/2007	Numerous trees blown down in and around the Sunshine community.
ELLENBORO	8/24/2007	Trees blown down on highway 74 and on highway 120 in the Ellenboro area.
FOREST CITY	8/25/2007	Trees blown down in the Caroleen and Sandy Mush area.
RUTHERFORDTON	3/4/2008	Numerous trees, power lines, and power poles blown down from the Green Hill area to Rutherfordton, to the Sunshine community. At least one tree fell on a home near Rutherfordton.
RUTHERFORDTON	5/20/2008	Large tree limbs were blown down.
LAKE LURE	6/27/2008	Multiple trees and power lines were blown down and some power poles snapped from the Lake Lure area to the Shingle Hollow area.
CLIFFSIDE	7/21/2008	Trees were blown down.
SPINDALE	7/31/2008	A tree was blown down on Thunder Rd in Rutherfordton and another tree down on Cherry Mountain St in Forest City.
RUTHERFORDTON	8/2/2008	Numerous trees were blown down by two thunderstorms across the northern part of the county.
HARRIS	4/10/2009	Trees were blown down in the Harris community.
GILKEY	5/9/2009	Trees were blown down in the Gilkey community.
CHIMNEY ROCK	6/9/2009	Several trees were blown down in and around Lake Lure.
BOSTIC	6/15/2009	Several trees were blown down across town.
RUTHERFORDTON	6/18/2009	Large tree limbs and signs were blown down on highway 221 near the highway 74 junction in town. A scattering of trees was blown down along highway 221 from Rutherfordton south to Harris Hanrietta Rd.
FOREST CITY	7/23/2009	Five trees were blown down across the city.
LAKE LURE	5/16/2010	Several trees were blown down along highway 64/74 in the Lake Lure area.
LAKE LURE	6/22/2010	Trees and power lines were blown down in the Lake Lure area.
BOSTIC	7/18/2010	Numerous trees were blown down in the town of Bostic.
HOLLIS	8/5/2010	Trees were blown down on highway 226.
RUTHERFORDTON	8/5/2010	Several trees were blown down from Rutherfordton to Spindale to Forest City.
FOREST CITY	10/25/2010	A few trees and power lines were blown down in and around Forest City.
FOREST CITY	11/16/2010	A couple trees were blown down near West Main Dr.
RUTHERFORDTON	4/4/2011	Trees were blown down across the north side of the county. One tree fell on a man on Hudlow Rd, about 6 miles north of Rutherfordton.
HARRIS	4/4/2011	Numerous trees were blown down in extreme southern sections of the county near Cliffside. A roof was blown off a mobile home near the intersection of Ferry Rd and Goode's Creek Church Rd about 3 miles west of Cliffside.
WHITEHOUSE	5/10/2011	Numerous trees were blown down across the county, some of which fell on homes and vehicles. A large tree fell on a mobile home on Spurlin Rd in Ellenboro, killing two 18-year-old twin sisters.
FOREST CITY	5/10/2011	Numerous trees were blown down in the southern part of the county. Some trees fell on homes and vehicles. In addition, a part of a high-tension line tower was blown down off Rabbit Moffit Rd, near the South Carolina line.

Location	Date	Description
UREE	5/23/2011	A few trees were blown down in the Bills Creek area.
UREE	5/26/2011	Numerous trees were blown down across the western part of the county, with Lake Lure being the hardest hit.
RUTH	5/26/2011	Trees were blown down in the Rutherfordton area.
ROCK SPGS	6/5/2011	Trees were blown down east of Lake Lure, near the Green Hill community.
GILKEY	6/9/2011	A tree was blown down on Sarah Lee Rd.
UNION MILLS	6/9/2011	A tree was blown down in the Union Mills area.
SUNSHINE	6/12/2011	A couple trees were blown down in the northeast part of the county.
ALEXANDER MILLS	6/22/2011	Multiple trees were blown down from Forest City to Ellenboro.
FOREST CITY	6/26/2011	Multiple trees were blown down around Forest City.
RUTHERFORDTON	6/26/2011	Multiple trees were blown down along highway 221 south of Rutherfordton.
GILKEY	7/13/2011	Multiple trees were blown down on Painters Gap Rd.
SPINDALE	7/31/2011	Numerous trees were blown down from Rutherfordton to Spindale to Forest City. Multiple trees fell on homes and vehicles, particularly in the Spindale area. A barn was damaged on Whiteside Rd in Rutherfordton.
SUNSHINE	9/2/2011	Numerous trees were blown down in the eastern part of the county from the Sunshine community south to Forest City.
CHIMNEY ROCK	5/15/2012	Trees were blown down on Boys Camp Rd.
CLIFFSIDE	6/12/2012	A large tree was blown down near the intersection of Pea Ridge Rd and highway 221. Multiple additional trees were blown down nearby along highway 120 north of Cliffside.
UREE	7/3/2012	Multiple large tree limbs were blown down, a tree was snapped and several anchored tents were blown away at a campground about 4 miles east of Lake Lure. Other trees were blown down along highway 64/74 between Rutherfordton and Lake Lure and about a half dozen trees down on Sid Sims Rd.
UREE	7/4/2012	Large tree limbs were blown down about 3 miles northeast of Lake Lure.
ROCK SPGS	7/4/2012	A few trees were blown down in the Riverbend area about 5 miles east of Lake Lure.
LAKE LURE	7/5/2012	Multiple trees were blown down in the Lake Lure area.
LAKE LURE	7/5/2012	Three trees were blown down in the Lake Lure area.
UNION MILLS	7/19/2012	A tree was blown down in the Union Mills community and another was blown down in the Cane Creek area.
RUTHERFORDTON	7/23/2012	A few trees were blown down on the northwest side of town.
RUTHERFORDTON	7/23/2012	A few trees were blown down in the Cleghorn Plantation area.
AVONDALE	8/9/2012	Numerous trees were blown down across eastern portions of the county.
GILKEY	9/8/2012	A couple trees were blown down on Rucker Rd.
RUTHERFORDTON	5/22/2013	Multiple trees were blown down across the central part of the county.
CLIFFSIDE	6/25/2013	Trees and power lines were blown down off Duke Power Rd.
LAKE LURE	7/6/2013	A couple trees were blown down on highway 64 near Lake Lure.
RUTHERFORDTON ARPT	7/12/2013	Multiple trees were blown down across the central and western part of the county, from the north side of Rutherfordton, to between Forest City and Rutherfordton, to just south of Rutherfordton. One fallen tree ruptured a gas line on Oscar Justice Rd.
HARRIS	7/12/2013	Trees were blown down on Big Island Rd about 9 miles south southeast of Rutherfordton.
SUNSHINE	7/17/2013	Numerous trees were blown down in the northeast part of the county.
ELLENBORO	7/17/2013	Multiple trees were blown down in the Ellenboro and Bostic areas.
ALEXANDER MILLS	7/28/2013	At least two trees were blown down on Rollins Rd.

