



Buncombe Madison

Regional Hazard Mitigation Plan



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SECTION 1
INTRODUCTION

This section provides a general introduction to the Buncombe Madison 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 hurricanes, 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 Buncombe Madison Region is located in the western part of North Carolina and includes the two counties and the municipalities within the counties. This area is vulnerable to a wide range of natural hazards such as hurricanes, landslides, winter storms, severe thunderstorms, and floods. It is also vulnerable to human-caused hazards, such as cyber threats and terrorism. These hazards threaten the life and safety of residents in the Buncombe Madison Region and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in the region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community 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.

Buncombe and Madison Counties first joined together in 2013 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 2026 update of the plan is detailed in Section 2: Planning Process. This plan was updated during the recovery period from historic Hurricane Helene which caused devastation in the region and helped further demonstrate the continued need for hazard mitigation.

This regional plan draws from both 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 Buncombe Madison Region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Act

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state, local and Tribal government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local or Tribal government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Building Resilient Communities and Infrastructure (BRIC) program and the Flood Mitigation Assistance (FMA) program, each of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

Major federal flood insurance legislation was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act (HFIAA) in 2014 which revised Biggert-Waters. HFIAA established the requirement that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for any of the FEMA mitigation programs. These acts made several changes to the way the National Flood Insurance Program is to be run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. These acts further emphasize Congress' focus on mitigating vulnerable structures.

The Buncombe Madison Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region 4 and 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 Buncombe Madison Regional Hazard Mitigation Plan is to:

- Completely update the existing Buncombe Madison 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; and
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the Buncombe Madison Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the Buncombe Madison 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 Buncombe and Madison as well as their incorporated jurisdictions. **Table 1.1** indicates the participating jurisdictions.

TABLE 1.1: PARTICIPATING JURISDICTIONS

Buncombe County	
Asheville	Montreat
Biltmore Forest	Weaverville
Black Mountain	Woodfin
Madison County	
Hot Springs	Mars Hill
Marshall	

1.4 AUTHORITY

The Buncombe Madison 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, local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Final Rule published in the Federal Register, at 44 CFR Part 201 (201.6 for local mitigation planning requirements);
- Flood Insurance Reform Act of 2004 (P.L. 108-264) and Biggert Waters Flood Insurance Reform Act of 2012(P.L. 112-141) and the Homeowner Flood Insurance Affordability Act of 2014.

1.5 SUMMARY OF PLAN CONTENTS

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

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

The ***Community Profile***, located in Section 3, provides a general overview of the Buncombe Madison 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 Buncombe Madison Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the Buncombe Madison Region.

The Risk Assessment begins by identifying hazards that threaten the Buncombe Madison Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, NCEM's Risk Management Section's loss estimation methodology is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the participating jurisdictions in the Buncombe Madison 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 Buncombe Madison Region's capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of a detailed survey questionnaire and an inventory and analysis of existing plans, ordinances, and relevant documents. The

purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in programs or activities that may hinder mitigation efforts and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Community Profile*, *Risk Assessment,* and *Capability Assessment* collectively serve as a basis for determining the goals for the Buncombe Madison 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 Buncombe Madison 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 Buncombe Madison 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 Buncombe Madison 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 2026 update of the Buncombe Madison Regional Hazard Mitigation Plan. Copies of the 2021 plan can be obtained by contacting Buncombe and Madison County Emergency Management offices 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 Buncombe Madison Region
- 2.3 Updating the Plan in 2026
- 2.4 The Buncombe Madison 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 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 BUNCOMBE MADISON REGION

Prior to the development of the first iteration of the Buncombe Madison Regional Hazard Mitigation Plan in 2016, both counties and their respective 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 Includes
Buncombe County HMP	September 2011	City of Asheville; Towns of Biltmore Forest, Black Mountain, Montreat, Weaverville, and Woodfin
Madison County HMP	June 2013	Towns of Hot Springs, Mars Hill, and Marshall

In 2016, all participating jurisdictions collaborated to create a regional plan. No new jurisdictions joined the process, and all those involved in previous planning efforts contributed to the development of the 2016 regional plan. This approach aimed to streamline planning for the jurisdictions in the Buncombe Madison Region, allowing resources to be shared among participants and reducing the administrative burdens on smaller, lower capacity communities.

The 2016 plan marked an important and successful beginning for regional hazard mitigation planning, and that success has continued into the 2026 update. For the development of the 2026 plan, all the jurisdictions that participated in the development of the 2016 and 2021 plans participated in this plan's development.

2.3 UPDATING THE PLAN IN 2026

FEMA requires hazard mitigation plans to be updated every five years to maintain eligibility for federal mitigation assistance and certain categories of disaster recovery funding. To prepare the 2026 Buncombe Madison Regional Hazard Mitigation Plan, ESP Associates, Inc. was contracted by North Carolina Emergency Management to provide professional mitigation planning services.

In accordance with the scope of work, the consultant team followed the mitigation planning process outlined in FEMA Publication Series 386, the *Local Mitigation Plan Review Guide,* and guidance provided by NCEM mitigation planning staff. The planning process also incorporated direction from FEMA's *Local Mitigation Planning Policy Guide* (2022) and *Local Mitigation Planning Handbook* (2023) in compliance with current federal requirements.

The 2026 update reflects several key enhancements, including the integration of post-disaster recovery considerations, expanded evaluation of future conditions, and continued integration with complementary state and federal planning frameworks.

2.3.1 Key Updates in the 2026 Plan

The Buncombe Madison Regional Hazard Mitigation 2026 Plan reflects both updated federal guidance and region-specific priorities identified through the planning process. FEMA requirements for hazard mitigation planning continue to evolve through policy updates and guidance documents, particularly with respect to documenting risk, capability, and participation. In addition to meeting these requirements, this update incorporates enhancements based on local conditions, recent disaster experience, and emerging best practices to improve the overall effectiveness of the plan.

The updates summarized below distinguish between required elements and enhancements based on best practices and local conditions.

SUBSTANTIAL DAMAGE PROCEDURES (Required Capability)
The 2026 update includes documentation of substantial damage procedures within the capability assessment, consistent with National Flood Insurance Program (NFIP) requirements. This informs post-disaster damage determinations and supports compliance with federal regulations.

ENHANCED COMMUNITY ENGAGEMENT (Required Process)
FEMA requires documentation of public involvement and stakeholder coordination. However, in response to post-Helene recovery conditions, engagement methods were adapted. The planning process emphasized flexible and accessible approaches, such as online resources and targeted outreach, to maintain participation while minimizing burden on affected communities.

INTEGRATION WITH CLIMATE RESILIENCE (Current Guidance and Expectations)
The plan includes an expanded evaluation of future conditions, including changing hazard patterns and potential impacts on vulnerability over time. While not explicitly required, this approach aligns with FEMA guidance encouraging consideration of long-term risk to support more resilient mitigation strategies.

EQUITY AND SOCIAL VULNERABILITY CONSIDERATIONS (Best Practice Enhancement)
The 2026 update incorporates an expanded assessment of social vulnerability, including indicators such as spoken language, disability status, and poverty status. This analysis supports a better understanding of disproportionate risk and helps guide more targeted and effective mitigation actions

Together, these updates satisfy FEMA requirements while integrating locally relevant considerations and emerging planning practices. By incorporating both regulatory expectations and region-specific insights, the 2026 plan is better positioned to support informed decision-making, effective implementation, and long-term resilience across the region.

2.3.2 Hurricane Helene and Post-Disaster Context

The 2026 plan update was developed in the context of Hurricane Helene and the ongoing recovery efforts across the Buncombe Madison Region. At the time of plan development, local jurisdictions, partner agencies, and community members were actively engaged in response and recovery activities. In recognition of these conditions, the planning process was conducted with careful consideration of local capacity constraints, the need to avoid duplicative efforts, and the importance of aligning mitigation planning with ongoing recovery initiatives.

Post-disaster data, stakeholder input, and observed impacts from Hurricane Helene were incorporated throughout the planning process to ensure the plan reflects current conditions and vulnerabilities. This included the use of damage information and identification of previously unrecognized or heightened risks. These insights informed updates to the risk assessment and supported the development of mitigation strategies that address both long-term risk reduction and near-term recovery needs. By integrating recovery considerations into the planning process, the plan is better positioned to guide implementation, support funding opportunities, and enhance community resilience.

2.3.3 Continued Integration with CRS and CWPP Frameworks

The 2026 update continues to incorporate elements of the FEMA Community Rating System (CRS) and the Community Wildfire Protection Plan (CWPP) processes, building upon integration established in previous plan updates. Maintaining alignment with these frameworks supports consistency across planning efforts, enhances coordination among participating jurisdictions and partner agencies, and positions communities to maximize implementation opportunities and potential program benefits.

As part of this update, CRS and CWPP considerations were reviewed and carried forward, with refinements made where appropriate to reflect updated data, current conditions, and ongoing planning priorities. This continued integration supports comprehensive hazard mitigation planning by reinforcing connections between floodplain management, wildfire risk reduction, and broader mitigation strategies.

Tables 2.2 and **2.3** below provide an overview of how the CRS and CWPP requirements were integrated into the 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
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: Involving Stakeholders
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

2.3.4 Plan Compliance and Development

The Local Mitigation Plan Review Tool, included in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with the Disaster Mitigation Act of 2000 (DMA 2000) and identifies where each requirement is addressed within this plan. These standards are based on FEMA's Final Rule, as published in Part 201 of the Code of Federal Regulations (CFR).

The process used to prepare this plan included twelve major steps completed over approximately seven months, beginning in August 2025. Each step (illustrated in **Figure 2.1**) resulted in key deliverables and outcomes that collectively form the plan. Additional details regarding plan organization and content are provided in Section 1: *Introduction*.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE BUNCOMBE MADISON REGION



2.4 THE BUNCOMBE MADISON REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

To facilitate the initial development of the regional plan and its subsequent update, the participating jurisdictions established the Buncombe Madison Regional Hazard Mitigation Planning Committee (HMPC). 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 September 2025, the members of the HMPC 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 HMPC members included:

- Participate in HMPC meetings and workshops,
- Provide best available data as required for the risk assessment portion of the plan,
- Provide information that will help complete the Capability Assessment section of the plan,
- Provide copies of any mitigation or hazard-related documents for review and incorporation into the plan,
- Support the development and update of the Mitigation Strategy, including the design and adoption of regional goal statements,
- Help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan,
- Review and provide timely comments on all study findings and draft plan deliverables, and
- Support the adoption of the 2026 *Buncombe Madison Regional Hazard Mitigation Plan.*

Table 2.4 lists the members of the HMPC who were responsible for participating in the development of the plan.

TABLE 2.4: MEMBERS OF THE BUNCOMBE MADISON REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Buncombe County and Municipalities				
Ammons, Christopher	Woodfin PD, Police Captain			X
Bell, Vance	Buncombe County, Operational Service Manager		X	
Boykin, Jacqui	Woodfin PD, Police Chief		X	X
Bradley, Carmen	Buncombe County, EMS Coordinator			X
Buckner, Harry	Biltmore Forest, Public Works Director		X	X
Carreiro, Leslie	Asheville, Water Resources Assistant Director		X	
Chandler, Brian	Buncombe County, Maintenance Tech		X	X
Cole, Ryan	Buncombe County, ES Assistant Director		X	
Cook, Brenna	Asheville, Water Dept. Compliance Manager		X	
Crawford, Graham	Weaverville, Town Planner		X	
Cutshall, Eric	Weaverville, Assistant Director of Public Works		X	X
Deyton, Amy	Asheville, Public Works Director			X
Early, Scott	AB Tech Asheville, Police Lieutenant		X	

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Eckard, Seth	Woodfin Water & Sewer District, Director		X	
Eller, James	Weaverville, Planning Director			X
Gardner, Joseph	French Broad VFD, Deputy Fire Chief		X	
Goodwin, Mark	Buncombe County, CISO		X	X
Gosnell, John	Buncombe County, MDS Supervisor		X	X
Grau, Eric	Buncombe County, IT Director		X	
Greene, Nathan	Buncombe County, EMS Paramedic		X	
Gudger, Jared	West Buncombe FD, Assistant Fire Chief		X	
Harris, Scottie	Weaverville, Town Manager		X	
Harrold, Josh	Black Mountain, Town Manager		X	
Haynes, Jason	Buncombe County, Radio Systems Manager		X	
Hughes, Brad	Buncombe County, Mitigation, Preparedness, & Recovery Manager	X	X	X
Hume, Gene	Buncombe County, GIS Manager		X	X
Hurley, Ricky	Woodfin, Planning Director		X	X
Jones, Taylor	Buncombe County, ES Director	X	X	
Judd, Jamie	Buncombe County, EMS Division Manager		X	
Kearns, Griffin	Buncombe County, Planner II	X		X
Kelly, Tom	Riceville VFD, Fire Chief		X	
Knighton, Jeremy	Asheville FD, EM Chief		X	
Looper, Billy	Buncombe County, Public Safety & Security Manager		X	
McEntire, Jason	Riceville VFD, Division Chief		X	
McKnight, Alex	Buncombe County, 911 Business Manager		X	
Mundy, Kevin	Barnardsville FD, Fire Chief		X	
Odderstol, Elizabeth	Buncombe County, Economic Development		X	
Parkinson, Ross	Asheville FD, Fire Captain			X
Pegg, Lynn	Buncombe County, EM Admin Coordinator			
Pennington, Nathan	Buncombe County, Planning Director	X	X	
Prestwood, Nick	Buncombe County, EMS Training Officer		X	
Prestwood, Shane	Upper Hominy FD, Fire Chief		X	
Quinn, Chris	Buncombe County, IT Network Engineer		X	X
Reece, Angela	Weaverville, Public Works Director			X
Rhodarmer, Brent	Buncombe County, IT Division Manager		X	X
Stowe, Jeremy	BCS, Transportation Director		X	
Tipton, Kevin	Buncombe County EM, Fire Marshal		X	
Trotman, Jessica	Black Mountain, Assistant Town Manager			X
Tuch, Shannon	Woodfin, Town Manager			X
Watford, Nancy	Asheville, Stormwater Supervisor		X	X

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Wyatt, Clark	BCS, Facilities & Maintenance Director		X	X
Madison County and Municipalities				
Bennett, Nathan	Mars Hill, Town Manager		X	X
Cody, Ryan	Marshall, Town Administrator		X	X
Greene, James	Madison County, EM Staff		X	
Honeycutt, Rod	Madison County, County Manager	X		
Waldrup, Nathan	Mars Hill, Fire Chief			X
Ward, Patrick	Madison County, EM Director			X
Wilson, Chad	Mars Hill, Police Chief			X
Other Stakeholders				
Baker, Carl	NCEM, Mitigation Plans Manager	X		X
Bennett, Jennifer	Duke Energy, Government & Community Relations		X	X
Chaney, Clay	National Weather Service, Meteorologist		X	
DeLude, Hannah	ESP Associates, Hazard Mitigation Planner	X		X
Flores, John	ESP Associates, Hazard Mitigation Planner	X	X	X
Garland, Caleb	NCFS, County Ranger		X	
Hembree, Larry	NCEM, Area 14 Coordinator	X	X	
Mello, John	NCEM, Hazard Mitigation Planner	X	X	X
Petty, Matt	UNCA, EM Director		X	X
Rahman, Fabiha	ESP Associates, Hazard Mitigation Planner	X	X	X
Roderick, Mary	Land of Sky Regional Council, Planning Director		X	X
Slaughter, Nathan	ESP Associates, Hazard Mitigation Dept. Manager	X	X	X
Smith, Kelly	Asheville Regional Airport, Public Safety Deputy Chief		X	
Stanley, Sealy	FernLeaf Interactive, COO		X	
Thompson, Hannah	NCAGR, CMAT Manager		X	

Table 2.5 lists points of contact for two 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. This limited capacity has also been exacerbated by post-Helene recovery. 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 BUNCOMBE MADISON REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT / AGENCY / TITLE	JURISDICTION
Houser, Ben	Zoning Administrator	Hot Springs
Parrish, Savannah	Town Manager	Montreat

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 Buncombe Madison Regional Hazard Mitigation Plan includes two (2) counties and nine (9) 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) their 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. Below is a summary of the key meetings conducted during the plan update process.

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.

TABLE 2.6: BUNCOMBE MADISON REGIONAL HAZARD MITIGATION PLANNING COMMITTEE MEETING SUMMARY

MEETING	MEETING TOPIC	DATE	LOCATION
County Leads – Internal Kickoff	• Introduction to project team and county leads • Review of mitigation, project scope, and tentative project schedule • Discussion on stakeholder engagement and citizen contacts	8/13/25	Virtual Microsoft Teams
HMPC Mtg #1 - Project Kick-Off	• Introduction to DMA requirements and the planning process • Review HMPC responsibilities and project schedule	9/30/25	20 Canoe Lane Woodfin, NC 28804
HMPC Mtg #2 - HIRA/Mitigation Strategy Mtg (combined)	• Review Draft Hazard Identification and Risk Assessment (HIRA) • Review asset inventory and discuss critical facilities • Review Capability Assessment and Mitigation Strategies • Solicit comments and feedback	2/11/26	20 Canoe Lane Woodfin, NC 28804

These meetings and workshops encouraged ongoing input and feedback from relevant participants throughout the drafting stages of the plan. Meeting minutes were recorded and are documented in *Appendix D*.

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 provide a better understanding of local concerns, increase community buy-in and support, and heighten 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.

2.6.1 Public Engagement Considerations Post-Helene

Public involvement strategies were adapted in response to Hurricane Helene and ongoing recovery efforts within the Buncombe Madison Region. During the planning process, many residents had been recently impacted by the disaster and engaged in recovery-related activities, including housing stabilization, access to services, and coordination with assistance programs. In recognition of these

conditions, the planning team and HMPC determined that traditional in-person public meetings could create confusion with concurrent recovery initiatives and place additional demands on community members.

In lieu of traditional public meetings, the planning process emphasized accessible and low-burden engagement strategies to ensure meaningful public involvement. Public involvement was sought using several methods:

- A dedicated project website was developed to serve as a centralized hub for plan information, updates, and materials, including the draft plan for public review.
- Public notices were distributed through multiple channels to maximize awareness.
- A public survey was made available both online and in-person at community locations to capture a broad range of input.

These methods allowed residents and stakeholders to participate on their own time and in a manner that aligned with their individual recovery circumstances. This adapted engagement approach ensured compliance with public participation requirements while remaining sensitive to the region's recovery context and prioritizing inclusivity and community well-being.

Multiple opportunities were provided to the public during the development of the regional plan. These opportunities were offered at three distinct points in 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: BUNCOMBE MADISON 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 ARCGIS Survey123
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

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

2.6.2 Public Participation Survey

Residents were successfully engaged during the planning process through the public survey. This survey was specifically designed to gather data and insights from residents of the Buncombe Madison region. Copies of the public survey were shared with the HMPC to distribute at local public offices, ensuring they were available for residents with limited internet accessibility. Additionally, a link to an electronic version of the survey was posted on county and municipal websites. In total, 64 survey responses were received, providing valuable input to consider while updating the plan. Selected survey results are presented below. Full results can be found in *Appendix D*.

- Approximately 67 percent of survey respondents are extremely concerned about the possibility of their community being impacted by a future disaster.
- Respondents ranked Flooding and Wildfire as the highest threats to their neighborhood (59 percent), followed by Severe Thunderstorms and High Winds (41 percent), and Landslides (34 percent).
- Approximately 59 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.
- 80 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services and Prevention were ranked as the most important activities for communities to pursue in reducing risks.

Additionally, the public survey was streamlined relative to prior regional and comparable planning efforts by reducing the number and complexity of questions to facilitate timely completion and reduce barriers to participation. Questions were also added, modified, or removed to reflect local conditions and incorporate the impacts of Hurricane Helene.

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 met with emergency management leaders from each county to initiate stakeholder outreach. A list of recommended stakeholders, derived from FEMA Publication 386-1: *Getting Started: Building Support for Mitigation Planning*, was distributed to identify a broad range of agencies, organizations, and institutions appropriate for participation in plan development. County emergency management leaders used this guidance to identify and invite stakeholders from their respective jurisdictions. In addition, FEMA's *Local Mitigation Planning Policy*

Guide (2023) and *Local Mitigation Planning Handbook* (2023) were reviewed to ensure all required elements for stakeholder participation and coordination were addressed.

County representatives invited stakeholders from administration, police and fire departments, information technology, and planning departments to provide input on local operations, critical systems, and the needs of underserved and socially vulnerable populations. In addition to jurisdictional staff, the HMPC included representatives from Buncombe County Schools (BCS), Asheville Regional Airport, Duke Energy, the National Weather Service (NWS), the North Carolina Department of Agriculture and Consumer Services (NCAGR), North Carolina Emergency Management (NCEM), and the University of North Carolina Asheville (UNCA), among others (see **Table 2.4** above).

The HMPC supported ongoing coordination throughout the planning process through a combination of meetings, direct outreach, and information sharing (outlined above). Stakeholders provided input at key stages of plan development, including hazard identification, vulnerability assessment, and mitigation strategy development. Input from neighboring communities was also requested through email communication, sharing a direct link to the project website. This process ensured that the plan reflects local knowledge, operational considerations, and community priorities.

2.7.1 Stakeholder Involvement Considerations Post-Helene

Stakeholder involvement during the plan update was tailored to reflect the operational demands placed on HMPC members and partner agencies following Hurricane Helene. Many stakeholders, including representatives from North Carolina Emergency Management, the National Weather Service, and Duke Energy, were actively engaged in response and recovery activities. As a result, the planning team prioritized efficient, flexible coordination methods that supported continued stakeholder participation while minimizing additional time commitments.

To accommodate varying availability and reduce participation barriers, the consultant offered hybrid HMPC meetings, allowing stakeholders to attend either in person or virtually based on their schedules and preferences. Additionally, the hazard identification and risk assessment (HIRA) and mitigation strategy meetings, were combined into a consolidated meeting. Beyond scheduled meetings, the planning team provided direct, as-needed coordination with HMPC members and partner organizations. This approach streamlined the planning process, reduced the number of required meetings, and optimized stakeholder time.

Through these targeted engagement strategies, stakeholders remained actively involved in the planning process despite ongoing recovery demands. Input from HMPC members informed updates to the risk assessment and mitigation strategy, including validation of hazard impacts, identification of vulnerabilities, and development of implementable mitigation actions aligned with recovery efforts.

2.8 DOCUMENTATION OF PLAN PROGRESS

This plan update documents the progress made in hazard mitigation planning for the participating jurisdictions in the Buncombe Madison Region. Since the initial county-level plans were developed in the 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. Status updates describing progress made on mitigation actions up until 2026 are documented in *Section 9: Mitigation Action Plan.*

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.

2.9 ASHEVILLE CRS PLANNING PROCESS DOCUMENTATION

As a participant in the NFIP's CRS program, the City of Asheville has taken additional steps during the 2026 update of this plan to meet the CRS requirements of Activity 510: Floodplain Management Planning and attempt to maximize the number of points the City receives for this activity for this plan.

Asheville staff were assigned to serve on the HMPC and actively participated in the plan update process. They represent a wide range of knowledge and experience in the areas of mitigation techniques. Asheville staff and their associated area of expertise are listed in **Table 2.8**.

TABLE 2.8: CITY OF ASHEVILLE STAFF MEMBERS OF THE BUNCOMBE MADISON HMPC AND THEIR AREA OF EXPERTISE

NAME	TITLE DEPARTMENT	MITIGATION TECHNIQUE					
		PREVENTION MEASURES	PROPERTY PROTECTION	NATURAL RESOURCE PROTECTION	EMERGENCY SERVICES	STRUCTURAL PROJECTS	PUBLIC EDUCATION
Carreiro, Leslie	Water Resources Assistant Director	X		X		X	
Cook, Brenna	Water Dept. Compliance Manager	X	X				
Deyton, Amy	Public Works Director	X			X	X	
Knighton, Jeremy	Fire Dept. EM Chief	X			X		X
Parkinson, Ross	Fire Dept. Captain				X		X
Watford, Nancy	Stormwater Supervisor	X		X		X	

The City of Asheville also established a separate CRS Steering Committee comprised of 50% public sector and 50% private sector. This was done to meet the requirements of CRS Planning Step 2. The members of the CRS Steering Committee for Asheville are listed in **Table 2.9.**

TABLE 2.9: CITY OF ASHEVILLE NFIP CRS STEERING COMMITTEE

NAME	AGENCY/TITLE
Bennett, Jennifer	Duke Energy, Government & Community Relations
Carreiro, Leslie	Asheville, Water Resources Assistant Director
Cook, Brenna	Asheville, Water Dept. Compliance Manager
Deyton, Amy	Asheville, Public Works Director
Early, Scott	AB Tech Asheville, Police Lieutenant
Knighton, Jeremy	Asheville, Fire Dept. EM Chief
Petty, Matt	UNCA, EM Director
Roderick, Mary	Land of Sky Regional Council, Planning Director
Smith, Kelly	Asheville Regional Airport, Public Safety Deputy Chief
Watford, Nancy	Asheville, Stormwater Supervisor

The formation of the Asheville CRS Steering Committee represents a strategic approach to floodplain management, emphasizing collaboration among a diverse range of stakeholders. This representation supports a comprehensive understanding of flood risk, infrastructure systems, emergency response, and community resilience, particularly in the context of Hurricane Helene and ongoing recovery efforts. The relevance of each role of the selected CRS committee members is described below:

- **Utility Coordination and Community Relations** – The inclusion of a representative from Duke Energy provides critical insight into utility operations, infrastructure resilience, and community communication. This role supports coordination between utility providers and local government, particularly during disaster response and recovery.
- **Water Resources Management** – The Water Resources Assistant Director brings expertise in watershed management, floodplain functions, and long-term water system planning. This role supports informed decision-making related to flood risk, resource management, and infrastructure investment.
- **Regulatory Compliance and Administration** – The Water Department Compliance Manager ensures that floodplain management efforts align with applicable regulations and standards. Their involvement supports adherence to permitting requirements and reinforces accountability in implementation.
- **Infrastructure and Operations** – The Public Works Director provides leadership on infrastructure systems, including roads, drainage, and public facilities. This role is essential for aligning capital improvements and maintenance practices with flood mitigation priorities and post-disaster recovery needs.
- **Public Safety and Emergency Response** – Representation from fire and law enforcement, including the Fire Department Emergency Management Chief and Fire Captain, as well as AB Tech Police, ensures that emergency response, preparedness, and coordination are integrated into floodplain management efforts. These roles provide critical insight into response capabilities and operational challenges observed during events such as Hurricane Helene.
- **Institutional Preparedness and Continuity** – The Emergency Management Director from the University of North Carolina Asheville contributes expertise in institutional resilience, continuity planning, and coordination with local agencies. This perspective supports broader community preparedness and recovery.
- **Regional Planning and Coordination** – The Planning Director from the Land of Sky Regional Council provides a regional perspective on hazard mitigation and land use planning. Their

involvement supports interjurisdictional coordination and alignment with regional resilience initiatives.

- **Critical Facility Protection** – The Public Safety Deputy Chief from Asheville Regional Airport offers insight into the protection and continuity of critical infrastructure. This role is essential for understanding risks to key facilities and ensuring operational resilience during hazard events.
- **Stormwater Management** – The Stormwater Supervisor provides technical expertise in drainage systems, runoff management, and localized flooding issues. This role is critical for identifying problem areas and implementing solutions that reduce flood risk at the community level.

The Asheville CRS Steering Committee provides a well-rounded and coordinated framework for advancing floodplain management and mitigation planning efforts. This collaborative structure enhances the City's ability to address current flood risks, incorporate lessons learned from Hurricane Helene, and strengthen long-term community resilience while maintaining compliance with CRS requirements.

SECTION 3
COMMUNITY PROFILE

This section of the plan provides a general overview of the Buncombe Madison 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 Buncombe Madison Region, located in western North Carolina, falls within the Blue Ridge Mountains and forms part of the broader Appalachian region. The planning area includes incorporated and unincorporated portions of both counties, including the City of Asheville and several smaller municipalities and rural communities (see *Section 1: Introduction*).

The region comprises a total area of approximately 1,100 square miles, with Buncombe County accounting for the majority of the region's land area. The size and terrain of the region contribute to variations in population distribution, infrastructure access, and hazard exposure. 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

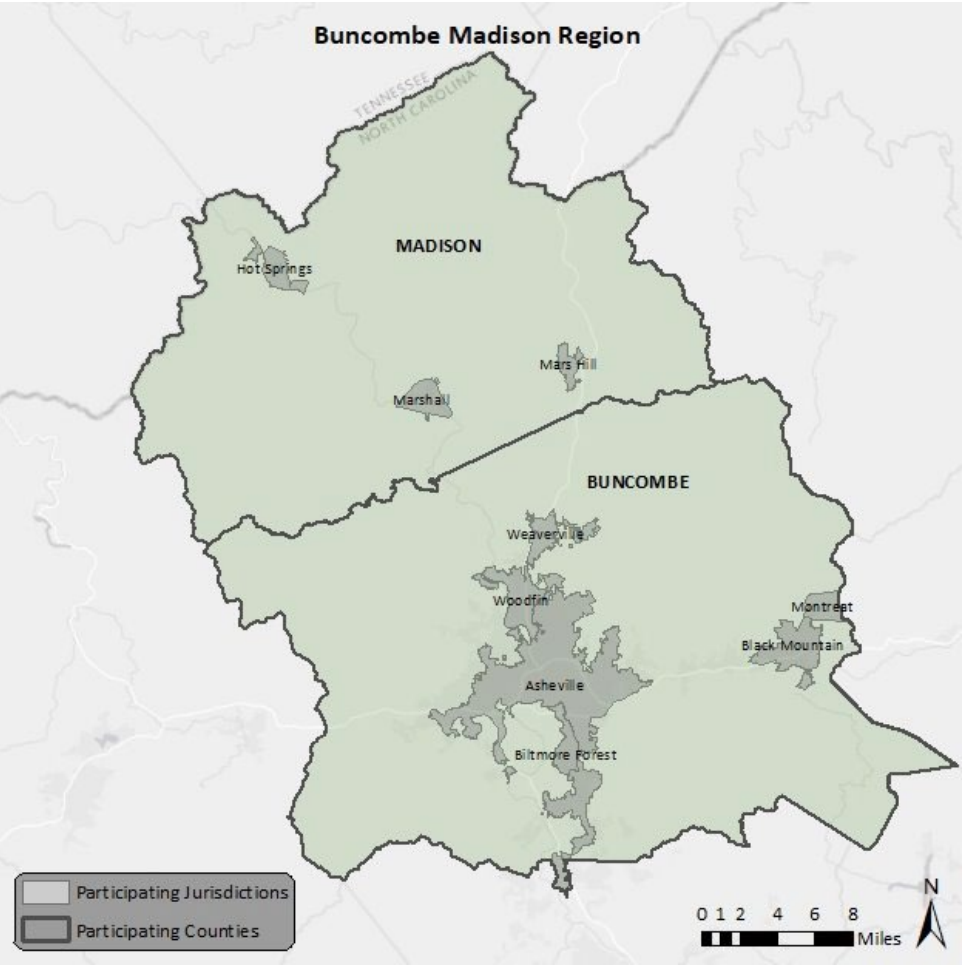
County	Land Area	Water Area	Total Area
Buncombe County	656.50 sq mi	3.45 sq mi	659.95 sq mi
Madison County	449.62 sq mi	1.87 sq mi	451.48 sq mi
Region Total	**1,106.12 sq mi**	**5.32 sq mi**	**1,111.48 sq mi**

Source: US Census Bureau

The region is strongly influenced by the Asheville, NC Metropolitan Statistical Area (MSA), which includes both Buncombe and Madison Counties. The presence of this metropolitan area significantly influences population growth, infrastructure demand, economic activity, and hazard mitigation capacity.

The region is also part of the Asheville-Waynesville-Brevard, NC Combined Statistical Area (CSA), which further connects it to surrounding counties and regional economic systems.

FIGURE 3.1: BUNCOMBE MADISON REGION ORIENTATION MAP



According to the Köppen climate classification system, the Buncombe Madison 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 55.6°F over the last ten years. The average temperatures and precipitation of each of the participating counties is presented in **Table 3.2**.

[1] *National Oceanic and Atmospheric Administration*

TABLE 3.2: ANNUAL AVERAGE TEMPERATURES AND PRECIPITATION OF PARTICIPATING COUNTIES (2015-2025)

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
Buncombe County	55.3°F	26.2°F	44.9°F	58.2°F	79.6°F	52.91”
Madison County	55.8°F	26.2°F	44.7°F	58.6°F	80.5°F	50.12”
Region Average	**55.6°F**	**26.2°F**	**44.8°F**	**58.4°F**	**80.1°F**	**51.52”**

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 26.2°F and an average maximum temperature of 44.8°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 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 58.4°F and average maximum temperatures reach 80.1°F, indicating a shift to a warm and humid summer.

The region averages about 51.5 inches of annual rainfall, equating to slight more than four (4) 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

The Buncombe Madison Region lies almost entirely within the French Broad River Basin, one of the oldest river systems in North America. The French Broad River originates in nearby Transylvania County and flows north through Buncombe and Madison Counties into Tennessee, serving as the primary drainage system for the region. Numerous tributaries, including the Swannanoa River, Ivy River, and Big Laurel Creek, contribute to a complex watershed network that influences localized flooding patterns and water flow dynamics.

The region’s hydrology, combined with steep terrain and relatively high annual precipitation, contributes to an elevated risk of riverine flooding, flash flooding, and erosion. Areas along the French Broad River and its tributaries, particularly in developed floodplains within Buncombe County, are more susceptible to repetitive flood events and stormwater management challenges.

Topographically, the region is highly variable, ranging from valley elevations near 2,000 feet to peaks exceeding 6,000 feet. Madison County includes portions of the Black Mountains, which contain the highest elevations east of the Mississippi River, including Mount Mitchell. This dramatic variation in elevation creates steep slopes, narrow valleys, and highly constrained development areas.

These physical characteristics directly influence hazard risk across the region, including:

- Flooding and Stormwater Behavior – Steep slopes and narrow floodplains can result in rapid runoff and limited infiltration during storm events, increasing the likelihood of flash flooding and localized inundation.
- Landslide Susceptibility – Saturated soils, combined with steep slopes and certain geologic conditions, increase the potential for landslides and slope failures, particularly following prolonged or intense rainfall events.
- Microclimates and Weather Variability – Elevation changes create localized differences in temperature, precipitation, and storm intensity, which can result in uneven hazard impacts across relatively small geographic areas.

3.1.2 Parks, Preserves, and Conservation

The Buncombe Madison Region contains extensive protected lands and recreational resources that highlight the area's ecological and economic importance. Major assets include the Blue Ridge Parkway, Pisgah National Forest, and proximity to Great Smoky Mountains National Park, as well as numerous state parks, game lands, and locally managed conservation areas.

A significant portion of the region's land area, particularly in Madison County, is forested or protected, limiting development in certain areas while preserving critical natural systems such as watersheds, wildlife habitat, and steep slope environments. These lands contribute to water quality protection, flood mitigation through natural storage, and overall ecosystem resilience.

From a hazard mitigation perspective, protected lands present both benefits and challenges:

- Forested areas can help reduce runoff and erosion, supporting natural flood mitigation functions.
- They are susceptible to hazards such as wildfire, particularly during periods of drought, as well as storm-related tree damage and debris that can impact roadways and utilities.
- Limited access points and remote terrain within protected lands can complicate emergency response and evacuation efforts.

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 Buncombe Madison Region has thirty-eight (38) 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	Scientific Name	Common Name	Federal Status	County
Amphibians	Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender	Proposed Endangered	B, M
Arachnids	Fumontana deprehendor	No common name	Species of Concern	B, M
Arachnids	Microhexura montivaga	Spruce-fir moss spider	Endangered	B
Birds	Aegolius acadicus	Northern Saw-whet Owl	Species of Concern	B, M
Birds	Loxia curvirostra	Red crossbill	Species of Concern	B
Birds	Vermivora chrysoptera	Golden-winged warbler	Under Review	B, M
Clams	Alasmidonta raveneliana	Appalachian elktoe	Endangered	B
Clams	Pleuronaia barnesiana	Tennessee pigtoe	Proposed Endangered	M
Clams	Fusconaia subrotunda	Longsolid	Threatened	M
Conifers and Cycads	Abies fraseri	Fraser fir	Species of Concern	B
Crustaceans	Cambarus reburrus	French Broad crayfish	Species of Concern	B, M
Fishes	Percina squamata	Olive darter	Species of Concern	M
Flowering Plants	Juglans cinerea	Butternut	Species of Concern	M
Flowering Plants	Thaspium pinnatifidum	Mountain thaspium	Species of Concern	M
Flowering Plants	Hexastylis rhombiformis	French Broad heartleaf	Species of Concern	B
Flowering Plants	Packera millefolia	Piedmont ragwort	Species of Concern	B
Flowering Plants	Plagiochila virginica var. caroliniana	[Unnamed] liverwort	Species of Concern	B
Flowering Plants	Calamagrostis cainii	Cain's reedgrass	Species of Concern	B
Flowering Plants	Hedyotis purpurea var. montana	Roan Mountain bluet	Endangered	B, M
Flowering Plants	Plagiochila sharpii	Sharp's leafy liverwort	Status Undefined	B
Flowering Plants	Geum radiatum	Spreading avens	Endangered	B, M
Flowering Plants	Buckleya distichophylla	Piratebush	Species of Concern	B, M
Flowering Plants	Solidago simulans	Granite Dome Goldenrod	Species of Concern	B, M

Group	Scientific Name	Common Name	Federal Status	County
Flowering Plants	Lilium grayi	Gray's lily	Species of Concern	B
Flowering Plants	Solidago spithamaea	Blue Ridge goldenrod	Threatened	B, M
Flowering Plants	Sagittaria fasciculata	Bunched arrowhead	Endangered	B
Flowering Plants	Sisyrinchium dichotomum	White irisette	Endangered	B
Insects	Danaus plexippus	Monarch butterfly	Proposed Threatened	B, M
Insects	Phyciodes batesii maconensis	Southern tawny crescent	Species of Concern	B
Lichens	Gymnoderma lineare	Rock gnome lichen	Endangered	B, M
Mammals	Myotis septentrionalis	Northern Long-Eared Bat	Endangered	B, M
Mammals	Myotis sodalis	Indiana bat	Endangered	B, M
Mammals	Myotis grisescens	Gray bat	Endangered	B, M
Mammals	Glaucomys sabrinus coloratus	Carolina northern flying squirrel	Endangered	B, M
Mammals	Myotis lucifugus	Little brown bat	Under Review	B, M
Mammals	Perimyotis subflavus	Tricolored bat	Proposed Endangered	B, M
Reptiles	Glyptemys muhlenbergii	Bog turtle	Similarity of Appearance (Threatened)	B
Snails	Paravitrea ternaria	Sculpted supercoil	Species of Concern	M

Source: US Fish & Wildlife Service, Environmental Conservation Online System (ECOS)

3.1.4 Post-Hurricane Helene Considerations: Regional Hydrologic Conditions

The remnants of Hurricane Helene in September 2024 produced widespread rainfall across western North Carolina, including Buncombe and Madison Counties. Rainfall generally ranged from approximately 3 to 8 inches across the region, with higher localized accumulations in upslope areas along the Blue Ridge Escarpment and higher elevations in eastern Buncombe County and southern Madison County.

Hydrologic responses were observed throughout the French Broad River Basin. Stream gauge data from the USGS indicate that the French Broad River near Asheville, as well as tributaries including the Swannanoa River and Ivy River, experienced rapid rises in stage during the event. At several monitoring locations, river levels approached or exceeded action stage thresholds, with localized minor flooding observed in low-lying areas adjacent to river corridors.

In Buncombe County, areas along the Swannanoa River corridor, including portions of Swannanoa, Biltmore Village, and low-lying sections near the confluence with the French Broad River, experienced

elevated water levels and localized inundation of adjacent lands. Smaller tributaries exhibited rapid flow increases, contributing to localized flooding in areas with constrained drainage systems.

In Madison County, riverine impacts were observed along the French Broad River corridor, particularly in and near Marshall and Hot Springs, where steep terrain and narrow valleys contribute to rapid runoff and concentration of flows.

These conditions reflect the region's hydrologic sensitivity to prolonged rainfall, particularly where steep slopes, shallow soils, and confined floodplains influence runoff behavior.

3.2 POPULATION AND DEMOGRAPHICS

According to Census data, the Buncombe Madison Region experienced moderate but uneven population growth, increasing by 13.8 percent between 2010 and 2023. This growth is largely driven by Buncombe County, which grew by 14.6 percent and comprises most of the regional population (273,197 residents), while Madison County experienced more modest growth of 4.5 percent, totaling 21,705 residents.

This disparity reflects the influence of the Asheville metropolitan area, where increased in-migration, economic opportunity, and development pressures are concentrated. As a result, population density, infrastructure demand, and development patterns are significantly more pronounced in Buncombe County, while Madison County remains more rural with lower density and slower growth trends.

Population counts from the US Census Bureau for 2000, 2010, 2021, 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	2021 Census Population	2023 ACS Estimates	Population Change 2010-2023 (%)
Buncombe County	206,330	238,318	269,452	273,197	14.6%
Madison County	19,635	20,764	21,193	21,705	4.5%
Region Total	**225,965**	**259,082**	**290,645**	**294,902**	**13.8%**

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

Additional demographic indicators provide insight into population characteristics that influence vulnerability and resilience across the Buncombe Madison Region. Based on ACS data (2019-2023), the region has a median age of approximately 45.4 years, indicating a relatively older population overall. Educational attainment is high, with approximately 91.6 percent of residents age 25 and older holding at least a high school diploma and 39.1 percent holding a bachelor's degree or higher.

Approximately 5.6 percent of residents age five and older speak a language other than English at home, representing a smaller but important population that may require targeted communication strategies to ensure effective dissemination of warnings and emergency information. The racial demographics of the participating jurisdictions are presented in **Table 3.5.**

TABLE 3.5: DEMOGRAPHICS OF PARTICIPATING COUNTIES

County	Caucasian (%)	African American (%)	Asian (%)	Other Race* (%)	Two or More Races (%)	Persons of Hispanic or Latino Origin** (%)
Buncombe County	83.2%	6.6%	1.5%	2.7%	6.0%	8.3%
Madison County	95.3%	1.3%	0.4%	0.9%	2.1%	3.1%
Region Total	**89.3%**	**4.0%**	**1.0%**	**1.8%**	**4.1%**	**5.7%**

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.

The region remains predominantly White, with an average of 89.3 percent of residents identifying as Caucasian. However, demographic diversity is more pronounced in Buncombe County, where 6.6 percent of residents identify as African American and 8.3 percent identify as Hispanic or Latino, compared to 1.3 percent and 3.1 percent, respectively, in Madison County. This indicates that racial and ethnic diversity is more concentrated in the region's urbanized areas.

3.2.1 Post-Hurricane Helene Considerations: Population Impacts and Disruption

Storm-related impacts associated with Hurricane Helene included localized flooding, roadway disruptions, and temporary service interruptions affecting communities across Buncombe and Madison Counties. Power outages were reported in both counties, primarily associated with downed trees and saturated soils affecting utility infrastructure. These outages were generally localized but contributed to temporary service interruptions in residential areas.

In Buncombe County, transportation disruptions were reported along key corridors including sections of U.S. 70 (Tunnel Road and Swannanoa River Road), portions of NC Highway 251 (Riverside Drive), and low-lying segments of Biltmore Avenue near Biltmore Village. These areas are located adjacent to major waterways and are subject to flooding during high rainfall events.

Neighborhoods and communities situated along river corridors, such as Swannanoa, parts of East Asheville, and areas near the French Broad River greenway system, experienced temporary access limitations due to roadway flooding and drainage exceedances. In some cases, localized street-level flooding affected residential access and mobility during peak rainfall periods.

In Madison County, roadway access constraints were observed along U.S. 25/70 and NC Highway 209, particularly in areas where roads parallel the French Broad River or traverse narrow mountain valleys. Communities in and around Marshall and Hot Springs experienced temporary travel disruptions due to high water and debris along roadways.

While long-term displacement was not widely documented, the storm resulted in short-term disruptions to daily activities, including limited access to workplaces, schools, and essential services in affected areas.

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the US Census Bureau, in 2023 there were an estimated 142,920 housing units in the Buncombe Madison Region. The regional housing stock is predominantly single-family, accounting for approximately 70 percent of housing units, though composition varies by county. Housing information for the participating counties is presented in **Table 3.6**.

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
Buncombe County	108,848	130,557	64.7%	11.3%	$357,400
Madison County	11,286	12,363	76.9%	19.2%	$255,500
Region Total	**120,134**	**142,920**	**70.8%**	**15.3%**	**$306,450**

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

The housing trends across the Buncombe Madison 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 both counties will be essential for hazard mitigation. Key findings and themes are summarized below:

- Growth in Housing Units – The region experienced an increase in housing units from 120,134 in 2010 to 142,920 in 2023, driven primarily by growth in Buncombe County, while Madison County experienced more modest increases consistent with its rural character.
- Housing Type Composition – Housing is predominantly single-family (70 percent); however, Buncombe County includes a notable share of multi-family housing (25 percent), while Madison County has limited multi-family development and a higher reliance on mobile homes (20 percent), which are generally more vulnerable to hazard impacts.
- Owner-Occupied vs. Renter Occupancy – Owner-occupied housing averages approximately 71 percent, with renters more concentrated in Buncombe County (65 percent owner-occupied) compared to Madison County (77 percent). Renters may be more vulnerable due to limited control over structural mitigation and higher displacement risk.
- Financial Resilience and Vulnerability – Differences in median home values and housing types indicate varying levels of financial resilience across the region, with higher costs in Buncombe County and more limited housing resources in Madison County, particularly in areas with older or manufactured housing stock.

These trends indicate that vulnerability is influenced by both housing type and tenure.

3.3.2 Infrastructure

Transportation

The Buncombe Madison Region is served by a transportation network that supports regional connectivity, economic activity, and emergency response. The region includes several nationally and regionally significant scenic corridors:

- The Blue Ridge Parkway traverses Buncombe County and connects Shenandoah National Park to Great Smoky Mountains National Park. As one of the most visited units of the National Park System, the Parkway contributes significantly to tourism and seasonal traffic volumes within the region.
- Interstate 26 includes a designated scenic byway segment through Madison County, providing elevated views and traversing steep terrain.
- Additional scenic byways, including the French Broad Overview and the Appalachian Medley, follow river corridors and mountainous landscapes throughout Buncombe and Madison Counties.

Beyond scenic corridors, the regional transportation network includes three interstates (I-26, I-40, and I-240), multiple U.S. highways (including US 19, 23, 25, 70, and 74), and an extensive system of state and local roads. Due to the region's topography, many roadways follow river valleys or are constructed along steep slopes, increasing susceptibility to flooding, landslides, and debris flows.

The Asheville Regional Airport serves as the primary commercial airport for western North Carolina, providing regional connectivity for residents and visitors. Larger hub airports, including Charlotte Douglas International Airport, are located outside the region and serve as major national and international gateways.

Utilities

Electrical service in the region is provided primarily by Duke Energy and French Broad Electric Membership Corporation. Water and sewer services are concentrated in more urbanized areas, including systems operated by the City of Asheville and the Metropolitan Sewerage District of Buncombe County, as well as smaller utility providers.

In rural portions of the region, particularly in Madison County, residents commonly rely on private wells and septic systems. This decentralized infrastructure can increase vulnerability during hazard events, as systems may be more susceptible to contamination, damage, or service disruption following flooding or landslides.

Utility infrastructure across the region is also exposed to hazards such as severe storms, high winds, and falling trees, which can result in power outages and service interruptions. Given the region's terrain and vegetation, restoration efforts may be prolonged in certain areas. These conditions emphasize the need for infrastructure hardening, vegetation management, and redundancy where feasible.

Community Facilities

The Buncombe Madison Region contains a wide range of public buildings and community facilities that support emergency response, healthcare, and essential services. See Section 6: *Vulnerability Assessment* for more in-depth information on emergency operations centers, fire and EMS stations, police stations, medical facilities, and public schools.

Healthcare facilities are primarily concentrated in Buncombe County, particularly in the Asheville area, which serves as the regional medical hub. Major facilities include Mission Hospital, Asheville Specialty Hospital, CarePartners Rehabilitation Hospital, and the Charles George VA Medical Center. Additional providers, such as Mountain Area Health Education Center (MAHEC) and regional urgent care facilities,

support broader healthcare access. Madison County has fewer and more dispersed healthcare and emergency facilities.

The concentration of critical facilities in Buncombe County and the dispersed nature of facilities in Madison County underscore the need for coordinated emergency planning, redundancy in critical services, and consideration of access limitations during disaster response and recovery.

3.3.3 Land Use

Land use within the Buncombe Madison Region reflects a combination of urban development, rural residential patterns, and extensive natural and protected lands. Buncombe County contains most of the region's urban and suburban development, particularly in and around Asheville, where commercial, institutional, and higher-density residential uses are concentrated. In contrast, Madison County is characterized by rural residential development, agricultural land, and forested areas.

Due to the region's mountainous terrain and the presence of protected lands, including national forests, conservation areas, and parklands, large portions of the region remain undeveloped or sparsely developed. These physical constraints influence development patterns, often concentrating growth in valley areas and along transportation corridors, which can coincide with flood-prone areas and increase exposure to hazard risks.

Land use patterns also reflect the region's strong tourism and recreation economy, with development occurring near scenic corridors, rivers, and outdoor destinations. Seasonal population increases associated with tourism can place additional demand on infrastructure and emergency services, particularly in areas with limited capacity.

Local land use policies, regulations, and planning capabilities are further discussed in Section 7: *Capability Assessment*.

3.3.4 Post-Hurricane Helene Consideratons: Infrastructure and Access Conditions

Infrastructure impacts during Hurricane Helene were most evident within the transportation network, where flooding, debris, and terrain-related conditions contributed to temporary disruptions.

In Buncombe County, roadway impacts were observed along several key corridors, including:

- Swannanoa River Road (U.S. 70 corridor), where proximity to the river contributed to localized flooding and ponding
- Riverside Drive (NC 251), which parallels the French Broad River and experienced high-water conditions in low-lying sections
- Biltmore Avenue and Biltmore Village area, where stormwater accumulation and drainage exceedances contributed to temporary roadway impacts
- Secondary roads and neighborhood streets in East Asheville and Swannanoa experienced localized flooding, particularly in areas with limited drainage capacity or proximity to tributary streams.

In Madison County, transportation impacts were concentrated along:

- U.S. 25/70, a primary corridor following the French Broad River

- NC Highway 209, which traverses steep terrain and is susceptible to debris flows and minor slope instability

These corridors experienced temporary closures or reduced accessibility due to high water, debris accumulation, and localized slope-related issues.

Drainage infrastructure across both counties was subject to increased flow conditions, with culverts and roadside ditches experiencing overtopping in some locations. Debris accumulation at inlets and crossings contributed to localized ponding and reduced conveyance capacity.

Utility infrastructure impacts included scattered power outages reported by Duke Energy and local electric cooperatives. Outages were primarily caused by falling trees and saturated ground conditions affecting utility poles and lines. Restoration activities were completed following the storm as conditions allowed.