Location	Date	Description
GILKEY	8/1/2013	Several trees were blown down in the Green Hill community. One large tree fell on a vehicle traveling along highway 64/74 near Green Hill, destroying the vehicle and causing serious injuries to the two occupants. The 66-year-old male driver died from his injuries several days later.
WHITEHOUSE	8/31/2013	A tree was blown down on Cove Rd, about 10 miles northwest of Rutherfordton. Another tree was blown down nearby on Owens Chapel Rd near Union Mills.
RUTHERFORDTON	1/11/2014	A tree blown down on East 2nd St in Rutherfordton.
BOSTIC	1/11/2014	A tree was blown down on Pea Ridge Rd at Whitesides Rd.
SUNSHINE	6/19/2014	County comms reported multiple trees and power lines blown down in the area between Bostic and the Sunshine community.
SUNSHINE	7/2/2014	FD reported two trees blown down in the Golden Valley community.
UREE	7/27/2014	Public reported a tree blown down near Lake Lure Dam (1.5 ESE Lake Lure) and another tree down on power lines near the intersection of Pheasant St and Redbird Dr (2.5 ESE). A spotter reported a tree blown down on a house in the Green Hill community, and trees blown down on Thunder Rd (2 S Rutherfordton).
HARRIS	7/27/2014	Spotter reported multiple trees and power lines blown down on Poors Ford Rd.
HARRIS SPICERS ARPT	8/20/2014	FD reported multiple trees down along Airport/County Line Rd along the Polk County line.
FOREST CITY	7/20/2015	County comms reported multiple trees blown down at Butler Rd and Hazelwood Dr.
ALEXANDER MILLS	7/21/2015	County comms reported numerous trees and power lines blown down in the southern part of Rutherford County.
HARRIS	8/5/2015	Public reported numerous tree limbs, with a few large limbs blown down on Dewitt Owens Rd.
RUTHERFORDTON	9/10/2015	FD reported multiple trees blown down across downtown Rutherfordton.
CLIFFSIDE	9/11/2015	County comms reported trees blown down on Hines Rd.
HARRIS SPICERS ARPT	2/24/2016	County comms reported multiple trees blown down across the southeast part of the county.
UNION MILLS	5/1/2016	County comms reported numerous trees blown down in the northeast part of the county.
RUTHERFORDTON	6/14/2016	County comms reported multiple trees blown down across Rutherfordton.
HOLLIS	7/3/2016	County comms reported multiple trees blown down on Stroud Rd.
FOREST CITY	7/8/2016	Spotter reported a large portion of the entrance overhang to a department store on Allendale Dr was blown off. Newspaper reported multiple trees and power lines blown down in the nearby Forest Hills neighborhood.
RUTHERFORDTON	7/17/2016	County comms reported multiple trees blown down south of Rutherfordton.
LAKE LURE	7/18/2016	County comms reported multiple trees blown down in the Hickory Nut Gorge.
GILKEY	7/22/2016	County comms reported numerous trees and power lines blown down along Cove Rd.
FOREST CITY	7/31/2016	Newspaper reported a tree was blown down on a home and a vehicle on Conner St.
ALEXANDER MILLS	3/1/2017	EM reported trees blown down on Oak St. Public reported (via social media) damage to the roof of a car dealership.
CHIMNEY ROCK	5/27/2017	County comms reported multiple trees blown down throughout the county, with the highest concentration of damage in the Lake Lure area.
ELLENBORO	7/15/2017	County comms reported a couple of trees blown down in the Ellenboro area.
UREE	7/23/2017	County comms reported numerous trees and power lines blown down from the Lake Lure area, across Shingle Hollow, to near Rutherfordton. A tree was blown down on a house near Rutherfordton.
GILKEY	9/1/2017	FD reported a few trees blown down north of Thermal City.

Location	Date	Description
LAKE LURE	10/8/2017	FD reported numerous trees blown down in the Lake Lure area in association with a thunderstorm. However, the EM also reported additional sporadic trees fell with strong prevailing winds throughout the day.
HENRIETTA	4/15/2018	County comms reported a tree blown down on a power line in the Henrietta area and another tree down on a power line near the Cleveland County line west of Mooresboro.
FOREST CITY	5/10/2018	Media reported numerous trees blown down, with some blocking Roads between Forest City and Ellenboro.
RUTHERFORDTON	5/31/2018	County comms reported a tree and power lines blown down on Chimney Rock Rd and a tree down on Highway 108.
ROCK SPGS	5/31/2018	County comms reported multiple trees blown down on Rock Springs Church Rd.
HARRIS	6/1/2018	County comms reported a few trees blown down on Jack McKinney Rd near Highway 221.
RUTH	6/3/2018	County comms reported multiple trees blown down in Rutherfordton, with additional trees down on Pea Ridge Rd in Bostic and on Piney Mountain Church Rd near Ellenboro.
RUTH	6/26/2018	County comms reported multiple trees blown down on West St and Main St.
HENRIETTA	6/26/2018	County comms reported numerous trees and power lines blown down in the Henrietta and Cliffside areas.
HARRIS SPICERS ARPT	6/27/2018	Public reported trees uprooted on Hogan Rd near Highway 221.
CHIMNEY ROCK	7/6/2018	County comms reported numerous trees blown down near Lake Lure.
BOSTIC	7/6/2018	County comms reported numerous trees blown down in the Bostic area.
ROCK SPGS	7/11/2018	FD reported a few trees and at least one power line blown down on Clark Road.
GILKEY	7/21/2018	County comms reported trees and power lines blown down in the Green Hill area.
RUTHERFORDTON	7/21/2018	County comms reported trees and power lines blown down near Rutherfordton and also across the southern part of the county.
ROCK SPGS	4/14/2019	Law enforcement reported numerous trees and power lines blown down across the county.
CHIMNEY ROCK	7/4/2019	County comms reported numerous trees blown down in the Chimney Rock area.
CHIMNEY ROCK	7/31/2019	County comms reported multiple trees blown down in the Rumbling Ridge area.
CHIMNEY ROCK	7/31/2019	County comms reported multiple trees blown down in the Boys Camp Rd area.
RUTHERFORDTON	8/10/2019	Fire dept reported multiple trees blown down in the Rutherfordton and Spindale area, including on Fairforest Dr and on Polar St.
ALEXANDER MILLS	10/31/2019	County comms reported several trees blown down across the southern part of Rutherford County, with a tree on a power line that sparked a fire on Rock Corner Rd near Forest City.
CLIFFSIDE	7/21/2020	County comms reported trees and power lines blown down in Cliffside and in Ellenboro.
GILKEY	7/22/2020	County comms reported trees and power lines blown down in the Shingle Hollow area, including along Piney Knob Rd.
UNION MILLS	7/25/2020	County comms reported trees blown down in the Union Mills area.
RUTHERFORDTON	8/5/2020	County comms reported multiple trees and power lines blown down throughout the central part of the county.
HENRIETTA	4/10/2021	County comms and spotters reported multiple trees and power lines blown down throughout Rutherford County. One tree fell on and damaged a barn near Ellenboro.
HOLLIS	7/27/2021	County comms reported multiple trees blown down along Highway 226 near the Cleveland County line.
HARRIS SPICERS ARPT	8/31/2021	County comms reported trees blown down on power lines on Painter Rd and Henry Jenkins Rd.
ROCK SPGS	6/2/2022	Emergency manager reported a collapse of walls and the roof of a covered bridge over the Broad River on McOwenben Pass. Numerous trees and power lines were also blown down in the area.

Location	Date	Description
RUTHERFORDTON	7/5/2022	County comms reported trees and power lines blown down from Rutherfordton to Forest City to near the Cleveland County line west of Mooresboro.
GILKEY	7/8/2022	County comms reported numerous trees and some power lines blown down across county, some on power lines. Trees fell on a home near Rutherfordton and punctured the roof.
BOSTIC	7/20/2022	County comms reported a couple of trees blown down between Forest City and Bostic.
SUNSHINE	8/3/2022	County comms relayed reports of at least ten trees blown down across the northern part of the county.
RUTH	8/15/2022	County comms reported a tree blown down on Broyhill Rd and another tree down on Pleasant Hill Church Rd.
HARRIS	1/12/2023	County comms reported numerous trees blown down along with a few power lines across Rutherford County.
HARRIS	6/26/2023	Public reported a few trees blown down.
UREE	7/1/2023	Law enforcement and public reported multiple trees blown down around Lake Lure, including on Buffalo Shoals Rd and Island Creek Rd.
UREE	7/2/2023	County comms and the public reported trees blown down on Bills Creek Rd, on Freeman Town Rd, and on Cove Rd.
ROCK SPGS	7/3/2023	Law enforcement and public reported numerous trees and large limbs blown down from the Polk County border, to Rutherfordton and across Forest City. Some trees fell on roads and power lines.
ELLENBORO	7/13/2023	County comms reported a tree blown down on Beams Mill Rd and another tree down on New House Rd.
ALEXANDER MILLS	8/7/2023	Fire dept and public reported a carport and shed destroyed along with multiple trees blown in the Forest City area. Other trees and some power lines were blown down in the Sandy Mush area, with some trees on houses.
BOSTIC	9/7/2023	Utility company reported trees and limbs blown down on power lines.
ROCK SPGS	5/7/2024	County comms reported multiple trees blown down on Clark Rd.
GILKEY	5/8/2024	County comms and public reported numerous trees and power lines blown from the Green Hill community, across Rutherfordton, Spindale, and Forest City, to Ellenboro.
RUTH	7/5/2024	Utility company reported trees blown down on power lines.
HARRIS SPICERS ARPT	7/15/2024	Public reported a tree and several large limbs blown down.
FOREST CITY	8/16/2024	County comms reported multiple trees blown down from Forest City through the Sandy Mush community, with some blocking roadways.
Transylvania County		
Unincorporated Area	9/17/1991	
Unincorporated Area	8/27/1992	
BREVARD	4/20/1996	
PISGAH FOREST	2/21/1997	
CONNESTEE	6/2/1997	Severe thunderstorms moved in from Upstate South Carolina during the early morning hours becoming more widespread across portions of western North Carolina. Large and damaging hail occurred in many locations, and a number of places were affected by two or three different storms. The hail caused extensive damage and the dollar total will no doubt end up in the millions for both property and crop damage. The counties which were hit hardest were McDowell and Rutherford. At one car dealership in Marion the damage reached $500 thousand quickly. At least one insurance company set up a disaster center to process claims involving many cars and roofs which were hail damaged. Only one downburst was known to have occurred and resulted in trees downed across Highway 221 north of Rutherfordton. At

Location	Date	Description
		Tryon, an historic house and contents including some antiques, burned to the ground. Lightning at Newton struck several residences, causing fire damage.
COUNTYWIDE	7/4/1997	Severe thunderstorms moved into the mountains from Tennessee in the early evening on the Fourth, before moving into or redeveloping in the foothills and western piedmont later in the evening. Damaging winds raked much of western North Carolina, downing trees and power lines, and a few reports of hail as large a golf balls were reported. Several counties reported trees and power lines down countywide, often blocking roads and damaging homes and/or vehicles. Outflow from the storms propagated southeast into the Charlotte metro area before midnight, producing gusty winds between 35 and 45 mph for a short period of time. Dollar amounts for much of the damage were not available at the time of this writing.
BREVARD	5/27/1998	A frontal boundary in the area again provided the focus for thunderstorm development during the afternoon of the 27th. Many storms became severe across western North Carolina and produced hail ranging in size between dimes and quarters. Severe straight-line winds downed numerous trees and power lines, some on houses, in Sylva and Brevard. A few cars were damaged as well. Several trees and power lines were downed in Cornelius later in the afternoon. Lightning struck an apartment in Hickory and caused an attic fire.
BREVARD	6/19/1998	A line of thunderstorms strengthened and bowed out across Jackson and Transylvania counties. Severe straight line winds downed trees in Sylva, and trees and power lines were downed on Hwy 215 near Balsam Grove.
BREVARD	6/24/1998	Multi-cell thunderstorms again developed in the early evening and moved south across the southern mountains and piedmont. A few became severe and produced large hail up to golf ball size, as well as damaging winds. Wind damage was confined to downed trees and power lines. The hardest hit area was northeast of Brevard where roads were blocked.
BREVARD	6/24/1998	Multi-cell thunderstorms again developed in the early evening and moved south across the southern mountains and piedmont. A few became severe and produced large hail up to golf ball size, as well as damaging winds. Wind damage was confined to downed trees and power lines. The hardest hit area was northeast of Brevard where roads were blocked.
BREVARD	1/23/1999	Unseasonably warm, moist air and strong winds through a deep layer of the atmosphere combined to produce a line of thunderstorms along a cold front advancing east across North Carolina. Some of these storms became severe, bringing damaging wind speeds to the surface in some of the southern and central mountain counties. Wind speeds were reported in the 60 to 70 mph range with a measured gust recorded on Flat Top Mountain (elev. 4320 ft) to 78 mph. A 9-mile-long damage path through Mills River and northern Henderson county was initially 100 yards wide, then narrowed to between 25 and 50 yards. Numerous trees and power lines were downed. A tree fell on a home in Brevard causing substantial damage.
BREVARD	7/27/1999	A severe thunderstorm downed several trees and power lines. In addition, a great amount of cloud to ground lightning was produced, which resulted in 3 injuries. One person was injured while in the basement, touching a water heater. Another injury occurred while talking on the phone.
BREVARD	8/10/2000	Trees and power lines were blown down all over the city.
BREVARD	5/19/2001	
LITTLE RIVER	6/14/2001	Trees blown down.
BREVARD	8/23/2001	Several trees blown down in town. Marble-sized hail (1/2 inch) also observed.
BREVARD	6/6/2002	Some small trees and live branches were blown down.
BREVARD	8/18/2002	Some trees and powerlines were blown down.
BREVARD	11/11/2002	A number of tree and power lines were blown down.
LAKE TOXAWAY	5/2/2003	Numerous trees were blown down.