3.4 EMPLOYMENT AND INDUSTRY

According to ACS estimates, the median household income is $70,578 in Buncombe County and $58,531 in Madison County, resulting in a regional average of approximately $64,555. This disparity reflects a more diversified and higher-wage economy in Buncombe County, while Madison County's lower median income indicates more limited financial resources and a greater potential for economic vulnerability.

Labor force characteristics further illustrate these differences. As shown in **Table 3.7**, approximately 57.6 percent of Buncombe County residents are employed, compared to 53.4 percent in Madison County, while a higher proportion of Madison County residents (44.6 percent) are not in the labor force compared to Buncombe County (40.0 percent). Regionally, employment averages 55.5 percent, with 42.3 percent of residents not participating in the labor force, reflecting the influence of age, rural conditions, and workforce access across the region.

TABLE 3.7: KEY ECONOMIC INDICATORS

County	Population in Labor Force	Employed (%)	Unemployed (%)	Not in Labor Force (%)	Unemployment Rate (%)
Buncombe County	145,361	57.6%	2.4%	40.0%	4.0%
Madison County	11,147	53.4%	2.0%	44.6%	3.6%
Region Total	**156,508**	**55.5%**	**2.2%**	**42.3%**	**3.8%**

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

Employment sectors, summarized in Table 3.8, are led by management, business, science, and arts occupations, which account for approximately 38.5 percent of employment regionally, though this sector is more concentrated in Buncombe County (42.1 percent) than in Madison County (34.8 percent). Madison County has a relatively higher share of employment in natural resources, construction, and maintenance (13.8 percent) compared to Buncombe County (9.8 percent), reflecting its more rural economic base. Service and sales occupations are also prominent across both counties, accounting for approximately 40 percent of employment combined.

TABLE 3.8: EMPLOYMENT SECTORS

County	Management, Business, Science & Arts (%)	Service (%)	Sales & Office (%)	Natural Resources, Construction & Maintenance (%)	Production, Transportation & Material Moving (%)
Buncombe County	42.1%	19.5%	18.6%	9.8%	10.0%
Madison County	34.8%	21.4%	20.7%	13.8%	9.3%
Region Total	**38.5%**	**20.5%**	**19.7%**	**11.8%**	**9.7%**

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

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

- Mission Health System
- Buncombe County Schools
- Buncombe County Government
- City of Asheville
- Ingles Markets, Inc.

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

- Madison County Schools
- Madison County Government
- Hot Springs Health Program, Inc.
- Mars Hill University
- Ingles Markets, Inc.

3.4.1 Post-Hurricane Helene Considerations: Economic Conditions

Economic impacts associated with Hurricane Helene in the Buncombe Madison Region were primarily short-term and concentrated in sectors dependent on transportation, tourism, and in-person services

In Buncombe County, temporary roadway closures and reduced mobility affected access to commercial areas in Asheville, particularly in locations such as:

- Downtown Asheville, where reduced visitor activity occurred during the storm period
- Biltmore Village, a major tourism and retail area located near the Swannanoa River, where localized flooding and access limitations affected business operations
- River Arts District, where proximity to the French Broad River contributes to sensitivity to high water conditions

Tourism-related activities, including lodging, dining, and outdoor recreation, experienced short-duration declines due to weather conditions and travel disruptions. The Blue Ridge Parkway and portions of nearby recreational areas also experienced temporary closures or reduced visitation during the storm period.

In Madison County, economic impacts were more localized and associated with access constraints along key transportation corridors. Businesses in Marshall and Hot Springs, which rely on through-travel and tourism, experienced temporary reductions in activity due to roadway conditions and decreased visitor movement.

Construction and outdoor labor sectors across both counties experienced temporary interruptions due to rainfall, saturated soil, and limited site access. These conditions delayed ongoing work but generally resumed following improved weather and site conditions.

SECTION 4
HAZARD IDENTIFICATION

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

- 4.1 Overview
- 4.2 Disaster Declarations
- 4.3 Summary of Hazard Impacts Since Previous Plan
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

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 Buncombe Madison 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 Buncombe Madison Region has included a comprehensive assessment of both types of hazards.

Upon reviewing the full range of natural hazards suggested under FEMA planning guidance, the participating jurisdictions in the Buncombe Madison Region have identified numerous hazards that are to be addressed in the Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Buncombe Madison 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. To maintain consistency, the Buncombe Madison Regional Hazard Mitigation Planning Committee agreed to assess the same hazards that were identified in the most recent update of the North Carolina State Hazard Mitigation Plan (2023). A list of all previous hazards covered in the 2021 Buncombe Madison Regional Hazard Mitigation Plan is viewable in **Table 4.1**, along with a summary of the hazards assessed in this 2026 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 Buncombe Madison Region can be found below in **Section 4.2**.

TABLE 4.1: 2026 BUNCOMBE MADISON REGION HAZARDS UPDATE

2021 Buncombe Madison Identified Hazards		2026 Buncombe Madison Identified Hazards		Subhazards covered in 2026 Plan
Natural Hazards	Drought	Drought	**Natural Hazards**	Agricultural, Hydrological, Meteorological, Socioeconomic
		Excessive Heat		Heat Wave
	Hurricanes and Coastal Hazards	Hurricanes and Coastal Hazards		Tornadoes, High Wind, Torrential Rain, Severe Weather, and Storm Surge associated with Hurricanes, Tropical Storms, and Nor'easters
	Tornadoes/Thunderstorms	Tornadoes/Thunderstorms		Hailstorms, Lightning, Torrential Rain, Thunderstorm and High Winds
	Winter Storm & Freeze	Severe Winter Weather		Snow, Blizzards, Wind Chill, Extreme Cold, Ice Storms, Freezing Rain
	Earthquakes	Earthquakes		
	Geological (Landslide)	Geological (Landslide)		Landslides, Sinkholes, Erosion
	Dam Failure	Dam Failure		
	Flooding	Flooding		Flash Flooding, Urban Flooding
Other Hazards	Wildfires	Wildfires		
	Infectious Disease	Infectious Disease		Vector-Borne Disease, Foreign Animal Disease
Technological Hazards	Hazardous Substances	Hazardous Substances	**Technological Hazards**	Hazardous Materials and Chemicals, Oil Spills, Road/Rail Incidents
	Radiological Emergency	Radiological Emergency		Fixed Nuclear Facilities
	Terrorism	Terrorism		Chemical, Biological, Radiological, Nuclear, Explosive, Other Attacks
	Cyber	Cyber Threat		Mass Power/Utility Disruption
	Electromagnetic Pulse	Electromagnetic Pulse		
		Civil Disturbance		
		Food Emergency		Supply Chain Disruption

4.2 DISASTER DECLARATIONS

Disaster declarations provide insight into the hazards that may impact the Buncombe Madison Region. Since 1973, eighteen (18) presidential disaster declarations have been reported in the Buncombe Madison Region, which can be seen in **Table 4.2** below. This includes six (6) declarations related to severe storms and flooding, eight (8) storms related to hurricanes and tropical storms, three (3) storms related to severe winter weather events, and one (1) global pandemic related to COVID-19.

TABLE 4.2: BUNCOMBE MADISON REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Buncombe County	Madison County
1973	394	SEVERE STORMS & FLOODING	**X**	
1977	542	SEVERE STORMS & FLOODING	**X**	**X**
1995	1073	SEVERE STORMS, FLOODING, HIGH WINDS		**X**
1996	1087	BLIZZARD OF 96	**X**	**X**
1996	1103	WINTER STORM		**X**
1996	1134	HURRICANE FRAN	**X**	
1998	1200	SEVERE STORMS AND FLOODING		**X**
2004	1546	TROPICAL STORM FRANCES	**X**	**X**
2004	1553	HURRICANE IVAN	**X**	**X**
2010	1871	SEVERE WINTER STORMS AND FLOODING	**X**	**X**
2013	4146	SEVERE STORMS, FLOODING, LANDSLIDES AND MUDSLIDES	**X**	**X**
2018	4393	HURRICANE FLORENCE		**X**
2020	4487	COVID-19 PANDEMIC	**X**	**X**
2020	4553	SEVERE STORMS, TORNADOES AND FLOODING		**X**
2020	4568	HURRICANE ISAIAS	**X**	**X**
2021	4617	REMNANTS OF TROPICAL STORM FRED	**X**	
2022	3586	HURRICANE IAN	**X**	**X**
2024	4827	TROPICAL STORM HELENE	**X**	**X**

Source: FEMA Major Disaster Declarations

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous Buncombe Madison Regional Hazard Mitigation Plan in 2021 through the period of record (6/30/2025), there have been at least 124 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. Details for some of these events are discussed in further detail in the *Hazard Profiles* section and in the plan's appendices.

TABLE 4.3: SUMMARY OF HAZARD EVENTS SINCE PREVIOUS PLAN

Hazard Type*	Number of Reported Events in Buncombe County	Number of Reported Events in Madison County
Cold/Wind Chill	7	6
Flash Flood	4	2
Flood	2	1
Hail	16	7
Heavy Snow	1	6
High Wind	1	1
Lightning	0	0
Strong Wind	1	0
Thunderstorm Wind	24	11
Tornado	1	0
Tropical Storm	1	1
Winter Storm	0	0
Winter Weather	16	15
TOTAL NUMBER OF REPORTED EVENTS	**74**	**50**

Source: NCEI

* 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.

4.4 HAZARD EVALUATION

Table 4.4 documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether 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. 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 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 addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
NATURAL HAZARDS			
Avalanche	**NO**	• Review of FEMA National Risk Index • Review of the US Forest Service National Avalanche Center website • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• There is no risk of avalanche events in North Carolina. The United States avalanche hazard is limited to mountainous western states, including Alaska, as well as some areas of low risk in New England. • Avalanche hazards are not addressed in the NC State Hazard Mitigation Plan (State Plan). • Avalanche hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Drought	**YES**	• Review of FEMA National Risk Index • Review of the North Carolina Drought Monitor website • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Drought is a normal part of virtually all climatic regimes, including areas with high and low average rainfall. • There are consistent reports of drought conditions in the Buncombe Madison Region in the last 20+ years, according to the North Carolina Drought Monitor. • Drought hazards are addressed in the State Plan. • Drought hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Hailstorm	**YES (Assessed under Tornadoes/ Thunderstorms)**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI reports at least 278 hailstorm events (0.75-4.0 inches in size) for the Buncombe Madison Region between January 1950 and June 2025. For these events, there was at least $25,000 in property damage. • Hailstorm hazards are addressed in the State Plan under the Tornadoes/Thunderstorms hazard. • Hailstorm hazards were addressed as a Tornadoes/Thunderstorms subhazard in the previous Buncombe Madison Regional Hazard Mitigation Plan.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Excessive Heat	**YES**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Many areas of the United States are susceptible to excessive heat events, including North Carolina. • Excessive Heat hazards are addressed in the State Plan. • Excessive Heat hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Hurricane and Coastal Hazards	**YES**	• Review of FEMA National Risk Index • Analysis of NOAA historical tropical cyclone tracks and the National Hurricane Center website • Review of NOAA NCEI Storm Events Database • Review of FEMA historical disaster declarations • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• The U.S. Atlantic and Gulf regions are most prone to landfall by hurricanes and tropical storms. • NOAA historical records indicate at least 40 hurricanes or tropical storms/depressions have come within 75 miles of the Buncombe Madison Region between 1896 and 2025. • Eight (8) major disaster declarations in the Buncombe Madison Region are directly related to hurricane and tropical storm events. • Hurricane and Coastal Hazards are addressed in the State Plan. • Hurricane and Coastal Hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Lightning	**YES (Assessed under Tornadoes/ Thunderstorms)**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI reports at least 17 lightning events for the Buncombe Madison Region since 1996. These events have resulted in at least 7 injuries, 2 deaths, and nearly $896,180 (2025 dollars) in property damage. • Lightning hazards are addressed in the State Plan under the Tornadoes/ Thunderstorm hazard. • Lightning hazards were addressed as a Tornadoes/Thunderstorms subhazard in the previous Buncombe Madison Regional Hazard Mitigation Plan.

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Nor'easter	**NO**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI does not report any nor'easter activity for the Buncombe Madison Region. However, nor'easters may have affected the region as severe winter storms. In this case, the activity would be reported under Severe Winter Weather events. • Nor'easter hazards are addressed in the State Plan. • Nor'easter hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Tornadoes (Combined with Severe Thunderstorm hazard)	**YES**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI reports at least 12 tornado events in Buncombe Madison Region between January 1950 and June 2025. These events have resulted in at least 5 injuries and over $7.6 million (2025 dollars) in property damage, with the most severe being an F2. • Tornado hazards are addressed in the State Plan. • Tornado hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Severe Thunderstorm (Combined with Tornado hazard)	**YES**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI reports at least 297 thunderstorm wind events in the Buncombe Madison Region between January 1950 and June 2025. These events have resulted in at least 17 injuries, 3 deaths, and over $7.5 million (2025 dollars) in property damage. • Severe Thunderstorm hazards are addressed in the State Plan. • Severe Thunderstorm hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Severe Winter	**YES**		

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Weather		• Review of FEMA National Risk Index • Review of FEMA historical disaster declarations • Review of NOAA NCEI Storm Events Database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• NCEI reports that the Buncombe Madison Region has been affected by at least 568 snow and ice events between January 1996 and June 2025. These events resulted in at least $75,000 in property damage and did not cause any deaths or injuries. • Three (3) major disaster declarations in the Buncombe Madison Region are directly related to severe winter weather events. • Severe Winter Weather hazards, including snowstorms and ice storms, are addressed in the State Plan. • Severe Winter Weather hazards were addressed as the Winter Storm and Freeze hazard in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Earthquakes	**YES**	• Review of FEMA National Risk Index • USGS Earthquake Hazards Program website • Review of NOAA NCEI records • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Earthquakes have occurred in and around the State of North Carolina in the past. The state is affected by the Charleston and the New Madrid (near Missouri) Fault lines, which have generated a magnitude 8.0 earthquake in the last 200 years. • At least 54 events are known to have occurred in the region according to NCEI and USGS records. The greatest MMI reading reported was VII. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Buncombe Madison Region is approximately 5-9%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more. • Earthquake hazards are addressed in the State Plan, and the Buncombe Madison Region is rated at moderate risk of earthquakes (no counties are high risk). • Earthquake hazards were addressed in

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			the previous Buncombe Madison Regional Hazard Mitigation Plan.
Expansive Soils	**NO**	• Review of FEMA National Risk Index • Review of USDA Soil Conservation Service's Soil Survey • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• According to FEMA and USDA sources, the Buncombe Madison Region is located in an area that has a "little to no" clay swelling potential. • Expansive soil hazards are not addressed in the State Plan. • Expansive soil hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Geological (Landslides, Sinkholes, Erosion)	**YES**	• Review of FEMA National Risk Index • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey (NCGS) database of historic landslides • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Landslides occur in every state in the U.S, and they are most common in the coastal ranges of California, the Colorado Plateau, the Rocky Mountains, and the Appalachian Mountains. • USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landslides) is found in all counties. All counties also have areas of moderate incidence with high susceptibility. • Past data provided by NCGS has indicated numerous recorded landslide events in the Buncombe Madison Region. • Erosion remains a natural, dynamic, and continuous process in the Buncombe Madison Region that warrants inclusion as a potential hazard. • Geological hazards such as landslide/debris flow events are addressed in the State Plan. • Geological hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Dam Failure	**YES**	• Review of North Carolina Dam Safety Program Dam Inventory	• According to the North Carolina Dam Inventory, there are 60 high hazard

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the U.S. Army Corps of Engineers National Inventory of Dams database • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	dams in the planning region. A high hazard dam 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*." • Dam Failure hazards are addressed in the State Plan. • Dam Failure hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Flooding	**YES**	• Review of FEMA National Risk Index • Review of NC State Hazard Mitigation Plan • Review of FEMA historical disaster declarations • Review of NOAA NCEI Storm Events Database • Review of FEMA's NFIP Community Status Book & Community Rating System (CRS) • Review of FEMA DFIRM data • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Floods occur in all 50 states and in the U.S. territories. • At least seven (7) major disaster declarations were directly flooding-related and do not include those caused by hurricane or tropical storm-related events. • NCEI reports that the Buncombe Madison Region has been affected by at least 96 flood events between January 1950 and June 2025. These events caused at least 1 injury, 2 deaths, and an estimated $739 million in unadjusted property damage and over $13 million in unadjusted crop damage. • Both counties and all local municipalities participate in the NFIP. • Flooding hazards are addressed in the State Plan. • Flooding hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Storm Surge	**NO**	• Review of FEMA National Risk Index • Review of NOAA NCEI Storm Events Database • Review of NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional	• Given the inland location of the Buncombe Madison Region, storm surge will not affect the area. • No historical events were reported by NCEI. • Storm surge hazards are addressed in the State Plan under Hurricane and Coastal Hazards and indicate that the

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Hazard Mitigation Plan	mountain regions have no vulnerability. • Storm surge hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Tsunami	**NO**	• Review of FEMA National Risk Index • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "*Understanding Your Risks – Identifying Hazards and Estimating Losses*") • Review of NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time. • Tsunami hazards are not addressed in the State Plan. • Tsunami hazards were not addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Wildfires	**YES**	• Review of Southern Wildfire Risk Assessment (SWRA) data • Review of the NC Forest Service website • Review of NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the wildland-urban interface (WUI) increases. • A review of SWRA data indicates that there are areas of elevated concern in the Buncombe Madison Region. • According to the North Carolina Forest Service (NCFS), the Buncombe Madison Region experiences an average of 182 fires each year, which burn a combined average of 154 acres each year. • Wildfire hazards are addressed in the State Plan. • Wildfire hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Infectious Disease	**YES**	• Review of FEMA historical disaster declarations	• One (1) of the major disaster declarations in the Buncombe Madison

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Hazard Mitigation Plan	Region was directly related to an infectious disease (COVID-19 pandemic). • Infectious Disease hazards are addressed in the State Plan. • Infectious Disease hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
TECHNOLOGICAL HAZARDS			
Hazardous Substances	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• This update assesses hazardous materials, hazardous chemicals, and oil spills under this hazard. • Hazardous Substances are addressed in the State Plan. • Hazardous Substances were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Radiological Emergency – Fixed Nuclear Facilities	**YES**	• Review of the IAEA list of fixed nuclear power stations in the United States • Review of local official knowledge • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• The Oconee Nuclear Station is located closest to the Buncombe Madison Region near Seneca, SC, and could impact the region. • Emergency nuclear events can occur due to various causes and deserve focus in this plan due to some areas of the region being in the 50-mile evacuation zone for the Oconee Nuclear Station. • Radiological Emergency hazards are addressed in the State Plan. • Radiological Emergency hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Terrorism	**YES**	• Review of local official knowledge • Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• This hazard assesses chemical, biological, radiological, nuclear, and explosive terrorism events. • Terrorism hazards are addressed in the State Plan. • Terrorism hazards were addressed in the previous Buncombe Madison Regional

Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			Hazard Mitigation Plan.
Cyber Threat	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the NC State Emergency Operations Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of a cyberattack with the increase in global technology. • Cybersecurity is a concern included in the North Carolina Emergency Operations Plan. • Cyber hazards are addressed in the State Plan. • Cyber hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Electromagnetic Pulse	**YES**	• Review of the NC State Hazard Mitigation Plan • Review of the previous Buncombe Madison Regional Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology. • Electromagnetic Pulse hazards are addressed in the State Plan. • Electromagnetic Pulse hazards were addressed in the previous Buncombe Madison Regional Hazard Mitigation Plan.
Civil Disturbance	**YES**	• Review of the NC State Hazard Mitigation Plan	• Changing future conditions and social systems encourage the assessment of the possibility of a civil disturbance incident. • Civil Disturbance hazards are addressed in the State Plan.
Food Emergency	**YES**	• Review of the NC State Hazard Mitigation Plan	• Changing future conditions and food systems encourage the assessment of the possibility of a food emergency. • Food Emergency hazards are addressed in the State Plan.

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 "☑").

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

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

☑ = Hazard considered significant for further evaluation in the Buncombe Madison 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*), which are determined to be significant enough for further evaluation in the Buncombe Madison Regional Hazard Mitigation Plan. It contains the following subsections:

- 5.1 Overview
- 5.2 Study Area
- 5.3 Drought
- 5.4 Excessive Heat
- 5.5 Hurricane and Coastal Hazards
- 5.6 Tornadoes/Thunderstorms
- 5.7 Severe Winter Weather
- 5.8 Earthquakes
- 5.9 Geological (Landslides)
- 5.10 Dam Failure
- 5.11 Flooding
- 5.12 Wildfires
- 5.13 Infectious Disease
- 5.14 Hazardous Substances
- 5.15 Radiological Emergency – Fixed Nuclear Facilities
- 5.16 Terrorism
- 5.17 Cyber Threat
- 5.18 Electromagnetic Pulse
- 5.19 Civil Disturbance
- 5.20 Food Emergency
- 5.21 Conclusions on Hazard Risk
- 5.22 Final Determinations

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

5.1 OVERVIEW

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

After reviewing the list of assessed hazards from a previous update, the Buncombe Madison Regional Planning Committee agreed to keep significant hazards consistent with the State of North Carolina Hazard Mitigation Plan. This required revisions of some hazard names, and additional hazards were included in the assessment.

The following hazards were identified:

- **Natural**
  - Drought
  - Excessive Heat
  - Hurricane and Coastal Hazards
  - Tornadoes/Thunderstorms (including Hailstorms and Lightning)
  - Severe Winter Weather
  - Earthquakes
  - Geological (including Landslides, Sinkholes, and Erosion)
  - Dam Failure
  - Flooding
  - Wildfires
  - Infectious Disease
- **Technological**
  - Hazardous Substances
  - Radiological Emergency (including Fixed Nuclear Facilities)
  - Terrorism
  - Cyber Threat
  - Electromagnetic Pulse
  - Civil Disturbance
  - Food Emergency

The following supplemental table lists all initially identified hazards in the left column below, along with identification of potential "**compounding hazards**" that may either **(1)** act as a key driver or **(2)** lead to secondary risks associated with the primary hazard of concern:

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 & COASTAL HAZARDS (9)				●			●	●	●		●	●	●				●	●
TORNADOES/THUNDERSTORMS (6)		●	●				●		●	●		●						
SEVERE WINTER WEATHER (6)	●			●			●		●		●							●
EARTHQUAKES (6)							●	●	●			●	●				●	
GEOLOGICAL (9)	●	●	●	●	●	●		●	●			●						
DAM FAILURE (5)			●			●	●		●					●				
FLOODING (12)	●	●	●	●	●	●	●	●			●	●					●	●
WILDFIRES (5)	●	●		●								●					●	
INFECTIOUS DISEASE (8)		●	●		●				●			●		●			●	●
TECHNOLOGICAL HAZARDS																		
HAZARDOUS SUBSTANCES (11)			●	●		●	●		●	●	●		●	●			●	●
RADIOLOGICAL EMERGENCY (8)			●			●						●		●	●	●	●	●
TERRORISM (7)								●			●	●	●		●	●	●	
CYBER THREAT (4)													●	●		●	●	
ELECTROMAGNETIC PULSE (4)													●	●	●		●	
CIVIL DISTURBANCE (10)			●			●			●	●	●	●	●	●	●	●		
FOOD EMERGENCY (8)	●	●	●		●				●		●	●	●					

This 2026 plan update cycle also explicitly recognizes the global threat of climate change as a severe concern for the Buncombe Madison Region. 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 both historical trends and future projections. Recent statewide studies demonstrate that North Carolina will experience a variety of negative impacts due to climate change[1]. Additionally, the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) State Climate Summary for North Carolina reports that, as of 2022, average temperatures have risen more than 1 degree Fahrenheit since the 20th century, hurricane-associated storm intensity is projected to increase as the climate warms, and statewide vulnerability to sea level rise is projected to increase due to changing elevations and land subsidence[2].

Some of the major impacts of climate change over the next fifty (50) years are expected to include, but are not limited to:

- More frequent and/or more intense hazard events (of various types)
- Increased vulnerability of the built/natural environment to hazards (of various types)
- Increased number of extreme heat/weather days
- Increased risks of heat stroke and other heat-related illnesses
- Increased vectors of disease
- Reduced crop yields and agricultural losses

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

[1] *2020 North Carolina Climate Science Report* (https://ncics.org/programs/nccsr/)
[2] *2022 NOAA NCEI State Climate Summary for North Carolina (https://statesummaries.ncics.org/chapter/nc/)*

5.2 STUDY AREA

The Buncombe Madison Region is comprised of the two counties and nine (9) municipalities. **Table 5.1** provides a summary table of the participating jurisdictions within each county.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE BUNCOMBE MADISON REGIONAL HAZARD MITIGATION PLAN

Buncombe County	
Asheville	Montreat
Biltmore Village	Weaverville
Black Mountain	Woodfin
Unincorporated Area	
Madison County	
Hot Springs	Mars Hill
Marshall	Unincorporated Area

In addition, **Figure 5.1** provides a reference base map of the Buncombe Madison Region.

FIGURE 5.1: BUNCOMBE MADISON REGION

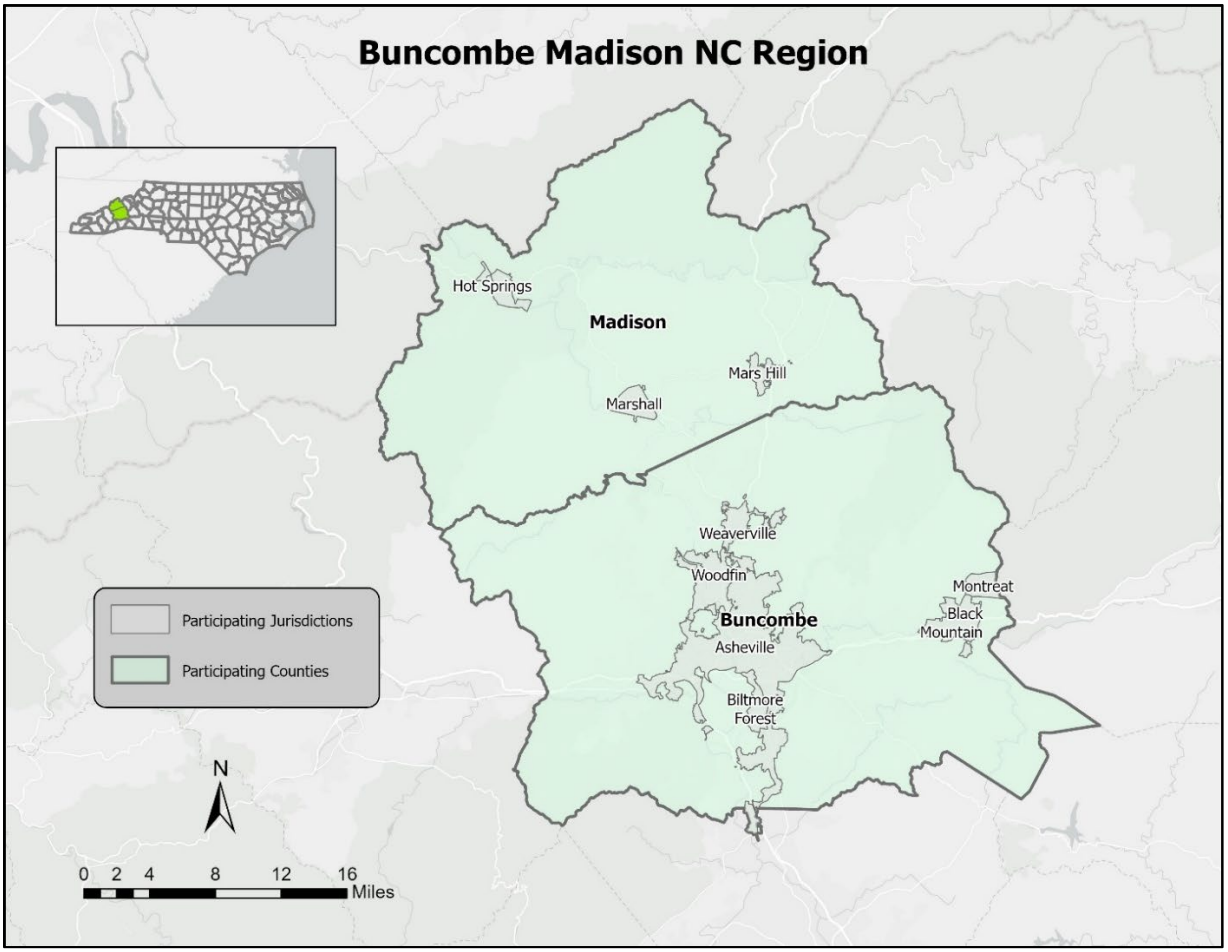


Table 5.2 lists each significant hazard for the Buncombe Madison Region and identifies whether it has been determined to be a specific hazard of concern for any municipal jurisdiction and each of the two counties' unincorporated areas. This is based on the best available data and information from the Buncombe Madison Regional Hazard Mitigation Planning Committee (● = hazard of concern).

TABLE 5.2 SUMMARY OF IDENTIFIED HAZARDS IN THE BUNCOMBE MADISON REGION

Jurisdiction	Natural													Technological					
	Drought	Excessive Heat	Hurricane and Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Tsunami	Wildfires	Infectious Disease	Hazardous Substances	Radiological Emergency	Terrorism	Cyber Threat	Electromagnetic Pulse	Civil Disturbance	Food Emergency
Buncombe County																			
Asheville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Biltmore Forest	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Black Mountain	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Montreat	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Weaverville	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Woodfin	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Unincorporated Area	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Madison County																			
Hot Springs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Marshall	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mars Hill	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
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, 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 categories are based on streamflow, groundwater levels, the amount of water stored in reservoirs, soil moisture, the time of year, and other relevant factors for assessing the extent and severity of dry conditions.

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

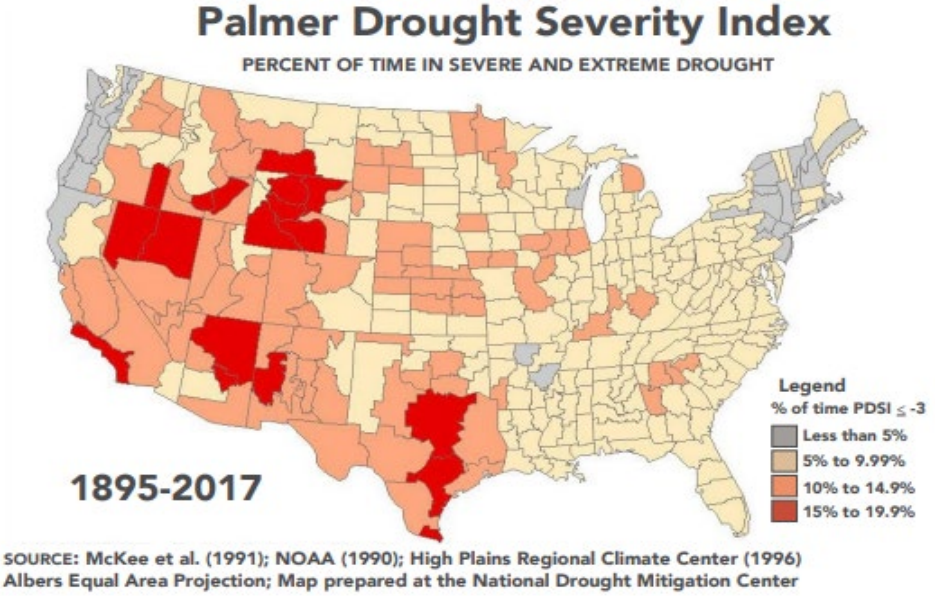
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to the 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: Federal Emergency Management Agency (FEMA)

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

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and ranges from -0.5 (incipient dry spell) to -4.0 (extreme drought). 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.

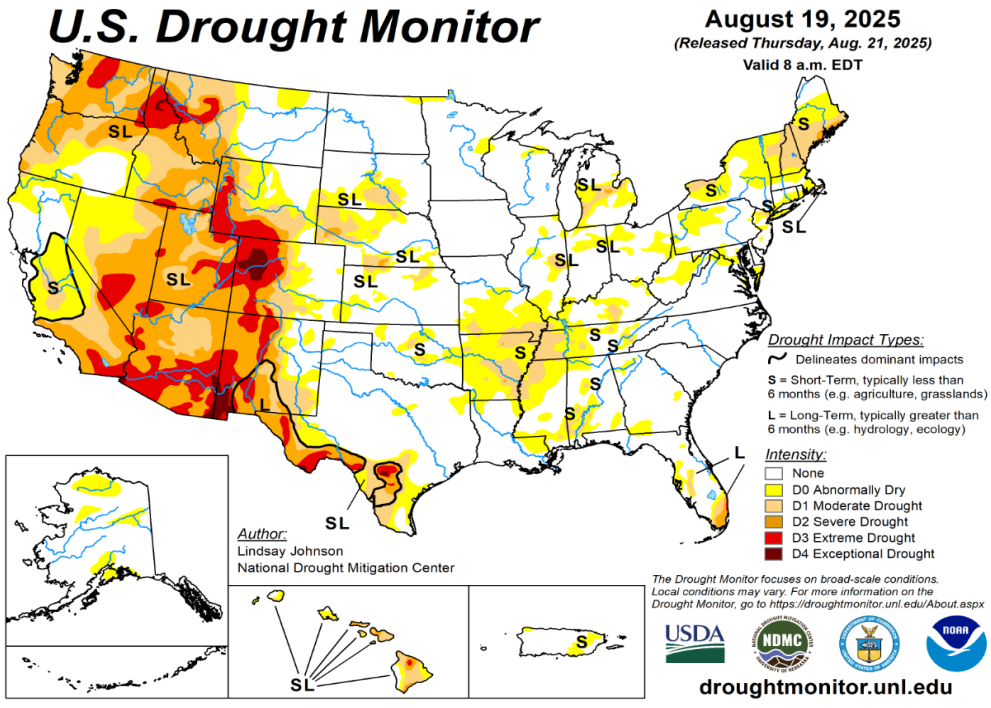
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY



Source: National Drought Mitigation Center

The figure above is the most up-to-date version of the average Palmer Drought Severity Index nationwide; however, the US Drought Monitor is updated weekly. An archived map from the late summer of 2025 is shown below in **Figure 5.3** to illustrate more recent 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 Buncombe Madison 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 2025 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor, which classifies conditions on a scale of D0 to D4. Each class is further explained in **Table 5.4.**

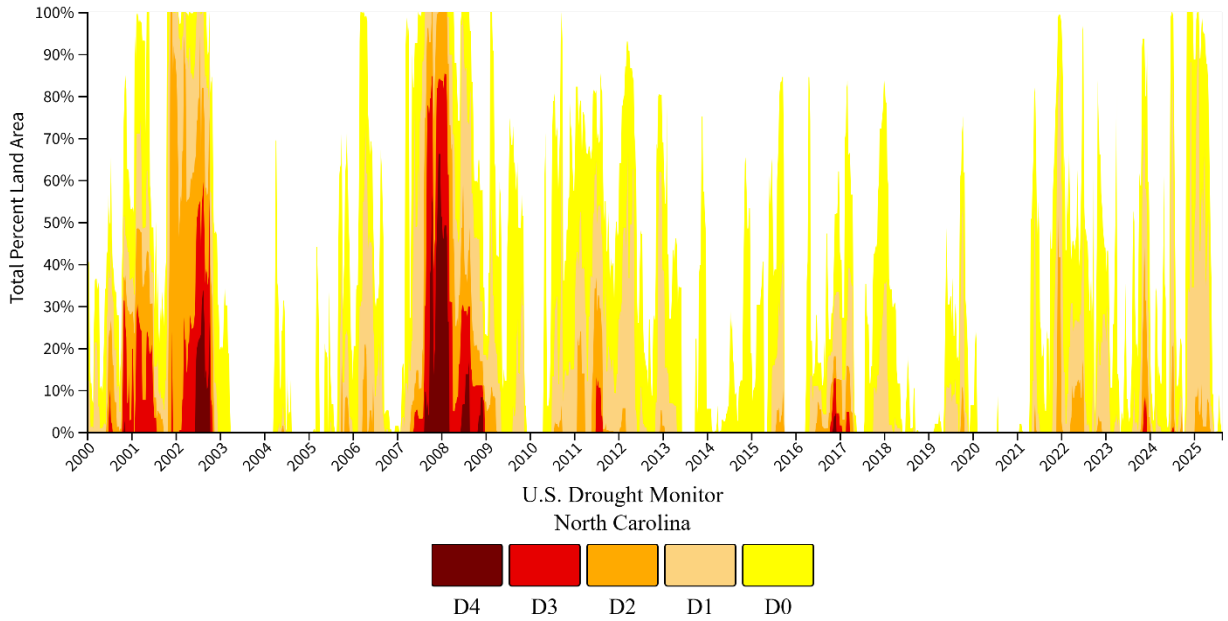
TABLE 5.4: USDM DROUGHT CLASSIFICATIONS

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

Source: US Drought Monitor

Data from the North Carolina Drought Management Advisory Council and the National Centers for Environmental Information (NCEI) were used to ascertain historical drought events in the Buncombe Madison 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 during the week of December 11, 2007, when D4 conditions affected 66.2% of North Carolina land. **Figure 5.4** shows the percentage area of North Carolina that has experienced drought conditions from 2000 to 2025.

FIGURE 5.4: NORTH CAROLINA DROUGHT CONDITIONS (2000-2025)



Source: NIDIS, Drought.gov, US Drought Portal

According to the North Carolina Drought Monitor, all the counties in the Buncombe Madison Region had drought occurrences (including abnormally dry) in all the last 20+ years (2005-2025) (**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 be in a less severe condition.

TABLE 5.5: SUMMARY OF DROUGHT OCCURRENCES

	Buncombe County		Madison County	
	Scale	Description	Scale	Description
2025	D1	Moderate Drought	D1	Moderate Drought
2024	D1	Moderate Drought	D1	Moderate Drought
2023	D2	Severe Drought	D1	Moderate Drought
2022	D1	Moderate Drought	D1	Moderate Drought
2021	D0	Abnormally Dry	D0	Abnormally Dry
2020	N/A	No data	N/A	No data
2019	D1	Moderate Drought	D2	Severe Drought
2018	D0	Abnormally Dry	D0	Abnormally Dry
2017	D3	Extreme Drought	D2	Severe Drought
2016	D2	Severe Drought	D3	Extreme Drought
2015	D2	Severe Drought	D1	Moderate Drought
2014	D0	Abnormally Dry	D0	Abnormally Dry
2013	D0	Abnormally Dry	D0	Abnormally Dry
2012	D1	Moderate Drought	D0	Abnormally Dry
2011	D1	Moderate Drought	D0	Abnormally Dry
2010	D1	Moderate Drought	D1	Moderate Drought
2009	D2	Severe Drought	D1	Moderate Drought
2008	D4	Exceptional Drought	D4	Exceptional Drought

	Buncombe County		Madison County	
	Scale	Description	Scale	Description
2007	D4	Exceptional Drought	D4	Exceptional Drought
2006	D2	Severe Drought	D1	Moderate Drought
2005	D0	Abnormally Dry	D1	Moderate Drought

Source: North Carolina Drought Monitor

According to the North Carolina Drought Management Advisory Council, the year 2007 was recorded as the driest year by the National Weather Service in more than 100 years in North Carolina and was #1 in the 2007 statewide temperature ranks. Records were set in many areas for the number of days of low humidity and the number of days with temperatures above 90 F[3].

The Buncombe Madison Region in the 2007-2008 season experienced the highest number of acres burned by wildfire in the last 24 years. According to the National Park Service Division of Fire and Aviation Management, wildfires burned 1,809.8 acres in the 2007-2008 season in the Buncombe Madison Region. This was due in part to a lack of rainfall, which left pine straw and other vegetation crispy and dry and fueled far more wildfires than average. Across the rest of North Carolina, the 7,200 wildfires in 2007 burned more acreage than had burned in any year during the last two decades.

As a response to the consistent level of drought in the state, the North Carolina Department of Environmental Quality (NCDEQ) engaged in rule revisions that provided even greater uses for reclaimed water for residents.

5.3.4 Changing Future Conditions

According to findings from the 2020 North Carolina Climate Science Report[4] 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 in 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 Buncombe Madison Region has a probability level of likely (10 to 100 percent annual probability) for future drought events. This hazard may vary slightly by location, but each area has an equal probability of experiencing a drought. While reports indicate that there is a much lower probability of extreme, long-lasting drought conditions, North Carolina will continue to have areas of persistent drought development in the future. As of 2025, the FEMA National Risk Index[5] rates the drought hazard as “relatively moderate” in Buncombe County and “very low” in Madison County.

[3] North Carolina Drought Management Advisory Council Activities Report - 2008
[4] North Carolina Climate Science Report. (2020). https://ncics.org/programs/nccsr/
[5] FEMA National Risk Index (https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool)

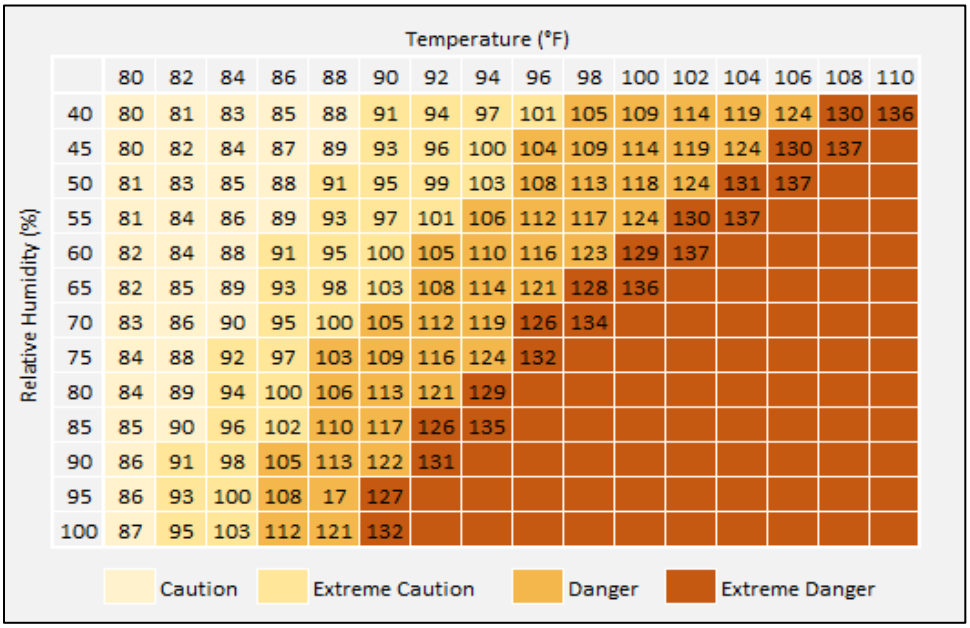
5.4 EXCESSIVE HEAT

5.4.1 Background and Description

Excessive heat, like drought, poses little risk to property. However, excessive heat can be devastating to public health. Excessive heat is often referred to interchangeably as "extreme heat" or a "heat wave." According to the National Oceanic and Atmospheric Administration (NOAA), there is no universal definition for excessive or extreme heat because "the definition of 'extreme' can vary depending on the location and typical climate." 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[6, 7]. Each National Weather Service forecast office considers its 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 whether to issue a heat watch, warning, or advisory.

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 in any other year on record[8]. The National Weather Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in **Figure 5.5**, uses air temperature and humidity to determine the heat index or apparent temperature. **Table 5.6** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly and young, are more susceptible to heat danger than other segments of the population.

FIGURE 5.5: NWS HEAT INDEX CHART



Source: NOAA, National Weather Service

[6] NWS Heat Forecast Tools (https://www.weather.gov/safety/heat-index)
[7] NWS Heat Safety (https://www.weather.gov/safety/heat-ww)
[8] Associated Press Climate (https://apnews.com/article/record-heat-deadly-climate-change-humidity-south-11de21a526e1cbe7e306c47c2f12438d)

TABLE 5.6: HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

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

Source: National Weather Service, NOAA

In addition to the direct impact excessive heat has on health, heat waves can cause air pollution levels to spike. Stagnant atmospheric conditions trap pollutants. Heat accelerates the production of ground-level ozone. Excessive heat can lead to droughts, which subsequently increase 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. Therefore, the entire Buncombe Madison Region is susceptible to extreme heat conditions.

5.4.3 Historical Occurrences

Data from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI)[9] was used to determine that there are no reported historical events of excessive heat for the Buncombe Madison Region. 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 1876. The recorded maximum for each county can be found below in **Table 5.7.**

TABLE 5.7: HIGHEST RECORDED REGIONAL TEMPERATURES

Location	Date	Temperature (°F)
Buncombe County	7/28/1952	101
Madison County	7/1/2012	104
Buncombe Madison Region Maximum Temperature	--	**104**

Source: State Climate Office of North Carolina

The State Climate Office also reports average maximum temperatures in various locations in the region. **Table 5.8** shows the average maximum temperatures by month between 1949 and 2025 from the Asheville Regional Airport observation station in Buncombe County, which can be used as a general comparison site for the region.

[9] **Note for all NOAA NCEI data**: These records represent the best available data for a variety of natural hazards and may only represent a partial total of the actual number of events occurring within a given county or planning region due to inconsistencies in collection, validation, and entry of official records. These gaps in hazard event records will be supplemented with any local information or other authoritative sources where available.

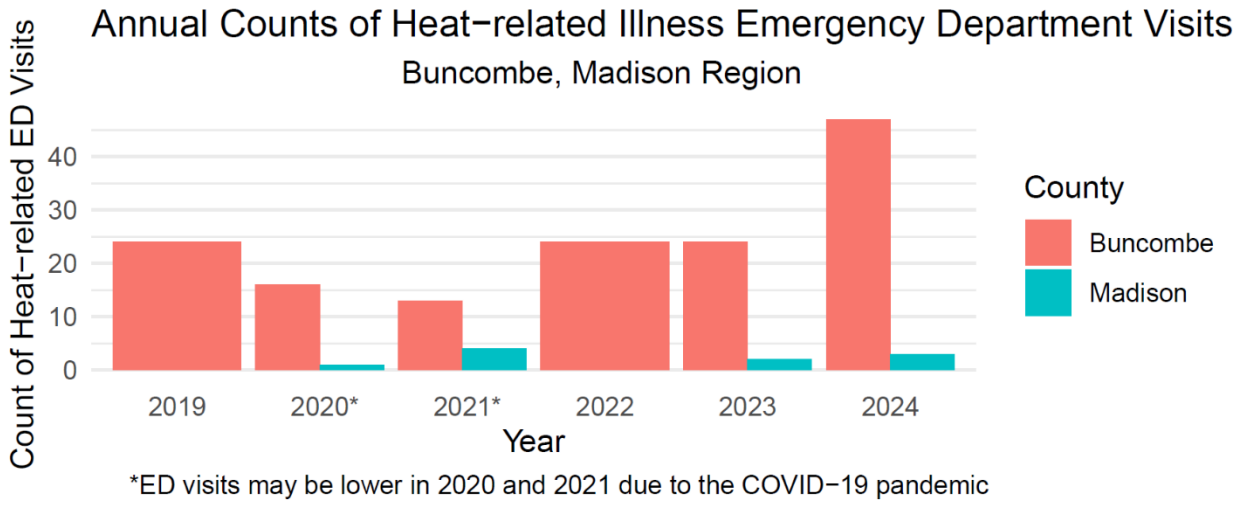
TABLE 5.8: AVERAGE MAXIMUM TEMPERATURE BY MONTH (ASHEVILLE REGIONAL AIRPORT, BUNCOMBE COUNTY)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Avg. Max (°F)	65.7	68.4	75.9	82.4	85.6	89.3	90.5	89.5	86.5	80.6	73.3	66.7

Source: State Climate Office of North Carolina

Additional data for heat-related illnesses reported in the region is discussed in detail below.

FIGURE 5.6: REGIONAL HEAT-RELATED ILLNESS



Source: North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT)

Figure 5.6 shows the annual count of emergency department visits for heat-related illness in the Buncombe Madison Region, using public health syndromic surveillance system data from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT). The annual count of emergency department visits for heat-related illness in Buncombe County ranged from 13 visits in 2021 to 47 visits in 2024. The annual count of emergency department visits for heat-related illness in Madison County ranged from 0 visits in 2019 to 4 in 2021.

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 have been consistently recorded above average since 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[10].

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 and 95°F, along with nighttime lows above

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

70°F, will increase significantly in all counties of the region, as shown in **Table 5.9**[11].

TABLE 5.9: REGIONAL EXTREME HEAT PROJECTIONS

Location	Average Number of Days each Year with Daytime Temperatures Over 90°F	
	Historical Number of Days	Projected Number of Days (2060s)
Buncombe County	4	20-31
Madison County	4	21-32
Location	**Average Number of Days each Year with Daytime Temperatures Over 95°F**	
	Historical Number of Days	Projected Number of Days (2060s)
Buncombe County	0	3-6
Madison County	0	3-7
Location	**Average Number of Days each Year with Nighttime Lows Over 70°F**	
	Historical Number of Nights	Projected Number of Days (2060s)
Buncombe County	0	6-13
Madison County	0	3-6

Source: State Climate Office of North Carolina, North Carolina Resilience Exchange

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

5.4.5 Probability of Future Occurrences

Based on historical occurrence, it is assumed that all of the Buncombe Madison Region has a probability level of likely (between 10 and 100 percent annual probability) for future excessive heat events to impact the region. As of 2025, the FEMA National Risk Index rates the heat wave hazard as “very low” in Buncombe County and no rating is provided in Madison County.