Location	Date	Description
BREVARD	5/2/2003	Numerous trees were blown down.
LAKE TOXAWAY	6/11/2003	Some trees were blown down.
BREVARD	7/16/2003	Numerous trees and power lines were blown down.
BREVARD	7/18/2003	Trees were blown down.
BREVARD	8/8/2003	Some trees were blown down.
ROSMAN	6/6/2005	Several trees blown down.
BREVARD	8/4/2005	Trees down on highway 276 south of Brevard.
ROSMAN	4/22/2006	Trees down on Indian Camp Mountain Rd.
BREVARD	6/22/2006	Trees down north of Pisgah Forest
BALSAM GROVE	8/4/2006	A few trees blown down.
ROSMAN	9/28/2006	A Bradford pear tree snapped off on Calvert Rd, and several 2 to 3-inch diameter limbs blown down on Old Rosman Highway.
ROSMAN	6/23/2007	Two large trees blown down on Hannah Ford Rd.
LAKE TOXAWAY	5/20/2008	Trees blown down in the Sapphire and Lake Toxaway area.
GRANGE	5/20/2008	Trees blown down in the Little River area.
BALSAM GROVE	7/21/2008	Trees were blown down on highway 215.
BREVARD ARPT	7/29/2008	A tree was blown down on Wilson Rd and a tree was blown onto power lines on highway 276 southeast of town.
SAPPHIRE	6/17/2009	Trees were blown down on Whisper Lake Dr.
GRANGE	6/25/2010	Numerous trees were blown down between the Connestee and Little River communities.
BALSAM GROVE	10/25/2010	Multiple trees and power lines were blown down across the county.
SELICA	2/28/2011	A tractor trailer was blown over and greenhouses were damaged at a plant nursery on Hannah Ford Rd.
LAKE TOXAWAY	4/4/2011	Numerous trees and power lines were blown down across the county, with at least one tree on a house.
SAPPHIRE	4/28/2011	Law enforcement reported trees blown down in the Sapphire area with all three severe thunderstorms that moved across the region during the late night and early morning hours.
GRANGE	4/28/2011	Trees and power lines were blown down in the Little River area.
BALSAM GROVE	6/15/2011	Multiple trees, power lines, and power poles were blown down across the county. In Brevard, trees were blown down on homes on South Caldwell St and Merrill Loop, with significant damage occurring to both homes.
JOHN ROCK	6/21/2011	Several trees were blown down on highway 276 through Pisgah National Forest.
OAKLAND	7/4/2011	A few large tree limbs were blown down west of Lake Toxaway. A church building under construction was heavily damaged in town as well.
CONNESTEE	8/20/2011	Large tree limbs and power lines were blown down on Island Ford Rd.
BALSAM GROVE	3/2/2012	Scattered trees were blown down as a supercell thunderstorm moved across the northern part of the county.
BREVARD	7/1/2012	Multiple trees were blown down in the Brevard area.
GRANGE	7/1/2012	A second severe thunderstorm moving over eastern Transylvania County blew down multiple trees in the Little River area.
BREVARD ARPT	7/5/2012	Large tree limbs were blown down on North Country Club Rd.
BALSAM GROVE	7/5/2012	A small tree and several large limbs were blown down along highway 215.
REID	1/30/2013	Multiple trees were blown down across the county as a line of heavy rain showers with embedded thunderstorms moved over the region.
ROSMAN	6/13/2014	County comms reported multiple trees and power lines blown down.

Location	Date	Description
BREVARD ARPT	7/8/2014	FD reported a few trees and power lines blown down near Becky Mountain.
CEDAR MTN	6/8/2015	County comms reported trees and power lines blown down in the Cedar Mountain area, and at least one tree down in the Little River community (3 N).
CONNESTEE	7/8/2016	Public reported a few trees blown down along Highway 276 south of Brevard.
BALSAM GROVE	3/21/2017	County comms reported a few trees blown down on power lines from the Balsam Grove area to Brevard.
QUEBEC	5/27/2017	County comms reported multiple trees and large limbs blown down on Wildwood Drive.
CALVERT	6/16/2018	FD reported a tree blown down on Highway 64 near Old Rosman Highway and power lines down on Highway 64 in Rosman.
LAKE TOXAWAY	6/25/2018	County comms reported numerous trees and power lines blown down throughout the county.
ROSMAN	6/17/2019	County comms reported multiple trees and power lines down along Diamond Creek Road and vicinity and multiple lines down along Highway 178 south of Rosman.
LAKE TOXAWAY	6/22/2019	County comms reported trees blown down across roads in the vicinity of Lake Toxaway.
JOHN ROCK	6/22/2019	County comms reported trees blown down across roads in the Pisgah National Forest.
CALHOUN	7/6/2019	County comms reported trees and power lines down on Hart Rd at Everett Rd. Time estimated from radar.
LAKE TOXAWAY	8/1/2019	Fire dept reported large tree limbs blown down across Blue Ridge Road.
PENROSE	8/19/2019	County comms reported a few trees blown down in the Penrose area.
BALSAM GROVE	10/31/2019	County comms reported multiple trees blown down near Balsam Grove.
SELICA	7/1/2023	Law enforcement reported a tree blown down on Hannah Ford Rd near Green Rd in Brevard. Public reported another tree damaged, along with some large limbs down in Cedar Mountain.
LAKE TOXAWAY	8/24/2023	County comms reported a power line blown down and a tree down across Blue Ridge Rd.
ROSMAN	5/8/2024	Public reported (via Social Media) multiple trees blown down in the Rosman area.
SELICA	8/16/2024	County comms reported multiple trees blown down along Highway 64 between Rosman and Brevard.
REID	8/30/2024	Fire dept reported numerous trees and a few power lines blown down in the Lake Toxaway area.

TABLE H.13: WINTER STORM EVENTS (1996-2024)