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

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 counterclockwise 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 poleward 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. Most 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 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

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

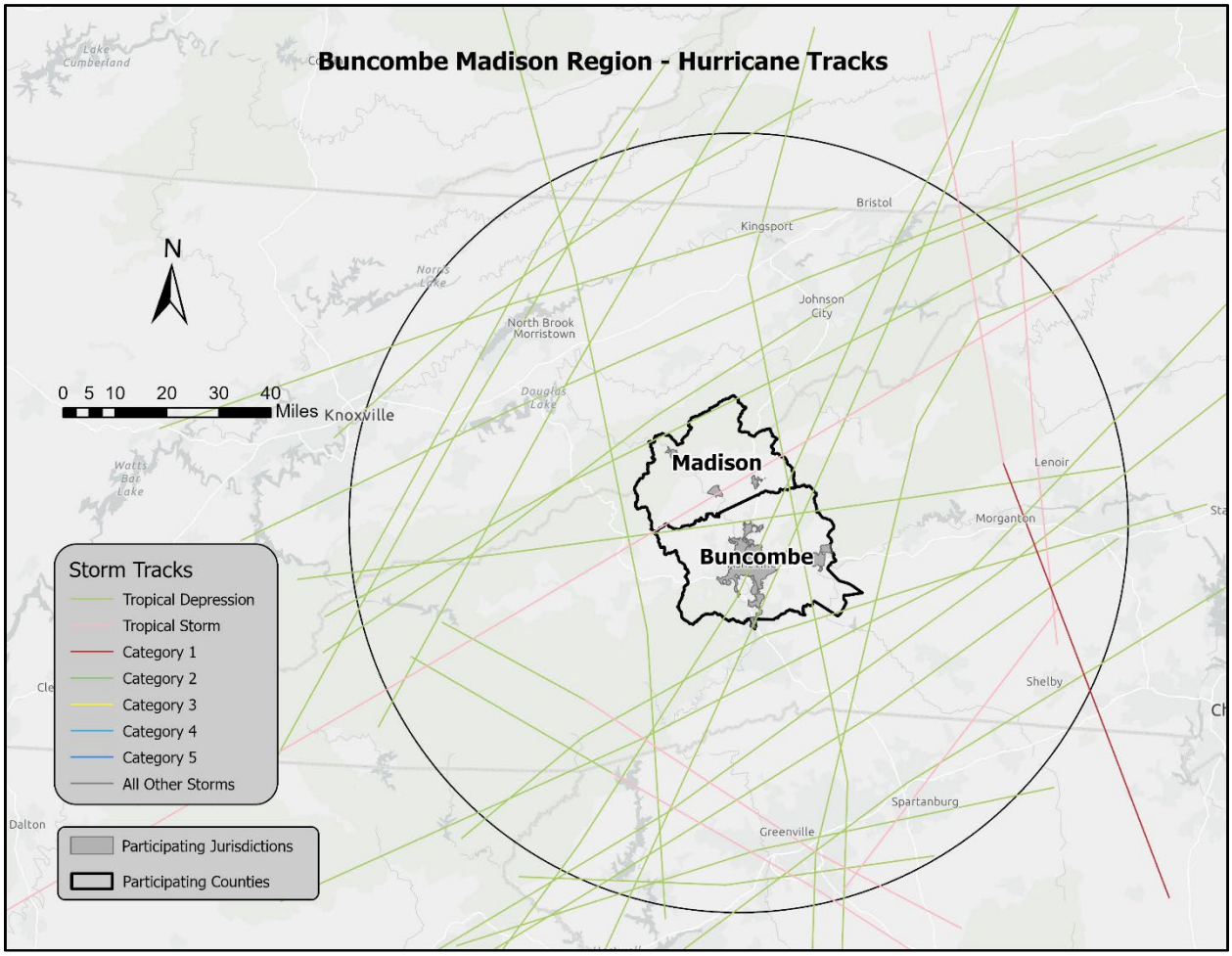
5.5.3 Historical Occurrences

According to the National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center (NHC) historical storm track records, at least 57 tropical storm tracks have passed within 75 miles of the Buncombe Madison Region since 1896.[12] This includes at least 12 tropical storms.

Of the recorded storm events, at least 5 tropical depressions traversed directly through the Buncombe Madison Region as shown in **Figure 5.7**. **Table 5.12** provides the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the Buncombe Madison Region), and maximum category of the storm based on the Saffir-Simpson Scale (e.g., Hurricane Category 1-5 = *H1* to *H5*, Tropical Storm = *TS*, and Tropical Depression = *TD*) for each event.

[12] 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: HISTORIC HURRICANE STORM TRACKS WITHIN 75 MILES



Source: NOAA, NHC

TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE BUNCOMBE MADISON REGION (1850–2025)

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category[13]
HELENE 2024	9/23/2024	120	H4
NICOLE 2022	11/6/2022	65	H1
FRED 2021	8/9/2021	55	TS
IDA 2021	8/26/2021	130	H4
ZETA 2020	10/24/2020	100	H3
FLORENCE 2018	8/30/2018	130	H4
FAY 2008	8/15/2008	60	TS
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	7/28/2003	50	TS
DANNY 1997	7/16/1997	70	H1

[13] Maximum category achieved by each storm track ranges from: Hurricane Category 1-5 = ***H1*** to ***H5***, Tropical Storm = ***TS***, and Tropical Depression = ***TD***.

Storm Name	Formation Date	Maximum Wind Speed (knots)	Maximum Storm Category[13]
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
DANNY 1985	8/12/1985	80	H1
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
GRACIE 1959	9/20/1959	115	H4
UNNAMED 1952	8/27/1952	45	TS
UNNAMED 1949	8/23/1949	115	H4
UNNAMED 1940	8/5/1940	85	H2
UNNAMED 1932	10/7/1932	60	TS
UNNAMED 1928	8/7/1928	80	H1
UNNAMED 1928	8/3/1928	90	H2
UNNAMED 1916	7/11/1916	100	H3
UNNAMED 1915	7/31/1915	65	H1
UNNAMED 1913	8/30/1913	75	H1
UNNAMED 1911	8/23/1911	85	H2
UNNAMED 1907	9/18/1907	40	TS
UNNAMED 1906	9/3/1906	80	H1
UNNAMED 1905	10/5/1905	45	TS
UNNAMED 1902	10/3/1902	90	H2
UNNAMED 1901	9/21/1901	45	TS
UNNAMED 1896	7/4/1896	85	H2
UNNAMED 1886	6/17/1886	85	H2
UNNAMED 1882	9/2/1882	110	H3
UNNAMED 1859	9/15/1859	70	H1

Source: NOAA, NHC

Federal records indicate that six disaster declarations were made in 1996 (Hurricane Fran), 2004 (Hurricane Frances), 2004 (Hurricane Ivan), 2020 (Hurricane Isaias), 2022 (Hurricane Ian), and 2024 (Hurricane Helene) for the region.[14]

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in the Buncombe Madison Region. Most events do not carry winds that are above those of the winter storms and straight-line winds received by the Buncombe Madison Region. Some anecdotal information is available about the major storms that have impacted the planning area, as found below:

The Great Flood of 1916 – June and July 1916
Prior to Helene, the Great Flood of 1916 was the storm of record for the region. Back to back tropical systems produced historic flooding along the French Broad River and other low-lying areas of the region. Altapass, NC measured 22.22 inches of rain from July 15 to July 16. Much of Buncombe County saw between 10-15 inches of rain, with greater amounts reported locally. Significant property, infrastructure and loss of life (more than 80 people were killed) was experienced as a result of these tropical systems.

[14] Not all 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*.

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 of more than 18 inches. Wind gusts reached between 40 and 60 mph along the Appalachian Mountains, and numerous trees were downed. Frances caused significant crop damage, 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.

Hurricane Florence – September 12-15, 2018
Hurricane Florence was a long-lived Cape Verde hurricane and the wettest tropical cyclone on record in the Carolinas. As the storm moved over North Carolina, it caused record breaking storm surge of 9 to 13 feet and rainfall across the state of 20 to 30 inches, which produced catastrophic and life-threatening flooding. North Carolina reported 42 fatalities due to the hurricane and preliminary damage estimates of $16.7 billion.

Hurricane Isaias – July 31-August 4, 2020
Hurricane Isaias made landfall as a Category 1 hurricane on the night of August 3 in Ocean Isle Beach, North Carolina, with sustained winds of 85 mph. The storm's quick passage reduced rainfall totals, but it caused substantial storm surge flooding along the coastline and created many tornadoes in eastern North Carolina. Hundreds of thousands of people were affected by widespread power outages, and debris clearance and road repairs were needed throughout coastal regions. The Small Business Administration also granted catastrophe loans to impacted households and businesses.

Hurricane Ian – September 28-October 4, 2022
After hitting Florida, Hurricane Ian moved north and most affected North Carolina as a Category 1 hurricane on September 30, when it made landfall along the coast of South Carolina. Persistent northeastern winds, coastal flooding, and storm surge inundation of 2-4 feet above ground were all experienced in Eastern North Carolina, particularly along the Outer Banks and tidal rivers. On October 1, 2022, the President issued an emergency declaration, providing federal support for emergency protective measures. The amount of public assistance required for emergency work totaled over $636.8 million.

Hurricane Helene[15] – September 24-September 29, 2024
In late September 2024, Hurricane Helene made landfall in Florida as a Category 4 hurricane, before moving further into the Southeast U.S. and causing devastating flooding, landslides, and extensive

[15] More information about the impacts of this event and subsequent response efforts is available through the NCEM *Helene Retrospective Dashboard* (https://experience.arcgis.com/experience/7892f669bb0e442981b15009c7f2b5f0/page/Helene-Retrospective?views=Home)

damage throughout the counties of Western North Carolina. In some places, rainfall topped 30+ inches, resulting in deadly landslides in the Appalachian Mountains and historic riverine flooding. Over one million people lost electricity due to high winds that reached speeds of over 80 mph, which brought down entire mountainsides of trees. In addition to destroying many residences across the mountains, the storm also damaged vital infrastructure, such as water systems, highways, and bridges. Helene was the most severe storm in North Carolina's history, resulting in approximately 107+ fatalities[16], damage to 125,000+ housing units, and an estimated $59+ billion in total damage statewide[17]. On September 28, 2024, a major disaster declaration for federal government assistance was issued, encompassing 39 counties.

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 from the late 1990s through today have been notably active in terms of hurricane formation and local damage, including Hurricanes Dennis, Floyd, Frances, Ivan, Matthew, Florence, and Helene. 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[18].

5.5.5 Probability of Future Occurrences

Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane), which may result in flooding or high winds. The probability of being impacted is less than in coastal areas, but it remains a real threat to the Buncombe Madison Region due to subsequent compounding hazards such as flooding and landslides. Based on historical evidence and recent events, the probability level of future occurrences is considered likely (between 10 and 100 percent annual probability). Given the regional nature of the hazard, all areas are equally exposed to this hazard. However, if and when the region is affected, the damage could be catastrophic, threatening lives and property throughout the planning area. As of 2025, the FEMA National Risk Index rates the hurricane hazard as “relatively low” in Buncombe County and “very low” in Madison County.

[16] Fatalities by county in North Carolina were highest in Buncombe County for this event. **Additionally, more information about regional impacts for this event can be found in the plan appendices.**

[17] National Weather Service (https://www.nhc.noaa.gov/data/tcr/AL092024_Helene.pdf) and North Carolina Office of State Budget and Management (https://www.osbm.nc.gov/hurricane-helene-dna/open)

[18] 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.

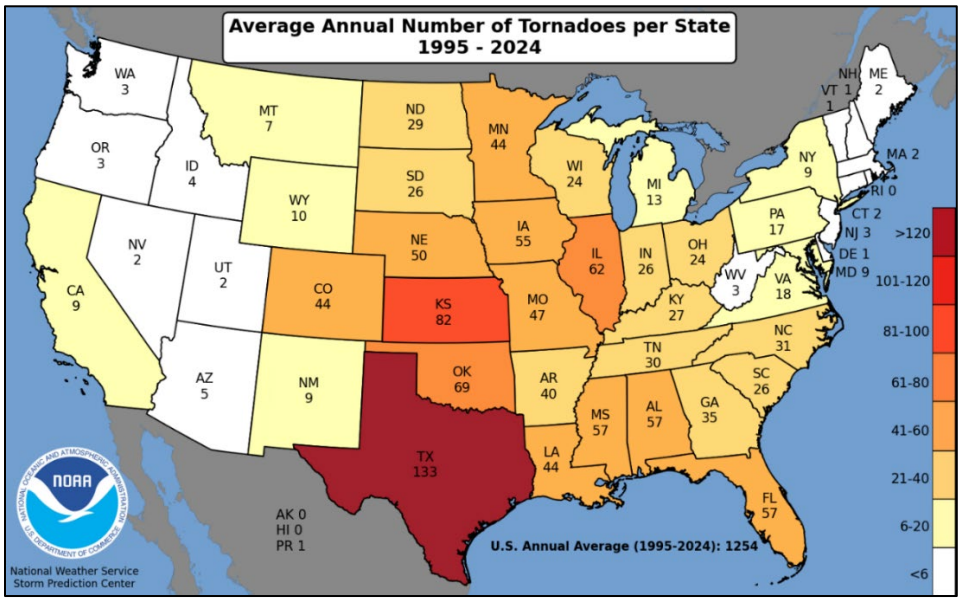
5.6.1 Background and Description

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 56 deaths and 1,500 injuries[19].

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 the average annual tornado activity in the United States per state (1995-2024).

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

[19] NOAA, 2013.

in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes before 2005 were determined using the traditional version of the Fujita Scale (**Table 5.13**). However, tornado magnitudes from 2005 onward have been determined using the Enhanced Fujita Scale (**Table 5.14**).

TABLE 5.13: THE FUJITA SCALE (EFFECTIVE BEFORE 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 signboards.
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-reinforced 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 winds 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 signboards.
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.

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
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-reinforced concrete structures badly damaged.

Source: National Weather Service

Thunderstorms

Thunderstorms can produce a variety of accompanying hazards, including wind, hailstorms, and lightning[20], 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 is 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 individually, 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 Buncombe Madison Region. Therefore, high winds are also reported in this section. High winds can form due to pressure systems of the Northeast coast that combine with strong pressure moving through the Ohio Valley. This creates a tight pressure gradient across the region, resulting in high winds that 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

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

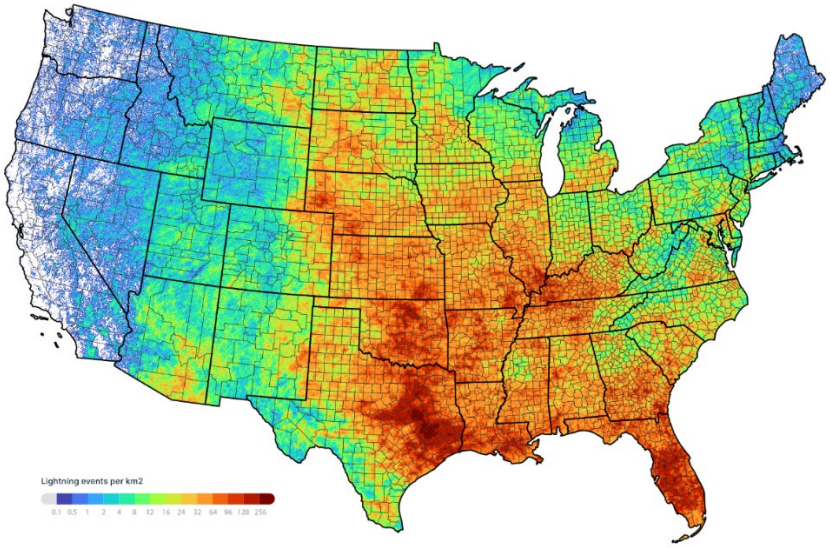
minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

Lightning

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

Figure 5.9 shows a lightning flash density map for the years 2016-2024 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.9: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala U.S. National Lightning Detection Network

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

Hailstorms

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter.

The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.15** shows the TORRO Hailstorm Intensity Scale, which is a way of measuring hail severity.

TABLE 5.15: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-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 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 (http://www.torro.org.uk/site/hscale.php)

5.6.2 Location and Spatial Extent

Tornadoes

Tornadoes occur throughout the state of North Carolina, and thus in the Buncombe Madison 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 Buncombe Madison 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 Buncombe Madison Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the Buncombe Madison Region has uniform exposure to a thunderstorm/wind event, and the spatial extent of an impact could be large.

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 Buncombe Madison Region is uniformly exposed to lightning.

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

5.6.3 Historical Occurrences

Tornadoes
Tornadoes are a fairly rare occurrence in mountainous areas. However, they have and do occur in the Buncombe Madison Region. Tornadoes have resulted in major disaster declarations in the Buncombe Madison Region in 2020.[21] According to the National Centers for Environmental Information (NCEI) Storm Events Database, there have been a total of at least 12 recorded tornado events in the Buncombe Madison Region between January 1976 and June 2025 (**Table 5.16**), resulting in over $6.8 million (2025 dollars) in property damage.[22] In addition, 5 injuries were reported. The magnitude of these tornadoes ranges from F0 to F1 in intensity, although an F2 through F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the years.

TABLE 5.16: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2025)
Buncombe County	**7**	**0/0**	**$4,010,966**
Asheville	2	0/0	$561,937
Biltmore Forest	0	0/0	$0
Black Mountain	0	0/0	$0
Montreat	0	0/0	$0
Weaverville	0	0/0	$0
Woodfin	0	0/0	$0
Unincorporated Area	5	0/0	$3,449,029
Madison County	**5**	**0/5**	**$2,813,861**
Hot Springs	0	0/0	$0
Marshall	0	0/0	$0
Mars Hill	0	0/0	$0
Unincorporated Area	5	0/5	$2,813,861
BUNCOMBE MADISON REGION TOTAL	**12**	**0/5**	**$6,824,827**

Source: National Centers for Environmental Information (NCEI)

Thunderstorms
Severe storms resulted in multiple major disaster declarations in the Buncombe Madison Region in 1973, 1977, 1995, 1998, 2013, and 2020.[23] According to NCEI records, there have been at least 389

[21] A complete list of historical disaster declarations can be found in Section 4: *Hazard Identification*.
[22] 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 Buncombe Madison Region. As additional local data becomes available, this hazard profile will be amended.
[23] A complete list of historical disaster declarations can be found in Section 4: *Hazard Identification*.

reported thunderstorm and high wind events between January 1959 and June 2025 in the Buncombe Madison Region.[24] These events caused over $7.2 million (2025 dollars) in property damage. There were reports of at least 9 injuries and 2 fatalities. **Table 5.17** summarizes this information.

TABLE 5.17: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2025 dollars)
Buncombe County	**253**	**2/9**	**$4,970,160**
Asheville	27	0/1	$462,113
Biltmore Forest	0	0/0	$0
Black Mountain	4	0/0	$$1,805
Montreat	2	0/0	$0
Weaverville	16	0/1	$$16,249
Woodfin	4	0/3	$0
Unincorporated Area	200	2/6	$4,508,047
Madison County	**136**	**0/0**	**$2,255,479**
Hot Springs	10	0/0	$0
Marshall	20	0/0	$32,222
Mars Hill	10	0/0	$3,438
Unincorporated Area	62	0/0	$2,219,819
BUNCOMBE MADISON REGION TOTAL	**389**	**2/9**	**$7,225,639**

Source: National Centers for Environmental Information (NCEI)

Lightning

According to NCEI records, there have been at least 17 recorded lightning events in the Buncombe Madison Region between January 1950 and June 2025.[25] These events resulted in at least 2 deaths, 7 injuries, and over $885,000 (2025 dollars) in property damage, as listed in summary **Table 5.18**.

Many of the reported events are those that caused significant impacts or damage as reported by authoritative sources, and it should be expected that total damage in the region is likely much higher for this hazard than what is reported.

TABLE 5.18: SUMMARY OF LIGHTNING OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2025 dollars)
Buncombe County	**14**	**1/7**	**$490,693**
Asheville	4	0/6	$101,025
Biltmore Forest	0	0/0	$0
Black Mountain	1	0/0	$0
Montreat	0	0/0	$0
Weaverville	1	0/1	$0
Woodfin	0	0/0	$0
Unincorporated Area	8	1/0	$389,668

[24] These thunderstorm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is extremely likely that additional thunderstorm events have occurred in the Buncombe-Madison Region. As additional local data becomes available, this hazard profile will be amended.

[25] These lightning events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is extremely likely that additional lightning events have occurred in the Buncombe Madison Region. As additional local data becomes available, this hazard profile will be amended.

Madison County	**3**	**1/0**	**$394,562**
Hot Springs	0	0/0	$0
Marshall	1	0/0	$18,071
Mars Hill	1	0/0	$376,490
Unincorporated Area	1	1/0	$0
BUNCOMBE MADISON REGION TOTAL	**17**	**2/7**	**$$885,255**

Source: National Centers for Environmental Information (NCEI)

Hailstorm

According to NCEI records, at least 202 recorded hailstorm events have affected the Buncombe Madison Region between January 1962 and June 2025.[26] **Table 5.19** is a summary of the hail events in the Buncombe Madison Region. In all, hail occurrences resulted in over $45,000 (2025 dollars) in property damage, most of which was reported in Madison County. Hail ranged in diameter from 0.25 inches to 2.0 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment, so it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

TABLE 5.19: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2025)
Buncombe County	**128**	**0/0**	**$9,147**
Asheville	34	0/0	$0
Biltmore Forest	1	0/0	$0
Black Mountain	11	0/0	$0
Montreat	3	0/0	$0
Weaverville	21	0/0	$0
Woodfin	1	0/0	$0
Unincorporated Area	57	0/0	$$9,147
Madison County	**74**	**0/0**	**$$36,108**
Hot Springs	3	0/0	$0
Marshall	22	0/0	$$36,108
Mars Hill	12	0/0	$0
Unincorporated Area	4	0/0	$0
BUNCOMBE MADISON REGION TOTAL	**202**	**0/0**	**$45,255**

Source: National Centers for Environmental Information (NCEI)

5.6.4 Changing Future Conditions

Tornadoes are among the most difficult hazards to link definitively with climate change, partially because they are both relatively small and short-lived events when compared to wildfires, heat waves, and other climate disasters with a larger temporal and/or spatial distribution. However, the clustering of tornado systems has appeared to increase in recent years despite few changes in the total number of systems observed[27]. 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

[26] 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 Buncombe-Madison Region. In addition to NCEI, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

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

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 Buncombe Madison 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[28].

5.6.5 Probability of Future Occurrences

Tornadoes

Tornadoes occur throughout the State of North Carolina, including the Buncombe Madison Region. Tornadoes typically impact a relatively small area, but damage from a single event may be catastrophic and 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 Buncombe Madison Region is uniformly exposed to this hazard. The probability of future tornado occurrences affecting the Buncombe Madison Region is considered possible (1 to 10 percent annual probability). As of 2025, the FEMA National Risk Index rates the tornado hazard as "relatively moderate" in Buncombe County and "very low" in Madison County.

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 Buncombe Madison Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the Buncombe Madison Region has uniform exposure to a thunderstorm/wind event. Given the high number of previous events, it is certain that wind events, including straight-line winds and thunderstorm winds, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future events in the planning area. As of 2025, the FEMA National Risk Index rates the strong wind hazard as "relatively high" in Buncombe County and "relatively low" in Madison County.

Lightning

Although there were not a high number of historical lightning events reported throughout the Buncombe Madison Region via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though not all events will cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), the Buncombe Madison Region is in an area of the country that experienced an average of 8-16 lightning flashes per square kilometer per year between 1997 and 2024. Therefore, the probability of future events is considered highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause property damage throughout the region. As of 2025, the FEMA National Risk Index rates the lightning hazard as "very high" in Buncombe County and "relatively moderate" in Madison 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

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

thunderstorms), it is assumed that the entire Buncombe Madison Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause property damage and vehicle damage throughout the region. As of 2025, the FEMA National Risk Index rates the hail hazard as "relatively moderate" in Buncombe County and "very low" in Madison County.

5.7 SEVERE WINTER WEATHER

5.7.1 Background and Description

Severe winter weather can range from 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 damage, 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 or 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 winter storm elements (snow, low temperatures, sleet, ice, etc.) have the potential to pose significant hazards to communities. Even small accumulations can down power lines and tree 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 storms 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 Buncombe Madison Region is accustomed to severe winter weather conditions and frequently 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 Buncombe Madison Region. This includes the Blizzard of 1996, one subsequent 1996 winter storm, and a severe winter storm in 2010.[29] According to NCEI records, there have been at least 609 recorded winter storm events in the Buncombe

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

Madison Region between January 1996 and June 2025 (**Table 5.20**).[30] These events resulted in over $125,000 (2020 dollars) in property damage.

TABLE 5.20: SUMMARY OF WINTER STORM EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage (2020 dollars)
Buncombe County	**283**	**0/0**	**$125,146**
Asheville	0	0/0	$0
Biltmore Forest	0	0/0	$0
Black Mountain	0	0/0	$0
Montreat	0	0/0	$0
Weaverville	0	0/0	$0
Woodfin	0	0/0	$0
Unincorporated Area	283	0/0	$125,146
Madison County	**326**	**0/0**	**$0**
Hot Springs	0	0/0	$0
Marshall	0	0/0	$0
Mars Hill	0	0/0	$0
Unincorporated Area	326	0/0	$0
BUNCOMBE MADISON REGION TOTAL	**609**	**0/0**	**$125,146**

Source: National Centers for Environmental Information (NCEI)

There have been several severe winter weather events in the Buncombe Madison Region. The text below describes one of the major events and associated impacts on the Region. Winter storms and other severe winter weather events throughout the planning area may have multiple detrimental effects on communities, including spikes in hypothermia, the 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.

1996 Winter Storm

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

2010 Winter Storm

The storm came in two different parts: the first part of the storm produced between 3 and 7 inches of snow across the western and northern portions of the central North Carolina Piedmont during the afternoon and evening of December 25th; the latter part generally produced between 4 and 12 inches of snow. North Carolina was one of six states where a state of emergency was declared due to the storm.

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[31]. The increased

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

[31] NOAA Winter 2022 Climate Report (https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202202)

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[32].

5.7.5 Probability of Future Occurrences

Severe winter weather events will remain a threat and regular occurrence in the Buncombe Madison Region due to the region's location, elevation, and climate profile. According to historical information, the Buncombe Madison Region experiences multiple severe winter weather and winter storm events each year. Therefore, the probability of future occurrences is considered highly likely (100 percent annual probability). As of 2025, the FEMA National Risk Index rates the winter weather hazard as "relatively moderate" in Buncombe County and "relatively low" in Madison County.

[32] U.S. Climate Resilience Toolkit, Southeast (https://toolkit.climate.gov/regions/southeast)

5.8 EARTHQUAKES

5.8.1 Background and Description

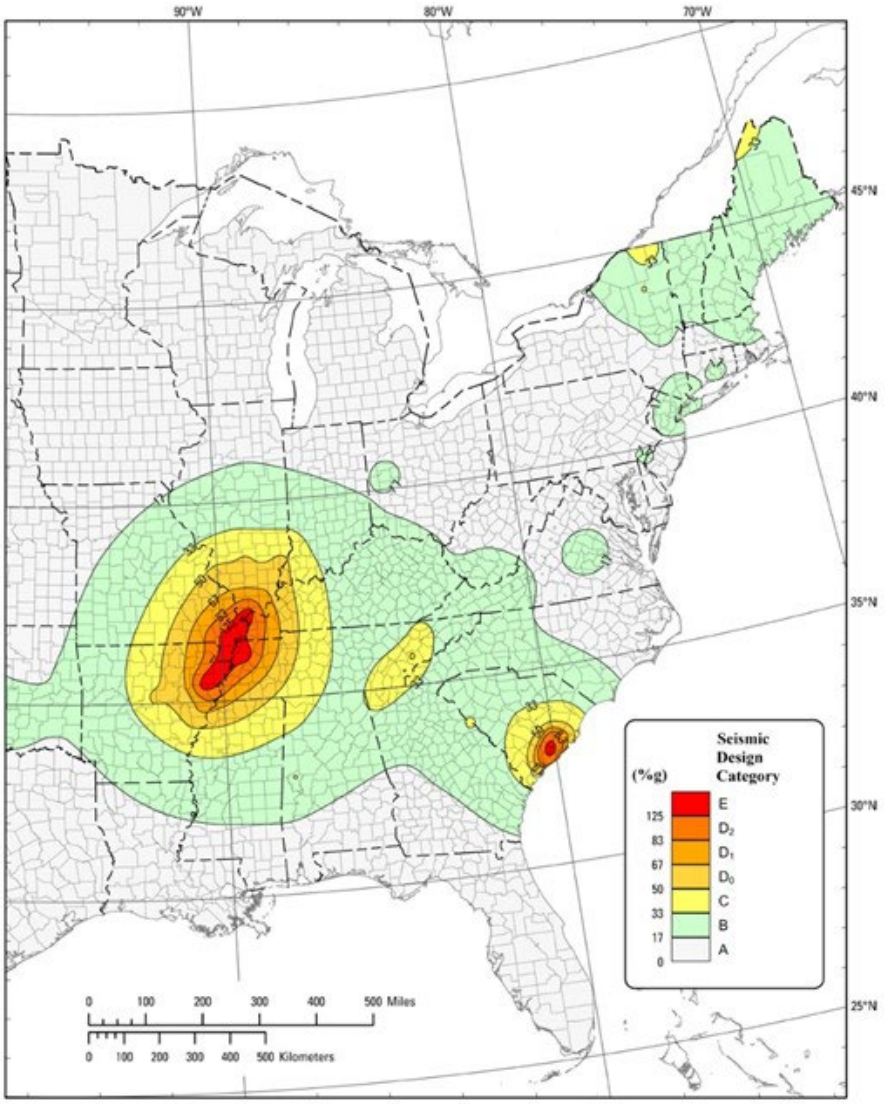
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured 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 quicksand. In the case of liquefaction, anything relying on the substrate for support can shift, tilt, rupture, or collapse.

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

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United States does face a moderate risk of less frequent, less intense earthquake events. **Figure 5.10** shows the relative seismic risk for the Eastern United States.

FIGURE 5.10: EASTERN UNITED STATES EARTHQUAKE HAZARD MAP



SEISMIC DESIGN CATEGORIES FOR DEFAULT SITE CONDITIONS
FOR THE CONTERMINOUS UNITED STATES (EASTERN)

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 shockwave 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 FOR EARTHQUAKES

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

Source: Federal Emergency Management Agency

TABLE 5.22: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

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

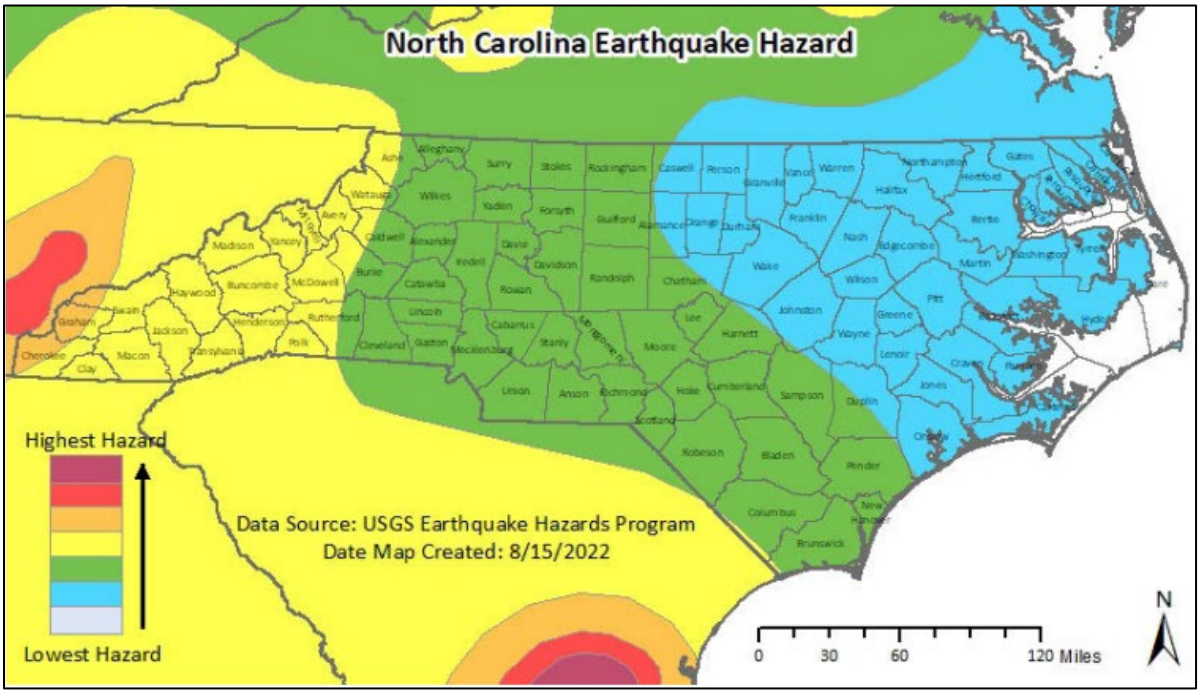
Source: Federal Emergency Management Agency

5.8.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast regions most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and the New Madrid Fault in Tennessee. Both 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.

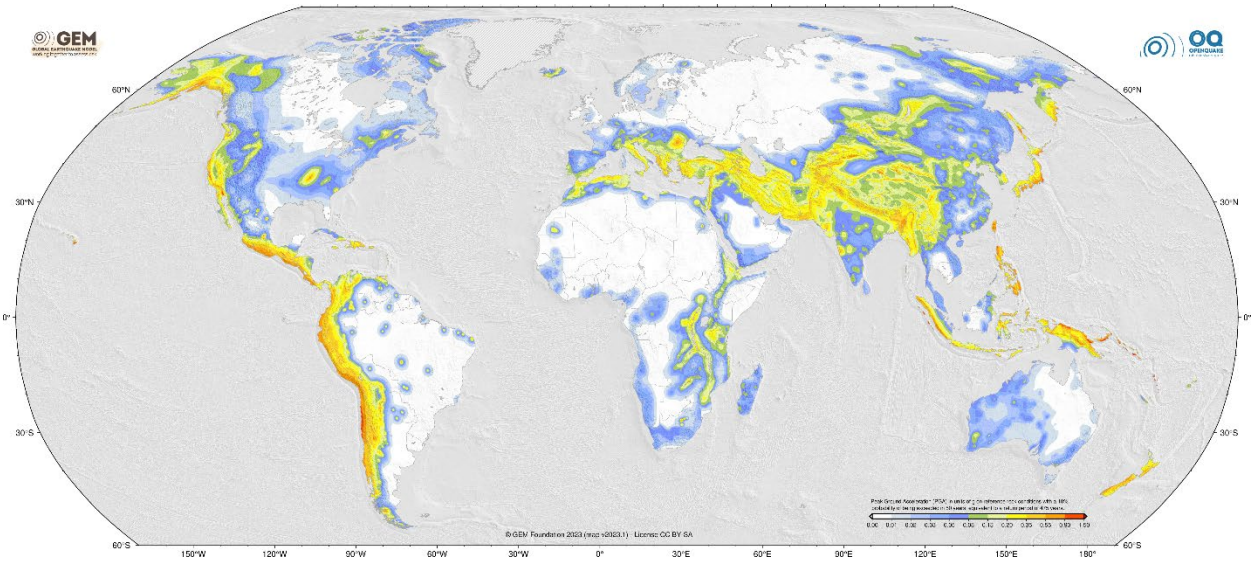
FIGURE 5.11: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.12 shows the intensity level associated with the Buncombe Madison Region, based on the national USGS map of peak ground acceleration (PGA) with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, most of the Buncombe Madison Region lies within an approximate zone of level "5-6" peak ground acceleration, with a small portion being located in the "4-5" zone. This indicates that the overall region exists within an area of 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 54 earthquakes are known to have occurred in the Buncombe Madison Region since 1960. The strongest of these measured a VII on the Modified Mercalli Intensity (MMI) scale. **Table 5.23** provides a summary of earthquake events reported by the United States Geological Survey between 1638 and 1985.

TABLE 5.23: SUMMARY OF SEISMIC ACTIVITY IN THE BUNCOMBE MADISON REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Buncombe County	**37**	**VII**	**< 6.1**
Asheville	27	VII	< 6.1
Biltmore Forest	-	-	-
Black Mountain	3	II	< 4.2
Montreat	5	V	< 4.8
Weaverville	2	VI	< 5.4
Woodfin	0	-	-
Unincorporated Area	0	-	-
Madison County	**17**	**VI**	**< 5.4**
Hot Springs	4	IV	< 4.8
Marshall	8	VI	< 5.4
Mars Hill	5	V	< 4.8
Unincorporated Area	0	-	-
BUNCOMBE MADISON REGION TOTAL	**54**	**VII**	**< 6.1**

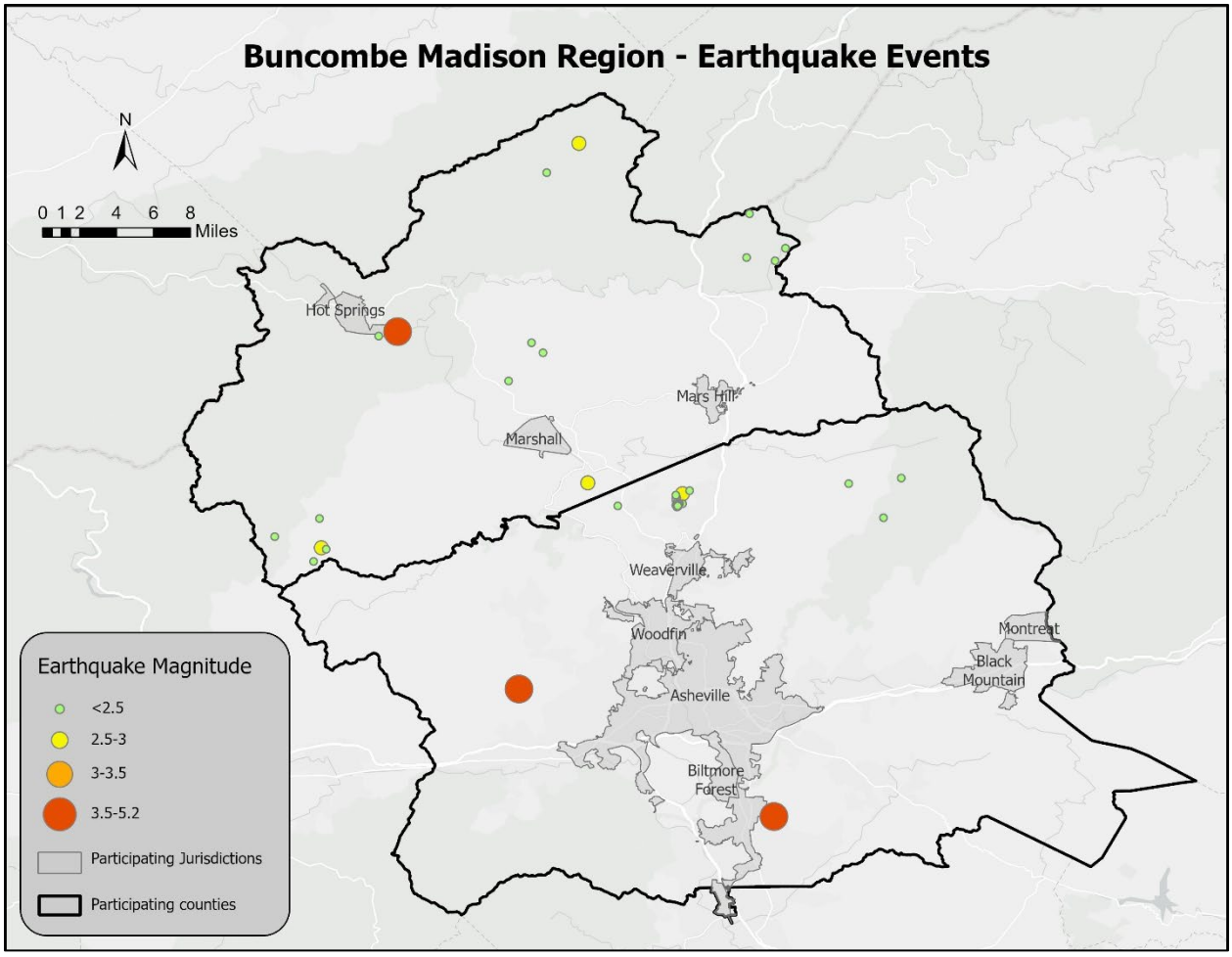
Source: USGS, NCEI

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

Figure 5.13 below shows the historical epicenter points where earthquakes have occurred throughout

the Buncombe Madison Region between 1960 and 2025.

FIGURE 5.13: HISTORIC EARTHQUAKE EVENTS (1960-2025)



Source: USGS

The most recent earthquake to directly impact this region occurred in October 2025, about 7 km northwest of Weaverville, with a magnitude of 2.09. Another significant event in recent history was the 2020 Sparta earthquake. A narrative discussion about this earthquake can be found below.

Sparta Earthquake (August 9, 2020)
According to the National Weather Service, the 5.2 magnitude earthquake was the second strongest earthquake to occur in North Carolina since 1900. There were no immediate reports of injuries from this earthquake. Before the 5.1 earthquake, five other minor earthquakes were measured in the area. Although there were no reports of injuries or deaths associated with the earthquake, there was extensive property damage reported across Sparta and across Alleghany County. Over 525 damage reports were filed with Alleghany County officials. People felt the effects of the earthquake across the Carolinas, in Virginia, Georgia, and Tennessee.

In addition to those earthquakes specifically affecting the Buncombe Madison 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 N.C.

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
08/09/2020	Sparta, NC	5.1	VII	VII

*This event is accounted for in the Buncombe Madison occurrences.

** Conflicting reports on this event, intensity in North Carolina could have been either V or 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[33]. Although strong earthquakes are rare in North Carolina, there have still been several notable events recorded across susceptible regions of the state within the last 100 years alone. A single event of magnitude 5 or greater can easily cut off critical infrastructure around the mountains and cause residual structural damage over a large area. Current building and development practices may account for this hazard in their designs, but significant portions of existing development, especially in more rural or older areas, will remain vulnerable to earthquakes without any new structural interventions. Earthquakes are primarily influenced by tectonic processes, and although they could potentially be affected by climate factors

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

such as droughts, these connections remain unclear[34].

5.8.5 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Buncombe Madison Region is unlikely. However, it is likely that future earthquakes resulting in light to moderate perceived shaking and damage ranging from none to very light will affect the region. The probability of earthquakes in the region is estimated to be likely (10 to 100 percent annual probability). The USGS also uses historical data to predict the probability of a major earthquake within the next 50 years by county, and the probability for Buncombe County is approximately 3.42% compared to approximately 4.11% for Madison County. As of 2025, the FEMA National Risk Index rates the earthquake hazard as "relatively low" in Buncombe County and "very low" in Madison County.

[34] 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)

5.9 GEOLOGICAL (LANDSLIDES)

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

5.9.1 Background and Description

Landslide

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 environmental changes, including heavy rain, rapid snowmelt, 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 topples, 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, 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 mudflows spread over a broad area where they can accumulate in thick deposits.

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

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

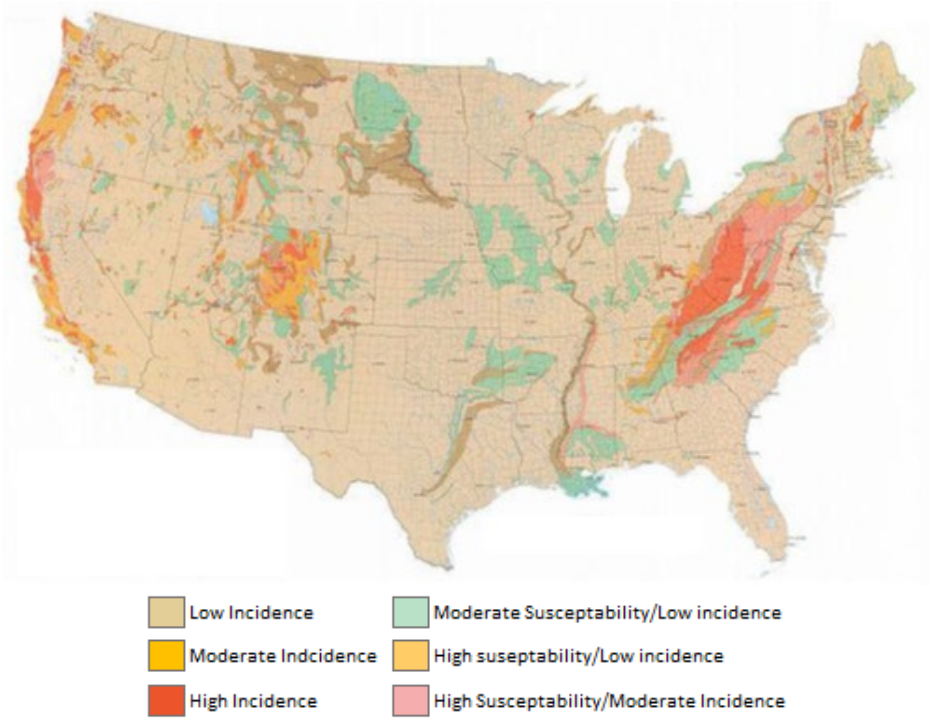
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved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

According to the United States Geological Survey, each year landslides cause $5.1 billion (2009 dollars) in damage and between 25 and 50 deaths in the United States.[35] **Figure 5.14** delineates areas where

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

large numbers of landslides have occurred and areas that are susceptible to landslides in the conterminous United States.[36]

FIGURE 5.14: LANDSLIDE OVERVIEW MAP



Source: United States Geological Survey

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 commonly where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big. If there is not enough support for the land above the empty spaces, then a sudden collapse of the land surface can occur. These collapses can be small, or, as **Figure 5.15** below shows, they can be huge and can occur where a house or road is on top[37].

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

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

FIGURE 5.15: 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 geological, 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 increase enough to cause movement of the streambed and bank soils. Major storms, such as 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, and climate/rainfall. Soils composed of a large percentage of silt and fine sand are most susceptible to erosion. As the clay and organic content of these soils increase, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse-gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area, including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion.

Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

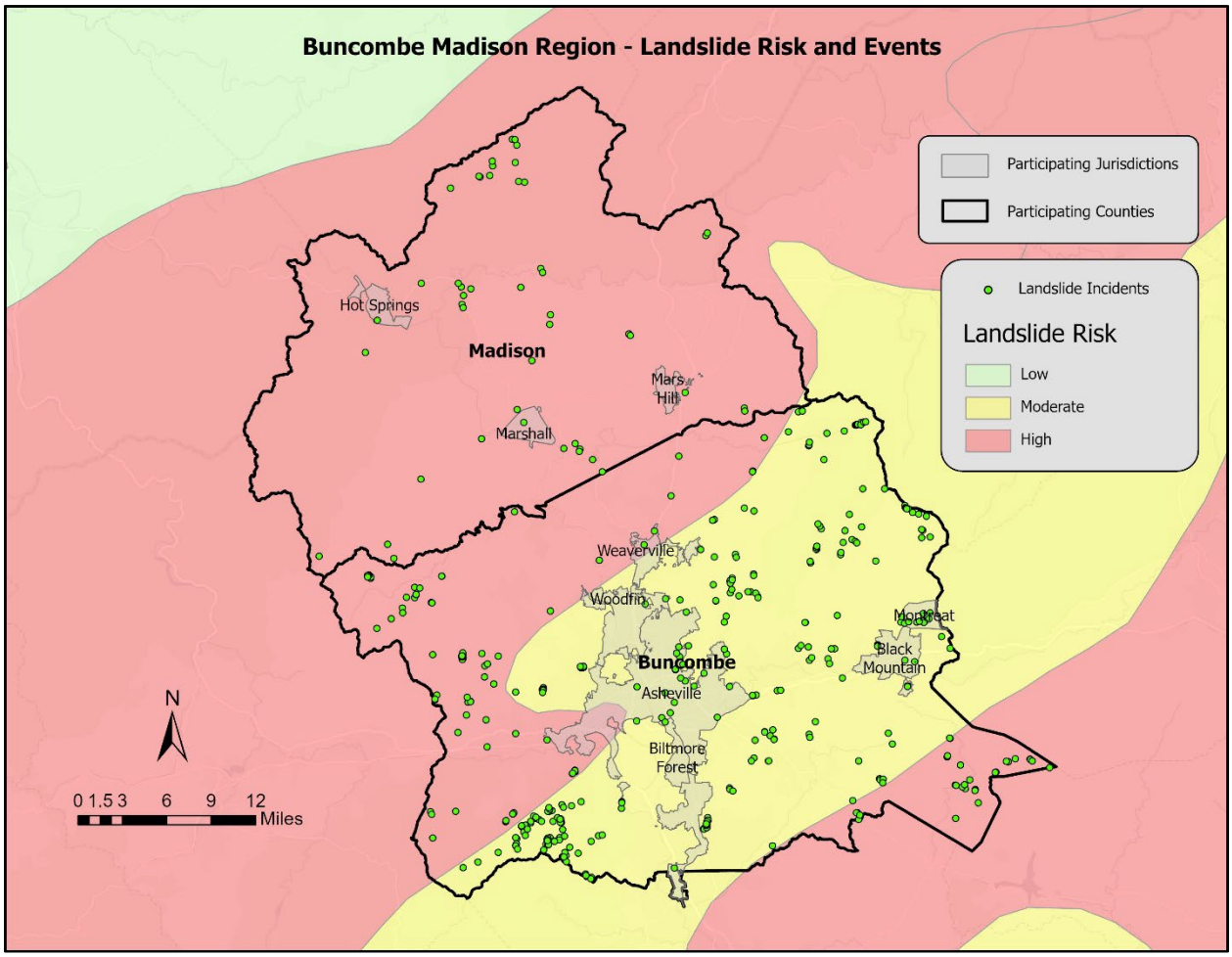
During the past 20 years, the importance of erosion control has gained increased attention from the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due 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 are possible throughout the Buncombe Madison Region. However, some areas may experience more landslide activity than others. According to **Figure 5.16** below, landslide activity is primarily concentrated in various areas of Buncombe County, although Madison County carries a high risk throughout most of its area as well.

FIGURE 5.16: LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP



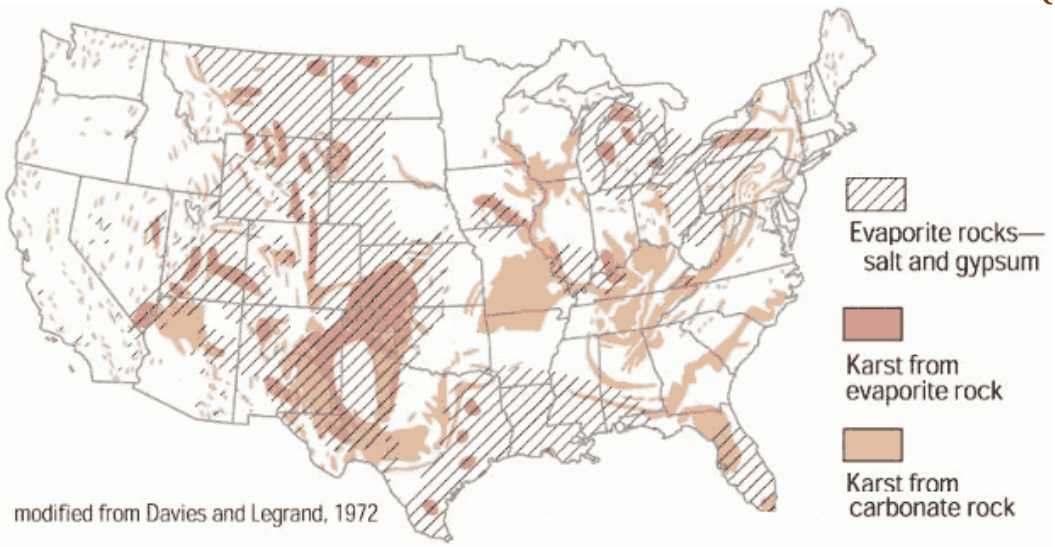
Source: United States Geological Survey

Sinkholes

Figure 5.17 below shows areas of the United States where certain rock types that are susceptible to dissolution in water occur. In these areas, underground cavities can form, which may subsequently lead

to catastrophic sinkholes. 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 5.17: UNITED STATES GEOLOGICAL SURVEY OF KARST FEATURES (1972)



Erosion

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

5.9.3 Historical Occurrences

Landslides

Steep topography throughout the Buncombe Madison Region makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that were not previously possible also contributes to risk. **Table 5.25** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey through September 2024[38]. Some incidence mapping has also been completed throughout the western portions of North Carolina in recent years, though it is not fully complete and continues to be updated. Therefore, it should be noted that many more incidents are likely to have occurred in both counties compared to what is reported.

[38] It should be noted that the North Carolina Geological Survey (NCGS) continues to improve and update its landslide databases. Therefore, there may be additional historical landslide occurrences not previously reported. Furthermore, dates were not included for all events. The earliest date reported was 1940. No damage information was provided by NCGS.

TABLE 5.25: SUMMARY OF LANDSLIDE ACTIVITY INCIDENTS

Location	Number of Occurrences
Buncombe County	**398**
Asheville	18
Biltmore Forest	1
Black Mountain	5
Montreat	12
Weaverville	1
Woodfin	1
Unincorporated Area	360
Madison County	**60**
Hot Springs	1
Marshall	1
Mars Hill	0
Unincorporated Area	58
BUNCOMBE MADISON REGION TOTAL	**458**

Source: North Carolina Geological Survey, September 2024

Hurricane Helene – September 24-September 29, 2024
Hurricane Helene caused catastrophic flooding across Western North Carolina, which led to many severe geological hazard events (e.g., landslides and mudflows) triggered by widespread heavy rain and soil erosion. According to landslide inventory analysis from the National Aeronautics and Space Administration (NASA), over 2,200 landslides were reported in North Carolina (concentrated east of the Appalachian Mountains from Asheville, NC to Johnson City, TN) by the U.S. Geological Survey[39]. Approximately 1,300 of these landslides directly impacted various roads, structures, and river flow regimes. Massive amounts of debris were also washed out across Western North Carolina, along with widespread losses of topsoil, trees, and other natural resources that contribute to slope stabilization.

Historical Landslide Events (2000s-2010s)
The National Centers for Environmental Information (NCEI) has previously reported at least three significant landslide events that took place in the Buncombe Madison Region between September 2004 and July 2005, as described below.

Buncombe County — September 8, 2004
Flooding began during the late afternoon across the county and gradually worsened during the evening and overnight hours, with near-record flooding observed along the Swannanoa and French Broad Rivers. Most valley communities across the county were affected by severe flooding along the rivers or along smaller streams. Flooding along the Swannanoa devastated Asheville's Biltmore area, as well as the Black Mountain and Swannanoa communities. Numerous businesses and residences were damaged or destroyed by floodwater. Widespread damage to roads and bridges also occurred, either due to flooding or landslides. Resulting landslides caused $13,047,732 (2013 dollars) of property damage in Buncombe County.

Buncombe County — September 17, 2004
After many hours of moderate to heavy rainfall, gradual rises on creeks and streams resulted in the second devastating flood across the county in just 9 days. Flooding first began around Candler but

[39] NASA. (2025). *Landslide Risks and Impacts – A Case Study of 2024's Hurricane Helene*. https://www.earthdata.nasa.gov/dashboard/stories/landslides-helene

eventually affected every valley community in the county. Flooding was more widespread than during the Frances flood but was not quite as severe. Virtually every stream in the county flooded, including the French Broad River. Two males, ages 32 and 28, died in Leicester when they attempted to cross a flooded area in a pickup truck. Hundreds of roads were flooded, and the bridge over Highway 197 in Barnardsville was washed out. The French Broad flooded the studios and other businesses in the River District in downtown Asheville. At Enka, a motel was flooded, which necessitated the rescue of 40 people. Numerous homes were destroyed or severely damaged by floodwater or landslides. There was a total of $13,047,732 (2013 dollars) of property damage.

Buncombe County — July 7, 2005
Part of a hillside gave way, damaging the Broad River VFD building. There was a total of $63,339 (2013 dollars) of property damage.

Additional historical information, as originally reported in the former hazard mitigation plans of the Buncombe Madison Region, is described below.

Buncombe County – Former Hazard Mitigation Plan Analysis[40]
"*In September 2004, intense rainfall from the remnants of Hurricanes Frances and Ivan triggered at least 400 landslides throughout western North Carolina. Following these events, the NC Department of Environment and Natural Resources (NCDENR) conducted a field study to document the number, location, and extent of previous landslides in Buncombe, Haywood, Henderson, Jackson, Macon, and Watauga Counties. This study revealed 1,253 landslide features throughout Buncombe County (314 landslides and 938 landslide deposit areas). According to a North Carolina Landslide Fact Sheet produced after this study, '…landslide deposits are where significant volumes of unconsolidated soil and rock fragments have accumulated over time from several processes such as debris flows, debris slides, and rock falls. Most mapped deposits are likely prehistoric but have yet to be verified by modern age-dating techniques.'"*

"According to NCDENR data, most recent landslide events include: a storm event in November of 1977 that triggered over 60 debris flows in the Bent Creek area; a debris flow in the Starnes Cove community triggered by the remnants of Hurricane Ivan in September of 2004 that destroyed one home, damaged two vehicles, destroyed the garage of another home, and damaged the road; and a rockslide that caused significant damage to the Broad River Fire Department in July of 2005 during the remnants of Tropical Storm Cindy. The debris deposit volume from the 2004 Starnes Cove event was estimated to be 7,500 to 10,000 cubic yards of earthen material. The volume estimate did not include debris from the damaged and destroyed structures. Volume estimates were not available for the 1977 and 2005 events."

Madison County – Former Hazard Mitigation Plan Analysis[41]
"*Madison County is susceptible to large landslides, and the most recent occurrence was the Good Friday event of 2019. Heavy rain fell on already saturated soil, causing several slides, including one that damaged three structures. Other small landslides (10 to 40 cubic yards) have been occasional during times of higher-than-normal precipitation*."

5.9.4 Changing Future Conditions

According to the North Carolina Climate Risk Assessment and Resilience Plan as of 2020, the number of

[40] Excerpt(s) taken from former hazard mitigation plans of the Buncombe Madison Region.
[41] Excerpt(s) taken from former hazard mitigation plans of the Buncombe Madison Region.

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[42]. According to the USGS, pumping water and its associated drawdown of the water table are primary risk factors 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 changes in sinkhole formation. 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[43].

5.9.5 Probability of Future Occurrences

Landslides

Based on historical information and the USGS susceptibility index, the probability of future landslide events is highly likely (100 percent annual probability). Local conditions may become more favorable for landslides due to factors such as heavy rain, which would increase the likelihood of occurrence. It should also be noted that some areas in the Buncombe Madison Region carry greater risks than others, given factors such as slope steepness and terrain modifications. As of 2025, the FEMA National Risk Index rates the landslide hazard as “relatively high” in Buncombe County and “relatively moderate” in Madison 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. While many sinkhole events have been relatively small, it remains possible (between 1 and 10 percent annual probability) that this region will continue to be affected in the future. Given the general lack of historical events, location, data, and threat to life or property, no further analysis will be done for this subhazard.

Erosion

Erosion remains a natural, dynamic, and continuous process for the Buncombe Madison Region, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent annual probability). Given the general lack of historical events, location, data, and threat to life or property, no further analysis will be done for this subhazard.

[42] 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)
[43] USGS Sinkholes (https://www.usgs.gov/special-topics/water-science-school/science/sinkholes)

5.10 DAM FAILURE

5.10.1 Background and Description

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

There are over 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 can also pose a serious 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 Department of Environmental Quality (NCDEQ) provides information on dams, including a hazard potential classification. There are three hazard classifications — high, intermediate, and low — that correspond to qualitative descriptions and quantitative guidelines. **Table 5.26** explains these classifications.

TABLE 5.26: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low-volume roads	Less than 25 vehicles per day
	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 life
	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 Department of Environmental Quality (NCDEQ)

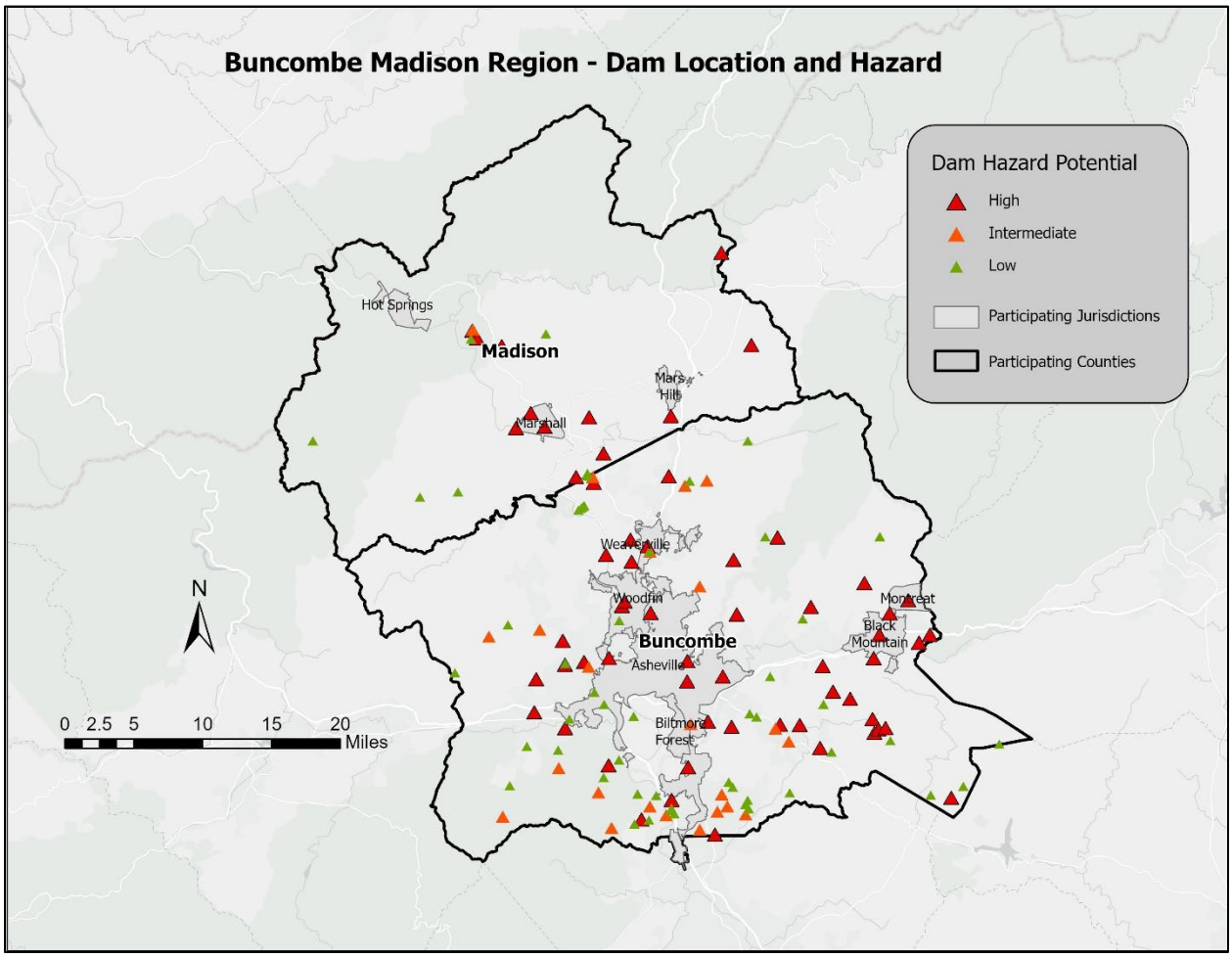
According to NCDEQ, there are approximately 135 dams in the Buncombe Madison Region, with 115 in Buncombe County and only 20 in Madison County.[44] **Figure 5.18** shows the dam location and the corresponding hazard ranking for each. Of these dams, 60 are classified as high hazard potential. These high hazard dams are summarized by county in **Table 5.24.**

TABLE 5.27: SUMMARY OF HIGH HAZARD DAMS

Location	High Hazard Dams
Buncombe County	115
Madison County	20
BUNCOMBE MADISON REGION TOTAL	135

Source: NCDEQ

FIGURE 5.18: DAM LOCATION AND HAZARD RANKING



Source: NCDEQ

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

[44] The latest version of the North Carolina Dam Inventory as of was obtained

Buncombe Madison Region – Former Hazard Mitigation Plan Analysis[45]
"*The highest level of risk [of a dam failure] is along the Swannanoa River below the Bee Tree and North Fork Dams. This area extends along US 70 Highway from Swannanoa to Biltmore. In a breach involving the ¾ Probable Maximum Precipitation, the maximum flood depth within the inundation area would be 58.5 feet. These dams have the greatest impoundment and, therefore, larger inundation areas. It is possible that a dam failure having a limited impact over a small area could occur*."

5.10.3 Historical Occurrences

The only dam failure to cause significant damage occurred when Bear Wallow Dam along Newfound Creek in Buncombe County failed on February 22, 1976. The private earthen dam broke, destroying one home and killing a family of four. There is no record of additional significant dam failures in the region; however, several breach scenarios in the area 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 damage, and other key risk factors. Dam failures present recurring dangers of widespread flooding, which would greatly impact the Buncombe Madison Region in a breach scenario. Recent events, such as the widespread devastation caused by Hurricane Helene in late 2024, have also renewed concerns about dam failure hazards across Western North Carolina due to the potential of greater stress on aging dam infrastructure.

5.10.5 Probability of Future Occurrence

Given the current dam inventory and historical data, a dam breach is considered 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 NCDEQ Dam Safety Program will be completed in ***Section 6: Vulnerability Assessment,*** as more sophisticated dam breach plans continue to be investigated and developed for regional dams of concern at the state and federal levels.

[45] Excerpt(s) taken from former hazard mitigation plans of the Buncombe Madison Region.

5.11 FLOODING

5.11.1 Background

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

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

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where urban 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 pose 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. **Growing needs for effective flood mitigation measures remain present across every regional 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 intervals.

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 Buncombe Madison Region that are susceptible to significant flooding events. Special flood hazard areas in the Buncombe Madison Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM).[46] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), and Zone X 500 (0.2- percent annual chance floodplain). According to GIS analysis, of the 1,111 square miles that make up the Buncombe Madison Region, there are approximately 31.3 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 3 square miles of land in zone X 500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.28**.

TABLE 5.28: SUMMARY OF REGIONAL FLOODPLAIN AREAS

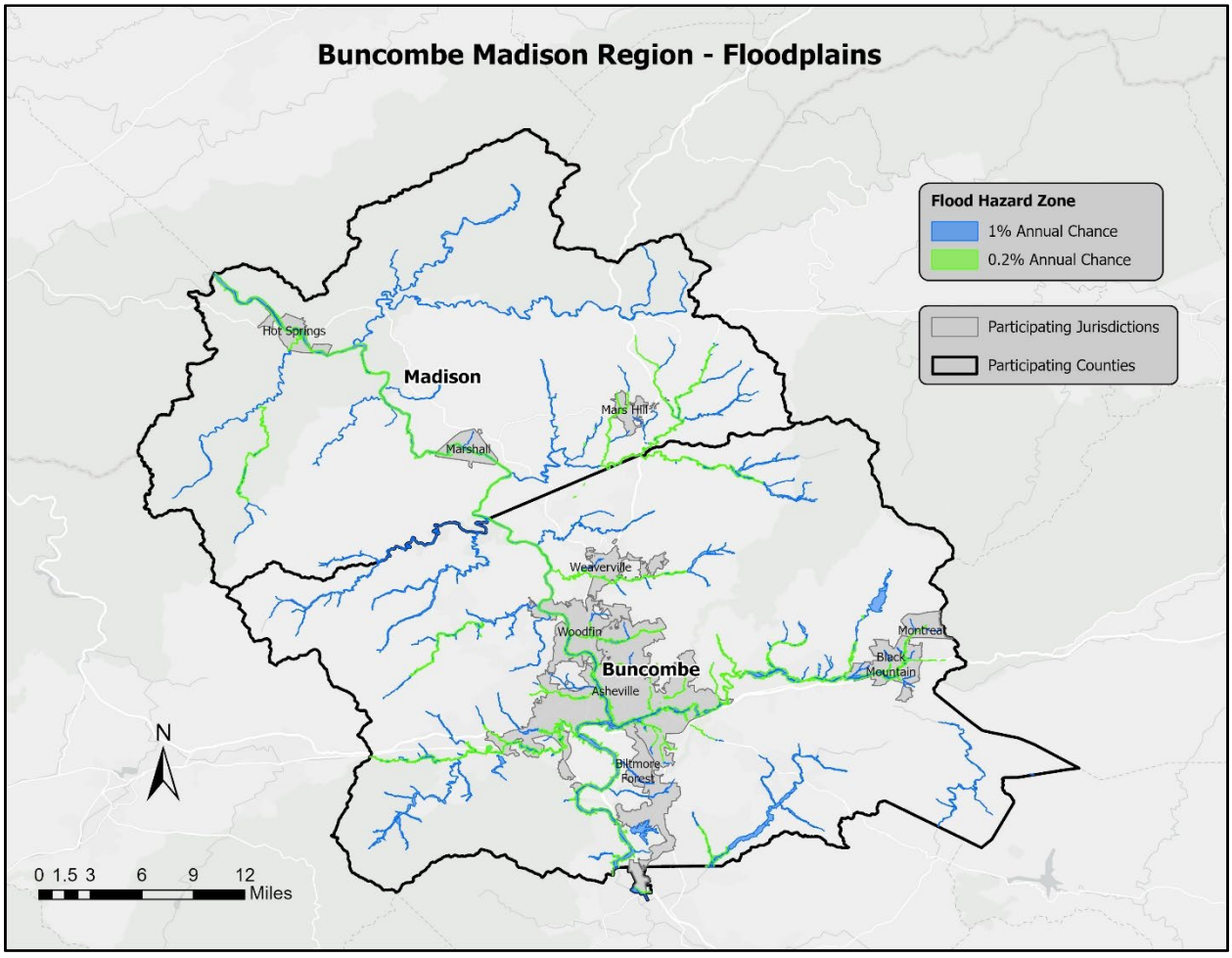
Location	100-year flood area (square miles)	500-year flood area (square miles)
Buncombe County	**22.21**	**2.14**
Madison County	**9.12**	**0.85**
BUNCOMBE MADISON REGION TOTAL	**31.32**	**3.00**

Source: FEMA DFIRM

These flood zone values account for approximately 3.1 percent of the total land area in the Buncombe Madison Region. It is important to note that while FEMA digital flood data is recognized as the best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure 5.19** illustrates the location and extent of currently mapped special flood hazard areas for the Buncombe Madison Region based on the best available FEMA DFIRM data. **Additionally, more detailed county-level and jurisdiction-specific maps can be found in the plan appendices.**

[46] The county-level DFIRM data used for analysis were last updated in 2010 (Madison County) and 2012 (Buncombe County). Recent amendments made through the Letter of Map Revision (LOMR) process were updated in 2024 (Madison County) and 2025 (Buncombe County).

FIGURE 5.19: REGIONAL SPECIAL FLOOD HAZARD AREAS



Source: Federal Emergency Management Agency

5.11.3 Historical Occurrences

Flooding has resulted in seven major disaster declarations in the Buncombe Madison Region.[47] Information from the National Centers for Environmental Information (NCEI) was used to ascertain additional historical flood events. Data reported by NCEI includes a total of 96 events throughout the Buncombe Madison Region between January 1996 and June 2025.[48] A summary of these events is presented in **Table 5.29**. These events have led to over $700 million in total unadjusted property damage throughout the region. Specific information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in the plan appendices.

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

[48] These events are only inclusive of those reported to NCEI. It is likely that additional occurrences have occurred and have gone

TABLE 5.29: SUMMARY OF REGIONAL FLOOD OCCURRENCES

Location	Number of Occurrences	Injuries	Deaths	Property Damage	Crop Damage
Buncombe County	**52**	**0**	**26**	**$686,293,000**	**$1,000,000**
Asheville	4	0	0	$10,000	$0
Biltmore Forest	0	0	0	$0	$0
Black Mountain	4	0	0	$54,000	$0
Montreat	1	0	0	$500	$0
Weaverville	4	0	0	$40,000	$0
Woodfin	1	0	0	$2,500,000	$0
Unincorporated Area	38	0	26	$683,688,500	$1,000,000
Madison County	**44**	**2**	**6**	**$52,758,000**	**$12,170,000**
Hot Springs	2	0	0	$2,500,000	$0
Marshall	15	0	0	$2,835,000	$7,500,000
Mars Hill	2	0	0	$0	$0
Unincorporated Area	25	2	6	$47,423,000	$4,670,000
BUNCOMBE MADISON REGION TOTAL	**96**	**2**	**32**	**$739,051,000**	**$13,170,000**

Source: National Centers for Environmental Information (June 2025)

5.11.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of June 2025, there have been approximately 1,297 insured flood losses reported in the Buncombe Madison Region through the National Flood Insurance Program (NFIP) since 1978, totaling over $97.6 million in total claim payments. A summary of these figures for each municipality in the Buncombe Madison Region is provided in **Table 5.30**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the Buncombe Madison Region were either uninsured, denied claims payment, or not reported.

TABLE 5.30: SUMMARY OF REGIONAL INSURED FLOOD LOSSES

Location	Number of Policies	Flood Losses	Claims Payments
Buncombe County	**1,213**	**1,188**	**$90,031,567**
Asheville	638	618	$55,437,043
Biltmore Forest	3	3	$31,101
Black Mountain	73	73	$4,416,494
Montreat	6	6	$44,667
Weaverville	7	7	$476,252
Woodfin	18	18	$1,546,403
Unincorporated Area	468	463	$28,079,607
Madison County	**109**	**109**	**$7,617,685**
Hot Springs	7	7	$495,540
Marshall	65	65	$5,306,375
Mars Hill	0	0	$-
Unincorporated Area	37	37	$1,815,770
BUNCOMBE MADISON REGION TOTAL	**1,322**	**1,297**	**$97,649,252**

Source: Federal Emergency Management Agency, National Flood Insurance Program (June 2025)

5.11.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss

property may or may not be currently insured by the NFIP. Currently, there are over 140,000 repetitive loss properties nationwide.

As of December 2024 records, there are approximately 67 repetitive loss properties in the Buncombe Madison Region, which accounted for 192 total losses. 37 properties in Buncombe County are non-residential, whereas 25 are residential. 9 properties in Buncombe County are considered mitigated. All properties in Madison County are non-residential, and 1 property is considered mitigated. Without additional mitigation measures, these properties will likely continue to experience flood losses. **Table 5.31** presents a summary of these figures for the Buncombe Madison Region.

TABLE 5.31: SUMMARY OF REGIONAL REPETITIVE LOSS PROPERTIES

Location	Number of Properties	Number of Losses
Buncombe County	**62**	**176**
Asheville	47	141
Biltmore Forest	0	0
Black Mountain	1	2
Montreat	0	0
Weaverville	2	4
Woodfin	0	0
Unincorporated Area	12	27
Madison County	**5**	**16**
Hot Springs	0	0
Marshall	5	16
Mars Hill	0	0
Unincorporated Area	0	0
BUNCOMBE MADISON REGION TOTAL	**67**	**192**

Source: National Flood Insurance Program (Dec 2024)

5.11.6 Changing Future Conditions

An increasingly changing climate translates to new weather patterns, stronger storms, and significant shifts in rainfall, which can exacerbate flood risks across different regions. The 2020 North Carolina Climate Science Report notes a recent upward trend in heavy rainfall events (3 inches or more per day), with the years 2015-2018 showing the greatest number of such 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 that extreme precipitation frequency and intensity will increase 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 Buncombe Madison Region, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and 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 2025, the FEMA National Risk Index rates the inland flooding hazard as “relatively moderate” in Buncombe County and “relatively low” in Madison County.

5.12 WILDFIRES

5.12.1 Background and Description

A wildfire is any outdoor fire (e.g., grassland, forest, brushland) that is not under control, supervised, or prescribed.[49] 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 of 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 wildfire 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 wildfires. 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.

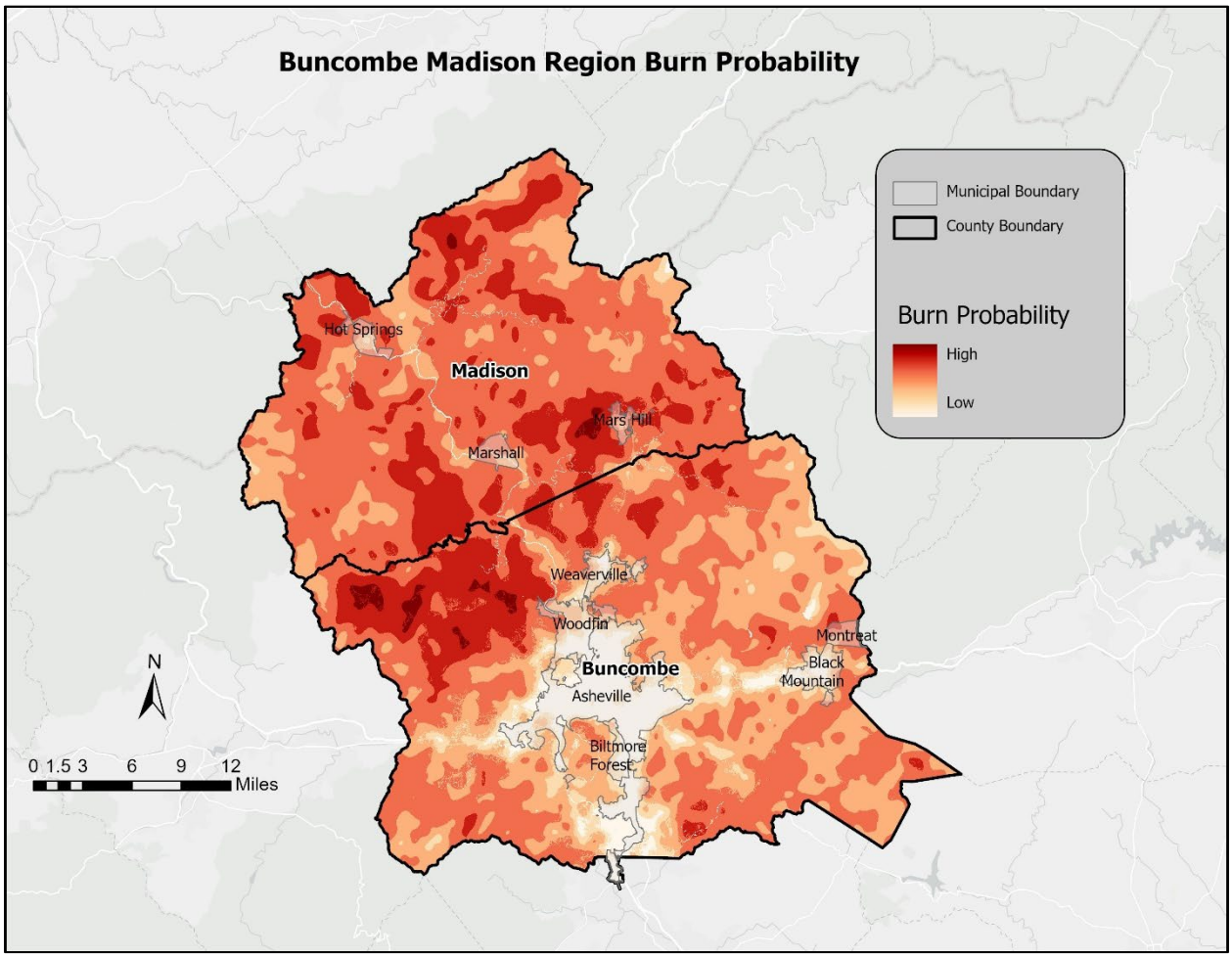
5.12.2 Location and Spatial Extent

The entire region is at risk of a wildfire occurrence. However, several factors, such as drought conditions or high levels of fuel on the forest floor, may make wildfire more likely. Furthermore, areas in the urban-wildland interface are particularly susceptible to fire hazards as populations abut formerly undeveloped areas.

[49] 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 5.20 shows the burn probability for each county in the Buncombe Madison Region based on data from the Southern Wildfire Risk Assessment (SWRA). This data represents the likelihood of an area burning based on landscape conditions, percentile weather, historical ignition patterns, and historical fire suppression efforts. **Additionally, more detailed county-level and jurisdiction-specific maps can be found in the plan appendices.**

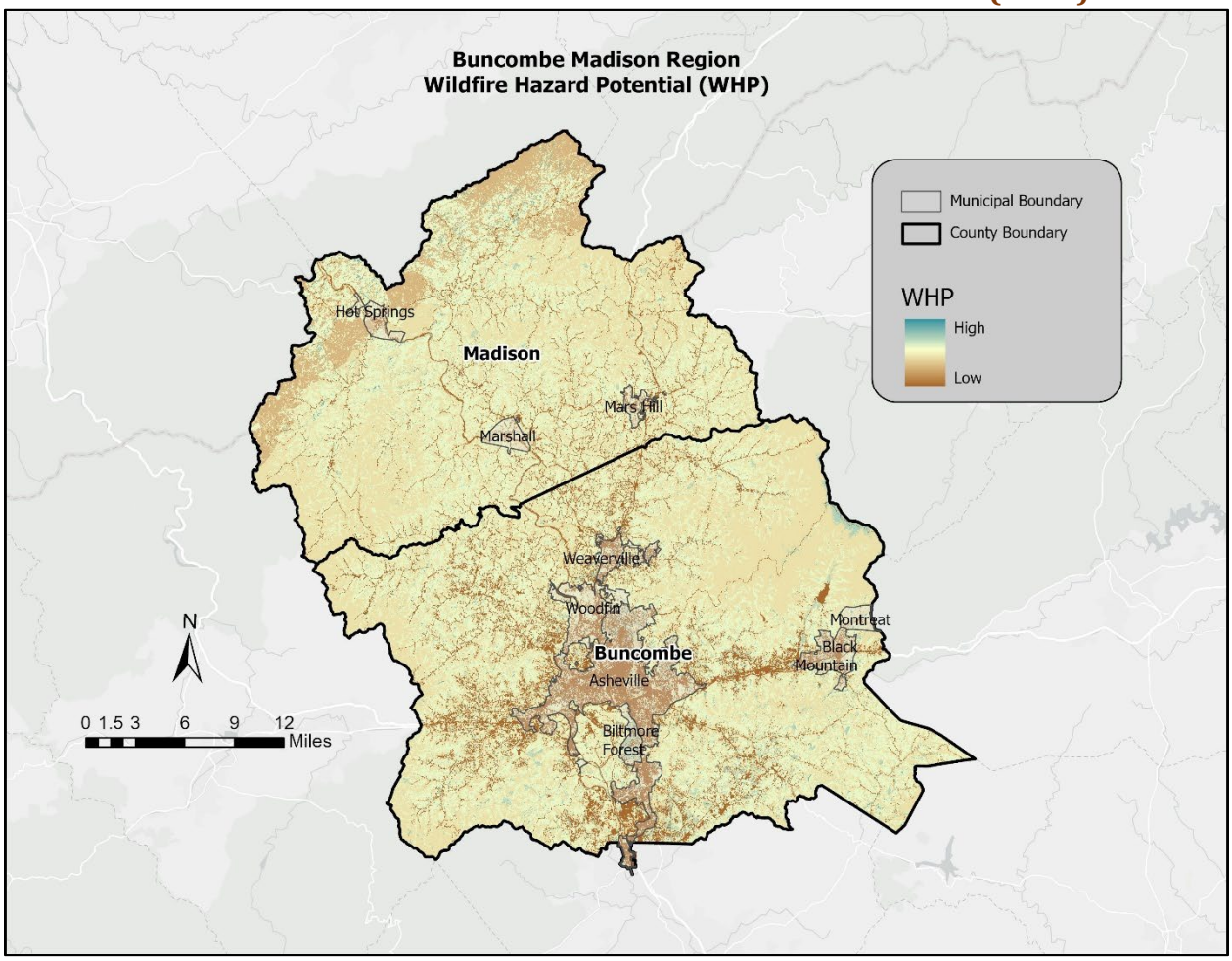
FIGURE 5.20: REGIONAL BURN PROBABILITY



Source: Southern Wildfire Risk Assessment

Figure 5.21 shows the wildfire hazard potential (WHP) for each county in the Buncombe Madison Region based on data from the Southern Wildfire Risk Assessment (SWRA). This data helps to inform evaluations of wildfire hazard or prioritization of fuels management needs across very large landscapes. Jurisdiction-specific maps related to this data are included in the plan appendices.

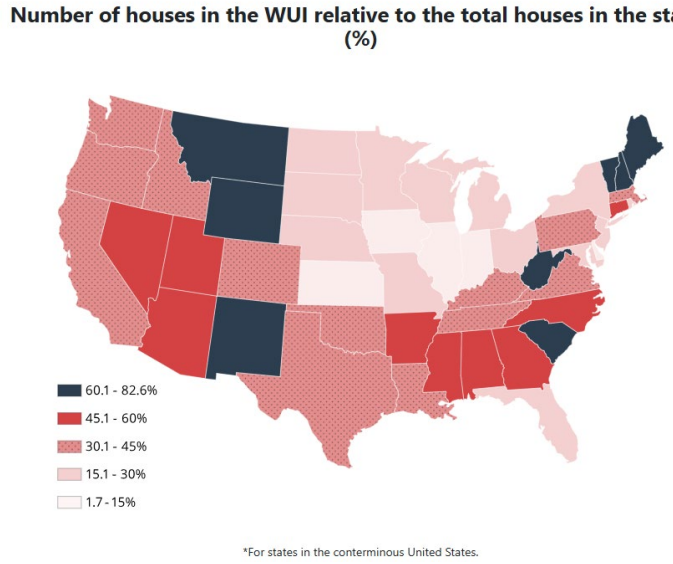
FIGURE 5.21: REGIONAL WILDFIRE HAZARD POTENTIAL (WHP)



Source: Southern Wildfire Risk Assessment

Every state also has a Wildland-Urban Interface (WUI), which is an area of significance for potential wildfire impacts 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. **Figure 5.22** below shows a map of each state's WUI. Based on the data from the US Forest Service, approximately 45.1-60% of homes in North Carolina lie within the WUI.

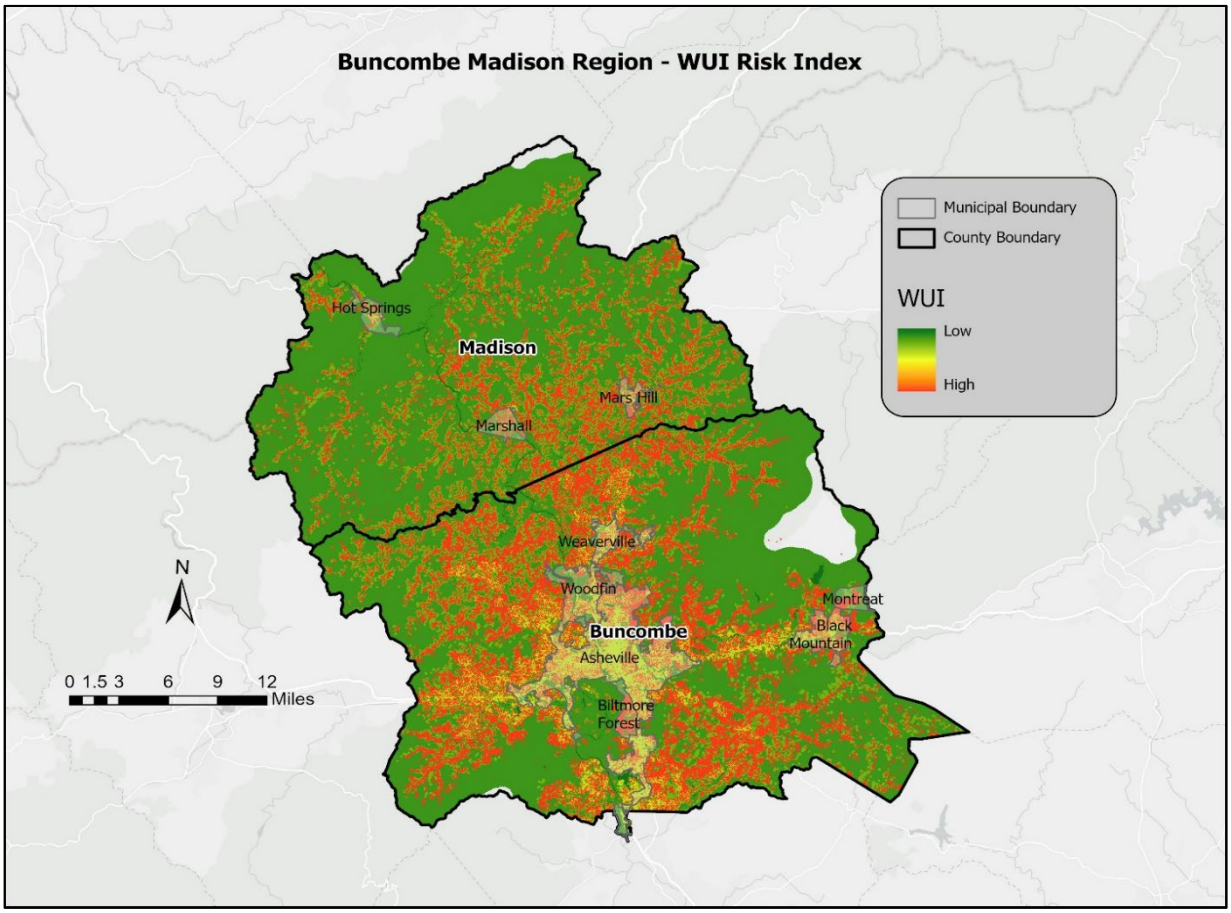
FIGURE 5.22: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: U.S. Forest Service

Below, **Figure 5.23** displays the WUI Risk Index for the Buncombe Madison Region.

FIGURE 5.23: REGIONAL WUI RISK INDEX



Source: Southern Wildfire Risk Assessment

5.12.3 Historical Occurrences

Information from the National Association of State Foresters (NASF) was used to ascertain historical wildfire events. The NASF has previously reported that a total of 767 events, impacting an area greater than 1 acre, have occurred throughout the Buncombe Madison Region between 2001 and 2018[50]. A summary of these events is presented in **Table 5.32,** and a map of them is shown in **Figure 5.24**. The largest of these events was the Larman Fire, which occurred north of Hot Springs in 2001 and impacted 2,716 acres.

TABLE 5.32: SUMMARY OF WILDFIRE INCIDENTS (2001-2018)

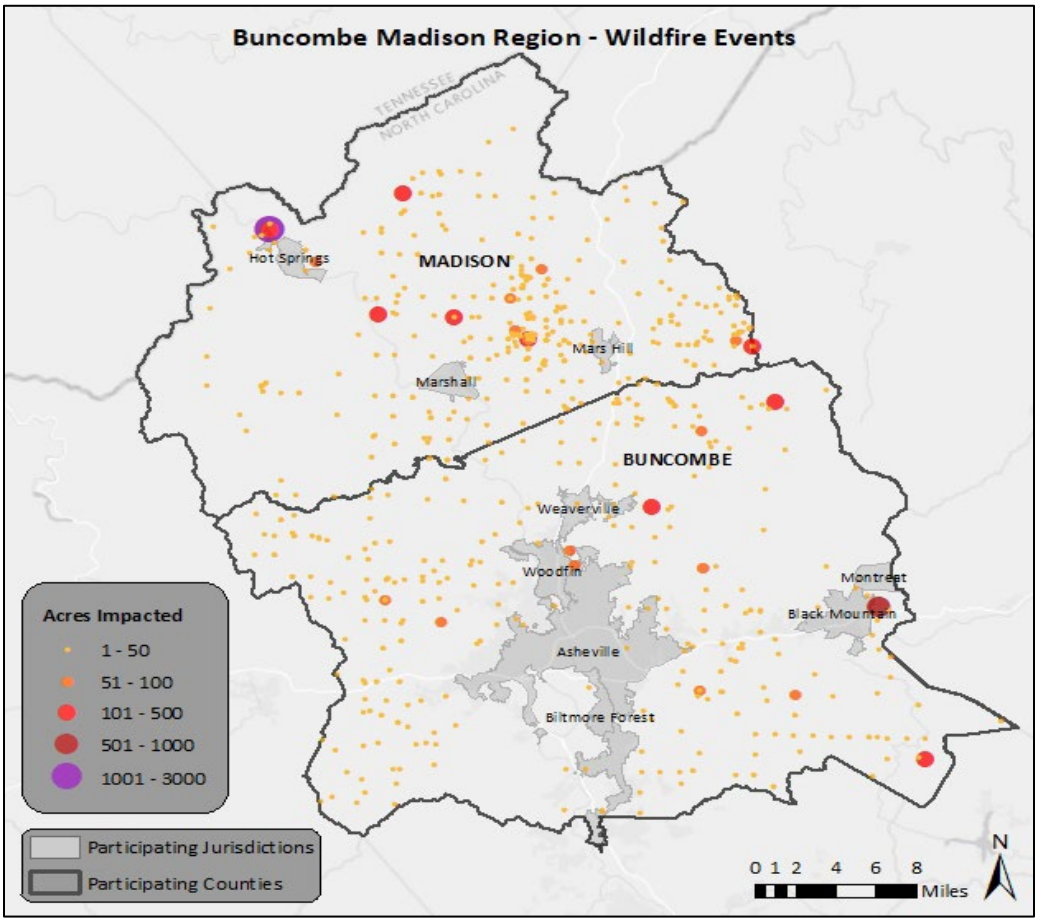
Location	Number of Wildfires	Total Acres Burned
Buncombe County	**340**	**3,749**
Asheville	6	12.9
Biltmore Forest	0	0
Black Mountain	1	1
Montreat	0	0
Weaverville	2	4
Woodfin	1	54
Unincorporated Area	330	3,677
Madison County	**427**	**7,197**
Hot Springs	2	5.4
Marhsall	1	5.1
Mars Hill	3	3.6
Unincorporated Areas	421	7182.9
BUNCOMBE MADISON REGION TOTAL	**767**	**10,946**

Source: National Association of State Foresters

The Buncombe Madison Region has experienced numerous wildfires over time. In **Figure 5.24** below, the greatest cluster of mapped wildfires to occur was near the town of Hot Springs. The town is located directly off the Appalachian Trail and is subject to an increased risk of wildfire due to its proximity to the forest. In April 2016, a 2,500-acre wildfire was believed to have started from high temperatures and dry conditions approximately 1 mile east of the town on Highway 25/70. Another wildfire happened in May 2018, which scorched about 50 acres and closed a 7.2-mile section from Garenflo Gap to Hot Springs. In September 2019, an 11-acre wildfire broke out near the town as well. All of these events coincide with years where there were consistently high levels of drought severity.

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

FIGURE 5.24: HISTORIC WILDFIRE EVENTS



Source: National Association of State Foresters

No counties in the Buncombe Madison Region have significant wildfire events reported based on NCEI Storm Events Database records searched between January 1950 and June 2025.

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, plant mortality, and climate change stressors are all increasing in the context of growing wildfire risks[51].

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. Recent events, such as the widespread devastation caused by Hurricane Helene in late 2024, have also raised concerns about higher wildfire risk created by larger fuel

[51] *2020 North Carolina Forest Action Plan* (https://www.stateforesters.org/districts/north-carolina/)

loads of debris and vegetation scattered throughout counties in Western North Carolina.

5.12.5 Probability of Future Occurrence

Wildfire events will be an ongoing occurrence in the Buncombe Madison Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. As a result of Hurricane Helene, there are significant amounts of fuels in the form of downed trees across the entire region. Fires are likely to stay small in size but could increase due to the local climate and ground conditions. Dry, windy conditions with an accumulation of forested fuels (due to droughts, ice storms, or lack of fire) could create conditions for a larger wildland fire that spreads quickly. It should also be noted that some areas do vary in overall risk. For example, highly developed areas are less susceptible unless they are located near the wildland-urban interface (WUI) boundary. Risk may also vary due to community assets and procedures. Areas in the WUI will typically have much more property at risk, resulting in increased vulnerability and increasing needs to mitigate, compared to rural, mainly forested areas. The probability assigned to the Buncombe Madison Region for future wildfire events is likely (10 to 100 percent annual probability). As of 2025, the FEMA National Risk Index rates the wildfire hazard as “relatively low” in Buncombe County and “very low” in Madison County.

5.13 INFECTIOUS DISEASE

For the purposes of this plan, this section will assess infectious diseases, vector-borne diseases, and foreign animal diseases (FADs) within the Buncombe Madison Region.

5.13.1 Background and Description

Infectious Disease

Communicable, or infectious, diseases are conditions that result in clinically evident illnesses that 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 Buncombe Madison 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 Centers 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 influenza, particularly in a pandemic form, as well as norovirus and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly, and immunocompromised 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, 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.

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 Buncombe Madison 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 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 primary response agencies are essential in order to facilitate safe, effective, and collaborative efforts during 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 Buncombe Madison 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 40,000 positive tests and 542 influenza-associated deaths during the 2024-2025 respiratory season, compared to lower rates of RSV and COVID-19 versus the previous season[52]. The Buncombe Madison Region is part of Flu Surveillance Region 6 (see regional map in NCDHHS annual surveillance summaries) in the state.

Information from the North Carolina Department of Health and Human Services (NCDHHS) was used to monitor and track cases of the infectious disease COVID-19. A disaster declaration for the COVID-19 Pandemic was declared for North Carolina on March 24, 2020. **Table 5.33** provides a summary of confirmed cases of COVID-19 in the Buncombe Madison Region as of May 10, 2023. The COVID-19 pandemic is technically still ongoing in certain regions of the world as of the final version of this plan update. Statistics may be amended as additional data becomes available.

TABLE 5.33: SUMMARY OF CONFIRMED REGIONAL COVID-19 CASES

Location	Number of Cases	Number of Deaths*
Buncombe County	**71,806**	**727**
Madison County	**6,381**	**93**
Buncombe Madison Region Total	**78,187**	**820**

Source: North Carolina Department of Health and Human Services
** Deaths reflect deaths in persons with laboratory-confirmed COVID-19 as reported by local health departments to NCDHHS*

As of May 10, 2023, NCDHHS reported a statewide total of 3,501,404 cases of COVID-19 and 29,059 COVID-related deaths in North Carolina[53]. These cases reflect those that were tested and returned positive from monitoring institutions such as the NC State Laboratory of Public Health, hospitals, and commercial labs.

Vector-Borne Diseases

In 2016, North Carolina state health officials encouraged citizens to take preventative measures against mosquito bites to avoid contracting the Zika virus. $477,500 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. 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[54].

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

[52] NCDHHS Respiratory Disease Surveillance Summaries (https://flu.ncdhhs.gov/data.htm)
[53] NCDHHS Covid-19 Cases (https://www.ncdhhs.gov/covid-19-case-count-nc#by-counties)
[54] 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)

milder winters, warmer summers, and fewer days of frost make it easier for infectious diseases and vector-borne diseases to expand to new geographic areas and infect more people. Between 2004 and 2018, the number of reported illnesses from mosquito, tick, and flea bites more than doubled, with more than 760,000 cases reported in the United States. Additionally, nine new germs spread by mosquitoes and ticks were discovered or introduced into the United States during this time. In 2012, a mild winter, early spring, and a hot summer also set the stage for an outbreak of West Nile Virus disease in the United States, resulting in more than 5,600 illnesses and 286 deaths[55].

5.12.5 Probability of Future Occurrence

It is difficult to predict the future probability of infectious diseases due to the difficulty in obtaining information on this type of hazard. The most common and probable disease in the state is typically strains of influenza; however, based on historical data, it is possible (between 1 and 10 percent annual probability) that the Buncombe Madison Region will experience an outbreak of additional infectious diseases in the future.

[55] CDC National Center for Emerging and Zoonotic Infectious Disease (NCEZID) (https://www.cdc.gov/ncezid/index.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[56]. 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 accumulate beyond the initial incident area by people, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur because 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 (along with other recent hurricanes and tropical storms), 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 concerns. Potential widespread contamination of watersheds, habitats, and other sensitive environmental areas remains a pressing issue following a hazardous substances incident.

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.

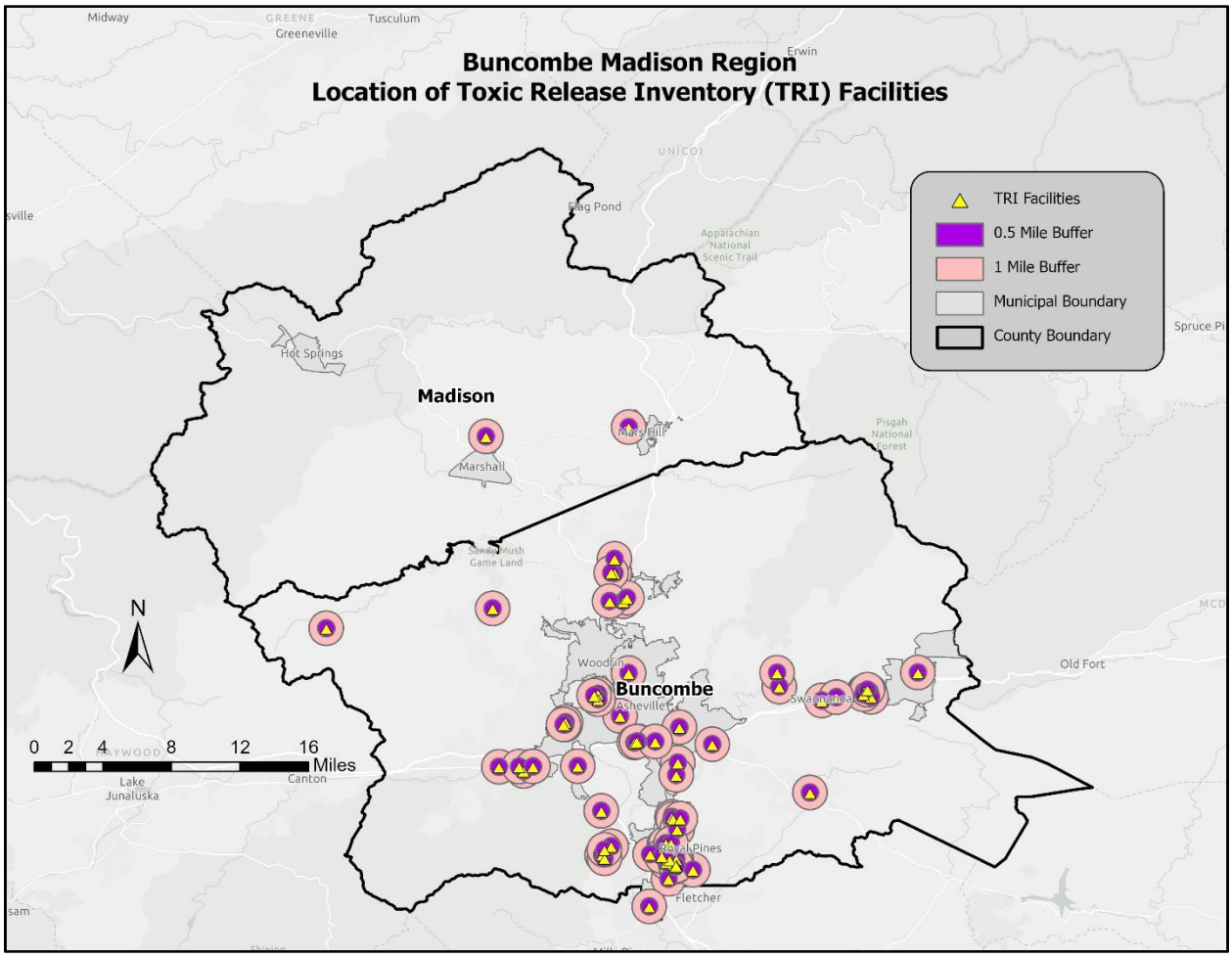
5.13.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the U.S. 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

[56] FEMA, 1997.

toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity occurs. The Buncombe Madison Region has approximately 70 TRI sites. These sites are shown in **Figure 5.25.**

FIGURE 5.25: TOXIC RELEASE INVENTORY (TRI) SITES IN THE BUNCOMBE MADISON REGION



Source: Environmental Protection Agency

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

5.13.3 Historical Occurrences

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" (highlighted in yellow in **Table 5.37** below) is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of hazardous material,

- the evacuation of 25 or more people due to the 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 gallons 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, before 2002, a hazardous material "serious incident" was defined as follows:

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

Table 5.34 summarizes the HAZMAT incidents as reported in the Buncombe Madison Region.