Location	Date	Description
Henderson County	1/6/1996	Snow began early in the morning and by mid-day had reached heavy criteria over part of the mountains with accumulations exceeding 6 inches in some areas. Remaining mountain locations picked up heavy snow accumulations a bit later in the afternoon. At the start of the storm the snow was very wet and accumulations caused power outages in some places. The heavy snow continued through the night and into the next day. Accumulations in the mountains ranged from 4 to 12 inches over the central and southern mountains with 18 to 30 inches in the northern mountains. Brutally cold conditions followed the snow with very windy conditions reported. Blizzard conditions may have been reached in some areas. Extreme cold followed the storm in much of the mountains with wind chills of 20 to 30 below zero.
Henderson County	1/11/1996	The second snowstorm within a week caused more excitement in North Carolina. Up to a foot of snow was reported in some of the mountains with most mountain and foothill locations receiving 3 to 6 inches. In the piedmont, there was more of a mixture of ice with minimal ice storm conditions reported in and around the Charlotte area. There were some power outages and numerous traffic accidents.
Henderson & Transylvania County	2/13/1997	
Henderson County	2/16/2003	A light freezing rain developed along the Blue Ridge during the morning hours, and began to intensify during the afternoon. By mid-afternoon, a quarter of an inch of glaze had accumulated across much of the area. The precipitation transitioned to mainly sleet during the late afternoon, and by mid-evening, around an inch of sleet had accumulated on top of the glaze of ice. Numerous traffic accidents and road closures resulted from the precipitation.
Transylvania County	12/4/2003	Heavy snow and sleet began during the early morning hours across the North Carolina mountains, and by late afternoon had accumulated to 3 to 4 inches across much of the area. Some slopes with an eastern exposure had up to 5 inches.
Henderson & Transylvania County	1/29/2005	After light precipitation fell for much of the overnight hours, snowfall intensity increased around sunrise, and continued through the morning, before changing to a mixture during the afternoon. Total snowfall across the area ranged from 2 to 4 inches. A trace of sleet and freezing rain fell on top of that during the afternoon and evening hours.
Polk & Rutherford County	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.
All Counties	3/1/2009	Rain changed to snow across portions of the southern and central mountains, generally in locations from the Balsams to areas north and east, and continued through the afternoon. The snow became heavy at times, and quickly accumulated to 1-4 inches by early evening. Locally higher amounts were reported in the higher elevations of the Balsams and Newfound Mountains. Snow, heavy at times continued into the evening hours. By the time the snow tapered off, accumulations of 2-5 inches were common across the area. However, locally higher amounts occurred, especially in the higher elevations, where up to 10 inches were reported. The heavy wet snow, combined with gusty winds, caused some trees to fall and isolated power outages.
All Counties	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

Location	Date	Description
		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.
All Counties	2/4/2010	As low pressure moved across the deep south, snow, mixed with sleet, developed over the southern mountains during the late afternoon hours. The precipitation fell heavily at times, and up to 4 inches of snow accumulated across the area by early evening. Snow continued to fall overnight, but became mixed with or changed to sleet around midnight. Total sleet and snow accumulations of 2 to 5 inches occurred across the area by sunrise. By mid-morning of the 5th, precipitation changed to freezing rain, with damaging ice accumulations occurring. Total ice accretion in excess of 1/2 inch occurred along the Blue Ridge, resulting in widespread damage to trees and power lines, and widespread power outages along the southeastern escarpment. Ice accretion diminished rapidly north and west of the Blue Ridge.
Rutherford County	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.
All Counties	2/12/2014	A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow and sleet to the Blue Ridge Mountains of North Carolina. Most areas saw snow and sleet accumulation of 3-5 inches.
All Counties	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.
Transylvania County	2/23/2015	Light snow associated with a wave of low pressure overspread the southern Appalachians by late evening of the 23rd, and continued into the overnight. Snow, heavy at times, continued into the pre-dawn hours, when heavy snow accumulations were reported across much of the area. Total accumulations were generally in the 3 to 5-inch range, with locally higher amounts reported in the high elevations. The snow tapered off shortly after sunrise.
All Counties	2/25/2015	After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches.
Transylvania County	1/22/2016	Light snow developed around midnight across the southwest mountains of North Carolina in association with an area of low pressure. The snow became moderate to heavy at times during the

Location	Date	Description
		pre-dawn hours. By sunrise, accumulations of 2-6 inches were common across the area. Warm air began filtering into the valleys from the southwest through the morning, and by late morning, most of the Little Tennessee Valley and surrounding valleys south of the Smokies had transitioned to rain. Total accumulations ranged from 2-5 inches in the far southwest valleys, to more than a foot across the high elevations and the upper French Broad Valley, where the cold air remained in place through the day.
All Counties	12/8/2017	As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread the western Carolinas, rain and snow developed over the southern foothills and northwest Piedmont of North Carolina, becoming all snow by early afternoon. As moderate to occasionally heavy snow continued across the area, heavy snowfall accumulations were reported by early evening. By the time the snow tapered off to flurries and light snow showers around midnight, total accumulations ranged from 3 to 5 inches across the area. Rain and sleet mixing in with the snow during the evening likely undercut these totals a bit, especially south of I-40. While occasional flurries and light snow showers produced locally light additional accumulations into the overnight and early daylight hours of the 9th, the accumulating snow ended in most areas by late evening on the 8th.
Henderson & Rutherford County	1/30/2021	A wintry mix developed across portions of the mountains and portions of the foothills during the evening of the 30th as a frontal system moved across the Tennessee and Ohio Valleys. Precipitation began as snow in most locations and accumulated to a couple of inches or so throughout the evening. As temperatures warmed aloft, precip transitioned to sleet, especially along and south of I-40, where heavy sleet accumulations of 1 to 2 inches were reported in some areas. A transition to freezing rain occurred before the precip ended, resulting in a light glaze of ice on top of the sleet and snow. Total snow and sleet accumulations ranged from 1 to 3 inches along and south of I-40, where sleet undercut the totals, to 4 to 6 inches across Avery and Mitchell Counties. Ice accretion was mostly less than a tenth of an inch.

Source: NOAA, NCEI

Appendix I
FEMA National Risk Index Report

National Risk Index

June 27, 2024

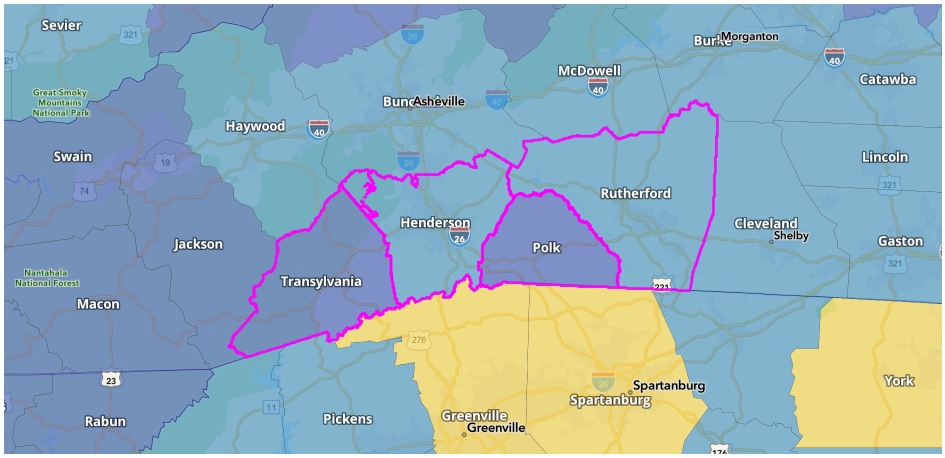
Risk Comparison Report

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	Henderson County	NC	Relatively Low	70.7	0 — 100
2	Rutherford County	NC	Relatively Low	59.37	0 — 100
3	Transylvania County	NC	Very Low	41.78	0 — 100
4	Polk County	NC	Very Low	19.31	0 — 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$10,798,724	Relatively Low	Relatively Moderate	1.14	$12,319,424	70.7
2	Rutherford County	NC	$6,196,413	Very High	Relatively Low	1.34	$8,318,863	59.37
3	Transylvania County	NC	$4,380,969	Relatively Moderate	Relatively Low	1.14	$4,975,440	41.78
4	Polk County	NC	$2,241,850	Relatively Low	Relatively Low	1.15	$2,579,825	19.31

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
	Henderson County	NC	Not Applicable		
	Polk County	NC	Not Applicable		
	Rutherford County	NC	Not Applicable		
	Transylvania County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Henderson County	NC	N/A	Relatively Low	Relatively Moderate	1.14	N/A	N/A
	Polk County	NC	N/A	Relatively Low	Relatively Low	1.15	N/A	N/A
	Rutherford County	NC	N/A	Very High	Relatively Low	1.34	N/A	N/A
	Transylvania County	NC	N/A	Relatively Moderate	Relatively Low	1.14	N/A	N/A

Coastal Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Henderson County	NC	Not Applicable		
	Polk County	NC	Not Applicable		
	Rutherford County	NC	Not Applicable		
	Transylvania County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Henderson County	NC	N/A	Relatively Low	Relatively Moderate	1.14	N/A	N/A
	Polk County	NC	N/A	Relatively Low	Relatively Low	1.15	N/A	N/A
	Rutherford County	NC	N/A	Very High	Relatively Low	1.34	N/A	N/A
	Transylvania County	NC	N/A	Relatively Moderate	Relatively Low	1.14	N/A	N/A

Cold Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively High	92.43	
2	Transylvania County	NC	Relatively Moderate	79.26	
3	Polk County	NC	Relatively Low	35.22	
4	Rutherford County	NC	Very Low	29.97	

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$875,358	Relatively Low	Relatively Moderate	1.14	$993,303	92.43
2	Transylvania County	NC	$315,519	Relatively Moderate	Relatively Low	1.14	$358,352	79.26
3	Polk County	NC	$13,396	Relatively Low	Relatively Low	1.15	$13,957	35.22
4	Rutherford County	NC	$1,806	Very High	Relatively Low	1.34	$1,860	29.97

Drought

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Low	52.21	0 100
2	Transylvania County	NC	Very Low	29.14	0 100
3	Polk County	NC	Very Low	27.81	0 100
4	Rutherford County	NC	Very Low	25.55	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$30,288	Relatively Low	Relatively Moderate	1.14	$32,808	52.21
2	Transylvania County	NC	$3,178	Relatively Moderate	Relatively Low	1.14	$3,487	29.14
3	Polk County	NC	$2,623	Relatively Low	Relatively Low	1.15	$2,833	27.81
4	Rutherford County	NC	$1,814	Very High	Relatively Low	1.34	$2,210	25.55

Earthquake

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Low	80.75	0 100
2	Rutherford County	NC	Relatively Low	74.45	0 100
3	Transylvania County	NC	Very Low	60.93	0 100
4	Polk County	NC	Very Low	49.19	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$916,747	Relatively Low	Relatively Moderate	1.14	$1,161,432	80.75
2	Rutherford County	NC	$443,212	Very High	Relatively Low	1.34	$653,423	74.45
3	Transylvania County	NC	$242,385	Relatively Moderate	Relatively Low	1.14	$274,173	60.93
4	Polk County	NC	$123,589	Relatively Low	Relatively Low	1.15	$146,689	49.19

Hail

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Moderate	88.39	0 100
2	Rutherford County	NC	Relatively Low	48.49	0 100
3	Transylvania County	NC	Very Low	29.34	0 100
4	Polk County	NC	Very Low	20.52	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$853,919	Relatively Low	Relatively Moderate	1.14	$973,825	88.39
2	Rutherford County	NC	$75,950	Very High	Relatively Low	1.34	$101,020	48.49
3	Transylvania County	NC	$36,958	Relatively Moderate	Relatively Low	1.14	$41,333	29.34
4	Polk County	NC	$21,218	Relatively Low	Relatively Low	1.15	$24,199	20.52

Heat Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Henderson County	NC	No Rating	0	0 100
	Polk County	NC	No Rating	0	0 100

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Rutherford County	NC	No Rating	0	0 100
	Transylvania County	NC	No Rating	0	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Henderson County	NC	$0	Relatively Low	Relatively Moderate	1.14	$0	0
	Polk County	NC	$0	Relatively Low	Relatively Low	1.15	$0	0
	Rutherford County	NC	$0	Very High	Relatively Low	1.34	$0	0
	Transylvania County	NC	$0	Relatively Moderate	Relatively Low	1.14	$0	0

Hurricane

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Rutherford County	NC	Relatively Low	67.16	0 100
2	Henderson County	NC	Relatively Low	64.87	0 100
3	Transylvania County	NC	Very Low	57.2	0 100
4	Polk County	NC	Very Low	52.49	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Rutherford County	NC	$702,807	Very High	Relatively Low	1.34	$953,108	67.16
2	Henderson County	NC	$687,716	Relatively Low	Relatively Moderate	1.14	$784,617	64.87
3	Transylvania County	NC	$352,975	Relatively Moderate	Relatively Low	1.14	$391,923	57.2
4	Polk County	NC	$223,450	Relatively Low	Relatively Low	1.15	$259,525	52.49

Ice Storm

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Rutherford County	NC	Very High	96.34	0 100
2	Transylvania County	NC	Relatively High	88.04	0 100
3	Polk County	NC	Relatively High	87.61	0 100
4	Henderson County	NC	Relatively Low	42.9	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Rutherford County	NC	$1,233,294	Very High	Relatively Low	1.34	$1,699,983	96.34
2	Transylvania County	NC	$469,199	Relatively Moderate	Relatively Low	1.14	$520,910	88.04
3	Polk County	NC	$433,336	Relatively Low	Relatively Low	1.15	$503,695	87.61
4	Henderson County	NC	$39,308	Relatively Low	Relatively Moderate	1.14	$45,106	42.9

Landslide

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively High	96.37	0 100
2	Rutherford County	NC	Relatively High	95.95	0 100
3	Transylvania County	NC	Relatively High	95.41	0 100
4	Polk County	NC	Relatively Moderate	77.48	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$356,974	Relatively Low	Relatively Moderate	1.14	$385,267	96.37
2	Rutherford County	NC	$310,563	Very High	Relatively Low	1.34	$355,582	95.95
3	Transylvania County	NC	$263,959	Relatively Moderate	Relatively Low	1.14	$302,536	95.41
4	Polk County	NC	$91,285	Relatively Low	Relatively Low	1.15	$90,702	77.48

Lightning

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Moderate	89.7	0 100
2	Rutherford County	NC	Relatively Moderate	83.78	0 100
3	Transylvania County	NC	Relatively Moderate	76.51	0 100
4	Polk County	NC	Relatively Low	51.8	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$557,382	Relatively Low	Relatively Moderate	1.14	$643,352	89.7
2	Rutherford County	NC	$310,052	Very High	Relatively Low	1.34	$422,360	83.78
3	Transylvania County	NC	$245,606	Relatively Moderate	Relatively Low	1.14	$274,982	76.51
4	Polk County	NC	$99,151	Relatively Low	Relatively Low	1.15	$114,883	51.8