TABLE 5.34: SUMMARY OF REGIONAL HAZMAT INCIDENTS

Location	Incidents Reported	Injuries	Fatalities	Type	Incident Costs
Buncombe County	**160**	**0**	**0**	**N/A**	**$1,492,567**
Asheville	134	0	0	Highway	$1,049,222
Biltmore Forest	0	0	0	n/a	$0
Black Mountain	2	0	0	Highway	$59,100
Montreat	0	0	0	n/a	$0
Weaverville	0	0	0	n/a	$0
Woodfin	0	0	0	n/a	$0
Unincorporated Area	24	0	0	Highway	384245
Madison County	**3**	**0**	**0**	**N/A**	**$38,452**
Hot Springs	0	0	0	n/a	$0
Marshall	0	0	0	n/a	$32,452
Mars Hill	2	0	0	Highway	$0
Unincorporated Area	1	0	0	Highway	$6,000
BUNCOMBE MADISON REGION TOTAL	**163**	**0**	**0**	**N/A**	**$1,531,019**

Source: U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA)

5.14.4 Changing Future Conditions

As the population of the Buncombe Madison 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 prevent incidents 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 Occurrences

Given the locations of roughly 70 TRI sites in the Buncombe Madison Region and serious HAZMAT incidents, a hazardous material incident is considered possible (with an annual probability between 1 and 10 percent). Local 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

5.15.1 Background and Description

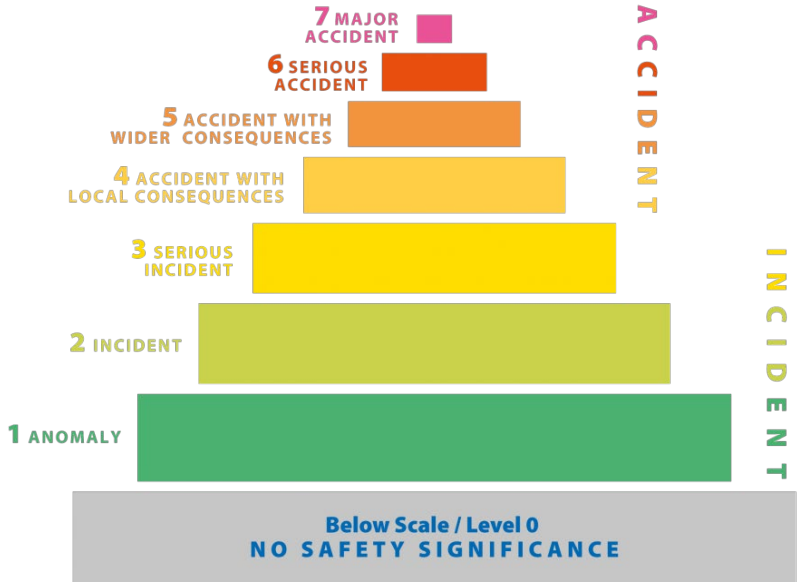
A nuclear or radiological emergency is defined by the International Atomic Energy Agency (IAEA) as "an event that has led to significant consequences to people, the environment, or the facility. Often, this type of incident results from damage to the reactor core of a nuclear power plant, which can release radioactivity into the environment. The degree of exposure from nuclear accidents has varied from serious to catastrophic. While radiological emergencies are generally a rare occurrence, many incidents are extremely well known due to their large-scale impact and serious effects on people and the environment.

5.15.2 Location and Spatial Extent

Buncombe County is at risk of a nuclear incident. The bottom of Buncombe County falls within a 50-mile radius of the Oconee Nuclear Plant. The Oconee Nuclear Station is located near Seneca, South Carolina. It began operation in 1973 and is currently operating under a renewed license until 2033. With three nuclear stations, it is one of the nation's largest nuclear plants.

The International Atomic Energy Agency (IAEA) 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, as 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 5.26**)

FIGURE 5.26: INTERNATIONAL NUCLEAR EVENT SCALE



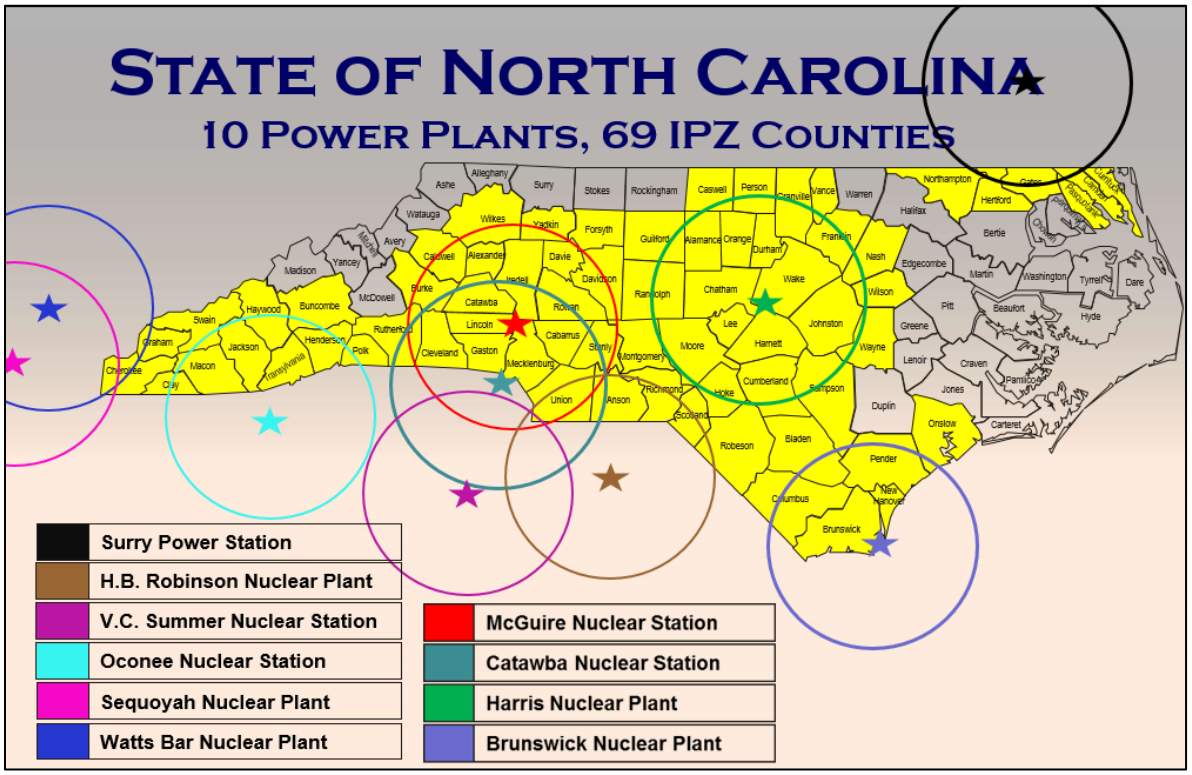
Source: International Atomic Energy Agency

The Nuclear Regulatory Commission (NRC) defines two emergency planning zones (EPZ) around nuclear plants. Areas located within 10 miles of the station are within the zone of highest risk to a nuclear incident, and this radius is the designated evacuation radius recommended by the NRC. 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. Only the bottom section of Buncombe County falls within the 50-mile radius, so it is at risk from a nuclear incident. Although the Oconee Nuclear Station is located far from the Buncombe Madison Region, one county falls within the 50-mile EPZ, as seen in **Figure 5.27** below.

Another concern reported by the Hazard Mitigation Planning Committee is the Nuclear Fuel Services facility in Erwin, Tennessee. Materials produced in the facility are transported along and through transportation routes in the region.

FIGURE 5.27: NORTH CAROLINA NUCLEAR POWER STATIONS AND INCIDENT HAZARD ZONES



Source: North Carolina Emergency Management

5.15.3 Historical Occurrences

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

5.15.4 Changing Future Conditions

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

5.15.5 Probability of Future Occurrences

A nuclear event is a very rare occurrence near the region and across the United States due to the

stringent operational regulations 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 chemical, biological, radiological, nuclear, explosive, and other threats.

Terrorism is defined in the United States by the Code of Federal Regulations as "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, cyber-attacks are included as a separate hazard.

Historically, the main categories of weapons of mass destruction (WMDs) used in terror attacks are Chemical, Biological, Radiological, Nuclear, and Explosive (collectively referred to as CBRNE). These categories are often ranked considering factors such as immediate danger posed, impact, probability, technical feasibility, frequency, and historical success.

Chemical
Chemical attacks can pose immediate danger to life and health, depending on the materials used. Chemicals are easily accessible, low-cost, and may be quickly deployed. Chemical terrorism can have high and persistent impacts on people and places.

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 to be deployed successfully. While some 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, nuclear attacks are extremely rare due to the fact that they are cost-prohibitive and very technically difficult to achieve. This type of attack, however, could be state-sponsored, which makes it viable under extreme scenarios.

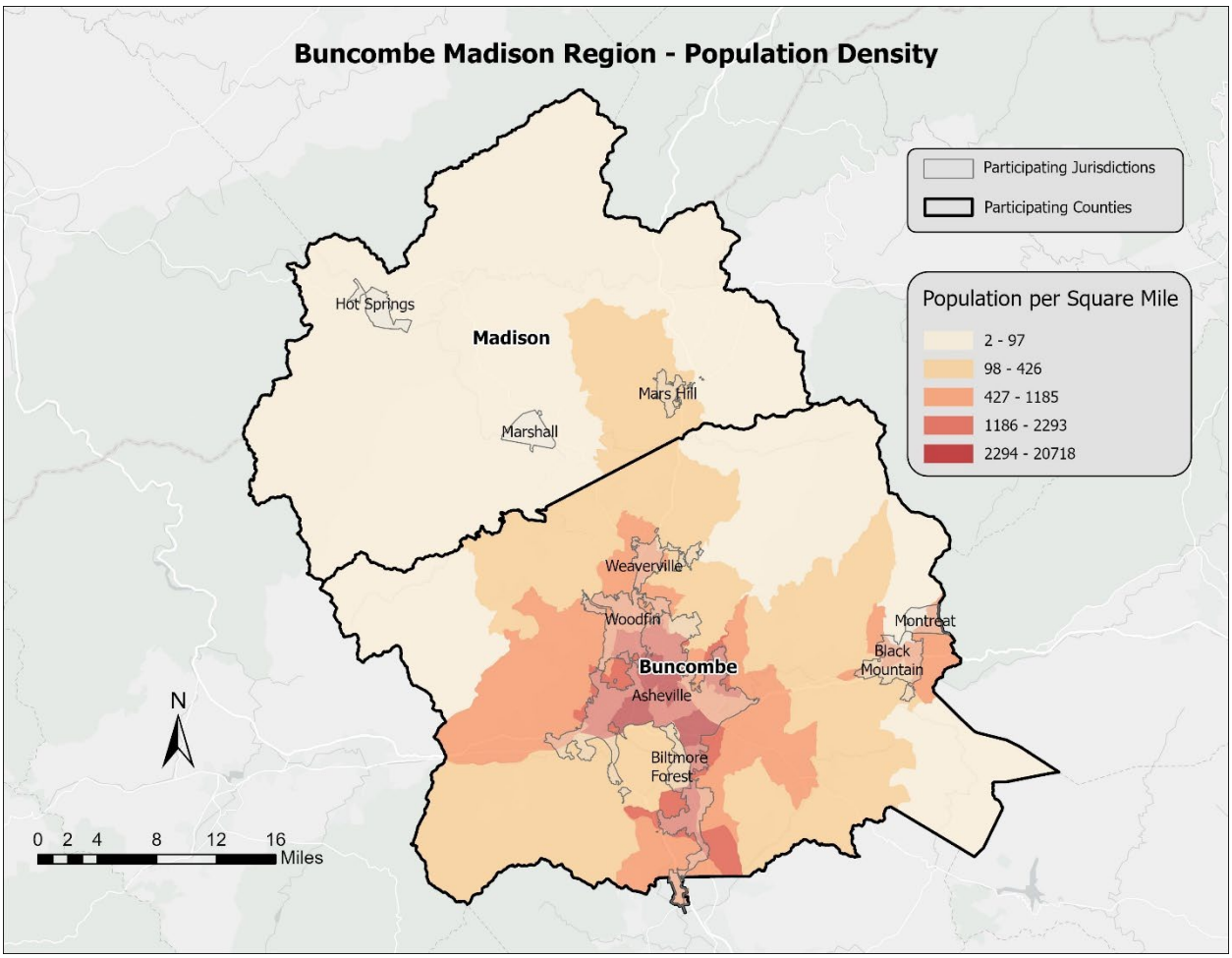
Explosive
Explosive attacks lead all others due to their immediate danger to life and health, immediate and measurable impact, high probability, low cost/easy degree of technical feasibility, and a long history of high-impact attacks.

Other Attacks
Terrorism hazard assessments must also account for modern trends and changes. An additional "Other Attacks" category should be considered that includes small arms attacks (e.g., active shooters), vehicle ramming attacks, edged weapon attacks, and incendiary attacks.

5.16.2 Location and Spatial Extent

All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The map in **Figure 5.28** displays the population density in each county in the Buncombe Madison Region using census tract geographies.

FIGURE 5.28: POPULATION DENSITY IN BUNCOMBE MADISON REGION



Source: US Census Bureau

Furthermore, the most recent population counts of each participating county and their local jurisdictions can be seen in **Table 5.35** below.

TABLE 5.35: REGIONAL POPULATION ESTIMATES

Location	2025 Population Estimate	Population Density (sq. mi.)
Buncombe County	**279,210**	**429**
Asheville	94,992	2,093
Biltmore Forest	1,462	508
Black Mountain	8,572	1,282
Montreat	1,044	384
Weaverville	4,799	1,251
Woodfin	8,158	893
Unincorporated Area	160,183	--
Madison County	**22,352**	**49**
Hot Springs	543	191
Marshall	812	206
Mars Hill	2,208	1,066
Unincorporated Area	18,789	--
BUNCOMBE MADISON REGION TOTAL	**301,562**	**--**

Source: US Census Bureau, World Population Review

5.16.3 Historical Occurrences

No extreme cases of terror attacks have previously affected the Buncombe Madison 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 Buncombe Madison Region has experienced no major terrorist attacks, but the area's population is continuing to grow. The probability of future occurrences of a terrorist attack, while unlikely (less than 1 percent annual probability), is a real possibility that the region must be prepared for.

5.17 CYBER THREAT

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 Buncombe Madison 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. Critical systems (e.g., communications, emergency response, utilities, healthcare) are also a frequent target of societal disruption through cyberattacks.

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 online risk management resources.

Cyberattacks can happen in both the public and private sectors. 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 2025 Data Breach Investigations Report by Verizon, 89% of all data breaches had a financial motive, and 17% of breaches had an espionage motive, with espionage cases nearly tripling since the last report.

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 security assets.
- **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 5.29 below displays nationwide cyberattack incident patterns from the 2025 Verizon Data Breach Investigations Report.

FIGURE 5.29: PERCENTAGE AND COUNTS OF INCIDENTS PER PATTERN

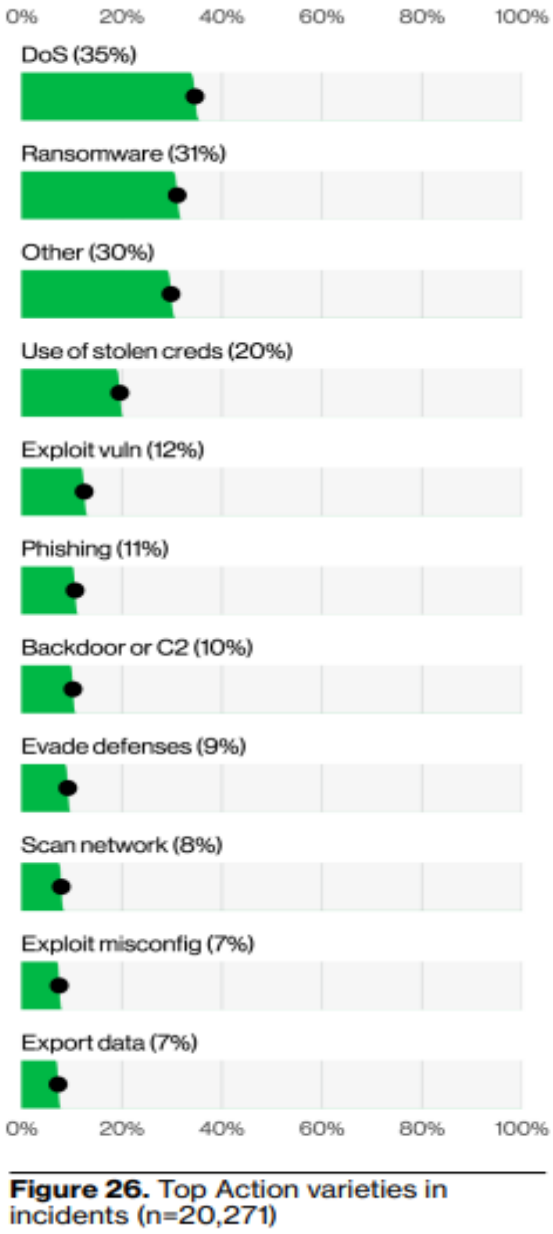


Figure 26. Top Action varieties in incidents (n=20,271)

Source: 2025 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 geographical boundary. They tend to affect public industries compared to private industries.

5.17.3 Historical Occurrences

In North Carolina and the Buncombe Madison Region, the Department of Information Technology specializes in cybersecurity and risk management. Within the department, the NC Information Sharing and Analysis Center gathers information on cyber threats within the State to improve cybersecurity.

Table 5.36 displays the North Carolina Cybercrimes and Victim Counts in 2024.

TABLE 5.36: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2024

Crime Type by Victim Count

Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
Advanced Fee	176	Lottery/Sweepstakes/Inheritance	130
BEC	569	Malware	8
Botnet	9	No Lead Value	1,159
Confidence/Romance	519	Non-payment/Non-Delivery	1,360
Credit Card/Check Fraud	343	Other	316
Crimes Against Children	83	Overpayment	88
Data Breach	68	Personal Data Breach	1,872
Employment	557	Phishing/Spoofing	7,848
Extortion	2,683	Ransomware	72
Government Impersonation	683	Real Estate	252
Harassment/Stalking	320	SIM Swap	26
Identity Theft	636	Tech Support	1,078
Investment	1,100	Threats of Violence	26
IPR/Copyright and Counterfeit	39		

Descriptors*			
Cryptocurrency	2,494	Cryptocurrency Wallet	1,193

*These descriptors relate to the medium or tool used to facilitate the crime, and are used by the IC3 for tracking purposes only. They are available only after another crime type has been selected.

Source: FBI Internet Crime Complaint Center (IC3), 2024

The Buncombe Madison Region has also been affected by cyberattacks in recent years. A November 2025 attack took down the emergency notification system of Buncombe County for an extended period of 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. There have been notable occurrences of cyberattacks in the region, and it is considered likely (between 10 and 100 percent annual probability) that more could happen in the near future.

5.18 ELECTROMAGNETIC PULSE

5.18.1 Background and Description

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

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

A human-caused EMP (such as a nuclear EMP) is a technological hazard that can cause severe damage to electrical components attached to power lines or communication systems. One of the most complex aspects of EMPs is the fact that 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 areas may be more prone to damage from an EMP. Therefore, bigger cities in the Buncombe Madison Region may be more susceptible.

5.18.3 Historical Occurrences

There have been no reports of EMP occurrences in the Buncombe Madison 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 emergencies. 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 and regional population centers. Sites preparing for political or other interest-based events/rallies should often be assessed as potential catalysts for a civil disturbance incident. Arenas and stadiums capable of hosting thousands of people at a time are other areas of concern as well. A civil disturbance incident may also spill over into surrounding areas beyond where an initial "trigger event" occurred.

5.19.3 Historical Occurrences

There is at least one major example of a community-wide civil disturbance in the Buncombe Madison Region. Several incidents have occurred, involving days of intense protests and demonstrations by various community groups, resulting in intervention responses from law enforcement.

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 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 Buncombe Madison 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 region, the future probability of civil disturbance incidents is considered possible (between 1 to 10 percent annual probability).

5.20 FOOD EMERGENCY

5.20.1 Background and Description

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

Most foodborne outbreaks that spread across multiple states are caused by Campylobacter, E. coli, Listeria, and Salmonella. In 2024, a Salmonella outbreak linked to cucumbers had sickened over 400 people across 31 states, including 22 cases in North Carolina. The CDC also issued a food safety alert.

5.20.4 Changing Future Conditions

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

5.20.5 Probability of Future Occurrences

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

5.21 CONCLUSIONS ON HAZARD RISK

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

5.21.1 Hazard Extent

Table 5.37 describes the extent of each natural hazard identified for the Buncombe Madison Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.37: REGIONAL HAZARD EXTENT

Natural Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications, which include *Abnormally Dry (D0), Moderate Drought (D1), Severe Drought (D2), Extreme Drought (D3),* and *Exceptional Drought (D4)*. According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional (D4). The Buncombe Madison Region experienced drought conditions in nearly every year of the last 20+ years (2005-2025).
Excessive Heat	The extent of excessive heat can be defined by the maximum temperature reached. The highest temperature recorded in the Buncombe Madison Region is approximately 104 degrees Fahrenheit (reported on 7/1/2012). • **Buncombe County**: 101°F • **Madison County**: 104°F
Hurricane and Coastal Hazards	Hurricane extent is defined by the Saffir-Simpson Scale, which classifies hurricanes as *Category 1* to *Category 5*. Only one hurricane has traversed directly through the region. The greatest classification to directly impact the region was Hurricane Ida in 2021, which reached a maximum wind speed of ~130 knots.
Tornadoes / Thunderstorms	**Tornadoes**: Tornado hazard extent is measured by tornado occurrences in the U.S., provided by agencies such as NOAA and FEMA, as well as the Fujita/Enhanced Fujita Scale. The greatest magnitude reported thus far was an F1 event, which occurred on several occasions in the region. It should be noted that future tornado events may exceed these historical occurrences. • **Buncombe County**: F1 • **Madison County**: F1 **Thunderstorms**: Thunderstorm extent is defined by the number of thunderstorm/strong wind events and wind speed reported. According to records of 75+ years from the National Centers for Environmental Information, the strongest recorded wind speed event in the Buncombe Madison region was reported on May 3, 2009, at 75 knots (approximately 85 mph). It should be noted that future thunderstorm events may exceed

	these historical occurrences. • **Buncombe County**: 75 knots • **Madison County**: 65 knots **Lightning**: According to the latest Vaisala lightning flash density map, most of the Buncombe Madison Region is located in an area that experiences approximately 8-16 lightning events 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 approximate size of the hailstone. The largest hailstone reported in the Buncombe Madison Region was 2.00 inches (reported on April 16, 1998). It should be noted that future hail occurrences may exceed these figures. • **Buncombe County**: 2.00 inches • **Madison County**: 2.00 inches
Severe Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region was approximately 22 inches, recorded on March 14, 1993. Due to extreme variations in elevation throughout the region, extent totals will vary for each participating jurisdiction, and reliable data on snowfall totals is not available. • **Buncombe County**: 20 inches • **Madison County**: 22 inches
Earthquakes	Earthquake extent can be measured by the Richter Scale, Modified Mercalli Intensity (MMI) Scale, and the distance of the epicenter from the region of interest. According to data provided by the U.S. Geological Survey, the greatest MMI to impact the region was reported on February 21, 1916, with an MMI of VII (Very Strong) with a correlating Richter Scale measurement of approximately 5.5. • **Buncombe County**: VII • **Madison County**: VI
Geological	**Landslides**: As noted in the landslide section of the hazard profile, landslide data provided by the North Carolina Geological Survey continues to undergo updates over time. This creates a challenge when trying to determine an accurate extent for evolving landslide hazards. However, when using the USGS landslide susceptibility index, extent can be measured through incidence, which is significantly high for a majority of the Buncombe Madison Region. High susceptibility is also found throughout the region. **Sinkholes**: The Buncombe Madison Region has a relatively low risk for sinkholes. The region has no historical information related to sinkholes. Even though there is no historical information from the North Carolina Geological Survey or the National Centers for Environmental Information, there is a possibility of unreported occurrences.

<table>
<tr><td></td><td><u>Erosion</u>: The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no clear erosion rate records available for the Buncombe Madison Region.</td></tr>
<tr><td>Dam Failure</td><td>Dam failure extent is defined using the North Carolina Department of Environmental Quality criteria outlined through the Dam Safety Program. Of the roughly 135 dams in the Buncombe Madison Region, approximately 60 dams are considered high hazard. High hazard dam totals by county are listed below.
• Buncombe County: 48
• Madison County: 12</td></tr>
<tr><td>Flooding</td><td>Flood extent can be measured by the area of land and property in the floodplain, as well as by flood height and velocity. The amount of land in the floodplain accounts for roughly 3.1 percent of the total land area in the Buncombe Madison Region. Flood depth and velocity are recorded via the United States Geological Survey (USGS) streamgages found throughout the region. While a streamgage does not exist for each of the participating jurisdictions, there is one at or near many areas. The greatest peak discharge recorded for the region was reported on July 16, 1916. Water reached a discharge of 115,000 cubic feet per second (cfs), and the streamgage height was recorded at approximately 22 feet. Additional peak discharge readings and recorded streamgage heights are in the table below.

<table>
<tr><th>Location/ Jurisdiction</th><th>Date</th><th>Peak Discharge (cfs)</th><th>Gage Height (ft)</th></tr>
<tr><td colspan="4">Buncombe County</td></tr>
<tr><td>French Broad River at Asheville</td><td>9/27/2024</td><td>113,000</td><td>24.82</td></tr>
<tr><td colspan="4">Madison County</td></tr>
<tr><td>French Broad River at Hot Springs</td><td>9/27/2024</td><td>134,000</td><td>12.19</td></tr>
</table>

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.</td></tr>
<tr><td>Wildfires</td><td>Wildfire data was provided by the North Carolina Forest Service (NCFS) and is reported annually by county through 2020. The data indicate the following wildfire hazard extent for each county.

Buncombe County
• The greatest number of fires to occur in any year was 37 in 2001.
• The greatest number of acres burned in any single year occurred in 2015, when 738 acres burned.
Madison County
• The greatest number of fires to occur in any year was 35 in 2007.
• The greatest number of acres burned in any single year occurred in 2008, when 360.2 acres burned.</td></tr>
</table>

	Although this data lists the extent that has occurred, larger and more frequent wildfire events remain possible throughout the region.
Infectious Disease	There is no available method for determining dollar losses due to infectious diseases at this time; however, $477,500 dollars was allocated from the Governor's yearly budget in 2016 for the preventative measures regarding Zika virus. Prevention resources and messaging have also increased in recent years for "Fight the Bite" campaigns targeting mosquito and tick bites to avoid serious vector-borne diseases after nearly 700 cases were reported in 2022. The entire Buncombe Madison Region is susceptible to infectious diseases like influenza, which kills hundreds of people annually.
Technological Hazards	
Hazardous Materials Incident	According to the USDOT PHMSA incident database, the largest hazardous materials incident reported in the region was ~12,000 LBS of ammonium nitrate fertilizers on October 3, 1997, in Asheville. It should be noted that larger events are possible.
Terrorism	Although no severe terrorist attacks have been reported in the Buncombe Madison Region, the entire area is still at risk of 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 Threat	Cyberattacks have previously been reported in the Buncombe Madison Region. Technology usage and adoption are also continuing to grow rapidly throughout society. 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 Buncombe Madison Region, but the risk still exists. If an EMP were to occur, the effects would negatively impact first responders and communication efforts and may cause panic within the area.
Civil Disturbance	Few major instances of civil disturbances have been identified in the region. However, established social systems of the area are still changing every year in response to new social, political, and/or cultural events.
Food Emergency	Some instances of food emergencies, especially in the form of mass foodborne illness (e.g., *E. coli* and *Salmonella*) or contamination, have been historically reported in the Buncombe Madison 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

In order to draw some meaningful planning conclusions on hazard risk for the Buncombe Madison Region, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for the Buncombe Madison Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allow for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for the jurisdictions in the Buncombe Madison Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Buncombe Madison 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 Buncombe Madison Regional Hazard Mitigation Planning Committee in gaining consensus on the determination of those hazards that pose the most significant threat to the counties of the region 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 Buncombe Madison 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[57], as summarized by the scoring template in **Table 5.38**. 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. Before being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Hazard Mitigation Planning Committee.

[57] 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.

TABLE 5.38: PRIORITY RISK INDEX SCORING

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

5.21.3 Priority Risk Index Results

Table 5.39 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 5.39: SUMMARY OF PRI RESULTS FOR THE BUNCOMBE MADISON REGION

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought	Agricultural, Hydrological, Meteorological, Socioeconomic	Likely	Minor	Large	More than 24 hours	More than 1 week	**2.5**
Excessive Heat	Heat Wave	Likely	Critical	Large	More than 24 hours	More than 1 week	**3.1**
Hurricane and Coastal Hazards	Tornadoes, High Wind, Torrential Rain, Severe Weather, and Storm Surge associated with Hurricanes, Tropical Storms, and Nor'easters	Likely	Catastrophic	Large	More than 24 hours	Less than 1 week	**3.3**
Tornadoes/ Thunderstorms	Hailstorms, Lightning, Torrential Rain, Thunderstorm and High Winds	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	Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	**3.3**
Earthquakes		Likely	Limited	Moderate	Less than 6 hours	Less than 6 hours	**2.6**
Geological	Landslides, Sinkholes, Erosion	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	**3.0**
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 1 week	**2.5**
Flooding	Flash Flooding, Urban 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	Possible	Critical	Large	More than 24 hours	More than 1 week	**2.8**
Technological Hazards							
Hazardous	Hazardous Materials	Possible	Limited	Small	Less than	Less than	**2.2**

Hazard	Subhazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Substances	and Chemicals, Oil Spills, Road/Rail Incidents				6 hours	24 hours	
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Moderate	6 to 12 hours	Less than 1 week	**2.4**
Terrorism	Chemical, Biological, Radiological, Nuclear, Explosive, Other Attacks	Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	**2.2**
Cyber Threat	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	Less than 24 hours	**2.2**
Civil Disturbance		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	**2.2**
Food Emergency	Supply Chain Disruption	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 Buncombe Madison 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 (**Table 5.40**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on life and property throughout the Buncombe Madison Region.

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

TABLE 5.40: CONCLUSIONS ON HAZARD RISK FOR THE BUNCOMBE MADISON REGION

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

SECTION 6
VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the jurisdictions within the Buncombe Madison Region to the significant hazards identified in the previous sections (***Section 4: Hazard Identification*** and ***Section 5: Hazard Profiles***). It consists of the following subsections:

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

44 CFR Requirement

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

6.1 OVERVIEW

This section builds upon the information provided in ***Section 4: Hazard Identification*** and ***Section 5: Hazard Profiles*** by identifying and characterizing an inventory of assets in the Buncombe Madison Region. Additionally, an assessment is conducted for each identified hazard using available data, including the potential impact and expected damage it may cause. The primary objective of the vulnerability assessment is to quantify the regional exposure and potential loss estimates for each hazard. In doing so, each county and its participating jurisdictions may better understand their unique risks of the identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions[1].

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

[1] Additional information related to hazard mitigation planning is available online through the *North Carolina Department of Public Safety* (https://www.ncdps.gov/our-organization/emergency-management/hazard-mitigation). Resilience planning resources are available at the *North Carolina Resilience Exchange* (https://www.resilienceexchange.nc.gov/), and hazard preparedness resources are available at *ReadyNC.gov* (https://www.readync.gov/stay-informed/north-carolina-hazards).

the Buncombe Madison Region. The remainder of this section focuses on the results of the assessment conducted.

It should be noted that a more detailed, actively updated vulnerability assessment is maintained by the Land of Sky Reginal Council as part of their Regional Resilience Assessment. The assessment includes detailed vulnerability analyses for the flood, landslide and wildfire hazards. More information about the Regional Resilience Assessment can be found by contacting the Land of Sky Regional Council.

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 the hazards of concern that were outside the scope of the GIS-based risk assessment and the NCEM Risk Management Tool (RMT). This involves consideration of annualized hazard loss estimates and impacts to both 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:

- Tornadoes/Thunderstorms
- Geological (Landslides)
- Hazardous Substances

Except for Hazardous Substances and Dam Failure, the hazards in this section are considered natural and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides estimates about all improved property in the Buncombe Madison Region that may be vulnerable to hazards. For all hazards, annualized loss estimates were determined using the best available data from sources including FEMA National Risk Index (NRI) records, NOAA National Centers for Environmental Information (NCEI) records, the previous Buncombe Madison Regional Hazard Mitigation Plan, and local knowledge. Given the standard weighting analysis of estimated losses, they can be readily compared across hazards, providing an objective approach for evaluating mitigation alternatives.

For all other hazards outside of this section, historical data regarding damage or extent was not readily available. A detailed vulnerability assessment could not be completed for these hazards at this time.

6.2.2 GIS-Based Analysis

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

- Geological (Landslides)
- Flooding
- Wildfires
- Hazardous Substances
- Dam Failure

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the Buncombe Madison Region using the 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 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 the population by census block becomes available for all areas in the region. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the assessed value of parcels and improvements, determined to be potentially at risk to those hazards with definable 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 geospatial 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 certain hazards selected based on predetermined calculations for each hazard. Some hazards will have a single return period, and others have multiple return periods. The availability of multiple return periods is based on the availability of datasets for each hazard and the degree of detail in each dataset.

The risk assessment produced by the 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.

[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.

Finally, the RMT also assesses vulnerable populations, such as children and elderly people. Data used to assess these populations is from the 2020 U.S. 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. It is important to note that the numbers assessed are from the most recent Census in 2010.

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

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 for statewide and potentially nationwide use 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, multiple factors affect prioritization. As discussed in ***Section 5: Hazard Profiles***, the risk (as determined by magnitude, probability, and location) of a hazard is one of the main elements used to determine the relative importance of addressing potential hazard impacts. 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/or the built environment. This is a critical component of hazard mitigation planning since a hazard that does not impact human life, safety, or welfare in significant ways is typically not considered as pressing for mitigation actions. The analysis that follows attempts to bring this consideration into the planning process by estimating the hazard-specific impacts on humans and the built environment and prioritizing hazards accordingly.

6.3 EXPLANATION OF DATA SOURCES

Hurricane and Coastal Hazards

The NCEM RMT assessed vulnerable buildings and populations to hurricanes. For this assessment, vulnerable buildings and populations were analyzed against damage caused by hurricane winds. *Additional information on hurricane and tropical storm hazards is available online through published North Carolina Department of Public Safety (NCDPS) resources*[3].

Tornadoes/Thunderstorms

The NCEM RMT assessed vulnerable buildings and populations to tornadoes and thunderstorms. Subhazards assessed under the thunderstorm hazard include hail, lightning, and thunderstorm winds; however, for this assessment, thunderstorm winds were the only subhazard with available data.

Earthquakes

The NCEM RMT assessed vulnerable buildings and populations to earthquake hazards. 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 the elderly. *Additional information on earthquake hazards is available online through published NCGS resources*[4].

Geological (Landslides)

Data from the U.S. Geological Survey (USGS) and the North Carolina Geological Survey (NCGS) were used to determine areas considered to have varying incidence and susceptibility to landslide hazards. Data was downloaded in GIS-compatible formats. This allowed property and parcel data to be layered on landslide regions to assess vulnerability to this hazard. *Additional information on landslide hazards is available online through published NCGS resources*[5].

Flooding

FEMA Digital Flood Insurance Rate Map (DFIRM) datasets were used to determine flood vulnerability. DFIRM data can be used in GIS for mapping purposes, and they identify several features, including floodplain boundaries and base flood elevations (BFEs). Identified areas on the DFIRM represent some features of a Flood Insurance Rate Map (FIRM), including the 100-year (1-percent annual chance) and 500-year (0.2-percent annual chance) flood zones. For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain and 500-year floodplain layers. This data was also supplemented with NCEM RMT data, which assessed vulnerable buildings, potential losses, and vulnerable populations within the floodplain areas. It should also be noted that this analysis does not

[3] Additional hurricane and tropical storm vulnerability information is available through the *Tropical Storm Helene* hub site published by NCDPS (https://www.ncdps.gov/our-organization/emergency-management/tropical-storm-helene).

[4] Additional earthquake vulnerability information is available through the *Earthquakes in North Carolina* hub site published by NCGS (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/north-carolina-geological-survey/geologic-hazards/earthquakes-north-carolina).

[5] Additional landslide vulnerability information is available through the *Landslides in Western North Carolina* and *Western North Carolina Landslide Hazard Data Viewer* dashboard sites published by NCGS and NCDEQ (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/north-carolina-geological-survey/geologic-hazards/landslides).

account for building elevation as a key flood mitigation factor. *Additional information on flooding hazards is available online through published NCEM resources*[6].

Wildfires

The data used to determine vulnerability to wildfires in the Buncombe Madison Region is based on GIS datasets sourced from the Southern Wildfire Risk Assessment (SWRA)[7]. Specific layers, such as Burn Probability, Wildland Urban Interface (WUI), Wildfire Hazard Potential (WHP), and Wildfire Exposure Scores were used as available to determine the vulnerability of people and property. The primary purpose of this data is to highlight areas of concern that may be conducive to wildfire mitigation actions. Many assumptions are made, making the layers not a true representation of event probability; however, it does provide a comparison of wildfire risk profiles throughout the region. This data was also supplemented with NCEM RMT data, which assessed vulnerable buildings, potential losses, and vulnerable populations within areas of wildfire risk.

Hazardous Substances

Hazardous materials incidents can occur in both fixed facilities and through mobile transportation. For the fixed incident analysis, updated Toxic Release Inventory (TRI) datasets were used. *The TRI 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*[8]. 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, updated transportation data for major highways and railroads were obtained from the North Carolina Department of Transportation (NCDOT). This data is GIS-compatible, lending itself to buffer analysis to determine risk.

[6] Additional flood vulnerability information is available through the *Flood.NC.gov* hub site published by NCDPS (https://flood.nc.gov/ncflood/).

[7] Additional wildfire vulnerability information is available through the main *Southern Wildfire Risk Assessment* site (https://southernwildfirerisk.com/).

[8] Additional hazardous substances vulnerability information is available through the *Toxic Release Inventory Program* hub site published by the EPA (https://www.epa.gov/toxics-release-inventory-tri-program).

Dam Failure

Data from the North Carolina Department of Environmental Quality (NCDEQ) Dam Safety Program was used to determine the locations, characteristics, and hazard potential of dams in the region. *Additional information on dam failure hazards is available online through published NCDEQ and U.S. Army Corps of Engineers (USACE) resources*[9].

[9] Additional dam failure vulnerability information is available through the *Dam Safety Program* hub site published by NCDEQ (https://www.deq.nc.gov/about/divisions/energy-mineral-and-land-resources/dam-safety-program-overview) and the *National Inventory of Dams (NID)* site published by USACE (https://nid.sec.usace.army.mil/).

6.4 ASSET INVENTORY

An inventory of georeferenced assets within the Buncombe Madison Region and all associated jurisdictions was compiled to identify and characterize properties potentially at risk of significant hazards identified in this plan[10]. By understanding the characteristics and locations of assets in known hazard areas, their relative risk and vulnerability can be assessed[11]. Under this assessment, two categories of physical assets were created and further assessed through GIS analysis. Additionally, social assets are addressed to determine the population at risk from the identified hazards (findings presented 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 Buncombe Madison Region according to local parcel data. The information has been expressed in terms of the number of parcels and the total assessed value of improvements (buildings) that may be exposed to the identified hazards.

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

The following tables provide a detailed listing of the georeferenced assets that have been identified for inclusion in the vulnerability assessment for the Buncombe Madison Region.

Table 6.1 lists estimates related to 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 Buncombe Madison Region (study area of vulnerability assessment)[12]. The U.S. Census Bureau also notes the following information for each county of the region as of the 2025 vintage year:

- **Buncombe County**
  - *Land area in square miles (2020):* 656.50
  - *Population per square mile (2020):* 410.4
  - *Housing units (2024):* 139,477
  - *Building permits (2024):* 3,613
  - *Total employer establishments (2023):* 9,863

- **Madison County**
  - *Land area in square miles (2020):* 449.62
  - *Population per square mile (2020):* 47.1

[10] While potentially not all-inclusive for the jurisdictions in the Buncombe Madison Region, "**georeferenced**" assets include those assets for which specific location-based data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis.

[11] **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.

[12] **Total assessed values for improvements are 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, potentially resulting in an inflated value exposure for an area.

- *Housing units (2024):* 11,728
- *Building permits (2024):* 155
- *Total employer establishments (2023):* 402

TABLE 6.1: IMPROVED PROPERTY IN THE BUNCOMBE MADISON REGION

Location[13]	Estimated Number of Parcels	Estimated Total Assessed Value of Parcels	Estimated Number of Buildings	Estimated Total Assessed Value of Improvements
Buncombe County	**133,866**	**$51,386,896,747**	**105,218**	**$38,179,643,221**
Asheville	39,533	$21,353,272,805	33,809	$15,705,614,912
Biltmore Forest	757	$958,978,450	704	$624,449,200
Black Mountain	5,156	$1,701,122,125	4,066	$1,290,440,900
Montreat	919	$360,452,200	642	$270,432,300
Weaverville	2,703	$1,197,088,300	2,305	$905,742,400
Woodfin	4,275	$1,301,795,100	2,875	$956,718,700
Unincorporated Area	80,523	$24,514,187,767	60,817	$18,426,244,809
Madison County	**21,525**	**$3,053,482,821**	**12,030**	**$1,535,221,560**
Hot Springs	468	$89,539,544	337	$46,008,504
Marshall	636	$88,775,839	637	$56,377,248
Mars Hill	896	$161,813,570	450	$123,714,353
Unincorporated Area	19,525	$2,713,353,868	10,606	$1,309,121,455
Buncombe Madison Regional Total	**155,391**	**$54,440,379,568**	**117,248**	**$39,714,864,781**

Source: NC OneMap

The following **Table 6.2** lists the emergency operations centers (EOCs), fire stations, police stations, medical care facilities, schools, and other critical facilities located in the Buncombe Madison Region as listed on NC OneMap[14]. In addition, **Figure 6.1** shows the locations of critical facilities in the Buncombe Madison Region. **Table 6.27**, at the end of this section, shows a complete list of the critical facilities by name, as well as the specific hazards that may significantly affect each facility. As noted previously, this list is not all-inclusive and only includes information provided by the counties.

TABLE 6.2: REGIONAL CRITICAL FACILITY INVENTORY

Location	EOCs	Fire/EMS Stations	Police Stations	Schools	Medical Care Facilities
Buncombe County	**1**	**53**	**23**	**93**	**249**
Asheville	1	17	14	40	133
Biltmore Forest	0	1	1	1	4
Black Mountain	0	2	3	4	14
Montreat	0	0	1	1	1
Weaverville	0	2	1	2	2
Woodfin	0	1	1	6	10
Unincorporated Area	0	30	2	39	85
Madison County	**1**	**14**	**4**	**12**	**18**
Hot Springs	0	2	1	1	4
Marshall	1	1	2	0	2
Mars Hill	0	1	1	2	3
Unincorporated Area	0	10	0	9	9

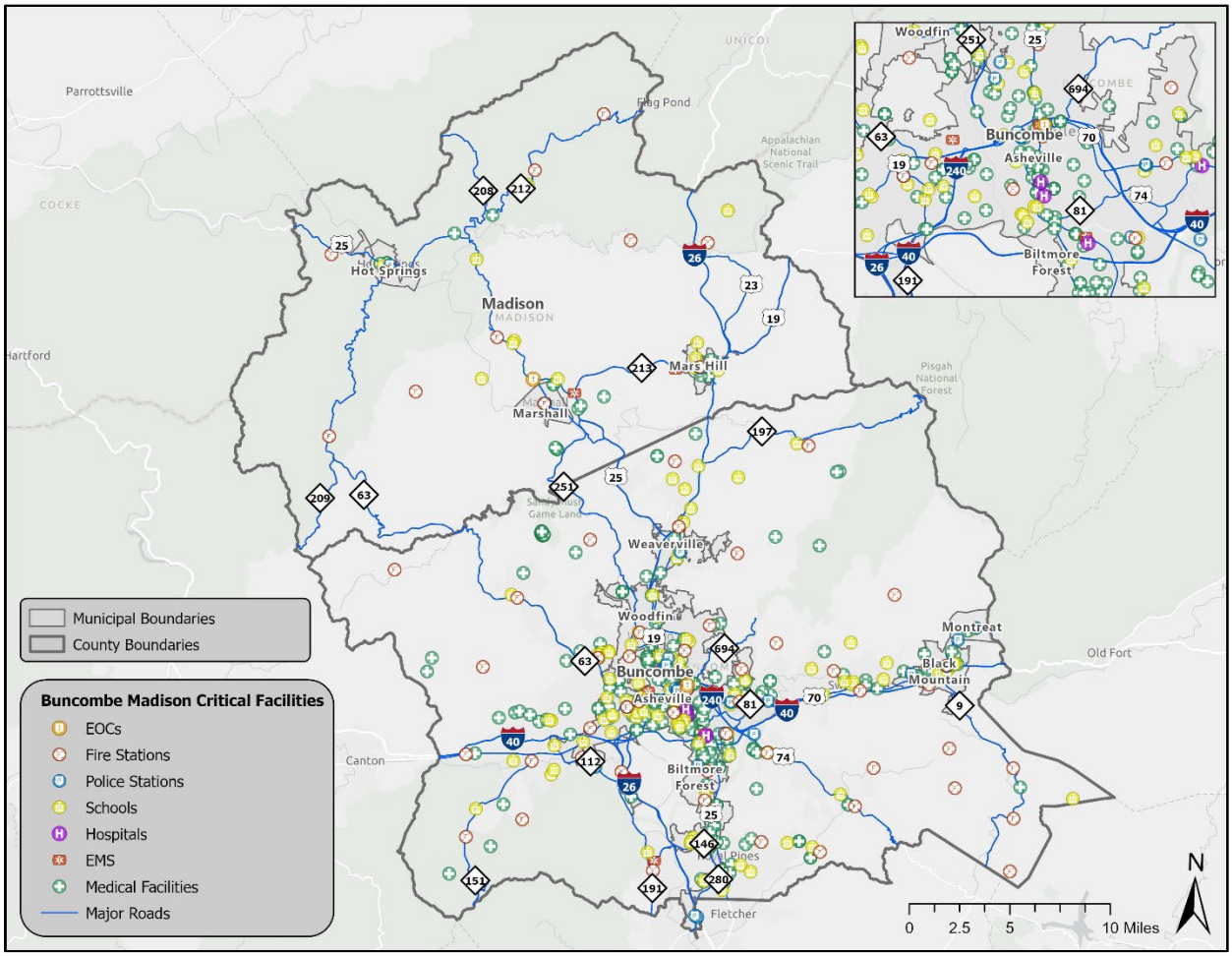
[13] Number of buildings for each county is based on the number of parcels with an improved building value greater than zero.

[14] NC OneMap (https://www.nconemap.gov/)

Location	EOCs	Fire/EMS Stations	Police Stations	Schools	Medical Care Facilities
Buncombe Madison Regional Total	2	67	27	105	267

Source: NC OneMap

FIGURE 6.1: REGIONAL CRITICAL FACILITIES



Source: NC OneMap

6.4.2 Social Vulnerability

Social vulnerability is defined by FEMA through the National Risk Index (NRI) 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 subgroups of the population in the Buncombe Madison Region that are potentially at higher risk of 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 of the American Community Survey (ACS). The total population in the Buncombe Madison Region, according to 2024 Census data, is reported as 301,562. Key factors that may provide additional insights regarding highly vulnerable

populations in the region include spoken language, disability status, and poverty status, as listed below. Additional population estimates and details are presented in ***Section 3: Community Profile***.

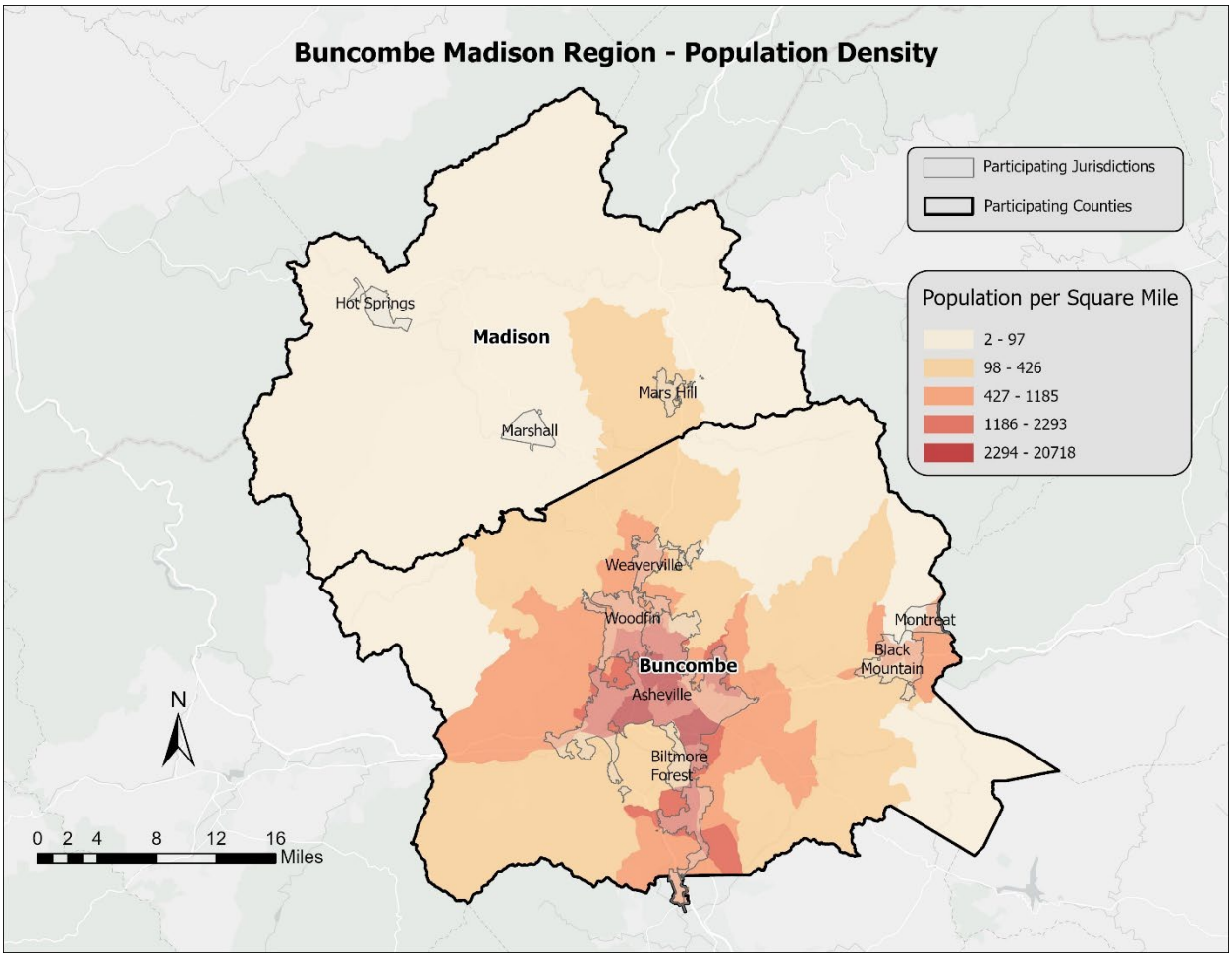
TABLE 6.3: TOTAL POPULATION IN THE BUNCOMBE MADISON REGION

Location	2024 Population Estimates	% population speaking a language other than English	% population with a disability	% population below the poverty level
Buncombe County	279,210	9.4%	14.4%	11.8%
Madison County	22,352	1.8%	18.1%	12.1%
Buncombe Madison Regional Total	**301,562**	--	--	--

Source: US Census Bureau, American Community Survey

In addition, **Figure 6.2** illustrates the population density by census tract as reported by the U.S. Census Bureau with updated ACS estimates (2024).