Riverine Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Moderate	80.81	0 100
2	Transylvania County	NC	Relatively Low	72.51	0 100
3	Rutherford County	NC	Relatively Low	56.73	0 100
4	Polk County	NC	Very Low	27.04	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$1,848,584	Relatively Low	Relatively Moderate	1.14	$1,982,437	80.81
2	Transylvania County	NC	$1,099,602	Relatively Moderate	Relatively Low	1.14	$1,288,767	72.51
3	Rutherford County	NC	$546,131	Very High	Relatively Low	1.34	$643,065	56.73
4	Polk County	NC	$118,815	Relatively Low	Relatively Low	1.15	$133,557	27.04

Strong Wind

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively High	92.2	0 100
2	Rutherford County	NC	Relatively Moderate	80.34	0 100
3	Transylvania County	NC	Relatively Low	58.77	0 100
4	Polk County	NC	Relatively Low	39.39	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$1,779,627	Relatively Low	Relatively Moderate	1.14	$2,045,115	92.2
2	Rutherford County	NC	$756,815	Very High	Relatively Low	1.34	$1,025,709	80.34
3	Transylvania County	NC	$443,685	Relatively Moderate	Relatively Low	1.14	$499,526	58.77

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
4	Polk County	NC	$239,720	Relatively Low	Relatively Low	1.15	$277,505	39.39

Tornado

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Moderate	76.55	0 100
2	Rutherford County	NC	Relatively Low	69.27	0 100
3	Transylvania County	NC	Relatively Low	45.53	0 100
4	Polk County	NC	Relatively Low	44.42	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$2,820,577	Relatively Low	Relatively Moderate	1.14	$3,235,035	76.55
2	Rutherford County	NC	$1,693,228	Very High	Relatively Low	1.34	$2,308,352	69.27
3	Transylvania County	NC	$899,379	Relatively Moderate	Relatively Low	1.14	$1,009,998	45.53
4	Polk County	NC	$845,086	Relatively Low	Relatively Low	1.15	$978,257	44.42

Tsunami

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Henderson County	NC	Not Applicable		
	Polk County	NC	Not Applicable		
	Rutherford County	NC	Not Applicable		
	Transylvania County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Henderson County	NC	N/A	Relatively Low	Relatively Moderate	1.14	N/A	N/A
	Polk County	NC	N/A	Relatively Low	Relatively Low	1.15	N/A	N/A
	Rutherford County	NC	N/A	Very High	Relatively Low	1.34	N/A	N/A
	Transylvania County	NC	N/A	Relatively Moderate	Relatively Low	1.14	N/A	N/A

Volcanic Activity

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Henderson County	NC	Not Applicable		
	Polk County	NC	Not Applicable		
	Rutherford County	NC	Not Applicable		
	Transylvania County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Henderson County	NC	N/A	Relatively Low	Relatively Moderate	1.14	N/A	N/A
	Polk County	NC	N/A	Relatively Low	Relatively Low	1.15	N/A	N/A
	Rutherford County	NC	N/A	Very High	Relatively Low	1.34	N/A	N/A
	Transylvania County	NC	N/A	Relatively Moderate	Relatively Low	1.14	N/A	N/A

Wildfire

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Rutherford County	NC	Relatively Low	67.13	0 100
2	Polk County	NC	Very Low	45.72	0 100
3	Henderson County	NC	Very Low	33.18	0 100
4	Transylvania County	NC	Very Low	6.11	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Rutherford County	NC	$114,432	Very High	Relatively Low	1.34	$143,583	67.13
2	Polk County	NC	$28,017	Relatively Low	Relatively Low	1.15	$31,516	45.72
3	Henderson County	NC	$12,704	Relatively Low	Relatively Moderate	1.14	$14,787	33.18
4	Transylvania County	NC	$2,226	Relatively Moderate	Relatively Low	1.14	$2,439	6.11

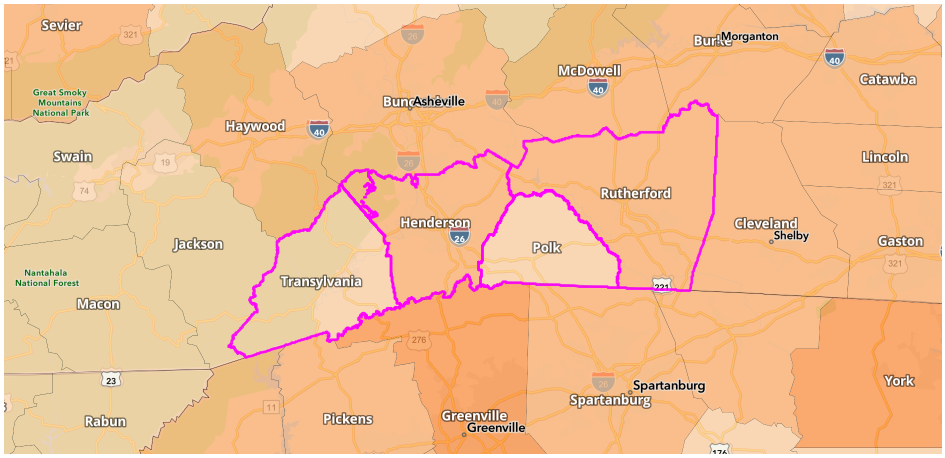
Winter Weather

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Henderson County	NC	Relatively Low	26.79	0 100
2	Rutherford County	NC	Very Low	12.28	0 100
3	Transylvania County	NC	Very Low	10.5	0 100
4	Polk County	NC	Very Low	4.2	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Henderson County	NC	$19,541	Relatively Low	Relatively Moderate	1.14	$22,343	26.79
2	Rutherford County	NC	$6,308	Very High	Relatively Low	1.34	$8,608	12.28
3	Transylvania County	NC	$6,297	Relatively Moderate	Relatively Low	1.14	$7,014	10.5
4	Polk County	NC	$2,162	Relatively Low	Relatively Low	1.15	$2,506	4.2

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	Henderson County	NC	$10,798,724	69.2
2	Rutherford County	NC	$6,196,413	54.26
3	Transylvania County	NC	$4,380,969	41.97
4	Polk County	NC	$2,241,850	19.75

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
	Henderson County	NC	N/A	--
	Polk County	NC	N/A	--
	Rutherford County	NC	N/A	--
	Transylvania County	NC	N/A	--

Coastal Flooding

Rank	Community	State	EAL Value	Score
	Henderson County	NC	N/A	--
	Polk County	NC	N/A	--
	Rutherford County	NC	N/A	--
	Transylvania County	NC	N/A	--

Cold Wave

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$875,358	92.5
2	**Transylvania County**	NC	$315,519	79.5
3	**Polk County**	NC	$13,396	37.5
4	**Rutherford County**	NC	$1,806	31.9

Drought

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$30,288	54.0
2	**Transylvania County**	NC	$3,178	31.5
3	**Polk County**	NC	$2,623	29.5
4	**Rutherford County**	NC	$1,814	27.0