FIGURE 6.2: REGIONAL POPULATION DENSITY



Source: US Census Bureau, American Community Survey

The FEMA National Risk Index (NRI)[15], a publicly available online dataset now integrated under the FEMA Resilience Analysis and Planning Tool (RAPT), also provides base ratings of risk index, social vulnerability, and community resilience by county and census tract using vetted risk 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 2025, and associated tables and reports can be viewed using the NRI data available through the online RAPT application.

For Buncombe County, the risk index rating is relatively moderate (89.34 out of 100), and social vulnerability is rated as relatively low (34.99 out of 100) compared to relatively high community resilience (70.71 out of 100). The risk index for Madison County is very low (27.35), social vulnerability is relatively low (37.44), and community resilience is relatively moderate (45.10).

6.4.3. Development Trends and Changes in Vulnerability

Since the previous regional hazard mitigation plan was approved (in 2021), the Buncombe Madison Region has experienced substantial growth and development. **Table 6.4** shows the total number of housing units reported as of 2023 and the share of units constructed since 2020 among regional jurisdictions, according to estimates provided by the American Community Survey (ACS).

TABLE 6.4: BUILDING COUNTS FOR THE BUNCOMBE MADISON REGION

Location	Total Housing Units (2023)	Units Built 2020 or Later	% Building Stock Built Post-2020
Buncombe County	**102,672**	**940**	**0.92%**
Asheville	38,049	58	0.15%
Biltmore Forest	570	9	1.58%
Black Mountain	5,034	123	2.44%
Montreat	21	0	0.00%
Weaverville	1,964	0	0.00%
Woodfin	3,170	22	0.69%
Unincorporated Area	53,864	728	1.35%
Madison County	**8,286**	**117**	**1.41%**
Hot Springs	576	3	0.52%
Marshall	1,413	28	1.98%
Mars Hill	2,033	13	0.64%
Unincorporated Area	4,264	73	1.71%
Buncombe Madison Regional Total	**110,958**	**1,057**	**0.95%**

Source: US Census Bureau, American Community Survey

Table 6.5 shows population growth estimates for regional jurisdictions from 2010 to 2024 based on ACS and Decennial Census datasets.

TABLE 6.5: POPULATION GROWTH FOR THE BUNCOMBE MADISON REGION

Location	2010	2016	2020	2024	% Change 2010-2024
Buncombe County	**238,737**	**254,988**	**269,452**	**279,210**	**16.95%**
Asheville	83,471	91,145	94,589	94,992	13.80%
Biltmore Forest	1,345	1,408	1,409	1,462	8.70%

[15] FEMA *National Risk Index* (NRI) & *Resilience Analysis and Planning Tool* (RAPT): https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool

Location	2010	2016	2020	2024	% Change 2010-2024
Black Mountain	7,843	8,145	8,426	8,572	9.29%
Montreat	722	797	901	1,044	44.60%
Weaverville	3,676	3,869	4,567	4,799	30.55%
Woodfin	6,178	6,472	7,936	8,158	32.05%
Unincorporated Area	135,502	143,152	151,624	160,183	18.21%
Madison County	**20,779**	**21,359**	**21,193**	**22,352**	**7.57%**
Hot Springs	557	565	520	543	-2.51%
Marshall	875	889	777	812	-7.20%
Mars Hill	1,869	2,058	2,007	2,208	18.14%
Unincorporated Area	17,478	17,847	17,889	18,789	7.50%
Buncombe Madison Regional Total	**259,516**	**276,347**	**290,645**	**301,562**	**16.20%**

Source: US Census Bureau, American Community Survey, Decennial Census

Based on the above data, the rate of residential development and population growth in the region has increased, especially in concentrated areas of Buncombe County. Changes in development since the previous plan update impact overall regional vulnerability. The greater the population, the greater the risk that people and their communities are impacted by hazards. It should be noted that if future development occurs in vulnerable areas, these populations and the infrastructure that serves them will be increasingly exposed to potential hazards.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling results, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (e.g., drought, excessive heat, hailstorm, lightning, and severe winter weather) or, due to inconsistent data, analysis would not lead to credible results (e.g., sinkholes, erosion, infectious disease, terrorism, cyber, EMP, civil disturbance, and food emergency).

Hazards assessed in this section include: *Hurricane and Coastal Hazards, Tornadoes/Thunderstorms, Earthquakes, Geological (Landslides), Flooding, Wildfires, Hazardous Substances,* and *Dam Failure*.

Estimated annual losses (EAL) for all natural hazards are presented at the end of this section in **Table 6.25,** whereas the total regional hazard exposure among individually listed critical facilities is presented in **Table 6.27**. For additional information related to vulnerability and expected annual losses for a wide range of natural hazards, the FEMA National Risk Index (NRI)[16] allows users to view and download data for county and census tract geographies.

6.5.1. Hurricane and Coastal Hazards

Historical evidence and recent events indicate that the Buncombe Madison Region faces a significant risk of hurricanes, tropical storms, and similar coastal hazards, primarily due to the coastal location of North Carolina. Many storm tracks have come near or traversed through the region, as shown and discussed in ***Section 5: Hazard Profiles***.

Numerous secondary hazards, such as flooding, landslides, erosion, tornadoes, and high winds, tend to result from hurricanes or tropical storms. The effects of compounding hazards can differ significantly based on regional geography as well. These cumulative effects often make potential loss estimates difficult to calculate and track.

The Risk Management Tool (RMT) developed by North Carolina Emergency Management (NCEM) analyzes hurricane winds and no other hazards often associated with hurricanes due to modeling variabilities; therefore, only hurricane winds are assessed. Building and population vulnerabilities to hurricane winds for a 100-year frequency event (return period) are reported in **Table 6.6** and **Table 6.7**.

It is assumed that all existing and future buildings and populations are at risk from hurricanes, tropical storms, and similar 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
Buncombe County	**72,789**	**101,185**	**$32,339,853**	**9,870**	**$9,064,384**	**1,705**	**$5,371,568**	**112,760**	**$46,775,805**
Asheville	33,778	33,144	$10,806,819	3,694	$4,730,943	750	$2,293,192	37,588	$17,830,954
Biltmore Forest	725	686	$468,379	31	$19,955	8	$4,156	725	$492,489
Black Mountain	4,016	3,585	$999,663	342	$644,078	88	$90,759	4,015	$1,734,500
Montreat	629	598	$202,971	5	$4,101	26	$17,575	629	$224,647
Weaverville	1,903	4,627	$1,862,037	300	$450,863	60	$193,964	4,987	$2,506,865
Woodfin	2,589	2,243	4606,425	238	$277,168	105	$134,548	2,586	$1,018,141
Unincorporated Area	29,149	56,302	$17,393,559	5,260	$2,937,276	668	$2,637,374	62,230	$22,968,209

[16] FEMA *National Risk Index* (NRI) & *Resilience Analysis and Planning Tool* (RAPT): https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool

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
Madison County	**16,305**	**15,546**	**$3,168,875**	**749**	**$792,802**	**276**	**$213,616**	**16,571**	**$4,175,293**
Hot Springs	447	392	$80,037	30	$24,611	25	$3,781	447	$108,429
Marshall	409	436	$73,098	85	$59,026	22	$13,866	543	$145,990
Mars Hill	409	436	$73,098	85	$59,026	22	$13,866	543	$145,990
Unincorporated Area	15,040	14,282	$2,942,642	549	$650,139	207	$182,103	15,038	$3,774,884
Buncombe Madison Regional Total	**89,094**	**116,731**	**$35,508,728**	**10,619**	**$9,857,186**	**1,981**	**$5,585,184**	**129,331**	**$50,951,098**

Source: NCEM Risk Management Tool

TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS

Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**54,653**	**13,303**	**271,912**
Asheville	17,450	4,826	96,832
Biltmore Forest	175	30	692
Black Mountain	926	154	3,216
Montreat	224	40	862
Weaverville	1,953	365	7,958
Woodfin	1,693	425	9,101
Unincorporated Area	32,232	7,463	153,251
Madison County	**4,773**	**1,035**	**21,234**
Hot Springs	12	3	55
Marshall	68	30	315
Mars Hill	289	54	1,444
Unincorporated Area	4,404	948	19,420
Buncombe Madison Regional Total	**59,426**	**14,338**	**293,146**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

Given equal susceptibility across the entire Buncombe Madison Region, it can be assumed that the entire population is at risk from hurricanes, tropical storms, and similar coastal hazards. Timely sheltering and 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 or tropical storm event.

CRITICAL FACILITIES

Given equal vulnerability across the Buncombe Madison Region, all critical facilities are at risk. Although some buildings may perform better than others due to construction, age, and other factors, determining individual building responses 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.

In conclusion, a hurricane or tropical storm event has the potential to impact many existing and future buildings, critical facilities, and populations in the Buncombe Madison Region. These 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.

6.5.1. Tornadoes/Thunderstorms

Tornadoes

A probabilistic scenario was created to estimate building and population vulnerabilities in the Buncombe Madison Region for the tornado hazard. For this scenario, a tornado ranked EF2 on the Enhanced Fujita Scale (or F2 on the Fujita Scale) was analyzed. The RMT 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
Buncombe County	**72,789**	**101,185**	**$12,138,877,930**	**9,870**	**$6,126,929,423**	**1,705**	**$1,959,700,623**	**112,760**	**$20,225,507,973**
Asheville	33,778	33,144	$4,061,769,761	3,694	$3,579,769,695	750	$904,950,438	37,588	$8,546,489,894
Biltmore Forest	725	686	$161,580,643	31	$23,453,221	8	$8,162,858	725	$193,196,722
Black Mountain	4,016	3,585	$400,252,716	342	$355,275,987	88	$62,101,586	4,015	$817,630,289
Montreat	629	598	$91,399,802	5	$4,961,400	26	$19,560,262	629	$115,921,464
Weaverville	1,903	4,627	$670,395,593	300	$303,850,381	60	$86,635,621	4,987	$1,060,881,594
Woodfin	2,589	2,243	$230,338,431	238	$169,757,905	105	$69,054,374	2,586	$469,150,709
Unincorporated Area	29,149	56,302	$6,523,140,984	5,260	$1,689,860,834	668	$809,235,484	62,230	$9,022,237,301
Madison County	**17,327**	**16,351**	**$1,509,018,215**	**775**	**$422,174,893**	**330**	**$185,128,628**	**17,456**	**$2,116,321,735**
Hot Springs	447	392	$30,665,785	30	$14,560,237	25	$7,436,170	447	$52,662,192
Marshall	409	436	$35,433,223	85	$40,305,637	22	$16,181,888	543	$91,920,748
Mars Hill	1,410	1,220	$135,525,429	111	$69,928,031	76	$57,889,046	1,407	$263,342,505
Unincorporated Area	15,061	14,303	$1,307,393,778	549	$297,380,988	207	$103,621,524	15,059	$1,708,396,290
Buncombe Madison Regional Total	**90,116**	**117,536**	**$13,647,896,145**	**10,645**	**$6,549,104,316**	**2,035**	**$2,144,829,251**	**130,216**	**$22,341,829,708**

Source: NCEM Risk Management Tool

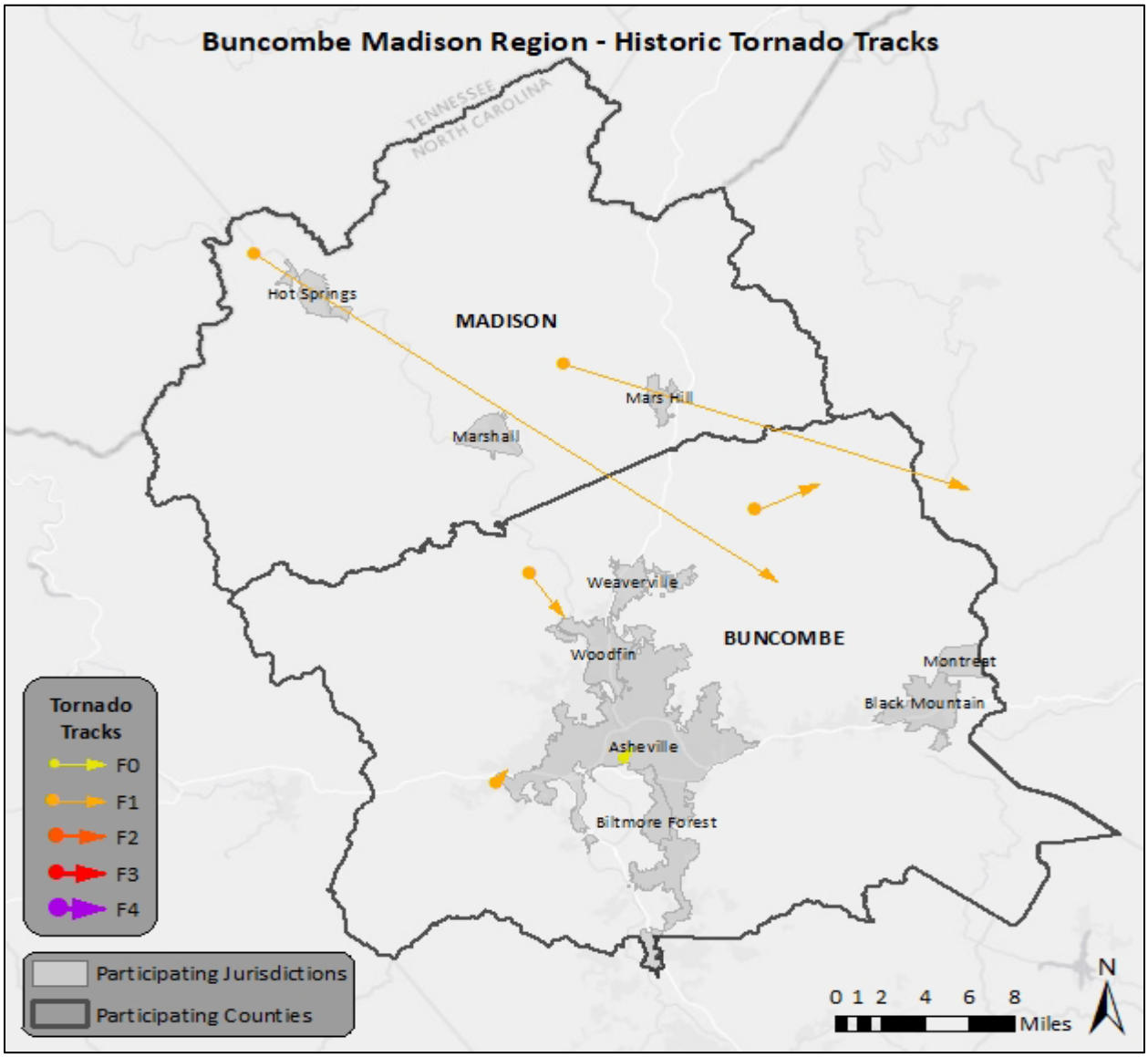
TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD

Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**54,653**	**13,303**	**271,912**
Asheville	17,450	4,826	96,832
Biltmore Forest	175	30	692
Black Mountain	926	154	3,216
Montreat	224	40	862
Weaverville	1,953	365	7,958
Woodfin	1,693	425	9,101
Unincorporated Area	32,232	7,463	153,251
Madison County	**4,779**	**1,036**	**21,263**
Hot Springs	12	3	55
Marshall	68	30	315
Mars Hill	289	54	1,444
Unincorporated Area	4,410	949	19,449
Buncombe Madison Regional Total	**59,432**	**14,339**	**293,175**

Source: NCEM Risk Management Tool

A map of historical tornado points of origin and paths can be seen below in **Figure 6.3.**

FIGURE 6.3: HISTORICAL TORNADO TRACKS



Source: NOAA

Thunderstorms

A probabilistic scenario was created to estimate building and population vulnerabilities in the Buncombe Madison Region for the thunderstorm hazard. For this scenario, damages due to thunderstorm winds of a 50-year frequency event (return period) were analyzed. It is important to note that this data does not include damage caused by other remnants of thunderstorms, such as lightning or hail. The NCEM 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
Buncombe County	**39,011**	**68,041**	**$21,533,034**	**6,176**	**$4,333,441**	**955**	**$3,078,376**	**75,172**	**$28,944,851**
Asheville	33,778	33,144	$10,806,819	3,694	$4,730,943	750	$2,293,192	37,588	$17,830,954
Biltmore Forest	725	686	$468,379	31	$19,955	8	$4,156	725	$492,489
Black Mountain	4,016	3,585	$999,663	342	$644,078	88	$90,759	4,015	$1,734,500
Montreat	629	598	$202,971	5	$4,101	26	$17,575	629	$224,647
Weaverville	1,903	4,627	$1,862,037	300	$450,863	60	$193,964	4,987	$2,506,865
Woodfin	2,589	2,243	$606,425	238	$277,168	105	$134,548	2,586	$1,018,141
Unincorporated Area	29,149	56,302	$17,393,559	5,260	$2,937,276	668	$2,637,374	62,230	$22,968,209
Madison County	**17,306**	**16,330**	**$3,435,072**	**775**	**$814,425**	**330**	**$268,520**	**17,435**	**$4,518,017**
Hot Springs	447	392	$80,037	30	$24,611	25	$3,781	447	$108,429
Marshall	409	436	$73,098	85	$59,026	22	$13,866	543	$145,990
Mars Hill	1,410	1,220	$339,295	111	$80,649	76	$68,770	1,407	$488,714
Unincorporated Area	15,040	14,282	$2,942,642	549	$650,139	207	$182,103	15,038	$3,774,884
Buncombe Madison Regional Total	**56,317**	**84,371**	**$24,968,106**	**6,951**	**$5,147,866**	**1,285**	**$3,346,896**	**92,607**	**$33,462,868**

Source: NCEM Risk Management Tool

TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS

Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**54,653**	**13,303**	**271,912**
Asheville	17,450	4,826	96,832
Biltmore Forest	175	30	692
Black Mountain	926	154	3,216
Montreat	224	40	862
Weaverville	1,953	365	7,958
Woodfin	1,693	425	9,101
Unincorporated Area	32,232	7,463	153,251
Madison County	**4,773**	**1,035**	**21,234**
Hot Springs	12	3	55
Marshall	68	30	315
Mars Hill	289	54	1,444
Unincorporated Area	4,404	948	19,420
Buncombe Madison Regional Total	**59,426**	**14,338**	**293,146**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk from the tornadoes/ thunderstorms hazard. Timely sheltering and 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 to damage should an event occur.

6.5.3. Earthquakes

A probabilistic scenario was created to estimate building and population vulnerabilities in the Buncombe Madison 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
Buncombe County	**72,789**	**101,185**	**$30,252,921**	**9,870**	**$30,944,372**	**1,705**	**$10,111,017**	**112,760**	**$71,308,311**
Asheville	33,778	33,144	$11,113,702	3,694	$19,181,005	750	$4,759,686	37,588	$35,054,394
Biltmore Forest	725	686	$363,791	31	$116,145	8	$48,883	725	$528,819
Black Mountain	4,016	3,585	$884,315	342	$1,517,905	88	$369,167	4,015	$2,771,387
Montreat	629	598	$182,732	5	$16,346	26	$89,296	629	$288,374
Weaverville	1,903	4,627	$1,607,089	300	$1,528,585	60	$458,841	4,987	$3,594,514
Woodfin	2,589	2,243	$647,666	238	$940,001	105	$408,318	2,586	$1,995,985
Unincorporated Area	29,149	56,302	$15,453,626	5,260	$7,644,385	668	$3,976,826	62,230	$27,074,838
Madison County	**17,327**	**16,351**	**$4,308,900**	**775**	**$2,138,204**	**330**	**$1,032,861**	**17456**	**$7,479,962**
Hot Springs	447	392	$114,240	30	$75,619	25	$41,310	447	$231,168
Marshall	409	436	$133,042	85	$237,308	22	$113,493	543	$483,843
Mars Hill	1,410	1,220	$462,905	111	$391,467	76	$302,742	1,407	$1,157,113
Unincorporated Area	15,061	14,303	$3,598,713	549	$1,433,810	207	$575,316	15,059	$5,607,838
Buncombe Madison Regional Total	**90,116**	**117,536**	**$34,561,821**	**10,645**	**$33,082,576**	**2,035**	**$11,143,878**	**130,216**	**$78,788,273**

Source: NCEM Risk Management Tool

TABLE 6.13: POPULATION VULNERABILITY TO THE EARTHQUAKE HAZARD

Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**54,653**	**13,303**	**271,912**
Asheville	17,450	4,826	96,832
Biltmore Forest	175	30	692
Black Mountain	926	154	3,216
Montreat	224	40	862
Weaverville	1,953	365	7,958
Woodfin	1,693	425	9,101
Unincorporated Area	32,232	7,463	153,251
Madison County	**4,779**	**1,036**	**21,263**
Hot Springs	12	3	55
Marshall	68	30	315
Mars Hill	289	54	1,444
Unincorporated Area	4,410	949	19,449
Buncombe Madison Regional Total	**59,432**	**14,339**	**293,175**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk from 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 of damage should a significant event occur.

In conclusion, an earthquake could potentially impact all existing and future buildings, facilities, and populations in the Buncombe Madison 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 (Landslides)

GIS analysis was used to complete the vulnerability assessment for landslides in the Buncombe Madison Region. The total improved value of exposed property can be estimated using the USGS Landslide Incidence and Susceptibility Index (detailed in ***Section 5: Hazard Profiles***) and local parcel data.

Table 6.14 presents the potential at-risk property based on estimates informed by local parcel data (where available). The entire Buncombe Madison Region is identified as a high-incidence or susceptible area based on USGS landslide susceptibility and incidence analysis. Varying incidence levels (e.g., high, moderate) were used to identify different jurisdictions 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		Approx. Value of Improvements at Risk ($)	
	Moderate	High	Moderate	High
Buncombe County	**0**	**133,831**	**$0**	**$38,181,045,214**
Asheville	0	39,579	$0	$16,000,989,312
Biltmore Forest	0	765	$0	$812,016,600
Black Mountain	0	5,168	$0	$1,294,704,900
Montreat	0	925	$0	$271,642,200
Weaverville	0	2,711	$0	$910,313,800
Woodfin	0	4,290	$0	$964,032,300
Unincorporated Area	0	80,393	$0	$17,927,346,102
Madison County	**0**	**21,538**	**$0**	**$1,533,522,939**
Hot Springs	0	496	$0	$46,931,017
Marshall	0	680	$0	$59,752,968
Mars Hill	0	934	$0	$133,819,470
Unincorporated Area	0	19,428	$0	$1,293,019,484
Buncombe Madison Regional Total	**0**	**155,369**	**$0**	**$39,714,568,153**

Source: NC OneMap, United States Geological Survey

SOCIAL VULNERABILITY

Given high landslide incidence and susceptibility across the entire Buncombe Madison Region, it is assumed that a significant portion of the total regional population is at risk. Timely sheltering/evacuations of elderly and young individuals, disabled individuals, and individuals requiring specialized care or equipment are of critical importance to reducing risk when dangerous landslide conditions exist.

CRITICAL FACILITIES

All critical facilities of the region are considered at risk of landslides due to widespread areas of high incidence or susceptibility.

In conclusion, landslides can impact many existing and future buildings, facilities, and populations in the Buncombe Madison Region, though some areas are at a higher risk than others. For example, steep slopes and modified slopes bear a significantly greater risk than flatter areas. Specific vulnerabilities for assets in the Buncombe Madison Region 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

In order to assess flood risk, a GIS-based analysis was used to estimate regional exposure to flooding using Digital Flood Insurance Rate Map (DFIRM) data[17] in combination with local parcel data for each county of the Buncombe Madison Region. The determination of assessed value at risk (exposure) was calculated using GIS analysis by summing the total assessed building values of improved properties that were confirmed to be in an identified floodplain area. **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% Annual Chance of Flooding (100-year)		0.2% Annual Chance of Flooding (500-year)	
	Approx. # of Parcels	Approx. Value of Improvements	Approx. # of Parcels	Approx. Value of Improvements
Buncombe County	**8,356**	**$3,672,978,102**	**4,926**	**$2,732,641,362**
Asheville	2,582	$1,831,530,500	2,349	$1,509,959,200
Biltmore Forest	18	$185,570,800	5	$175,179,900
Black Mountain	508	$289,787,700	286	$203,288,700
Montreat	53	$46,855,200	26	$16,170,900
Weaverville	70	$40,263,400	61	$38,110,000
Woodfin	176	$30,171,000	155	$33,078,000
Unincorporated Area	4,949	$1,248,799,502	2,044	$756,854,662
Madison County	**2,880**	**$216,292,396**	**1,072**	**$89,466,422**
Hot Springs	131	$15,803,194	134	$14,840,676
Marshall	271	$26,777,127	149	$14,570,066
Mars Hill	81	$15,076,869	52	$9,298,741
Unincorporated Area	2,397	$158,635,206	737	$50,756,939
Buncombe Madison Regional Total	**11,236**	**$3,889,270,498**	**5,998**	**$2,822,107,784**

Source: FEMA DFIRM, NC OneMap

To assess flood risk, the RMT analyzed buildings located in the 1-percent annual chance (100-year) floodplain area. The buildings are assessed by the type of building (commercial, residential, or public) and assess pre-FIRM buildings, or structures built before modern flood code regulations became effective. This data is shown 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
Buncombe County	**2,002**	**1,803**	**$40,838,395**	**551**	**$96,467,685**	**46**	**$15,268,044**	**2,400**	**$152,574,121**
Asheville	650	336	$11,915,831	396	$73,685,821	12	$1,884,547	744	$87,486,199
Biltmore Forest	1	0	$0	1	$72,816	0	$0	1	$72,816
Black Mountain	254	220	$3,705,110	30	$12,996,144	4	$69,959	254	$16,771,212
Montreat	18	14	$1,591,242	0	$0	4	$312,514	18	$1,903,755
Weaverville	28	37	$452,017	2	$52,722	0	$0	39	$504,738
Woodfin	98	54	$1,461,773	36	$5,952,175	8	$5,593,487	98	$13,007,434
Unincorporated Area	953	1,142	$21,712,422	86	$3,708,007	18	$7,407,537	1,246	$32,827,967

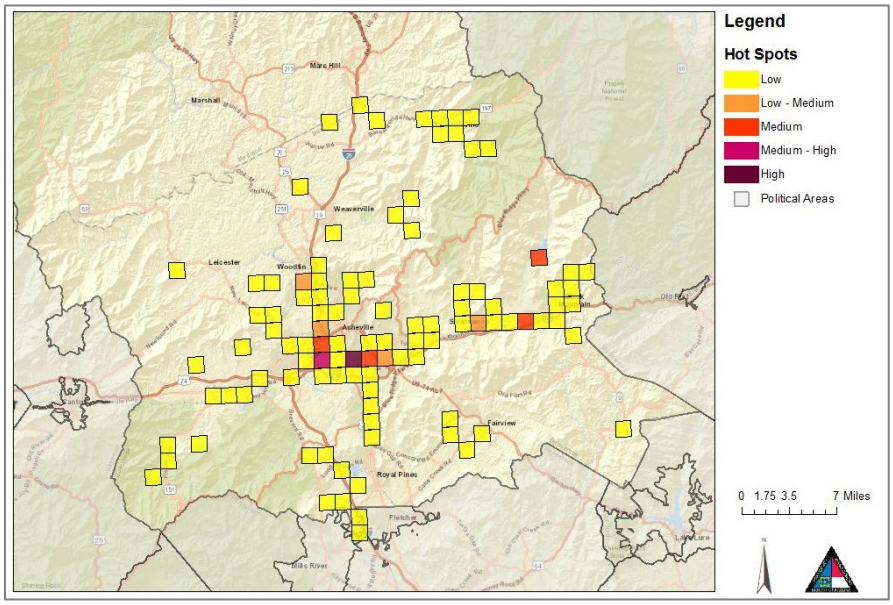
[17] The county-level DFIRM data used for analysis were last updated in 2010 (Madison County) and 2012 (Buncombe County). Recent amendments made through the Letter of Map Revision (LOMR) process were updated in 2024 (Madison County) and 2025 (Buncombe County).

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
Madison County	**711**	**578**	**$12,697,791**	**106**	**$9,863,641**	**36**	**$5,744,854**	**720**	**$28,306,285**
Hot Springs	71	47	$1,539,961	15	$596,829	9	$555,928	71	$2,692,718
Marshall	116	53	$3,656,768	59	$7,889,134	15	$4,462,390	127	$16,008,292
Mars Hill	14	10	$167,326	2	$216,737	1	$112,442	13	$496,504
Unincorporated Area	510	468	$7,333,736	30	$1,160,941	11	$614,094	509	$9,108,771
Buncombe Madison Regional Total	**2,713**	**2,381**	**$53,536,186**	**657**	**$106,331,326**	**82**	**$21,012,898**	**3,120**	**$180,880,406**

Source: NCEM Risk Management Tool

Figure 6.4 below displays visual hotspots of potential dollar losses for the flood hazard in Buncombe County based on NCEM analysis.

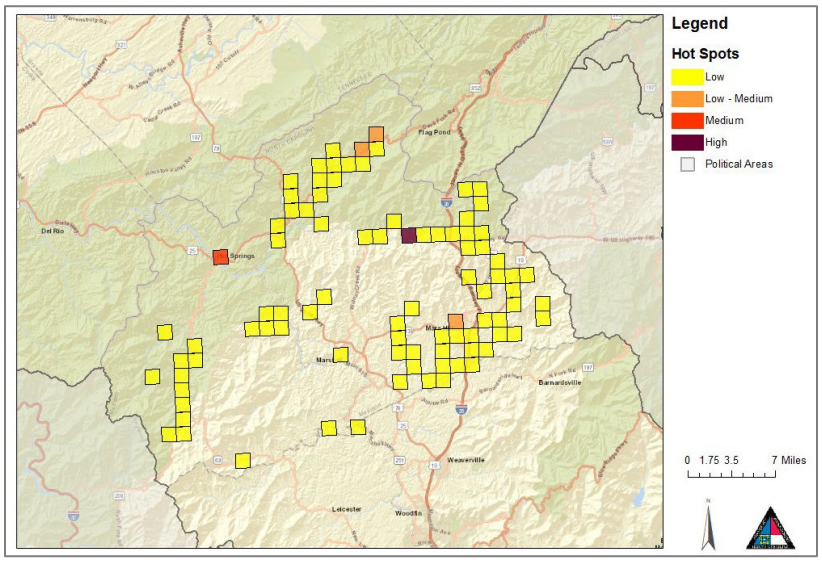
FIGURE 6.4: POTENTIAL DOLLAR LOSSES FOR FLOODING BUNCOMBE COUNTY



Source: NCEM Risk Management Tool

The same information for Madison County is presented below in **Figure 6.5.** Based on the figures shown, most potential hotspots of flood loss are in areas with relatively low vulnerability.

FIGURE 6.5: POTENTIAL DOLLAR LOSSES FOR FLOODING IN MADISON COUNTY



Source: NCEM Risk Management Tool

Table 6.17 assesses vulnerable populations of the region. This data is also from the RMT and analyzes the populations of elderly and children at risk from 1-percent annual chance (100-year) flooding.

TABLE 6.17: POPULATION VULNERABILITY FOR 100-YEAR FLOODPLAINS

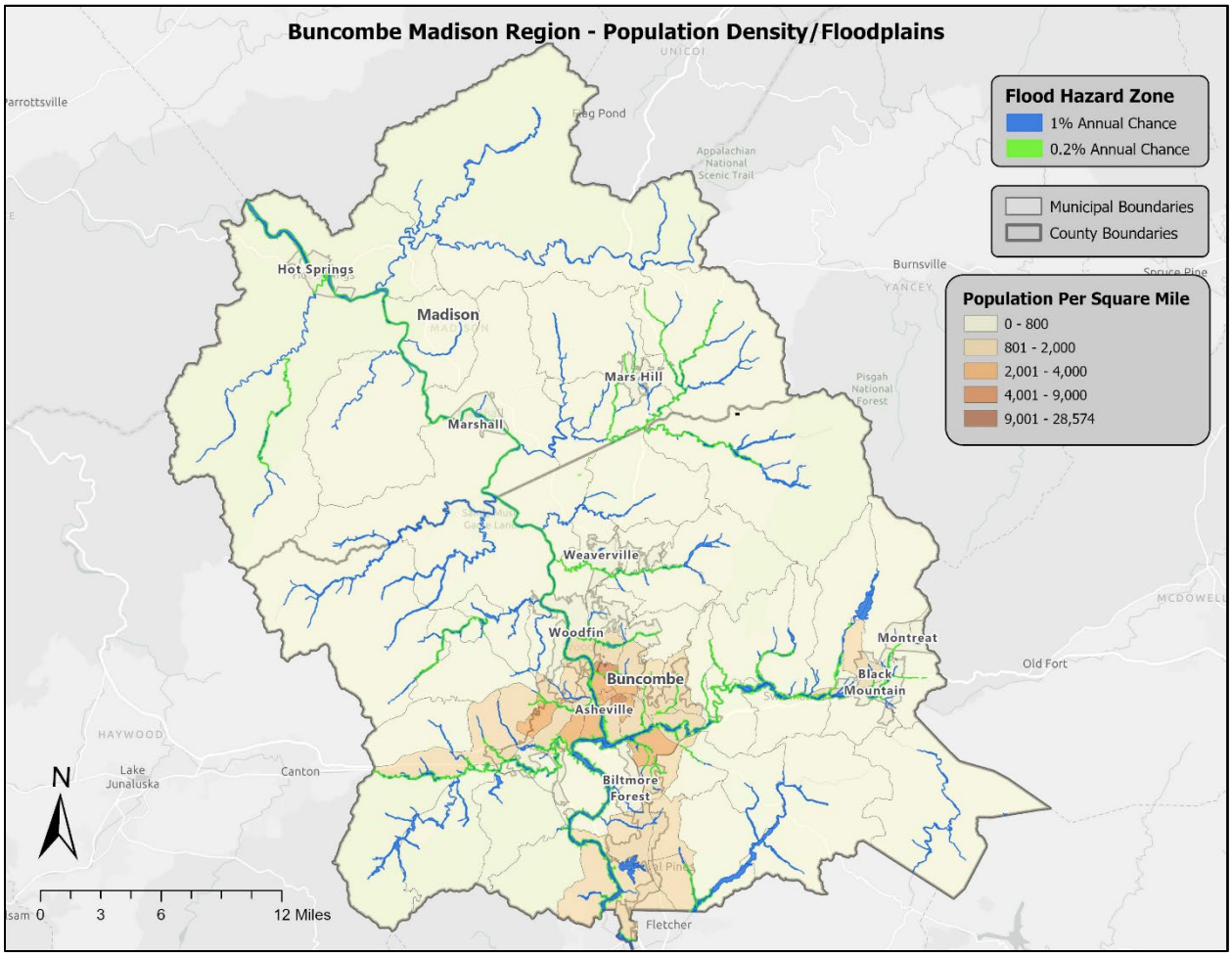
Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**952**	**225**	**4,602**
Asheville	179	50	995
Biltmore Forest	0	0	0
Black Mountain	58	10	200
Montreat	5	1	20
Weaverville	16	3	64
Woodfin	41	10	218
Unincorporated Area	653	151	3,105
Madison County	**155**	**35**	**692**
Hot Springs	1	0	7
Marshall	8	4	38
Mars Hill	2	0	12
Unincorporated Area	144	31	635
Buncombe Madison Regional Total	**1,107**	**260**	**5,294**

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 at the census tract level to further understand at-risk populations to the flooding hazard in the Buncombe Madison Region, and specific floodplain areas of concern based on population density can be seen below in **Figure 6.6**.

FIGURE 6.6: POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, US Census Bureau

CRITICAL FACILITIES

The critical facility analysis revealed that there are at least 28 critical facilities located in the Buncombe Madison Region's 1.0-percent (100-year) and 0.2-percent (500-year) annual chance floodplains based on FEMA flood zones and GIS analysis[18]. They include at least 6 fire/EMS stations, 3 police stations, 3 schools, and 16 medical facilities.

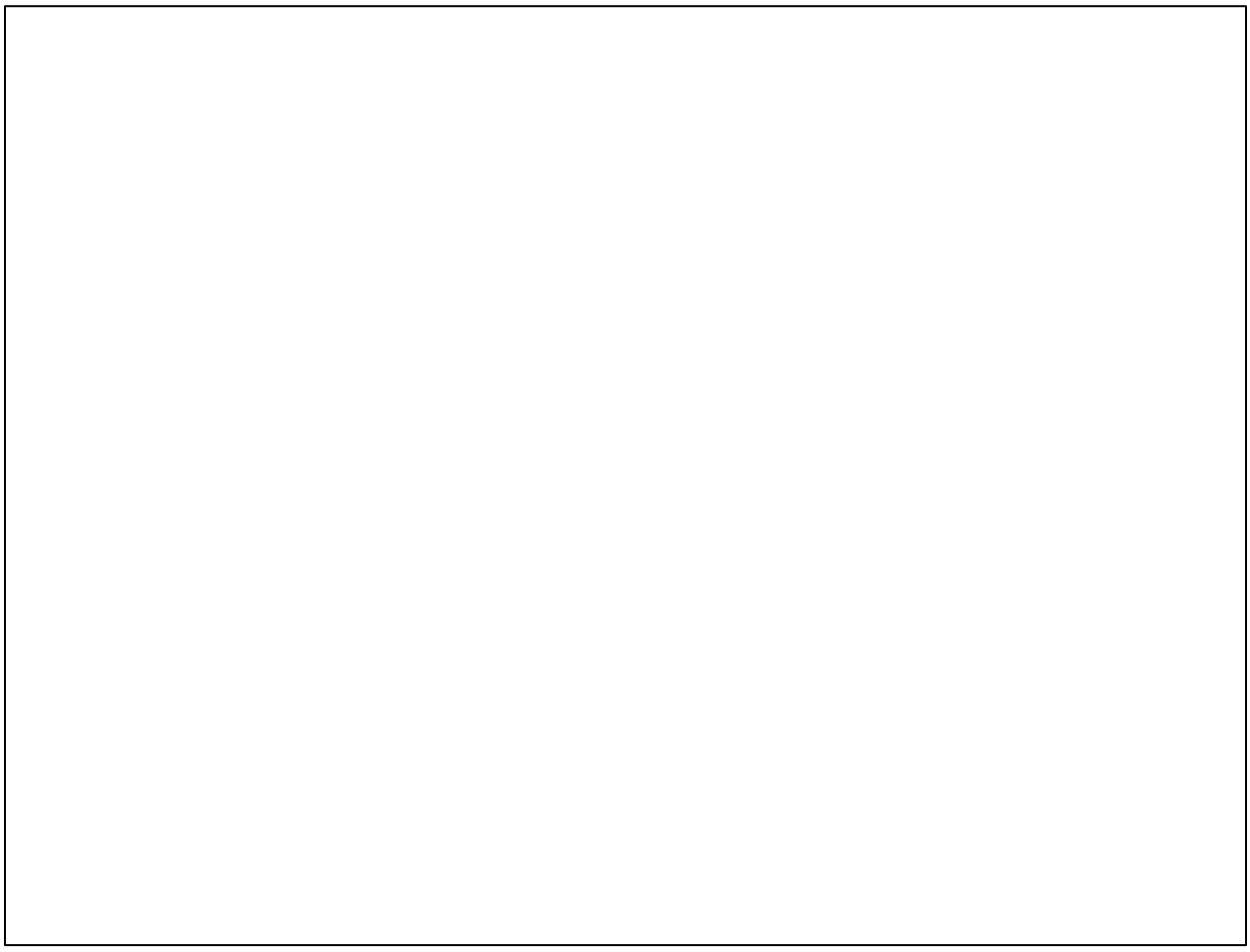
In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the Buncombe Madison Region, though some areas are at a higher risk than others. All types of structures in a floodplain are inherently at risk, though elevated structures will have a 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, specific areas or properties subject to repetitive flooding losses should continue to be assessed and targeted for mitigation actions.

[18] As previously noted, this analysis does not consider building elevation, which may negate risk.

6.5.6 Wildfires

Historical evidence indicates that the Buncombe Madison Region is susceptible to wildfire events. To estimate exposure to wildfire, the Wildfire Exposure Score (or Structure Exposure Score), among other wildfire risk layers for the region, was obtained directly from the Southern Wildfire Risk Assessment (SWRA). This layer combines the chance of wildfire (*Burn Probability*) with potential wildfire damage to homes (*Damage Potential*) for a comprehensive index of risk. Each subsequent score category also accounts for a 1.5x increase (+ 50%) in exposure (e.g., Category 4/10 acreage is 1.5 times, or 50% more, exposed to wildfire vs. Category 3/10 acreage). **Figure 6.7** shows the Wildfire Exposure Scores for the region below.

FIGURE 6.7: REGIONAL WILDFIRE EXPOSURE SCORES



Source: Southern Wildfire Risk Assessment

Based on an analysis of SWRA data, the Buncombe Madison Region has some areas of significant wildfire risk exposure. Exposure score categories of the region range from 1/10 (lowest exposure, 4,923 acres or 1% of total area) up to 8/10 (high exposure, 469 acres or less than 1% of total area). The most common wildfire exposure categories are 4/10 (473,971 acres or 67% of total area), 5/10 (116,863 acres or 16% of total area), and 3/10 (73,587 acres or 10% of total area).

SOCIAL VULNERABILITY

Even though not all areas have equal vulnerability, there is some susceptibility across the entire Buncombe Madison Region. It is assumed that the total population is at risk of wildfire hazards. 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

A significant share of critical facilities in the Buncombe Madison Region are in the at-risk area of wildfire burn probability, which is measured as a -7 or higher on a -1 (lowest) to -9 (highest) scale of risk. Buncombe County has the most facilities at risk, with at least 22 facilities, while Madison County has at least 3 facilities at risk. **Table 6.18** shows the results of this GIS analysis.

TABLE 6.18: CRITICAL FACILITIES IN THE AT-RISK WUI RISK INDEX AREA

Location	At-Risk Critical Facilities
Buncombe County	22
Madison County	3
Buncombe Madison Regional Total	**25**

Source: Southern Wildfire Risk Assessment, NC OneMap

Additional information was provided through RMT analysis. This data can be seen below in **Table 6.19** and **Table 6.20**.

TABLE 6.19: BUILDING VULNERABILITY TO WILDFIRE HAZARDS IN THE BUNCOMBE MADISON REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Buncombe County	**40,881**	**67,157**	**$9,572,707,107**	**6,055**	**$4,302,725,119**	**1,228**	**$2,157,003,222**	**73,794**	**$16,032,434,804**
Asheville	12,516	13,045	$2,102,789,725	889	$1,808,782,048	209	$644,338,354	14,143	$4,555,910,127
Biltmore Forest	3	3	$631,561	0	$0	0	$0	3	$631,561
Black Mountain	2,399	2,223	$318,037,457	127	$314,327,230	48	$56,236,881	2,398	$688,601,569
Montreat	323	323	$323	323	$323	323	$323	323	$323
Weaverville	1,591	3,992	$702,638,095	249	$352,657,346	47	$132,082,383	4,288	$1,187,377,824
Woodfin	1,687	1,482	$198,262,203	139	$155,343,228	64	$93,206,259	1,685	$446,811,690
Unincorporated Area	22,362	46,089	$6,250,347,743	4,328	$1,671,614,944	537	$1,231,139,022	50,954	$9,153,101,710
Madison County	**14,638**	**13,856**	**$1,619,129,434**	**648**	**$453,164,772**	**265**	**$265,666,792**	**14,769**	**$2,337,960,997**
Hot Springs	329	299	$34,131,549	19	$14,720,758	11	$8,559,387	329	$57,411,693
Marshall	409	435	$49,388,081	85	$57,017,287	22	$26,949,330	542	$133,354,698
Mars Hill	1,273	1,122	$179,654,684	99	$82,181,726	52	$75,136,171	1,273	$336,972,581
Unincorporated Area	12,627	12,000	$1,355,955,120	445	$299,245,001	180	$155,021,904	12,625	$1,810,222,025
Buncombe Madison Regional Total	**55,519**	**81,013**	**$11,191,836,541**	**6,703**	**$4,755,889,891**	**1,493**	**$2,422,670,014**	**88,563**	**$18,370,395,801**

Source: NCEM Risk Management Tool

TABLE 6.20: POPULATION VULNERABILITY TO WILDFIRE HAZARD

Location	Elderly at Risk	Children at Risk	Total at Risk
Buncombe County	**36,732**	**8,716**	**178,812**
Asheville	6,858	1,897	38,058
Biltmore Forest	1	0	3

Location	Elderly at Risk	Children at Risk	Total at Risk
Black Mountain	574	95	1,994
Montreat	112	20	430
Weaverville	1,684	315	6,864
Woodfin	1117	280	6,007
Unincorporated Area	26,386	6,109	125,456
Madison County	**4,042**	**878**	**17,996**
Hot Springs	9	2	42
Marshall	68	30	314
Mars Hill	266	50	1,327
Unincorporated Area	3,699	796	16,313
Buncombe Madison Regional Total	**40,774**	**9,594**	**196,808**

Source: NCEM Risk Management Tool

6.5.7 Hazardous Substances

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

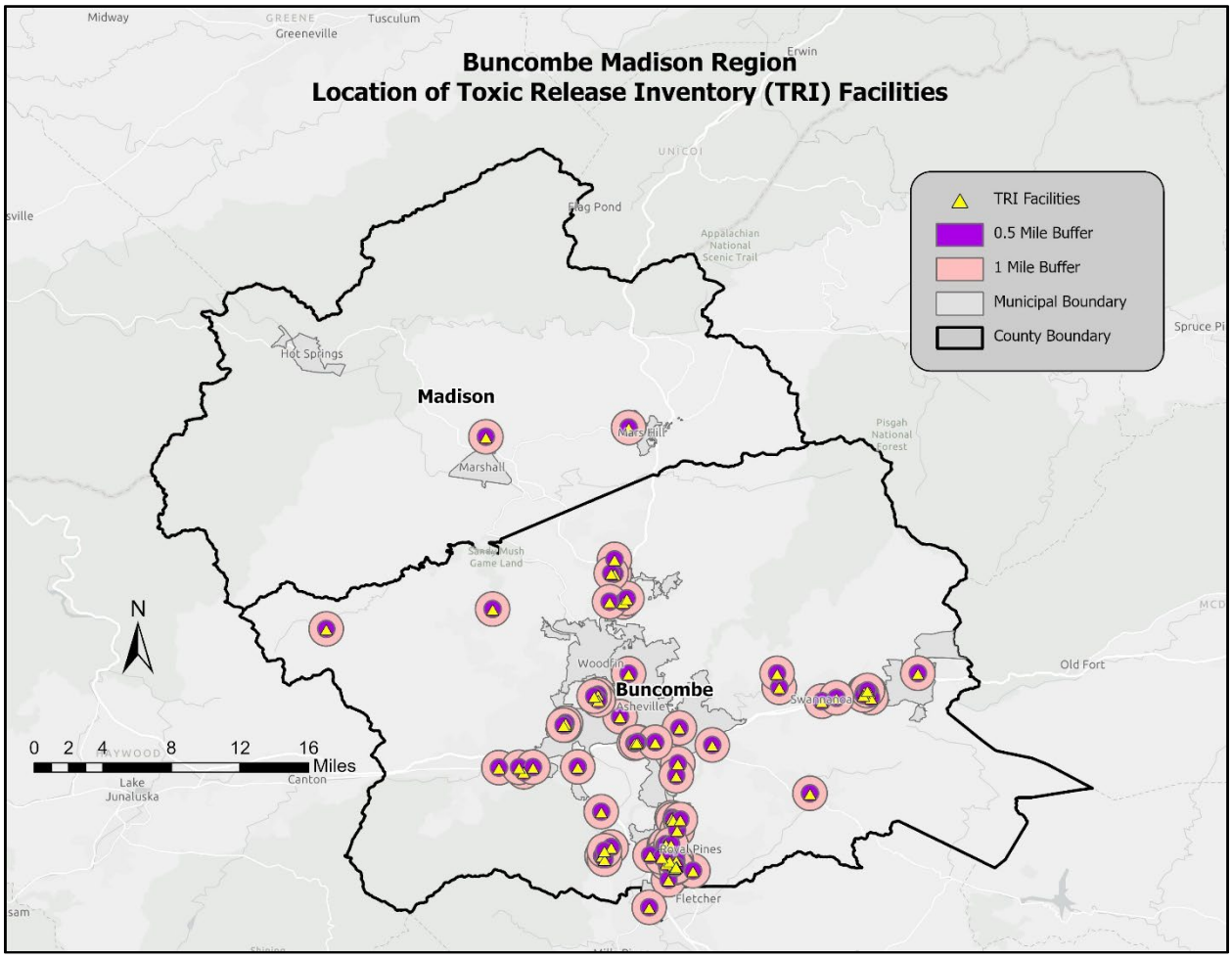
Most hazardous substance incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, or cause more than 50 percent 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 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 assets and parcels[19]. In both scenarios, two buffer sizes, 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, georeferenced TRI-listed toxic sites in the Buncombe Madison Region, along with buffers, were used for analysis as shown in **Figure 6.8.** For the mobile analysis, the major roads (e.g., 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 6.9** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.21** (fixed sites), **Table 6.22** (mobile road sites), and **Table 6.23** (mobile railroad sites)[20].

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

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

FIGURE 6.8: REGIONAL TOXIC RELEASE INVENTORY (TRI) FACILITIES



Source: EPA

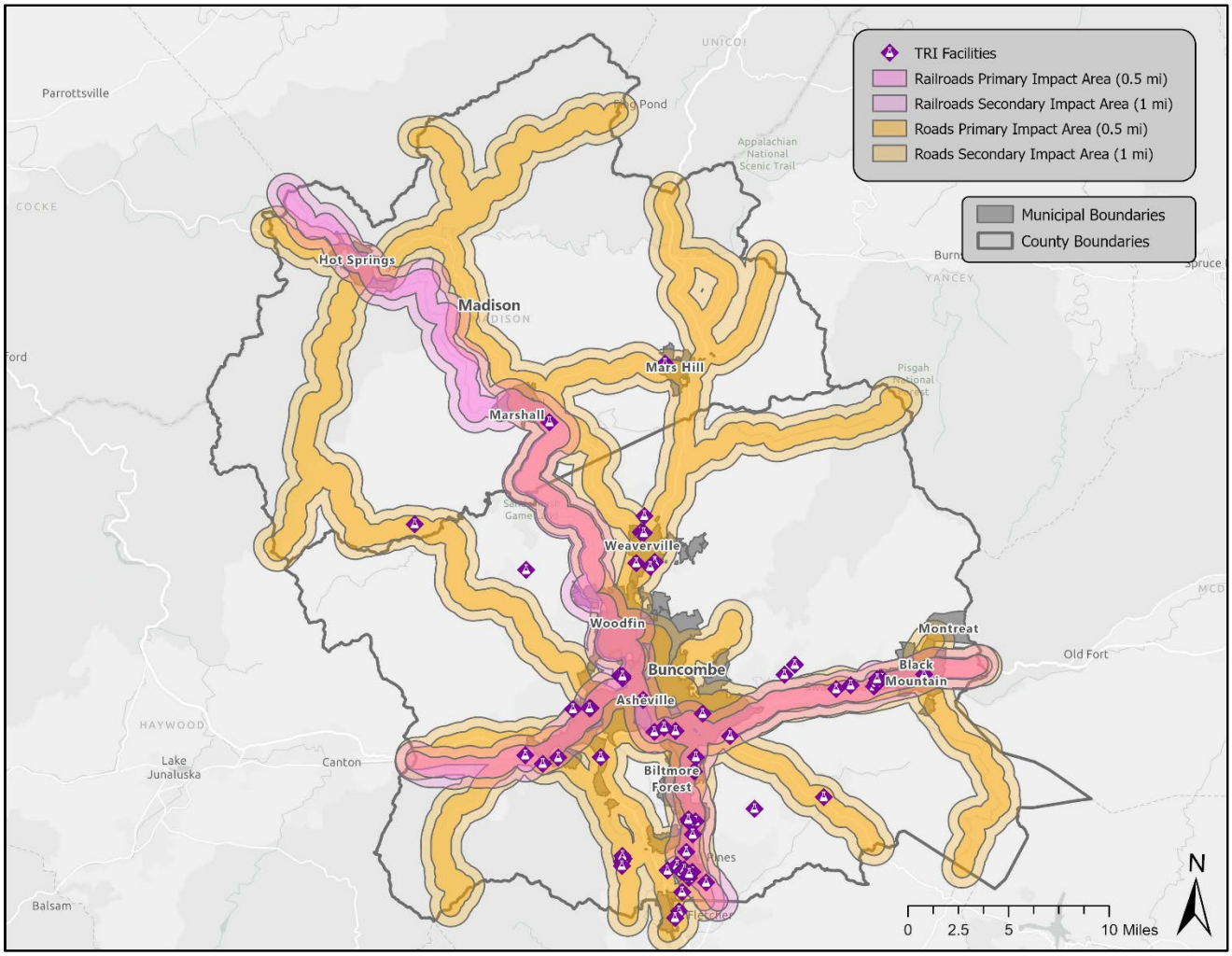
TABLE 6.21: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES) IN THE BUNCOMBE MADISON REGION

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Buncombe County	**6,972**	**5,503**	**$1,921,998,100**	**25,531**	**20,272**	**$5,976,791,314**
Asheville	1,940	1,520	$583,872,100	8,049	6,520	$2,247,582,184
Biltmore Forest	0	0	$0	55	50	$29,428,400
Black Mountain	1,106	917	$221,957,100	2,779	2,222	$461,098,200
Montreat	0	0	$0	6	5	$1,484,900
Weaverville	581	461	$113,388,900	1,804	1,449	$329,388,900
Woodfin	0	0	$0	4	4	$3,138,800
Unincorporated Area	3,345	2,605	1,002,780,000	12,834	10,022	$2,904,669,930
Madison County	**0**	**0**	**$0**	**0**	**0**	**$0**
Hot Springs	0	0	$0	0	0	$0
Marshall	0	0	$0	0	0	$0
Mars Hill	0	0	$0	0	0	$0

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Unincorporated Area	0	0	$0	0	0	$0
Buncombe Madison Regional Total	**6,972**	**5,503**	**$1,921,998,100**	**25,531**	**20,272**	**$5,976,791,314**

Source: EPA, NC OneMap

FIGURE 6.9: MOBILE HAZMAT BUFFERS IN THE BUNCOMBE MADISON REGION



Source: NC Department of Transportation

TABLE 6.22: 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
Buncombe County	**73,062**	**56,393**	**$15,745,097,401**	**97,002**	**74,202**	**$19,799,782,001**
Asheville	32,050	25,809	$8,293,529,844	36,286	29,104	$9,164,691,544
Biltmore Forest	498	453	$306,895,100	693	611	$436,415,800

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
Black Mountain	3,951	2,886	$638,774,900	4,535	3,324	$723,501,800
Montreat	296	229	$69,800,200	546	424	$159,418,000
Weaverville	1,825	1,461	$335,313,500	1,847	1,471	$338,560,700
Woodfin	2,426	1,670	$353,014,327	2,607	1,715	$385,919,627
Unincorporated Area	32,016	23,885	$5,747,769,530	50,488	37,553	$8,591,274,530
Madison County	**8,588**	**4,226**	**$416,124,168**	**11,945**	**5,903**	**$568,764,297**
Hot Springs	439	265	$19,281,922	458	277	$19,705,487
Marshall	561	342	$28,001,088	587	353	$28,762,668
Mars Hill	377	279	$48,251,856	576	431	$65,454,737
Unincorporated Area	7,211	3,340	$320,589,302	10,324	4,842	$454,841,405
Buncombe Madison Regional Total	**81,650**	**60,619**	**$16,161,221,569**	**108,947**	**80,105**	**$20,368,546,298**

Source: NC Department of Transportation, NC OneMap

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

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Buncombe County	**28,552**	**22,115**	**$5,693,252,677**	**53,408**	**41,567**	**$11,040,976,365**
Asheville	14,438	11,471	$3,075,499,550	25,438	20,256	$5,904,231,408
Biltmore Forest	280	249	$185,119,800	656	586	$412,957,100
Black Mountain	2,043	1,591	$373,340,900	3,766	2,905	$624,543,000
Montreat	0	0	$0	0	0	$0
Weaverville	0	0	$0	0	0	$0
Woodfin	1,598	1,099	$220,242,327	2,265	1,487	$329,909,027
Unincorporated Area	10,193	7,705	$1,839,050,100	21,283	16,333	$3,769,335,830
Madison County	**2,009**	**1,020**	**$83,571,268**	**3,357**	**1,719**	**$140,418,748**
Hot Springs	424	264	$19,004,419	458	277	$19,705,487
Marshall	498	293	$22,838,000	579	352	$28,351,186
Mars Hill	0	0	$0	0	0	$0
Unincorporated Area	1,087	463	$41,728,849	2,320	1,090	$92,362,075
Buncombe Madison Regional Total	**30,561**	**23,135**	**$5,776,823,945**	**56,765**	**43,286**	**$11,181,395,113**

Source: NC Department of Transportation, NC OneMap

SOCIAL VULNERABILITY

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

CRITICAL FACILITIES

***Fixed Site Analysis**:*

The critical facility analysis for fixed TRI sites revealed that there are at least 133 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 44 facilities throughout the region. All of the facilities in the primary impact zone are located in Buncombe County.

***Mobile Analysis**:*

The critical facility analysis for road and railroad transportation corridors revealed that there are at least 353 critical facilities located in the primary (0.5-mile) mobile HAZMAT buffer areas for roads and railroads throughout the region. Although this is a worst-case scenario model, it indicates that most of the critical facilities in the Buncombe Madison region are vulnerable to a potential mobile HAZMAT incident. Additionally, there are at least 386 critical facilities located in the secondary (1-mile) buffer area of both roads and railroads, accounting for roughly over 80 percent of the total number of critical facilities in the region. This may be the result of many critical facilities being located near major roadways for ease of access, but it is nonetheless important to recognize that a large percentage of critical facilities in the region are in the smaller buffer area.

In conclusion, a hazardous substances incident has the potential to impact many existing and future buildings, critical facilities, and populations in the Buncombe Madison 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 as wind speed and direction, volume of release, etc.

6.5.8 Dam Failure

Regional vulnerability to dam failure is essentially limited to the people, property, infrastructure, critical facilities, and environment of areas located immediately downstream of dams, especially ones rated as high hazard. At the time of this 2026 plan update, 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 (NCDEQ) 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 (USACE) also maintains the National Inventory of Dams (NID) at the federal level to monitor these infrastructure assets. Additional information that is available related to high hazard dams of the region can be found below in **Table 6.24**.

TABLE 6.24: SUMMARY OF REGIONAL HIGH-HAZARD DAM VULNERABILITY

Dam Name	NID ID	EAP?	Condition (as of July 2024)	Owner Type	Max Capacity (acre-feet)	Max Discharge (ft^3/s)	River/Stream
BUNCOMBE COUNTY							
Beaver Lake Dam	NC00291	Y	Poor	Private	996	6,000	Beaver Dam Creek
Bee Tree Lake Dam	NC00289	Y	Satisfactory	Local Gov	2,800	46,000	Bee Tree Creek
Black Mountain Reservoir Dam	NC01247	Y	Satisfactory	Local Gov	56	350	UT to Swannanoa River
Busbee Reservoir Dam	NC01887	Y	Satisfactory	Private	48	480	UT to Sweeten Creek
Capps Pond Dam	NC01888	N	Poor	Private	19	0	Pinner Creek
Lake Craig Dam	NC01254	N	Satisfactory	Local Gov	50	N/A	Swannanoa River
Crowfields Dam	NC01893	Y	Satisfactory	Private	22	470	Dingle Creek
Echo Lake Dam	NC00286	Y	Satisfactory	Private	185	556	Cane Creek
Biltmore Lake Dam	NC00293	Y	Satisfactory	Private	1,523	4,950	Bill Moore Creek
Flat Top Mountain Lake Dam	NC00287	Y	Satisfactory	Private	200	170	Flat Branch
Holcombe Dam	NC01904	N	Satisfactory	Private	21	N/A	UT to Flat Creek
Freedom Lake Dam	NC01249	Y	Satisfactory	Private	28	600	Hominy Creek
Jewell Acres Dam	NC01905	Y	Satisfactory	Private	12	N/A	Bull Branch
Lake Charles Dam	NC01906	Y	Fair	Private	25	N/A	Grassy Creek
Lake Kenilworth Dam	NC00290	Y	Satisfactory	Private	215	41	Ross Creek
Caldwell Pond Dam	NC01907	Y	Satisfactory	Private	18	N/A	UT to Pole Creek
Camp Merrimac Dam	NC01909	N	Satisfactory	Private	10	N/A	Swannanoa River
Moore's Dam	NC01911	Y	Satisfactory	Private	24	N/A	Cane Creek
Morgan Pond Dam	NC01707	N	Satisfactory	Private	25	N/A	Ashworth Creek
Nolen Pond Dam	NC01914	N	Not Rated	Private	0	N/A	N/A
North Fork Reservoir Dam	NC00288	Y	Satisfactory	Local Gov	21,700	27,000	N. Fork Swannanoa River
Lake Evens Dam	NC01248	Y	Satisfactory	Private	60	1,250	Upper Flat Creek
Straus Pond Dam	NC00285	Y	Satisfactory	Private	80	148	Rocky Fork Creek
Camp Ridgecrest Lake Dam	NC01238	Y	Satisfactory	Private	80	282	Swannanoa River
Ross Creek Dam	NC01918	N	Fair	State	15	N/A	Ross Creek
Smith Lake Dam	NC01921	N	Not Rated	Private	15	N/A	Dix Creek
MSD Treatment Plant Dam	NC00320	Y	Satisfactory	Local Gov	385	N/A	French Broad River
Starnes Cove Lower Dam	NC01251	N	Fair	Private	12	N/A	Ragsdale Creek
Lake Susan Dam	NC01923	Y	Satisfactory	Private	20	N/A	Flat Creek
Thrash Dam	NC01250	N	Satisfactory	Private	37	1,000	Little Pole Creek
Lake Tomahawk Dam	NC00395	Y	Satisfactory	Local Gov	85	750	Tomahawk Branch
Woodfin Reservoir Dam	NC01253	Y	Fair	Local Gov	157	157,881	Sugar Camp Fork

Dam Name	NID ID	EAP?	Condition (as of July 2024)	Owner Type	Max Capacity (acre-feet)	Max Discharge (ft^3/s)	River/Stream
Woodland Hills Dam	NC01927	Y	Satisfactory	Private	35	N/A	UT to Reems Creek
Schmidt Pond Dam	NC01930	N	Satisfactory	Private	20	N/A	Avery Creek
Roddy Dam	NC01936	N	Satisfactory	Private	10	N/A	UT to Reems Creek
Kyle Boone Dam	NC04767	N	Fair	Private	16	N/A	Ox Creek
Laurel Lake Dam	NC05140	Y	Satisfactory	Private	24	N/A	Swannanoa River
Kyfields Condominiums Dam	NC05442	Y	Satisfactory	Private	13	N/A	Reems Creek
Lake Julian Dam	NC05712	Y	Satisfactory	Utility	8,819	7,543	UT to French Broad River
North Buncombe Quarry SB No. 7 Dam	NC05748	Y	Satisfactory	Private	1	N/A	French Broad River
Porter Dam	NC05798	N	Satisfactory	Private	19	N/A	White Branch
Asheville 1964 Ash Basin Dam	NC05971	Y	Satisfactory	Utility	1,000	N/A	French Broad River
Asheville North Stormwater Pond Dam	NC06429	N	N/A	Utility	25	0	N/A
Asheville South Stormwater Pond Dam	NC06430	N	N/A	Utility	26	0	N/A
Craggy Dam	NC06522	N	N/A	Local Gov	N/A	N/A	French Broad River
Spivey Pond Dam	NC07177	N	N/A	Private	N/A	N/A	N/A
MADISON COUNTY							
Wheeler Dam	NC03362	Y	Fair	Private	15	N/A	Crooked Creek
Mars Hill Water Supply Dam	NC01345	Y	Fair	Local Gov	40	N/A	Big Laurel Creek
Chestnut Hill Dam	NC01346	Y	Fair	Private	50	N/A	Long Branch
Fakhoury Dam	NC03364	N	Poor	Private	9	0	Little Creek
Ivy Dam	NC03365	N	Fair	Unknown	40	N/A	Ivy River
Ross Dam	NC04983	Y	Poor	Private	6	N/A	N/A
Redmon Dam	NC05539	Y	N/A	Utility	N/A	65,000	French Broad River
Stackhouse Dam Upper	NC05618	N	Poor	Private	26	N/A	King Creek
Capitola Dam	NC06533	N	Fair	Utility	N/A	N/A	French Broad River

Source: NCDEQ Dam Safety Program, July 2024

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

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

- Improving our understanding of the risk associated with the natural hazards in the Buncombe Madison 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 Buncombe Madison 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 Buncombe Madison 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 Buncombe and Madison counties.

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

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

Table 6.25 presents a summary of estimated annual losses (EAL) for each hazard and on a composite scale in the Buncombe Madison Region as reported in 2025 by the FEMA National Risk Index[21]. 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 risk measurement for determining prioritized hazard mitigation strategies throughout the region.

[21] FEMA *National Risk Index* (NRI) & *Resilience Analysis and Planning Tool* (RAPT): https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool. 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 6.25: POTENTIAL ESTIMATED ANNUAL LOSSES (EAL) BY HAZARD

Hazard	Buncombe County	Madison County	Total
Drought	$409,323	$667	**$409,990**
Excessive Heat	Negligible	Negligible	**Negligible**
Hurricane and Coastal Hazards	$544,131	$33,652	**$577,783**
Tornadoes/Thunderstorms[22]	$2,494,140	$317,765	**$2,811,905**
Severe Winter Weather[23]	$6,208,083	$417,724	**$6,625,807**
Earthquakes	$3,016,728	$247,354	**$3,264,082**
Geological (Landslides)	$1,294,455	$154,763	**$1,449,218**
Dam Failure	Negligible	Negligible	**Negligible**
Flooding	$48,055,800	$6,068,001	**$54,123,801**
Wildfires	$446,690	$101,167	**$547,857**
Infectious Disease	Negligible	Negligible	**Negligible**
Hazardous Substances	Negligible	Negligible	**Negligible**
Radiological Emergency	Negligible	Negligible	**Negligible**
Terrorism	Negligible	Negligible	**Negligible**
Cyber	Negligible	Negligible	**Negligible**
Electromagnetic Pulse	Negligible	Negligible	**Negligible**
Civil Disturbance	Negligible	Negligible	**Negligible**
Food Emergency	Negligible	Negligible	**Negligible**

**In this table, the term "Negligible" is used to indicate that no records of dollar losses for the particular hazard were recorded for calculations. This could be the case either because there was minimal significant damage noted or because documentation of that particular type of event is not well kept.*
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, severe winter weather, and tornadoes/thunderstorms. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.26** shows an expanded number of regional critical facilities retrieved from NCEM RMT data grouped by updated FEMA Community Lifelines[24]. These critical facility counts are planning estimates subject to future changes. Additionally, **Table 6.27** 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**").

[22] Calculated using an average of hail, lightning, strong wind, and tornado hazards
[23] Calculated using an average of cold wave, ice storm, and winter weather hazards
[24] FEMA Community Lifelines are defined as "*facilities that enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security*."

TABLE 6.26: REGIONAL 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**
Buncombe County	**3,891**	**112**	**1**	**5,340**	**3**	**450**	**6**	**824**	**402**	**0**	**0**	**0**	**0**	**547**	**62**	**38**	**19**	**11,695**
Asheville	121	86	1	2,933	3	202	3	398	300	0	0	0	0	404	4	14	1	4,470
Biltmore Forest	0	1	0	12	0	2	0	9	7	0	0	0	0	7	0	1	0	39
Black Mountain	27	8	0	297	0	19	1	40	17	0	0	0	0	19	0	2	1	431
Montreat	1	0	0	8	0	0	0	26	0	0	0	0	0	0	0	0	0	35
Weaverville	77	6	0	194	0	38	0	20	8	0	0	0	0	16	0	2	0	361
Woodfin	15	0	0	208	0	18	1	61	3	0	0	0	0	19	30	1	2	358
Unincorporated Area	3,650	11	0	1,688	0	171	1	270	67	0	0	0	0	82	28	18	15	6,001
Madison County	**12**	**8**	**0**	**571**	**0**	**194**	**0**	**152**	**20**	**0**	**0**	**0**	**0**	**133**	**4**	**0**	**4**	**1,098**
Hot Springs	0	0	0	30	0	4	0	16	0	0	0	0	0	2	0	0	0	52
Marshall	2	2	0	69	0	9	0	14	1	0	0	0	0	8	1	0	1	107
Mars Hill	2	1	0	64	0	29	0	62	6	0	0	0	0	19	0	0	3	186
Unincorporated Area	8	5	0	408	0	152	0	60	13	0	0	0	0	104	3	0	0	753
Buncombe Madison Regional Total	**3,903**	**120**	**1**	**5,911**	**3**	**644**	**6**	**976**	**422**	**0**	**0**	**0**	**0**	**680**	**66**	**38**	**23**	**12,793**

Source: NCEM Risk Management Tool

TABLE 6.27: HAZARD RISKS OF REGIONAL 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)
Buncombe County																		
Buncombe County Emergency Management	EOC/Response	X	X	X	X	X	X			X					X	X		
Asheville Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Asheville Fire Department 2	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Asheville Fire Department 3	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Asheville Fire Department 4	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Asheville Fire Department 5	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Asheville Fire Department 6	Fire/EMS	X	X	X	X	X	X			X				X	X	X		X
Asheville Fire Department 7	Fire/EMS	X	X	X	X	X	X			X					X	X		
Asheville Fire Department 8	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Asheville Fire Department 9	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Asheville Fire Department 10	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Asheville Fire Department 11	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Asheville Fire Department 12	Fire/EMS	X	X	X	X	X	X			X						X		
Barnardsville Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X		
Black Mountain Fire Department	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Black Mountain Fire Department 2	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Black Mountain Fire Department 3	Fire/EMS	X	X	X	X	X	X			X								
Broad River Volunteer Fire and Rescue Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Broad River Volunteer Fire and Rescue Department 2	Fire/EMS	X	X	X	X	X	X			X								
Broad River Volunteer Fire and Rescue Department 3	Fire/EMS	X	X	X	X	X	X			X					X	X		
Enka Candler Fire and Rescue Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Enka Candler Fire and Rescue Department 2	Fire/EMS	X	X	X	X	X	X			X					X	X		X
Enka Candler Fire and Rescue Department 3	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		X
Fairview Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Fairview Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X			X								
Fairview Volunteer Fire Department 3	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)
French Broad Volunteer Fire & Rescue	Fire/EMS	X	X	X	X	X	X			X		X						
Garren Creek Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X								
Garren Creek Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X			X								
Jupiter Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X		X						
Leicester Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X		X			X	X		
Leicester Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X			X		X						
Leicester Volunteer Fire Department 3	Fire/EMS	X	X	X	X	X	X			X								
Reems Creek Valley Fire Department	Fire/EMS	X	X	X	X	X	X			X								
Reems Creek Valley Fire Department 2	Fire/EMS	X	X	X	X	X	X			X								
Reynolds Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Riceville Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X								
Skyland Fire and Rescue Corporation	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Skyland Fire and Rescue Corporation 2	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X		
Skyland Fire and Rescue Corporation 3	Fire/EMS	X	X	X	X	X	X			X								
Skyland Fire and Rescue Corporation 4	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
Swannanoa Volunteer Fire Department & Rescue Squad	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
Swannanoa Volunteer Fire Department & Rescue Squad 2	Fire/EMS	X	X	X	X	X	X			X				X				
The Upper Hominy Volunteer Fire and Rescue Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
The Upper Hominy Volunteer Fire and Rescue Department 2	Fire/EMS	X	X	X	X	X	X			X								
Weaverville Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
West Buncombe Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
West Buncombe Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X			X						X	X	X
Woodfin Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
BUNCOMBE COUNTY EMERGENCY MEDICAL SERVICES STATION 2 AND 12	Fire/EMS	X	X	X	X	X	X			X					X	X		
BUNCOMBE COUNTY RESCUE SQUAD	Fire/EMS	X	X	X	X	X	X			X				X	X	X	X	X
MEDICAL EMERGENCY AMBULANCE INCORPORATED	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)
BUNCOMBE COUNTY EMERGENCY MEDICAL SERVICES STATION 3	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
REGIONAL TRANSPORT SERVICES	Fire/EMS	X	X	X	X	X	X			X			X	X	X	X	X	X
UNIVERSITY OF NORTH CAROLINA CAMPUS POLICE	Police	X	X	X	X	X	X			X					X	X	X	X
NORTH CAROLINA STATE HIGHWAY PATROL - FLETCHER SATELLITE HANGAR / ASHEVILLE DUTY STATION OFFICE	Police	X	X	X	X	X	X			X			X	X	X	X		
CITY OF BLACK MOUNTAIN POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
WOODFIN POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X	X	X
ASHEVILLE AIRPORT POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X		
DEPARTMENT OF HEALTH AND HUMAN SERVICES POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
NATIONAL PARK SERVICE - BLUE RIDGE PARKWAY RANGER STATION	Police	X	X	X	X	X	X			X			X	X	X	X	X	X
BUNCOMBE COUNTY SHERIFFS DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		X
NORTH CAROLINA STATE HIGHWAY PATROL - WESTERN CRIMINAL INTERDICTION TEAM	Police	X	X	X	X	X	X			X				X	X	X		
NORTH CAROLINA STATE HIGHWAY PATROL TROOP G HEADQUARTERS / TROOP G DISTRICT IV / TROOP G DISTRICT VII	Police	X	X	X	X	X	X			X				X	X	X		
BUREAU OF ALCOHOL TOBACCO FIREARMS AND EXPLOSIVES - ASHEVILLE SATELLITE OFFICE	Police	X	X	X	X	X	X			X				X	X	X		X
CITY OF ASHEVILLE POLICE DEPARTMENT - WEST ASHEVILLE RESOURCE CENTER	Police	X	X	X	X	X	X			X				X	X	X		X
NORTH CAROLINA DIVISION OF FOREST RESOURCES - REGION THREE	Police	X	X	X	X	X	X			X				X	X	X		
CITY OF MONTREAT POLICE DEPARTMENT	Police	X	X	X	X	X	X			X					X	X		
BILTMORE FOREST POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		X
CITY OF ASHEVILLE POLICE 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)
UNITED STATES MARSHALS SERVICE - ASHEVILLE	Police	X	X	X	X	X	X			X				X	X	X		X
NATIONAL PARK SERVICE - BLUE RIDGE PARKWAY OTEEN RANGER STATION	Police	X	X	X	X	X	X			X					X	X		X
UNITED STATES FISH AND WILDLIFE SERVICE - OFFICE OF LAW ENFORCEMENT - ASHEVILLE	Police	X	X	X	X	X	X			X					X	X	X	X
UNITED STATES INTERNAL REVENUE SERVICE CRIMINAL INVESTIGATION DIVISION - ASHEVILLE	Police	X	X	X	X	X	X			X				X	X	X		X
MONTREAT COLLEGE - MONTREAT CAMPUS POLICE DEPARTMENT	Police	X	X	X	X	X	X			X								
CITY OF ASHEVILLE POLICE DEPARTMENT - EAST ASHEVILLE OAKLEY RESOURCE CENTER	Police	X	X	X	X	X	X			X					X	X	X	X
TOWN OF WEAVERVILLE POLICE DEPARTMENT	Police	X	X	X	X	X	X			X			X	X	X	X		
Pisgah Elementary	School	X	X	X	X	X	X			X					X	X		
Enka High	School	X	X	X	X	X	X			X				X		X		X
Avery's Creek Elementary	School	X	X	X	X	X	X			X			X	X	X	X		
Valley Springs Middle	School	X	X	X	X	X	X			X					X	X		X
Weaverville Primary	School	X	X	X	X	X	X			X			X	X	X	X		
Weaverville Elementary	School	X	X	X	X	X	X			X			X	X	X	X		
North Buncombe Middle	School	X	X	X	X	X	X			X				X	X	X		
Owen Middle	School	X	X	X	X	X	X			X				X		X		X
Community High School	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Johnston Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Reynolds High	School	X	X	X	X	X	X	X	X	X					X	X		
Reynolds Middle	School	X	X	X	X	X	X			X					X	X		
Barnardsville Elementary	School	X	X	X	X	X	X			X					X	X		
Black Mountain Elementary	School	X	X	X	X	X	X			X				X	X	X	X	X
Black Mountain Primary	School	X	X	X	X	X	X			X				X	X	X	X	X
Candler Elementary	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)
Bell Elementary	School	X	X	X	X	X	X			X					X	X		
Owen High	School	X	X	X	X	X	X			X				X				X
Erwin High	School	X	X	X	X	X	X			X						X		
Erwin Middle	School	X	X	X	X	X	X			X					X	X		
Emma Elementary	School	X	X	X	X	X	X			X			X	X		X	X	X
Fairview Elementary	School	X	X	X	X	X	X			X			X	X	X	X		
Glen Arden Elementary	School	X	X	X	X	X	X			X				X		X		
Haw Creek Elementary	School	X	X	X	X	X	X			X					X	X		
Leicester Elementary	School	X	X	X	X	X	X			X					X	X		
North Buncombe Elementary	School	X	X	X	X	X	X			X								
North Buncombe High	School	X	X	X	X	X	X			X						X		
Oakley Elementary	School	X	X	X	X	X	X			X					X	X	X	X
Enka Middle	School	X	X	X	X	X	X			X				X	X	X	X	X
Sand HillVenable Elem	School	X	X	X	X	X	X			X				X	X	X	X	X
Williams Elementary	School	X	X	X	X	X	X			X			X	X	X	X		X
Roberson High	School	X	X	X	X	X	X			X				X	X	X		X
Estes Elementary	School	X	X	X	X	X	X			X					X	X		X
West Buncombe Elementary	School	X	X	X	X	X	X			X						X		
Woodfin Elementary	School	X	X	X	X	X	X			X					X	X	X	X
Asheville High	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Hall Fletcher Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Isaac Dickson Elementary	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Claxton Elementary	School	X	X	X	X	X	X			X					X	X		
Ira B Jones Elementary	School	X	X	X	X	X	X			X					X	X		
Asheville Middle	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Vance Elementary	School	X	X	X	X	X	X			X				X	X	X		X
Evergreen Community Charter	School	X	X	X	X	X	X			X						X		
Francine Delany New School	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)
Hominy Valley Elementary	School	X	X	X	X	X	X			X				X		X		X
Cane Creek Middle	School	X	X	X	X	X	X			X								
Buncombe County Early College	School	X	X	X	X	X	X			X			X	X	X	X	X	X
North Windy Ridge Intermediate	School	X	X	X	X	X	X			X					X	X		
ArtSpace Charter	School	X	X	X	X	X	X			X					X	X	X	X
School of Inquiry and Life Sciences	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Buncombe County Middle College	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Koontz Intermediate	School	X	X	X	X	X	X			X					X	X		X
Eblen Intermediate	School	X	X	X	X	X	X			X						X		
Buncombe Regional Detention	School	X	X	X	X	X	X			X					X	X		
Asheville Catholic School	School	X	X	X	X	X	X			X					X	X		
Asheville Montessori School	School	X	X	X	X	X	X			X					X	X		
Asheville Academy for Girls	School	X	X	X	X	X	X			X								
Asheville Christian Academy	School	X	X	X	X	X	X			X				X	X	X		X
Asheville-Pisgah Christian Sch.	School	X	X	X	X	X	X			X						X		
Asheville Waldorf School	School	X	X	X	X	X	X			X				X	X	X		X
Asheville School	School	X	X	X	X	X	X			X				X		X	X	X
Black Mountain Academy	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Black Mountain Montesorri	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Canterbury Classical School	School	X	X	X	X	X	X			X					X	X		
Canongate Catholic High School	School	X	X	X	X	X	X			X				X	X	X	X	X
Carolina Day School	School	X	X	X	X	X	X			X					X	X	X	X
Christ School	School	X	X	X	X	X	X			X								
Eliada Academy	School	X	X	X	X	X	X			X					X	X		
Emmanuel Lutheran School	School	X	X	X	X	X	X			X				X	X	X	X	X
Evolve Early Learning	School	X	X	X	X	X	X			X				X	X	X	X	X
French Broad River Academy	School	X	X	X	X	X	X			X					X	X	X	X
Friends-Montessori School	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)
Hanger Hall School for Girls	School	X	X	X	X	X	X			X					X	X		
Hawthorn Montessori School	School	X	X	X	X	X	X			X					X	X	X	X
Learning Community Sch	School	X	X	X	X	X	X			X								
Montessori Footprints Learning Center	School	X	X	X	X	X	X			X			X	X	X	X		X
Montessori Learning Com. West	School	X	X	X	X	X	X			X			X	X	X	X	X	X
Montessori Learning Community	School	X	X	X	X	X	X			X			X	X	X	X		
Mount Pisgah Academy	School	X	X	X	X	X	X			X						X		
Mount Sheba Baptist Acad.	School	X	X	X	X	X	X			X					X	X		
New Classical Academy	School	X	X	X	X	X	X			X					X	X		X
Odyssey Community School	School	X	X	X	X	X	X			X					X	X		X
Parkway Christian School	School	X	X	X	X	X	X			X					X	X		
Rainbow Community School	School	X	X	X	X	X	X			X					X	X		
Reynolds Mountain Christ. Acad.	School	X	X	X	X	X	X			X					X	X		X
Temple Baptist School	School	X	X	X	X	X	X			X					X	X		X
Timbersong Academy	School	X	X	X	X	X	X			X		X						
Trinity of Fairview Academy	School	X	X	X	X	X	X			X								
SOUTH COLLEGE-ASHEVILLE	School	X	X	X	X	X	X			X			X	X	X	X	X	X
ASHEVILLE BUNCOMBE TECHNICAL COMMUNITY COLLEGE	School	X	X	X	X	X	X			X			X	X	X	X	X	X
WARREN WILSON COLLEGE	School	X	X	X	X	X	X			X			X	X				
MONTREAT COLLEGE	School	X	X	X	X	X	X			X								
UNIVERSITY OF NORTH CAROLINA - ASHEVILLE	School	X	X	X	X	X	X			X					X	X		X
Country Time Village #11	Medical	X	X	X	X	X	X			X		X						
Country Time Village #12	Medical	X	X	X	X	X	X			X		X						
Country Time Village #13	Medical	X	X	X	X	X	X			X		X						
Samaritan Place Assisted Living	Medical	X	X	X	X	X	X			X				X	X	X		X
Hall Street Home	Medical	X	X	X	X	X	X			X					X	X		
FEMCARE, INC.	Medical	X	X	X	X	X	X			X					X	X		
Orthopaedic Surgery Center of Asheville	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)
The Endoscopy Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Heart Path Cardiac Rehabilitation Program	Medical	X	X	X	X	X	X			X				X	X	X		X
Arden Family Care Home #2	Medical	X	X	X	X	X	X			X			X	X	X	X		X
Arden's Family Care Home #1	Medical	X	X	X	X	X	X			X			X	X		X		X
Beaverdam Family Care Home	Medical	X	X	X	X	X	X	X	X	X								
Biltmore Family Care Home #1	Medical	X	X	X	X	X	X			X				X	X	X		X
Biltmore Family Care Home #2	Medical	X	X	X	X	X	X			X				X	X	X		X
Biltmore Family Care Home #3	Medical	X	X	X	X	X	X			X				X	X	X		X
Biltmore Family Care Home #4	Medical	X	X	X	X	X	X			X				X	X	X		X
Biltmore Forest Family Care Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Country Time Village #10	Medical	X	X	X	X	X	X			X		X						
Country Time Village #3	Medical	X	X	X	X	X	X			X		X						
Country Time Village #4	Medical	X	X	X	X	X	X			X		X						
Country Time Village #5	Medical	X	X	X	X	X	X			X		X						
Country Time Village #6	Medical	X	X	X	X	X	X			X		X						
Country Time Village #7	Medical	X	X	X	X	X	X			X		X						
Country Time Village #8	Medical	X	X	X	X	X	X			X		X						
Country Time Village #9	Medical	X	X	X	X	X	X			X		X						
Country Time Village I	Medical	X	X	X	X	X	X			X		X						
Country Time Village II	Medical	X	X	X	X	X	X			X		X						
Dillingham Family Care Home	Medical	X	X	X	X	X	X			X								
Erwin Hills Family Care Home	Medical	X	X	X	X	X	X			X					X	X		
Fairview Family Care Home #1	Medical	X	X	X	X	X	X			X								
Fairview Family Care Home #2	Medical	X	X	X	X	X	X			X								
Fairview Family Care Home #3	Medical	X	X	X	X	X	X			X								
Fairview Family Care Home #4	Medical	X	X	X	X	X	X			X								
French Broad Family Care	Medical	X	X	X	X	X	X			X		X						
Georgetown Family Care Home	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)
Haywood Heights	Medical	X	X	X	X	X	X			X			X	X		X	X	X
Holmes Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Kennilworth Family Care Home	Medical	X	X	X	X	X	X			X					X	X		
Knob Hill Family Care Home	Medical	X	X	X	X	X	X			X					X	X		
Lee's Ridge Family Care Home	Medical	X	X	X	X	X	X			X						X		
Leicester Heights Family Care	Medical	X	X	X	X	X	X			X			X	X		X		X
Liberty Oaks #1	Medical	X	X	X	X	X	X			X					X	X		X
Liberty Oaks #2	Medical	X	X	X	X	X	X			X					X	X		X
Mayflower House	Medical	X	X	X	X	X	X			X								
McDaniel's Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Meadowbrook Family Care Home	Medical	X	X	X	X	X	X			X								
Millbrook Family Care	Medical	X	X	X	X	X	X			X				X	X	X		X
Mitchell Heights Family Care #3	Medical	X	X	X	X	X	X			X					X	X	X	X
Mitchell Heights Family Care Home 1	Medical	X	X	X	X	X	X			X					X	X	X	X
Mitchell Heights Family Care Home 2	Medical	X	X	X	X	X	X			X					X	X	X	X
Mitchell Heights Family Care Home 4	Medical	X	X	X	X	X	X			X					X	X	X	X
Mitchell Heights Family Care Home 5	Medical	X	X	X	X	X	X			X					X	X	X	X
Mountain Valley Retirement Home	Medical	X	X	X	X	X	X			X								
Mt. Pisgah Family Care Home	Medical	X	X	X	X	X	X			X						X		
Penley Boarding Home #1	Medical	X	X	X	X	X	X			X				X	X	X		
Plemmons Family Care Home #1	Medical	X	X	X	X	X	X			X			X	X		X		X
Plemmons Family Care Home #2	Medical	X	X	X	X	X	X			X					X	X		X
Rivendell Woods A	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods B	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods East Unit L	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Rivendell Woods East Unit M	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Rivendell Woods East Unit N	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Rivendell Woods G	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)
Rivendell Woods North Unit C	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods North Unit D	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods North Unit F	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods Unit E	Medical	X	X	X	X	X	X			X				X		X	X	X
Rivendell Woods Unit K	Medical	X	X	X	X	X	X			X					X	X		X
Rivendell Woods West Unit H	Medical	X	X	X	X	X	X			X					X	X		X
Rivendell Woods West Unit I	Medical	X	X	X	X	X	X			X					X	X		X
Rivendell Woods West Unit J	Medical	X	X	X	X	X	X			X					X	X		X
Rivendell Woods, Inc. Unit O	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Rock Hill Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Roff's Family Care Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Shangri-La Family Care Home #1	Medical	X	X	X	X	X	X			X		X						
Shangri-La Family Care Home #2	Medical	X	X	X	X	X	X			X		X						
South Asheville Family Care Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Westwood Assisted Living - A	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Westwood Assisted Living - B	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
White Fawn Family Care Home	Medical	X	X	X	X	X	X			X					X	X		X
Advanced Home Care	Medical	X	X	X	X	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	X	X	X
Arcadia Health Care	Medical	X	X	X	X	X	X			X				X	X	X		X
Banaltrum Private Duty Caregivers, Ltd.	Medical	X	X	X	X	X	X			X					X	X		
Bayada Nurses, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Blue Ridge Home Care	Medical	X	X	X	X	X	X			X				X	X	X		X
CNC/Access	Medical	X	X	X	X	X	X			X					X	X		
Coram Alternate Site Services, Inc.	Medical	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
Givens Estates United Methodist Retirement Communit	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Highland Farms, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Interim Healthcare	Medical	X	X	X	X	X	X			X				X	X	X		X

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		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Lincare, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Loftis Oxygen & Medical Euipment, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Maxim Healthcare Services, Inc.	Medical	X	X	X	X	X	X			X					X	X	X	X
PSA Healthcare	Medical	X	X	X	X	X	X			X				X	X	X		X
Tar Heel Home Health	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Unique Care Incorporated	Medical	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	X	X	X
Visiting Health Professionals	Medical	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
Visiting Health Professionals, Inc.	Medical	X	X	X	X	X	X			X					X	X	X	X
Alterra Clare Bridge of Asheville	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Arbor Terrace of Asheville	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Ardenwoods	Medical	X	X	X	X	X	X	X	X	X					X	X		
Asheville Alzheimer's Care Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Asheville Manor	Medical	X	X	X	X	X	X			X				X	X	X		X
Becky's Rest Home #1	Medical	X	X	X	X	X	X			X								
Becky's Rest Home #2	Medical	X	X	X	X	X	X			X								
Crescent View	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Flesher's Fairview Rest Home, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X		
Grace Manor	Medical	X	X	X	X	X	X			X								
Liberty House	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Maggie's Place	Medical	X	X	X	X	X	X			X					X	X		X
Marjorie McCune Memorial Center	Medical	X	X	X	X	X	X			X			X	X		X	X	X
Mountain Brook Long Term Care	Medical	X	X	X	X	X	X			X						X		
Pleasant Cove	Medical	X	X	X	X	X	X			X								
Richard A. Wood, Jr. Assisted Living Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Richmond Hill Rest Home #1	Medical	X	X	X	X	X	X			X				X		X	X	X
Richmond Hill Rest Home #2	Medical	X	X	X	X	X	X			X				X		X	X	X
Richmond Hill Rest Home #3	Medical	X	X	X	X	X	X			X				X		X	X	X

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Richmond Hill Rest Home #4	Medical	X	X	X	X	X	X			X				X		X	X	X
Richmond Hill Rest Home #5	Medical	X	X	X	X	X	X			X				X		X	X	X
Shady Brook Assisted Living	Medical	X	X	X	X	X	X			X						X		
The Village Inn	Medical	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
Windwood Rest Home	Medical	X	X	X	X	X	X			X						X		
Mountain Area Hospice	Medical	X	X	X	X	X	X			X					X	X	X	X
St. Joseph's Hospital	Medical	X	X	X	X	X	X			X				X	X	X		X
Thoms Rehabilitation Hospital	Medical	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
35 Dogwood	Medical	X	X	X	X	X	X			X								
54 Tipperary	Medical	X	X	X	X	X	X			X						X		
Adams Family Care Home	Medical	X	X	X	X	X	X			X								
Addiction Recovery Institute	Medical	X	X	X	X	X	X			X				X	X	X		X
Americas Addiction Trtmnt-1796 Hendersonville Rd	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
ARP/Phoenix/Orange Street	Medical	X	X	X	X	X	X			X					X	X		
Asheville Institute, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Avondale DDA #1	Medical	X	X	X	X	X	X			X				X	X	X		
Avondale DDA #2	Medical	X	X	X	X	X	X			X				X	X	X		
Belleaire	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Beth Powell Home	Medical	X	X	X	X	X	X			X				X	X	X		X
Betty Jo Norton Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Beverly Lyda Home	Medical	X	X	X	X	X	X			X			X	X		X	X	X
Blue Ridge Area Foundation/Vocational Services	Medical	X	X	X	X	X	X			X					X	X	X	X
Blue Ridge Center-283	Medical	X	X	X	X	X	X			X				X	X	X		X
Blue Ridge Center-356	Medical	X	X	X	X	X	X			X				X	X	X		X
Blue Ridge Homes	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Carolina Mtn. DDA Group Home	Medical	X	X	X	X	X	X			X						X		
Carolyn Propst Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Child and Family Center of Arden	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X

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Chiles Avenue Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Clearview Terrace	Medical	X	X	X	X	X	X			X					X	X		
Counseling and Recovery Center	Medical	X	X	X	X	X	X			X					X	X		
Counterpoint	Medical	X	X	X	X	X	X			X					X	X		
Creative Clay, Inc.	Medical	X	X	X	X	X	X	X	X	X					X	X	X	X
Creekside Home	Medical	X	X	X	X	X	X			X				X		X		X
Crossroads Day Treatment Center	Medical	X	X	X	X	X	X			X					X	X		
Cummings, Reuter, Lions and Reynolds Cottages	Medical	X	X	X	X	X	X			X				X	X	X		X
Davidson Home	Medical	X	X	X	X	X	X			X						X		X
Dogwood Court Home	Medical	X	X	X	X	X	X			X								
Eliada Homes/ Donald and Carolyn Andrick	Medical	X	X	X	X	X	X			X					X	X		
Eliada Homes/Bob & Teresa McMinn	Medical	X	X	X	X	X	X			X						X		
Eliada Homes/James and Wanda McCurry	Medical	X	X	X	X	X	X			X					X	X		X
Eliada Homes/Martha Gardenhight	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Eliada Homes/Otis and Alice Ware	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Ellenwood	Medical	X	X	X	X	X	X			X					X	X		X
Farm School Road Home	Medical	X	X	X	X	X	X			X						X		
Ferndale Home	Medical	X	X	X	X	X	X			X					X	X		
First Step Farm-Men	Medical	X	X	X	X	X	X			X								
First Step Farm-Women	Medical	X	X	X	X	X	X			X								
Flynn Christian Fellowship Home	Medical	X	X	X	X	X	X			X					X	X		X
Foundation Psychological Services, P.A.	Medical	X	X	X	X	X	X	X	X	X								
Gaddy Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Goodwill Ind. of NW NC, Inc./Ashvill Emplymt&Trning	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Grandfather Home for Children-Asheville	Medical	X	X	X	X	X	X			X						X		
Heather Court	Medical	X	X	X	X	X	X			X				X	X	X		
Henry Home	Medical	X	X	X	X	X	X			X					X	X		X
Hillside Group Home	Medical	X	X	X	X	X	X			X					X	X		X

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Holmes Home	Medical	X	X	X	X	X	X			X					X	X		X
Hope House	Medical	X	X	X	X	X	X			X					X	X		X
Horizon Recovery	Medical	X	X	X	X	X	X			X					X	X		
Irene Wortham Residential Center-Azalea	Medical	X	X	X	X	X	X			X				X	X	X	X	X
IWC-Rose Street Home	Medical	X	X	X	X	X	X			X				X	X	X		X
IWRC-Dogwood	Medical	X	X	X	X	X	X			X				X	X	X		X
Johnson Drive Home	Medical	X	X	X	X	X	X			X					X	X		
Kathy's Place	Medical	X	X	X	X	X	X			X				X				
Ken & Lynn's Place	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Kim Andrick Home	Medical	X	X	X	X	X	X			X								
Liberty Corner Enterprises	Medical	X	X	X	X	X	X			X				X	X	X		X
MAHEC Women's Health Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Marshall	Medical	X	X	X	X	X	X			X					X	X		
Marty's Place	Medical	X	X	X	X	X	X			X					X	X		X
Mary Benson House	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Moody Home	Medical	X	X	X	X	X	X			X								
Mountain House	Medical	X	X	X	X	X	X			X					X	X		
Mountain Treatment Center	Medical	X	X	X	X	X	X			X					X	X		
Neil Dobbins Center	Medical	X	X	X	X	X	X			X				X	X	X		X
New Stock Road Group Home	Medical	X	X	X	X	X	X			X				X	X	X		
Oakley Home	Medical	X	X	X	X	X	X			X					X	X	X	X
ONAS'S Place	Medical	X	X	X	X	X	X			X				X	X	X		
Pisgah Group Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Riverview Group Home	Medical	X	X	X	X	X	X			X				X		X	X	X
Robert S. Swain Recovery Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Rogers/Uldricks Home	Medical	X	X	X	X	X	X			X				X	X	X		
Solution Therapy Associates	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Sonrise	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)
St. Dunstan Manor Group Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Stapleton Home	Medical	X	X	X	X	X	X			X		X						
Summersgill Home	Medical	X	X	X	X	X	X			X								
Susan Little Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Temperance House	Medical	X	X	X	X	X	X			X				X	X	X	X	X
The Baker Home	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
The Lighthouse Recovery Center	Medical	X	X	X	X	X	X			X					X	X		
The Ray Home	Medical	X	X	X	X	X	X			X								
The Relationship Center	Medical	X	X	X	X	X	X			X					X	X	X	X
The Riddle Institute/Studio XI	Medical	X	X	X	X	X	X			X					X	X		
The Window Box	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
The Women At Risk Program	Medical	X	X	X	X	X	X			X				X	X	X		X
Turning Point Services/ Teresa Warren Home	Medical	X	X	X	X	X	X			X					X	X		
UMAR-Givens Estates	Medical	X	X	X	X	X	X			X				X	X	X	X	X
UMAR-Haw Creek	Medical	X	X	X	X	X	X			X						X		
W N C Group Home - Kenmore	Medical	X	X	X	X	X	X			X				X	X	X	X	X
W N C Group Home - Ora	Medical	X	X	X	X	X	X			X				X	X	X	X	X
W N C Group Home - Pine Spring	Medical	X	X	X	X	X	X			X					X	X		
W N C Group Home-Montford	Medical	X	X	X	X	X	X			X					X	X		X
Wentworth Home	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Worley Place	Medical	X	X	X	X	X	X			X				X	X	X		X
Yale Avenue Home	Medical	X	X	X	X	X	X			X					X	X		
Asheville Health Care Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Aston Park Health Care Center, Inc.	Medical	X	X	X	X	X	X			X					X	X		
Beverly Health Care - Asheville	Medical	X	X	X	X	X	X			X								
Blue Ridge Rehabilitation and Healthcare Center	Medical	X	X	X	X	X	X			X				X	X	X		X
Brian Center Health & Rehabilitation/Weaverville	Medical	X	X	X	X	X	X			X				X	X	X		
Brooks-Howell Home	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)
Deerfield Episcopal Retirement Community, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Emerald Ridge Rehabilitation and Care Center	Medical	X	X	X	X	X	X			X					X	X	X	X
Flesher's Fairview Health Care Center, Inc.	Medical	X	X	X	X	X	X			X			X	X	X	X		
Givens Health Center	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Highland Farms, Inc.	Medical	X	X	X	X	X	X			X				X	X	X	X	X
Magnolia Health Care Center	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Mountain Ridge Wellness Center, LLC	Medical	X	X	X	X	X	X	X	X	X				X	X	X	X	X
Pisgah Manor Health Care Center	Medical	X	X	X	X	X	X	X	X	X						X		
Rickman Nursing Care Center	Medical	X	X	X	X	X	X			X				X		X	X	X
The Laurels of GreenTree Ridge	Medical	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X
The Laurels of Summit Ridge	Medical	X	X	X	X	X	X			X					X	X		
The Oaks at Sweeten Creek	Medical	X	X	X	X	X	X			X			X	X	X	X	X	X
Maxim Healthcare Services, Inc.	Medical	X	X	X	X	X	X			X					X	X	X	X
Pro Temps Medical Staffing	Medical	X	X	X	X	X	X			X				X	X	X	X	X
STAT Nursing Service, Inc.	Medical	X	X	X	X	X	X			X					X	X	X	X
USA Staffing	Medical	X	X	X	X	X	X			X				X	X	X		X
Madison County																		
Madison County Emergency Management	EOC/Response	X	X	X	X	X	X			X					X	X		X
Big Pine Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X								
Ebbs Chapel Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X						X		
Ebbs Chapel Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X	X	X	X		X						
Hot Springs Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X	X	X
Laurel Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
Laurel Volunteer Fire Department 2	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X		
Mars Hill Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X				X	X	X		
Marshall Community Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X
Spring Creek Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
The Country Volunteer Fire Department,	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)
Walnut Community Volunteer Fire Department	Fire/EMS	X	X	X	X	X	X			X					X	X		
MADISON COUNTY AMBULANCE SERVICE 6	Fire/EMS	X	X	X	X	X	X			X		X		X	X	X		
MADISON COUNTY AMBULANCE SERVICE 7	Fire/EMS	X	X	X	X	X	X	X	X	X					X	X	X	X
MADISON COUNTY AMBULANCE SERVICE	Fire/EMS	X	X	X	X	X	X			X					X	X		
MADISON COUNTY SHERIFFS DEPARTMENT / MADISON COUNTY JAIL	Police	X	X	X	X	X	X	X	X	X					X	X	X	X
MARSHALL POLICE DEPARTMENT	Police	X	X	X	X	X	X	X	X	X					X	X	X	X
MARS HILL POLICE DEPARTMENT	Police	X	X	X	X	X	X			X				X	X	X		
HOT SPRINGS POLICE DEPARTMENT	Police	X	X	X	X	X	X	X	X	X					X	X	X	X
Hot Springs Elementary	School	X	X	X	X	X	X			X					X	X	X	X
Madison High	School	X	X	X	X	X	X			X					X	X		
Laurel Elementary	School	X	X	X	X	X	X	X	X	X					X	X		
Madison Middle	School	X	X	X	X	X	X			X					X	X		
Mars Hill Elementary	School	X	X	X	X	X	X			X			X	X		X		
Brush Creek Elementary	School	X	X	X	X	X	X			X					X	X		
Madison Early College High	School	X	X	X	X	X	X			X		X						
Changing Hearts Boarding Sch.	School	X	X	X	X	X	X			X							X	X
Little Ivy Baptist Academy	School	X	X	X	X	X	X			X					X	X		
Wolf Creek Academy	School	X	X	X	X	X	X			X								
Woodson Branch Nature School	School	X	X	X	X	X	X			X					X	X		
MARS HILL COLLEGE	School	X	X	X	X	X	X			X			X	X	X	X		
Hot Springs Family Care Home #1	Medical	X	X	X	X	X	X			X					X	X	X	X
Hot Springs Family Care Home #2	Medical	X	X	X	X	X	X			X					X	X	X	X
Hot Springs Family Care Home #3	Medical	X	X	X	X	X	X			X					X	X	X	X
Mintz Family Care Home #1	Medical	X	X	X	X	X	X			X					X	X	X	X
Mintz Family Care Home #2	Medical	X	X	X	X	X	X			X					X	X	X	X
Mintz Family Care Home #3	Medical	X	X	X	X	X	X			X					X	X	X	X
Mintz Family Care Home #4	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)
Mintz Family Care Home #5	Medical	X	X	X	X	X	X			X					X	X		
Madison County Department of Community Services	Medical	X	X	X	X	X	X			X								
Madison Home Care & Hospice	Medical	X	X	X	X	X	X			X					X	X		
Mars Hill Retirement Community	Medical	X	X	X	X	X	X			X				X	X	X		
Asheville Institute, Inc.	Medical	X	X	X	X	X	X			X				X	X	X		
Blue Ridge Center-Madison County Program	Medical	X	X	X	X	X	X			X					X	X		
Madison County Group Home	Medical	X	X	X	X	X	X			X					X	X	X	X
Mountain Opportunity Center-Madison	Medical	X	X	X	X	X	X			X				X	X	X		X
Unaka Center	Medical	X	X	X	X	X	X			X					X	X		
Elderberry Health Care	Medical	X	X	X	X	X	X			X				X	X	X		X
Madison Manor Nursing Center	Medical	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 Buncombe Madison Region to implement hazard mitigation activities.