Earthquake

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$916,747	78.0
2	**Rutherford County**	NC	$443,212	69.8
3	**Transylvania County**	NC	$242,385	60.2
4	**Polk County**	NC	$123,589	48.7

Hail

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$853,919	88.4
2	**Rutherford County**	NC	$75,950	47.2
3	**Transylvania County**	NC	$36,958	32.9
4	**Polk County**	NC	$21,218	22.7

Heat Wave

Rank	Community	State	EAL Value	Score
	Henderson County	NC	$0	0.0
	Polk County	NC	$0	0.0
	Rutherford County	NC	$0	0.0
	Transylvania County	NC	$0	0.0

Hurricane

Rank	Community	State	EAL Value	Score
1	Rutherford County	NC	$702,807	63.7
2	Henderson County	NC	$687,716	63.5
3	Transylvania County	NC	$352,975	56.2
4	Polk County	NC	$223,450	51.3

Ice Storm

Rank	Community	State	EAL Value	Score
1	Rutherford County	NC	$1,233,294	95.5
2	Transylvania County	NC	$469,199	87.9
3	Polk County	NC	$433,336	87.0
4	Henderson County	NC	$39,308	43.5

Landslide

Rank	Community	State	EAL Value	Score
1	Henderson County	NC	$356,974	96.6
2	Rutherford County	NC	$310,563	95.7
3	Transylvania County	NC	$263,959	95.2
4	Polk County	NC	$91,285	78.8

Lightning

Rank	Community	State	EAL Value	Score
1	Henderson County	NC	$557,382	89.4
2	Rutherford County	NC	$310,052	81.5
3	Transylvania County	NC	$245,606	77.1
4	Polk County	NC	$99,151	53.4

Riverine Flooding

Rank	Community	State	EAL Value	Score
1	Henderson County	NC	$1,848,584	82.6
2	Transylvania County	NC	$1,099,602	72.6
3	Rutherford County	NC	$546,131	56.9
4	Polk County	NC	$118,815	28.5

Strong Wind

Rank	Community	State	EAL Value	Score
1	Henderson County	NC	$1,779,627	91.5
2	Rutherford County	NC	$756,815	77.1

Rank	Community	State	EAL Value	Score
3	**Transylvania County**	NC	$443,685	61.1
4	**Polk County**	NC	$239,720	42.2

Tornado

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$2,820,577	77.9
2	**Rutherford County**	NC	$1,693,228	66.7
3	**Transylvania County**	NC	$899,379	48.2
4	**Polk County**	NC	$845,086	46.7

Tsunami

Rank	Community	State	EAL Value	Score
	Henderson County	NC	N/A	--
	Polk County	NC	N/A	--
	Rutherford County	NC	N/A	--
	Transylvania County	NC	N/A	--

Volcanic Activity

Rank	Community	State	EAL Value	Score
	Henderson County	NC	N/A	--
	Polk County	NC	N/A	--
	Rutherford County	NC	N/A	--
	Transylvania County	NC	N/A	--

Wildfire

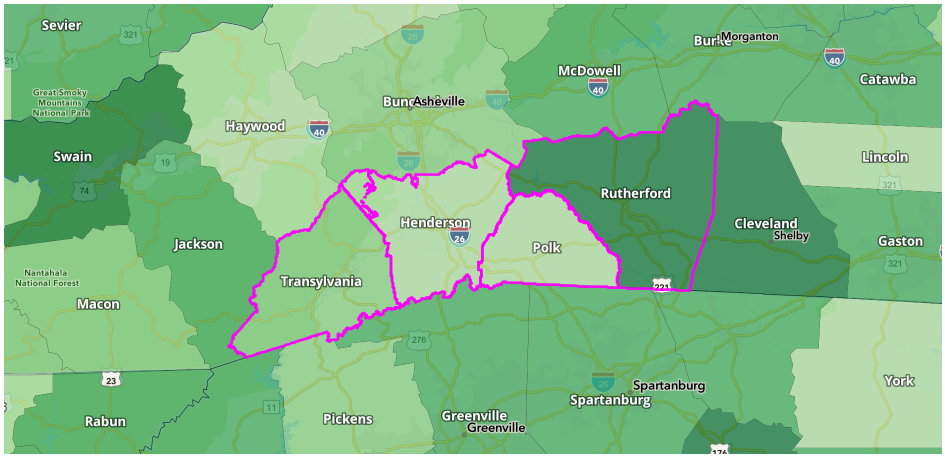
Rank	Community	State	EAL Value	Score
1	**Rutherford County**	NC	$114,432	66.1
2	**Polk County**	NC	$28,017	44.9
3	**Henderson County**	NC	$12,704	32.0
4	**Transylvania County**	NC	$2,226	6.7

Winter Weather

Rank	Community	State	EAL Value	Score
1	**Henderson County**	NC	$19,541	29.6
2	**Rutherford County**	NC	$6,308	13.6
3	**Transylvania County**	NC	$6,297	13.6
4	**Polk County**	NC	$2,162	7.0

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.



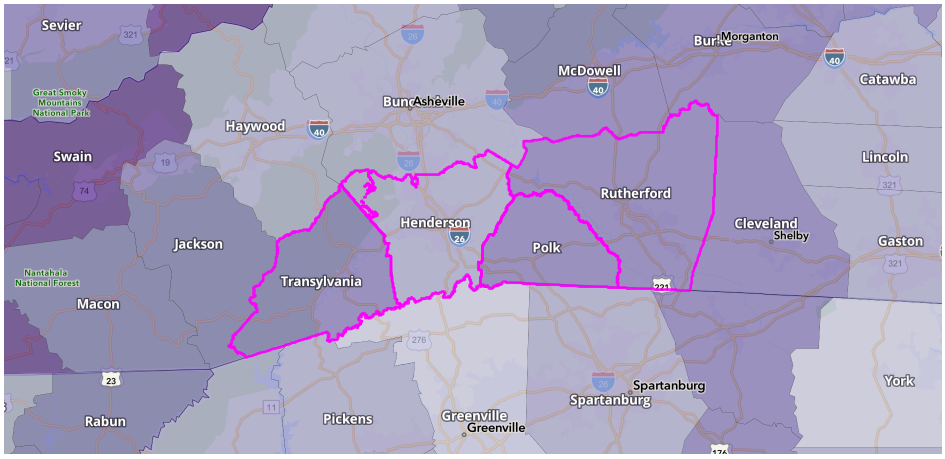
Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Rank	Community	State	Rating	Score
1	Rutherford County	NC	Very High	84.2
2	Transylvania County	NC	Relatively Moderate	52.2
3	Henderson County	NC	Relatively Low	38.3
4	Polk County	NC	Relatively Low	36.5

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	Henderson County	NC	Relatively Moderate	41.8
2	Transylvania County	NC	Relatively Low	32.1
3	Rutherford County	NC	Relatively Low	26.5
4	Polk County	NC	Relatively Low	25.8

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:

Risk Index = Expected Annual Loss × Social Vulnerability ÷ 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:

Expected Annual Loss = Exposure × Annualized Frequency × 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**.