This section 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, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to 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 Buncombe Madison 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

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[1] 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)).

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.

7.1.1 Following Hurricane Helene: Post-Disaster Capability Considerations

The capability assessment for the Buncombe Madison Region is informed by the impacts of Hurricane Helene, which provided a real-world evaluation of how existing plans, policies, and systems perform under extreme hazard conditions. The storm produced record-breaking rainfall across Western North Carolina, including more than 30 inches over a three-day period in portions of the region, resulting in catastrophic flooding that exceeded mapped flood hazard areas, widespread landslides, and extensive damage to the built environment and infrastructure systems.

Impacts documented across the region (including more than 49,000 damaged structures in Buncombe County, over 2,200 in Madison County, hundreds of damaged roads and bridges, and widespread slope failures) provided a direct basis for evaluating system performance and local capability. Observed conditions highlighted how existing planning, regulatory, and emergency management frameworks function under extreme stress and informed a reassessment of local practices and assumptions.

The event also produced new hazard data at a level of detail not previously available, including high-water marks, landslide inventories, and system-level damage assessments. These datasets, along with locally developed mapping and tracking efforts, provide a more accurate understanding of current risk conditions. Findings from these efforts directly inform the 2026 update of this plan by supporting refinement of mitigation priorities, planning assumptions, and implementation approaches based on observed conditions.

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

To facilitate the inventory and analysis of local government capabilities within Cabarrus, Stanly, and Union counties, a detailed capability assessment was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The assessment compiled information on various “capability indicators” including relevant planning 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[2] 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.

7.2.1 Integration of Post-Helene Recovery Conditions

The capability assessment reflects current conditions within the Buncombe Madison Region, where local governments remain actively engaged in recovery following Hurricane Helene. Recovery conditions are shaped by the scale of documented impacts, including widespread infrastructure damage, disruption to transportation networks, and ongoing housing and environmental recovery needs.

Accordingly, the assessment reflects an operating environment in which jurisdictions are:

- Implementing locally managed recovery and mitigation projects, including repair of damaged roads, bridges, and water systems identified through post-event assessments
- Coordinating and administering recovery-related funding and project delivery, including project scoping, procurement, and compliance at the local level
- Addressing ongoing infrastructure, housing, and environmental recovery needs, including areas impacted by flooding, landslides, and debris accumulation
- Managing constrained staffing and administrative capacity, as local personnel remain engaged in damage assessment, permitting, and recovery coordination

These conditions influence how capability indicators are interpreted, particularly with respect to implementation capacity. At the same time, recovery efforts have strengthened local coordination and expanded the use of post-event data, including damage inventories and mapping tools developed to track impacts across the region.

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 Buncombe Madison 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 Buncombe Madison 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.

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

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 Buncombe Madison 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 Buncombe Madison Region. A checkmark (✓) indicates that the given item is currently in place and an asterisk (*) indicates that the given item is currently being developed for future implementation.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	BUNCOMBE COUNTY	Asheville	Biltmore Forest	Black Mountain	Montreat	Weaverville	Woodfin	MADISON COUNTY	Hot Springs	Marshall	Mars Hill
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	✓	✓		✓	✓	✓		✓		✓	✓

Planning / Regulatory Tool	BUNCOMBE COUNTY	Asheville	Biltmore Forest	Black Mountain	Montreat	Weaverville	Woodfin	MADISON COUNTY	Hot Springs	Marshall	Mars Hill
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 Community Rating System		✓									

7.3.1.1 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. 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 can be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and 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 Buncombe Madison 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.

- Both of the counties participating in this multi-jurisdictional plan have previously adopted hazard mitigation plans. Each participating jurisdiction 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.

- Buncombe County and its municipalities have strengthened recovery planning capability through the adoption of the Helene Recovery Plan, which provides a coordinated, multi-jurisdictional framework to guide long-term recovery, redevelopment, and resilience efforts.

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

- Buncombe County and Madison County each maintain emergency operations plans through their respective Emergency Management Departments.
- All of the municipalities in Buncombe County have entered into a Civil Preparedness Agreement to implement the county EOP.

- Madison County's emergency operations plan addresses hazards which threaten the county and municipalities.

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.

- Buncombe County has a Continuity of Operations Plan.

Flood Response Plan: A flood response plan establishes procedures for responding to a flood emergency including coordinating and facilitating resources to minimize the impacts of flood.

- The City of Asheville is the only jurisdiction that has adopted a flood response plan.

7.3.1.2. General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the Buncombe Madison 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.

- Buncombe County has adopted a comprehensive land use plan that includes all its municipalities as well as the unincorporated county. All respective jurisdictions have local comprehensive land use plans in place.
- Madison County, the Town of Hot Springs, the Town of Marshall, and the Town of Mars Hill have each adopted a comprehensive 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.

- Buncombe County and all of its municipalities, except the Town of Biltmore Forest and the Town of Woodfin, have capital improvements plans.
- Madison County has established a capital improvements program, enhancing its fiscal and planning capability to prioritize and program infrastructure investments in a manner

that reduces long-term hazard risk. Similarly, the Town of Marshall and the Town of Mars Hill have capital improvements programs.

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

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

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

- All of the counties and municipalities participating in this plan have adopted zoning ordinances. The City of Asheville, the Town of Black Mountain, the Town of Weaverville, and the Town of Marshall include zoning regulations as part of their local unified development ordinance. The remaining municipalities and two counties have adopted stand-alone zoning ordinances.

Subdivision Ordinance: A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- All of the counties and municipalities participating in this plan have adopted subdivision regulations, except the Town of Hot Springs. Again, the City of Asheville, the Town of Black Mountain, the Town of Weaverville, and the Town of Marshall include these regulations as part of their local unified development ordinance. The other municipalities and two counties with subdivision regulations have adopted stand-alone ordinances.

Building Codes, Permitting, and Inspections: Building codes regulate construction standards. In many communities, permits and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- North Carolina has a state compulsory building code, which applies throughout the state; however, jurisdictions may adopt codes if approved as providing adequate minimum standards. All of the participating counties and municipalities have adopted a building code. The building code is enforced by each county's building inspector.

- In Buncombe County, the City of Asheville, the Town of Black Mountain, and the Town of Montreat have their own inspections departments that enforce the building code within their town limits.

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.

OTHER RELEVANT PLANS

There have been other planning efforts and processes conducted in the Buncombe Madison Region that contribute to enhanced hazard mitigation community capability and capacity for the participating jurisdictions. A few examples of these efforts include the following:

- City of Asheville Flood Damage Reduction Task Force
- Buncombe County Multi-Hazard Risk Tool
- City of Asheville's Climate Resilience Assessment
- Swannanoa Flood Risk Management Project
- Land of Sky Regional Resilience Risk Assessment and NEMAC/FernLeaf AccelAdapt Tool

7.3.1.3 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.

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

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 the community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in the Buncombe Madison Region.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Total Losses	Total Payments to Date
BUNCOMBE COUNTY†	08/01/80	04/03/12	578	$148,209,000	456	$28,052,227
Asheville	07/16/80	01/06/10	632	$206,612,000	618	$55,437,043
Biltmore Forest	03/26/10	01/06/10	11	$3,680,000	3	$31,101
Black Mountain	04/15/80	01/06/10	146	$39,452,400	73	$4,416,494
Montreat	09/19/05	01/06/10	22	$5,175,000	6	$44,667
Weaverville	05/06/97	01/06/10	46	$14,697,800	7	$476,251
Woodfin	02/01/80	01/06/10	33	$13,556,600	18	$1.546,420
MADISON COUNTY†	09/02/82	01/06/10	63	$16,213,200	36	$1,815,770
Hot Springs	07/05/82	01/06/10	12	$3,148,600	7	$495,539
Marshall	05/15/78	01/06/10	48	$10,221,000	65	$5,306,375
Mars Hill	08/19/87	01/06/10	7	$1,435,000	1	$0

†Includes unincorporated areas of county only
Source: NFIP Community Status information as of March 2026; NFIP claims and policy information as of November 2025

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 several 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.

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

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

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

Source: *FEMA*

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years based on community comments. Changes were made with the intent to make the CRS more user-friendly and make extensive technical assistance available for communities who request it.

- The City of Asheville participates in the CRS as a Class 8 community. Participation in the CRS program should be considered as a mitigation action by each of the counties and the

other municipalities. The program would be most beneficial to Buncombe County, which has 578 NFIP policies.

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 also participate in the NFIP and they all have adopted flood damage prevention regulations and have appointed floodplain managers to oversee enforcement and implementation of the ordinance.

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

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

Open Space Management Plan*:* An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances, open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- Buncombe County has adopted the Buncombe County Greenways and Trails Master Plan which also includes all of its municipalities. The City of Asheville, the Town of Black Mountain, and the Town of Montreat have each adopted a municipal-level parks or greenways master plan.
- Neither Madison County nor its municipalities have adopted an open space management 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.

- The Town of Black Mountain is the only jurisdiction with a stormwater management plan in place. However, several jurisdictions have stormwater management ordinances in place.
- Buncombe County has adopted a stormwater management ordinance that is administered by the county throughout the unincorporated area as well as within the municipal boundaries of the following towns: Biltmore Forest, Montreat, Weaverville, and Woodfin, through interlocal agreement. The City of Asheville, the Town of Black Mountain, and the Town of Montreat administer their own stormwater management ordinances.
- The Town of Marshall is the only Madison County jurisdiction that has adopted stormwater regulations. These regulations are included in the town's unified development ordinance.

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. Substantial damage estimating procedures for participating jurisdictions are detailed below. The SDE procedures are summarized in **Table 7.4.**

TABLE 7.4: SUBSTANTIAL DAMAGE ESTIMATE (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
BUNCOMBE COUNTY	The County maintains a county-wide Flood Damage Prevention Ordinance.	The County Director of Planning and Development is designated as the floodplain administrator. Determination of substantial damage is a coordinated effort between Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments and all jurisdictions within the County that participate in the NFIP.	Following a flood event, County Emergency Management staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: a. Estimation of market value or obtaining appraisal b. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure c. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by County staff and compliance with building codes and flood prevention ordinance required.
City of Asheville	The City maintains a city-wide Flood Damage Prevention Ordinance and participates in CRS (Class 8).	The City Public Works Director is designated as the Floodplain Administrator. Determination of substantial damage is a coordinated effort between relevant City staff	Following a flood event, City staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: a. Estimation of market value or obtaining appraisal	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by City staff 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
		and Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments.	b. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure c. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	
Town of Biltmore Forest	The Town maintains a town-wide Flood Damage Prevention Ordinance.	The Town Manager is designated as the Floodplain Administrator. Determination of substantial damage is a coordinated effort between relevant Town staff and Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments.	Following a flood event, Town staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: d. Estimation of market value or obtaining appraisal e. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure f. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by Town staff 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
Town of Black Mountain	The Town maintains a town-wide Flood Damage Prevention Ordinance.	The Town Planning Director is designated as the Floodplain Administrator. Determination of substantial damage is a coordinated effort between relevant Town staff and Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments.	Following a flood event, Town staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: a. Estimation of market value or obtaining appraisal b. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure c. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by Town staff and compliance with building codes and flood prevention ordinance required.
Town of Montreat	The Town maintains a town-wide Flood Damage Prevention Ordinance.	The Town Code Administrator is designated as the Floodplain Administrator. Determination of substantial damage is a coordinated effort between relevant Town staff and Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments.	Following a flood event, Town staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: a. Estimation of market value or obtaining appraisal b. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure c. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by Town staff 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
Town of Weaverville	The Town maintains a town-wide Flood Damage Prevention Ordinance.	Town Council has designated the Buncombe County Floodplain Administrator shall regulate the floodplain within the Town's corporate limits and extraterritorial jurisdiction. Determination of substantial damage is a coordinated effort between relevant Town staff and Buncombe County Emergency Management, Police and Fire Departments, Permitting Departments.	Buncombe County provides floodplain management services for Weaverville. (See specific procedures above)	Buncombe County provides floodplain management services for Weaverville. (See specific procedures above)
Town of Woodfin	The Town maintains a town-wide Flood Damage Prevention Ordinance.	The Town Stormwater Administrator is designated as the Floodplain Administrator Determination of substantial damage is a coordinated effort between relevant Town staff and Madison County Emergency Management, Police and Fire Departments, Permitting Departments.	Following a flood event, Town staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: a. Estimation of market value or obtaining appraisal b. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure c. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by Town staff 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
MADISON COUNTY	The County maintains a county-wide Flood Damage Prevention Ordinance.	The County Inspections and Zoning Department and Emergency Management Office is designated as the floodplain administrator. Determination of substantial damage is a coordinated effort between Madison County Emergency Management, Police and Fire Departments, Permitting Departments and all jurisdictions within the County that participate in the NFIP.	Following a flood event, County Emergency Management staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: d. Estimation of market value or obtaining appraisal e. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure f. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by County staff and compliance with building codes and flood prevention ordinance required.
Town of Hot Springs	The Town maintains a town-wide Flood Damage Prevention Ordinance.	Town Council has designated the Madison County Floodplain Administrator shall regulate the floodplain within the Town's corporate limits and extraterritorial jurisdiction. Determination of substantial damage is a coordinated effort between relevant Town staff and Madison County Emergency Management, Police and Fire Departments, Permitting Departments.	Madison County provides floodplain management services for Hot Springs. (See specific procedures above)	Madison County provides floodplain management services for Hot Springs. (See specific procedures above)

Jurisdiction	Local Floodplain Management Regulations	Designated Officials for SD/SI Determinations	Process Used to Make SD/SI Determinations	Communication Procedures for SD/SI Requirements
Town of Mars Hill	The Town maintains a town-wide Flood Damage Prevention Ordinance.	Town Council has designated the Madison County Floodplain Administrator shall regulate the floodplain within the Town's corporate limits and extraterritorial jurisdiction. Determination of substantial damage is a coordinated effort between relevant Town staff and Madison County Emergency Management, Police and Fire Departments, Permitting Departments.	Madison County provides floodplain management services for Mars Hill. (See specific procedures above)	Madison County provides floodplain management services for Mars Hill. (See specific procedures above)
Town of Marshall	The Town maintains a town-wide Flood Damage Prevention Ordinance.	The Town Clerk is designated as the Floodplain Administrator Determination of substantial damage is a coordinated effort between relevant Town staff and Madison County Emergency Management, Police and Fire Departments, Permitting Departments.	Following a flood event, Town staff (along with other County, municipal and mutual aid staff as needed) conduct damage assessments and collect data on damaged structures. Substantial damages/improvements determined by Floodplain Administrator with Building Official coordination using the following process: d. Estimation of market value or obtaining appraisal e. Cost comparison to improve, to repair a damaged building to pre-damaged condition, or combined, vs. market value of building/structure f. Determination of whether work constitutes substantial improvement/repair of damage This process involves comparing the damage assessment information with permit applications.	If work constitutes substantial improvement or repair of substantial damage, applicants are notified by Town staff and compliance with building codes and flood prevention ordinance required.

7.3.1.4 Post-Helene Planning and Regulatory Context

Planning and regulatory capability within the region is being actively applied under post-disaster conditions following Hurricane Helene. Existing tools, including zoning ordinances, flood damage prevention regulations, building codes, and permitting processes, are guiding rebuilding and redevelopment across areas affected by flooding, landslides, and infrastructure damage.

Observed conditions documented in Appendix J, including flooding that exceeded mapped flood hazard areas and concentrated landslide activity across mountainous terrain, have introduced new considerations for how these tools are applied. Jurisdictions are making site-specific decisions related to rebuilding, compliance, and development in areas where hazard conditions have shifted or expanded beyond previously mapped extents.

The scale of damage, including tens of thousands of impacted structures and extensive damage to transportation infrastructure, has required significant use of permitting, inspections, and substantial damage determinations. These activities are informing refinements to local review processes, coordination procedures, and data tracking efforts.

Planning tools and regional coordination mechanisms are also being used to prioritize recovery and redevelopment. Efforts coordinated through Buncombe County, local municipalities, and regional partners such as the Land of Sky Regional Council are supporting alignment of infrastructure repair, redevelopment timing, and long-term risk reduction considerations. These locally driven initiatives directly inform this plan update.

KEY CAPACITY CONSIDERATIONS:

- Flooding exceeded mapped floodplain limits
- Landslides constrain development in steep areas
- High volume of permits and inspections
- Site-specific rebuilding decisions required
- Planning assumptions updated with new data

KEY PLANNING INITIATIVES:

- Envision Buncombe (Helene Recovery Plan)
- NC Flood Resiliency Blueprint – French Broad River Basin
- Madison Alliance for Rebuilding Communities (MARC)
- Rebuild Marshall Initiative
- Rebuild Hot Springs Area (RHSA)

7.3.2 Administrative and Technical Capability

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

coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

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

Table 7.4 provides a summary of the capability assessment results for the Buncombe Madison Region with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	BUNCOMBE COUNTY	Asheville	Biltmore Forest	Black Mountain	Montreat	Weaverville	Woodfin	MADISON COUNTY	Hot Springs	Marshall	Mars Hill
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.

7.3.2.1 Post-Helene Administrative and Staffing Context

Administrative and technical capacity across the Buncombe Madison Region is shaped by ongoing recovery implementation following Hurricane Helene. Local staff are engaged in damage assessment, infrastructure coordination, permitting, and project delivery activities tied to impacts documented across the region, including damaged transportation networks, slope failures, and infrastructure disruption.

These responsibilities have required reallocation of staff resources, particularly in smaller jurisdictions. At the same time, recovery efforts have expanded technical capability through increased use of GIS, damage tracking systems, and locally developed datasets to document impacts such as high-water marks, landslides, and infrastructure damage.

Coordination among jurisdictions and regional partners has also increased in response to cross-boundary impacts, including watershed-level flooding and transportation access challenges. These conditions inform the Hazard Mitigation Plan update by identifying both current capacity constraints and areas of enhanced technical capability.

KEY CAPACITY CONSIDERATIONS:

- Staff capacity constrained by recovery workload
- Increased demand for inspections and compliance
- Expanded reliance on GIS and data systems
- Cross-department coordination required
- Regional coordination needed for shared impacts

KEY STAFFING SOLUTIONS:

- Buncombe County Helene Recovery Office
- Buncombe County GIS / Damage Mapping Systems
- One Buncombe Call Center
- Buncombe Recovers Platform
- Land of Sky Regional Council Technical Support
- MARC Case Management System

7.3.3 Fiscal Capability

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

Table 7.5 provides a summary of the results for the Buncombe Madison Region with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds) according to the previous county hazard mitigation plans.

TABLE 7.5: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	BUNCOMBE COUNTY	Asheville	Biltmore Forest	Black Mountain	Montreat	Weaverville	Woodfin	MADISON COUNTY	Hot Springs	Marshall	Mars Hill
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Purpose Taxes (or taxing districts)								✓	✓	✓	✓
Gas / Electric Utility Fees											

Fiscal Tool / Resource	BUNCOMBE COUNTY	Asheville	Biltmore Forest	Black Mountain	Montreat	Weaverville	Woodfin	MADISON COUNTY	Hot Springs	Marshall	Mars Hill
Water / Sewer Fees											
Stormwater Utility Fees		✓									
Development Impact Fees											
General Obligation, Revenue, and/or Special Tax Bonds											
Partnering Arrangements or Intergovernmental Agreements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other: HMGP, FMAP, other Federal and state funding sources, etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

7.3.3.1 Post Helene Fiscal Resource Considerations

Fiscal conditions across the Buncombe Madison Region have been significantly influenced by Hurricane Helene. While the disaster introduced substantial financial strain, it has also resulted in an influx of federal and state funding to support recovery efforts.

As of April 2026, federal disaster assistance includes more than $564 million in Individual Assistance, over $1.6 billion in Public Assistance, and approximately $93 million in Hazard Mitigation Grant Program funding. These resources provide critical support for rebuilding and mitigation but also introduce administrative requirements and local match obligations that affect fiscal capacity

KEY CAPACITY CONSIDERATIONS:

- Local responsibility for funding administration
- Match and cash flow constraints
- Procurement and compliance workload
- Funding tied to recovery priorities
- Capital plans reprioritized post-event

KEY FUNDING & ASSISTANCE RECEIVED:

- NCDEQ Flood Resiliency Blueprint Project Funding
- FEMA PA Local Project Implementation
- FEMA HMGP Local Allocations
- Buncombe County Open Space Bond
- NC Community Foundation Disaster Relief Fund

7.3.4 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 Buncombe Madison 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.).

7.3.4.1. Post-Helene Political Capability and Policy Context

Political capability within the Buncombe Madison Region is reflected in how local leadership, governing bodies, and community priorities have shaped recovery following Hurricane Helene. Observed impacts (including widespread damage to housing, infrastructure, and economic centers) have required local governments to make policy and funding decisions that balance immediate recovery needs with long-term resilience considerations.

Local elected officials and staff have played a central role in establishing recovery priorities, advancing projects, and coordinating with regional partners. Decision-making has been influenced by community input, particularly in heavily impacted areas such as river corridors and downtown districts. These dynamics affect how policies are applied, how resources are allocated, and how mitigation strategies are prioritized.

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. This methodology,

further described in **Appendix B**, attempts to assess the overall level of capability of the Buncombe Madison Region to implement hazard mitigation actions.

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

Table 7.6 shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information found in existing hazard mitigation plans and readily available on the jurisdictions' government websites. According to the assessment, the average local capability score for all jurisdictions is 36.5, which falls into the moderate capability ranking.

TABLE 7.6: CAPABILITY ASSESSMENT RESULTS

Jurisdiction	Overall Capability Score	Overall Capability Rating
BUNCOMBE COUNTY	45	High
Asheville	47	High
Biltmore Forest	35	Moderate
Black Mountain	40	High
Montreat	36	Moderate
Weaverville	39	Moderate
Woodfin	35	Moderate
MADISON COUNTY	33	Moderate
Hot Springs	28	Moderate
Marshall	33	Moderate
Mars Hill	30	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 planning committee considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8
MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the Buncombe Madison Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the Buncombe Madison Regional Hazard Mitigation Planning Committee 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 Buncombe Madison Region
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the Buncombe Madison 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 Buncombe Madison 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 jurisdictions to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Regional Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the Buncombe Madison 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

All existing mitigation actions found in the Mitigation Action Plan were previously prioritized by the participating jurisdictions. For the 2026 update of the plan the members of the Regional Hazard Mitigation Planning Committee were asked, as part of the process of providing a status update for each action, to make sure that the assigned priority for each action was still appropriate. Prioritization of the proposed mitigation actions was based on the following strategies:

1. High Priority – Highly cost-effective, administratively feasible and politically feasible strategies that should be implemented in fiscal years 2026/2027 and 2027/2028 and be continued.
2. Medium Priority – Strategies that have at least two of the following characteristics (but not all three) and should be implemented in fiscal years 2026/2027 to 2027/2028:
    a. Highly cost-effective; or
    b. Administratively feasible, given current levels of staffing and resources; or
    c. Are politically popular and supportable given the current environment.
3. Low Priority – Strategies that have at least one of the following characteristics (but not two or three) and should be implemented in the next five (5) years (by the end of 2031/2032):
    d. Highly cost-effective; or
    e. Administratively feasible, given current levels of staffing and resources; or
    f. Are politically popular and supportable given the current environment.

County and municipal stakeholders 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 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, the Buncombe Madison counties and the participating municipalities have developed eleven goal statements for local hazard mitigation planning in the region. Regional hazard mitigation goals were developed in previous plan update processes and documentation of how the goals were determined is discussed in those resulting plans. During the 2026 update, the Regional Hazard Mitigation Planning Committee reviewed the existing goals at the second Regional Hazard Mitigation Planning Committee meeting and determined that changes in wording of the goals were needed to better reflect the current relevancy. The wording of some of the goals was changed, some of the goals were combined with others or deleted. The resulting goals, as of 2026, are presented in **Table 8.1**. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more specific mitigation actions. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.2: BUNCOMBE MADISON REGIONAL MITIGATION GOALS

	Goal
Goal #1	Incorporate hazard mitigation into the planning process of each jurisdiction through evaluation, strengthening and enforcement of local ordinances.
Goal #2	Implement hazard mitigation projects by seeking local, state and federal funding opportunities when available.
Goal #3	Increase and enhance public education and awareness regarding disasters and hazard mitigation.
Goal #4	Address stormwater management and impervious surface issues through hazard mitigation.
Goal #5	Conduct future development (including infrastructure) in a way that protects human life and property through management of natural features such as floodplains and wetlands and avoids development in known hazard areas. This will also reduce the risk to emergency workers.
Goal #6	Implement hazard mitigation projects on existing structures that are vulnerable to hazards.
Goal #7	Enhance the community capability through the use of mutual aid agreements and sharing of resources at the county and regional level.
Goal #8	Promote awareness and education for community officials and citizens about the existing resources, regulations, and procedures related to hazard mitigation and 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 Buncombe Madison 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 Buncombe Madison Regional Hazard Mitigation Planning Committee meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Committee can be classified under one of the following six broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

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

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

Each of the prevention mitigation techniques is described in more detail in the Capability Assessment section (Section 7).

8.3.2 Property Protection

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

- Modification of the site to keep the hazard from reaching the building
  - Flood Barriers
  - Relocation
  - Building Elevation

  - Demolition
  - Demo/Rebuild
- Modify the building (retrofit) so it can withstand impacts of the hazard
  - Windproofing
  - Dry Floodproofing
  - Wet Floodproofing
  - Seismic design techniques
- Critical facilities protection
- Safe rooms, shutters, shatter-resistant glass
- Insurance (private property and public property)

Site Modification

Flood Barriers

A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed to ensure that it does not create additional flooding or drainage problems on neighboring properties. Depending on how well the ground drains, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or French drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier. However, barriers can only be built so high and they can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and properly maintained.

Relocation

Moving a flood-prone building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new location available outside of the hazard zone.

Building Elevation

Elevating a building above the flood level can be almost as effective as moving it out of the floodplain. Once the building is raised, water is allowed to flow under and around the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation. Building elevation protects the physical building but does not eliminate life safety or rescue needs during a flood event.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, may not be the expense to protect them from future damages. In some cases, it is cheaper to demolish them and either replace them with new, flood protected structures, or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move – such as larger, slab foundation or masonry structures – and for dilapidated structures that are not cost-beneficial to protect.

Demolition/Rebuild

If a building is not in good shape, elevating it may not be feasible or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood protection codes. However, it can be difficult to qualify for the FEMA funding to implement this technique and it is not a regularly funded option. Certain rules must be followed to qualify for federal funds for pilot reconstruction.

Site Modification (Retrofitting)

Dry Floodproofing

Dry floodproofing is a mitigation practice whereby one makes all areas of a structure below the flood protection level watertight. Dry floodproofing can be achieved by coating wall with waterproofing compounds or plastic sheeting. Additionally, openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. There are no restrictions for dry floodproofing buildings located outside the regulatory floodplain.

Dry floodproofing is only effective for areas of shallow flooding, such as areas with repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms or velocity flooding where floodwaters move swiftly and can damage the dry floodproofing materials.

Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let into the structure and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. Mechanical fixtures such as the furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Insurance

Private Property

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area. Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

Public Property

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-

insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

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:

- Wetland protection
- Erosion and sediment control
- Watershed management
- Stream/River Restoration
- Best Management Practices
- Dumping Regulations
- Farmland Protection
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Habitat preservations
- Slope stabilization

Wetland Protection

Wetlands are often synonymous with floodplains and topographically depressed areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter and helps improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Erosion and Sedimentation Control

Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil. Sediment suspended in the water tends to settle out where flowing water slows down. This sediment can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices. Many of the participating jurisdictions in the Buncombe Madison Region have adopted Erosion and Sedimentation Control Ordinances and/or Stormwater Management Ordinances that address some of these issues.

Stream/River Restoration

There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other chemicals, animal wastes, oils from street surfaces and industrial areas, and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities. Many of the Stormwater Management Ordinances that are in place in the Buncombe Madison Region contain regulations for stormwater BMPs.

Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

In addition, many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regrading their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Farmland Protection

Farmland protection is an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime, unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land.

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

Levees and Floodwalls

Probably the best-known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. However, they must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

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

Threat Recognition

The first step in responding to a flood is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated. The National Weather Service (NWS) is the prime agency for detecting meteorological threats. Severe weather warnings are transmitted through NOAA's Weather Radio System. Local emergency managers can then provide more site-specific and timely recognition after the Weather Service issues a watch or a warning. A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On smaller rivers and streams, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Warning

The next step in emergency response following threat recognition is to notify the public and staff of other agencies and critical facilities. More people can implement protection measures if warnings are early and include specific detail.

The NWS issues notices to the public using two levels of notification:

- Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.
- Warning: a flood, tornado, etc., has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- CodeRED countywide mass telephone emergency communication system
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should include a public information component.

StormReady

The National Weather Service (NWS) established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

Being designated a NWS StormReady community is a good measure of a community's emergency warning program for weather hazards. As documented in the Capability Assessment section of this plan, Buncombe County and the Biltmore Company are designated as StormReady.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (public works)
- Holding children at school or releasing children from school (school superintendent)
- Opening evacuation shelters (the American Red Cross)
- Monitoring water levels (public works)
- Establishing security and other protection measures (police)

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Evacuation and Shelter

There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., disabled persons, prisoners, hospital patients, schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff shelters and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

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

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties. Awareness of the hazard is not enough; people need to be told what they can do about the hazard.

Thus, projects should include information on safety, health and property protection measures. Research has shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: The most effective types of outreach projects are mailed or distributed to everyone in the community. In the case of floods, they can be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Libraries and Websites
The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources. Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government.

Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet. Some examples of resources that can be found online include, but are not limited to, floodplain maps, information for homeowners on how to retrofit for floods and flood information for children.

Technical Assistance

Hazard Information

Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Communities can easily provide map information from FEMA's FIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map

amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the FIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never flood.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track. Building or public works department staffs can provide the following types of assistance:

- Visit properties and offer protection suggestions,
- Recommend or identify qualified or licensed contractors,
- Inspect homes for anchoring of roofing and the home to the foundation, and
- Explain when building permits are needed for home improvements.

Public Information Program

A Program for Public Information (PPI) is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A PPI consists of the following parts, which are incorporated into this plan:

- Description of the local flood hazard,
- The property protection measures appropriate for the flood hazard,
- Flood safety measures appropriate for the local situation,
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies,
- Goals for the community's public information program,
- The outreach projects that will be done each year to reach the goals, and
- The process that will be followed to monitor and evaluate the projects.

8.4 SELECTION OF MITIGATION TECHNIQUES FOR THE BUNCOMBE MADISON REGION

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

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous Buncombe Madison Regional Hazard Mitigation Plan were evaluated to determine their 2026 implementation status. Updates on the implementation status of each action are provided. Any changes to relative priority of the action 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 2026 planning process. Actions identified as completed in the 2021 version of the plan have been moved to Appendix E.

SECTION 9
MITIGATION ACTION PLAN

This section includes the listing of the mitigation actions proposed by participating jurisdictions in the Buncombe Madison Region. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

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44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy* and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk in Buncombe and Madison counties. 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 Buncombe Madison 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 (2026)—Indication of completion, progress, deferment, or no change since the previous plan. If the action is new, that will be noted here.

9.1.1 Integration of Resilience Goals

As part of the 2026 update, the Mitigation Action Plan was enhanced by aligning mitigation actions with the resilience goals identified in *Envision Buncombe*. This effort was intended to strengthen the connection between hazard mitigation and long-term recovery by ensuring that proposed actions contribute to both risk reduction and broader resilience outcomes.

Each mitigation action was evaluated and assigned a primary resilience goal based on its function and intended outcome. A concise rationale was then developed to describe how the action supports that goal. Rationales were written to reflect the specific mechanism of the action, providing a clear and defensible linkage between individual mitigation actions and regional recovery priorities. The results of this process are incorporated into the Mitigation Action Plan through the addition of a resilience goal and supporting rationale for each action, improving transparency and supporting more informed prioritization and funding decisions.

BUNCOMBE COUNTY FINDINGS
Mitigation actions in Buncombe County are primarily focused on land use policy, regulatory controls, and integration of hazard mitigation into planning processes. Actions strongly align with floodplain management and damage prevention goals, reflecting the County's emphasis on guiding development to reduce long-term risk exposure. This approach represents a key strength, supported by an established regulatory framework and integration with the Comprehensive Plan. However, opportunities exist to expand mitigation efforts beyond policy-based actions to include additional project-based investments and initiatives addressing housing and community-level resilience.

MADISON COUNTY FINDINGS
Mitigation actions in Madison County emphasize infrastructure improvements, emergency response capacity, and implementation of mitigation projects such as debris removal, property acquisition, and wildfire fuel reduction. Actions are broadly distributed across resilience goals, particularly those related to infrastructure investment, wildfire prevention, and preservation of flood-prone properties. This implementation-focused approach reflects local conditions and represents a strength in addressing immediate risks. Opportunities remain to strengthen long-term risk reduction through greater integration of land use planning and regulatory strategies.

REGIONAL OBSERVATIONS
The integration of resilience goals highlights complementary approaches across the region, with Buncombe County emphasizing policy-driven risk reduction and Madison County focusing on infrastructure and operational capacity. Across both counties, mitigation actions most frequently support damage prevention, floodplain management, and infrastructure investment.

Resilience goals related to affordable housing, food security, and park systems are less represented

within the Mitigation Action Plan, indicating potential areas for future expansion. Overall, this integration improves the clarity and strategic alignment of the Plan by linking mitigation actions to broader recovery priorities and long-term resilience outcomes.

9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in 11 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
Buncombe Madison Regional Action	**9:4**	**1**
Buncombe County	**9:5**	**24**
Asheville	9:17	28
Biltmore Forest	9:32	5
Black Mountain	9:33	12
Montreat	9:37	13
Weaverville	9:40	6
Woodfin	9:42	7
Madison County	**9:45**	**25**
Hot Springs	9:55	5
Marshall	9:57	9
Mars Hill	9:60	5

Buncombe Madison Regional Hazard Mitigation Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Applicable Jurisdictions	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention								
BM-1	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of the application. Projects may include, but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.	All Hazards	High	Grants	Buncombe County, Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, Woodfin, Madison County, Hot Springs, Marshall, Mars Hill	County Administrations, Municipal Administration	2026-2031	New action for the 2026 update. Applicable for all participating jurisdictions.

Buncombe County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the planning process of each jurisdiction.	All Hazards	Moderate	Local	County EM	2031, Annual review	In May 2012, Buncombe County adopted the Sustainability Plan. The Plan outlined a five year plan for the County and its residents to make improvements in our community, environment and economy. One of the fourteen goal areas in the Plan is "Resistance to Natural and Manmade Hazards". The two objectives under this goal are to: 1) locate critical facilities outside high hazard areas; and 2) Ensure local preparedness for emergencies (floods, fuel shortages, climate change, fire, droughts, earthquakes, food shortages, landslides, hazardous materials incidents, medical epidemics, etc.). In each year's Plan update, current indicators are tracked and strategies for looking forward are shown.
P-2	Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.	All Hazards	Moderate	Local	County EM	2031, Annual review	On-going currently as evidenced by update of existing actions and continued participation in the regional hazard mitigation plan.
P-3	Evaluate participation in the National Flood Insurance Program Community Rating System (CRS)	Flooding	Moderate	Local	Planning Dept.	2031	A high percentage of Buncombe County's land area is located within Special Flood Hazard Areas. As developable land continues to diminish, the County will experience increased development pressure in these areas. As described on the CRS website, "*As a part of the National Flood Insurance Program (NFIP), the Community Rating System is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum program requirements.* *As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the Community Rating System:* 1. *Reduce flood damage to insurable property* 2. *Strengthen and support the insurance aspects of the National Flood Insurance Program* 3. *Encourage a comprehensive approach to floodplain management*" Citizens of participating CRS communities are eligible for reduced flood insurance rates. In exchange, participating local governments commit to implementing programs to educate the community about flood risks, and to the adoption of higher standards for floodplain development. Buncombe County will evaluate participation in CRS, in alignment with Hazards & Resilience Action 2 in the Buncombe 2043 Comprehensive Plan. Constraints:

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							• Program participation would require additional staff and capital resources within the Planning & Development, Emergency Management, and Communications departments, and expose the County to period program reviews by the International Organization for Standards (ISO). • Enhanced floodplain development standards will reduce the land area that is available for development as well as increase the cost of land development in these areas. This will be mitigated, to some extent, by improving options for cluster development.
P-4	Adopt new standards to limit the loss of life and damage to property in flood-prone areas.	Flooding	Moderate	Local	Planning Dept.	2031	A high percentage of Buncombe County's land area is located within Special Flood Hazard Areas. As developable land continues to diminish, the County will experience increased development pressure upon in these areas. Development in these areas reduces the County's supply of prime farmland, and increases the community's susceptibility to loss of life and property damage due to flooding. The County's current floodplain development regulations meet the minimum, Federal and State requirements for participation in the National Flood Insurance Program (NFIP). However, they do facilitate continued development in floodplains. In alignment with Hazards & Resilience Action 2 in the Buncombe 2043 Comprehensive Plan. Buncombe County will: • Modify current floodplain development procedures and standards to require more extensive engineering analysis for new developments in Special Flood Hazard Areas, to ensure that fill and other modifications to the floodplain do not elevate the risk of loss of life and property damage upon nearby properties. • Modify current floodplain development procedures and standards to limit the size and/or density of new developments within the floodplain. • Promote greater utilization of development processes that allow for the conservation of flood-prone land and the clustering of home sites outside of the floodplain. Retain existing processes, but reorganize, consolidate, and expand conservation and cluster development options across the Zoning and Subdivision ordinances. • The aforementioned policies may be implemented as part of, or separate from, potential participation in CRS. Constraints: • Enhanced floodplain development standards will reduce the land area that is available for development increase the cost of land development in these areas. This will be mitigated, to some extent, by improving options for cluster development.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-5	Improve access to large land development projects.	Flooding, Wildfire, Landslide	Moderate	Local	Planning Dept.	2031	Current land development regulations for minor and major subdivisions (see Comp Plan 2043 Hazards and Resilience Chapter – Action 4 and the Swannanoa SAP Policies and Actions Policy 1.3/Action 1.36 and Policy 1.1 Action 1.1.2) require one improved entrance into new residential developments. No defined access requirements exist for large multi-family, commercial, and mixed-use development projects. A majority of developments, which have occurred since the advent of Buncombe County's current land development regulations, have employed only a single point of access; these projects have created thousands of dwelling units. Developments – particularly residential developments – with a single point of access, can be severely impacted by hazards such as fires, floods, and landslides. Disruptions to access roads can trap residents, impair the ability of first responders to gain access to impacted neighborhoods, and can limit the speed with which essential services are restored. Buncombe County will: • Require that developments that exceed a defined set of thresholds (square feet of commercial space, number of dwellings, or similar), provide more than one point of access. • Require that larger residential developments include at least one primary street that is designed and constructed to North Carolina Department of Transportation (NCDOT) standards, and dedicated to NCDOT as a public street. • Require that a minimum number of streets within new developments, including a public street as referenced above, be designed to connect to adjacent properties for which future development potential is high, and / or to adjacent, existing developments. Constraints: The following considerations will limit the ability and / or willingness of developers to meet these goals: • Topographical features such as ridgelines, wetlands, and water bodies. • The size, configuration, ownership, and the timing of future development of adjacent properties. • The cost of infrastructure.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-6	Retain and improve Buncombe County's regulations that guide development on steep slopes.	Landslide	Moderate	Local	Planning Dept.	2031	A high percentage of Buncombe County's land area contains steeply sloping terrain. Home sites in these areas are in high demand, as new residents seek spectacular views in a rural setting. Development upon steep terrain can destabilize slopes and increase the risks to life and property due to landslides. Steep slope development can lead to elevated impacts from stormwater and erosion. Development upon steep slopes is at greater risk due to ice storms, wildfires, and landslides. Dispersed development in comparatively remote areas with steep road inclines increases the costs and response time for emergency services. As developable land continues to diminish, the County will experience increased development pressure in these areas. The County's current land development standards limit development density on steep slopes, and require a higher degree of engineering and design for new dwellings therein. However, these standards are spread across four, separate sections of the Subdivision and Zoning ordinances. Buncombe County will: • Retain, but reorganize and consolidate Buncombe County's existing standards for land development upon steep slopes. (See G.E.C. Action 8: Develop new tools to protect steep slopes.) County Planning staff have integrated their review of what to do with Debris Flow Pathways into the review of steep-slope/high-elevation, protected-ridge, and hillside development regulations. For example, when reviewing the steep slope regulations, they also examine how to add and regulate debris flow pathways within that overlay. The same review applies for the hillside development regulations in the subdivision ordinance. • Enhance current slope and soil evaluation requirements for lots containing steep slopes, to limit slope disturbance and avoid landslide-prone soils. • Promote greater utilization of development processes that allow for the conservation of steeply sloping land and the clustering of home sites. Retain existing processes, but reorganize, consolidate, and expand conservation and cluster development options across the Zoning and Subdivision ordinances (See Hazards and Resilience Action 2: Employ design standards to increase adaptive capacity and reduce exposure to hazards.) Constraints: • Enhanced steep slope development standards will increase the cost of land development in these areas and will reduce the land area that is available for development. This will be mitigated, to some extent, by improving options for cluster development.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-7	Implement a staffed post-disaster code enforcement program to inspect and document structure, bridges/culverts, and any additional development. Increase support for making Substantial Damage Determinations and ensuring compliance with the Buncombe County Flood Damage Prevention Ordinance.	Flooding, Hurricane and Coastal Hazards, Geological (Landslide)	High	HMGP	Buncombe County Emergency Management	2026	New action for the 2026 update. Hurricane Helene brought a staggering 13.98 inches of rain, leading to widespread landslides and damage to homes, businesses, and infrastructure throughout the county. The Buncombe County Planning and Development Department, already facing limited resources, has been further strained by the influx of flood permit reviews, field inspections, substantial damage assessments, and appeals. Recovery efforts are ongoing, focusing on compliance with the Buncombe County Flood Damage Prevention Ordinance. This project would support securing resources to be deployed in the field to ensure post-disaster repairs and rebuilding are in compliance with local ordinances and regulations.
P-8	Develop stand-alone, district specific Community Wildfire Protection Plans (CWPPs) to document each district's wildfire project, community characteristics, and infrastructure assets to develop a countywide wildfire mitigation strategy.	Wildfires	High	HMGP	Buncombe County Emergency Management	1-5 years	New action for the 2026 update. The County faces escalating wildfire risk due to its diverse landscapes, expanding development, and growth of the wildland-urban interface (WUI). The county contains 19 fire districts, but the majority of residents lack access to practical, household-level wildfire risk information. Without consistent, accessible tools, homeowners and communities are unable to adequately identify their level of risk, take cost-effective mitigation measures, or prepare for wildfire emergencies.
Property Protection							
PP-2	Consider strengthening the requirements for road construction for special subdivision through the Subdivision Ordinance	All Hazards	Moderate	Local	Planning Dept.	2031	In recent years, Buncombe County has made revisions to its Subdivision Ordinance. The changes to the Subdivision Ordinance included strengthening the requirements for road construction and turn-around specifications to help provide adequate access for emergency vehicles. These changes apply to minor and major subdivisions, and do not apply to subdivisions proposed with three lots or fewer (special subdivisions), or to family subdivisions. Prior to any subdivision being recorded, the Fire Marshal is required to approve the subdivision for emergency services access if the lot is not accessed off a state-maintained road. In 2005 requirements were added to require geotechnical reports, soils maps, and compaction testing for roads. Hillside developments on 25% or greater slope were restricted within the 2006 changes. Density is decreased and lot sizes are increased within these areas. Limitations on maximum impervious and disturbed surfaces was added which apply to individual lots with 25% or greater slope within hillside subdivisions. In 2007 changes were made which require that builders on lots subject to the maximum impervious and disturbed areas submit a scaled site plan showing the areas of disturbance and impervious cover. Provisions were included to allow and encourage cluster development in hillside subdivisions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							In 2010, additional revisions were made to the Subdivision Ordinance. Pre-application conferences for major subdivisions became a requirement prior to submission of plans. Slope analysis maps became a requirement for all major subdivisions and any subdivision subject to Hillside Development standards. Requirements for minor and major subdivisions during the preliminary plan review to submit proof of permission for waste system and water system were instituted. Also through the 2010 revisions, subdivision roads designated public or private became subject to final approval by the Buncombe County Fire Marshal; the minimum minor subdivision road right-of-way width was increased from 15 feet to 20 feet; and access roads standards to both major and minor subdivisions became eight-inch minimum aggregated base course No. 7 stone. with a minimum of 16 feet, subject to Buncombe County Fire Prevention Ordinance and approval by the Buncombe County Fire Marshal. The horizontal centerline design standards for both minor and major subdivisions T-turnaround became a minimum required length of perpendicular cord of 60 feet. Major subdivision road standards minimum pavement width became 18 feet, with two feet of additional drivable surface required capable of supporting the imposed load of fire apparatus weighing at least 75,000 pounds. Any request for variance for road width is now required to be accompanied by a letter from the Fire Marshal approving the alternate method. For minor subdivision roads, and any features such as cul-de-sacs and T-turnarounds, standards for roads less than or equal to ten percent grade began to be required to have an eight-inch minimum aggregated base course. All roads exceeding ten percent grade became required to meet major subdivision road construction standards. Final plan approval is now contingent upon the requirement that an engineer certify compliance with these standards. Within the Hillside Development Standards section of the Subdivision Ordinance (Sec. 70-68), changes were made to the density table for disturbance and minimum lot size. Changes were added to disturbed and impervious surfaces for communal infrastructure. Vegetation removal and re-vegetation requirements were included. Cluster development provisions became one of the types of development within the new Alternative Path Hillside Development standards, which allows for the additional design flexibility and preservation of environmentally sensitive features. The alternative path also recognizes Building and Grading Envelope Conservation development. The alternative path is encouraged in order to limit disturbed areas and preserve ridge tops, woodlands, open spaces, floodplains, moderate and high-risk landslide hazard areas and other environmentally sensitive areas. Since the 2010 changes were implemented, road requirements and standards are now being considered for special and family subdivisions. Consideration could be given for a minimum required road width and right-of-way width; road grade and required minimum distance for pull outs for emergency

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							vehicles; requirements for T-turnarounds or cul-de sacs; private driveway standards; and minimum access road width standards.
PP-3	Continue to implement the recommendations of the Buncombe 2043 Comprehensive Plan	All Hazards	Moderate	Local	Planning Dept./Board of Commissioners	2043	In May 2023, the Buncombe County Board of Commissioners adopted the County's first 20-year Comprehensive Plan. The Plan creates a 20-year vision to guide County policies and regulations on seven key topics: equitable growth, transportation, environmental conservation, recreation, hazard resilience, infrastructure, and economic development. There is an entire chapter in the Comprehensive Plan dedicated to Hazards and Resilience (Chapter 7).
PP-5	Continue to evaluate and revise the stormwater management ordinance in accordance with changes as mandated by state law.	Flooding	Moderate	Local	Planning Dept.	2031, Annually	Buncombe County adopted the Stormwater Management Ordinance on September 27, 2006. It was adopted to establish minimum requirements for the control of adverse impacts due to stormwater runoff associated with new development. Managing stormwater runoff protects property, lessens stream channel erosion, prevents increased flooding and provides additional protection of floodplains, wetlands and water resources, riparian and aquatic ecosystems. The Ordinance requires permits for residential development activity disturbing one acre or more. Commercial activity requires permits for activities that are on tracts one acre or larger. The Ordinance requires developers to install permanent measures to control the rate of runoff to that which existed prior to development for the 1 year 24-hour storm events. ***Note – the County is considering engaging a consultant to advise on best management practices, etc. for the stormwater management program and this process is likely to result in suggested amendments to the ordinance.***

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PP-6	Ensure enforcement of ordinances.	All Hazards	Moderate	Local	Planning Dir., Fire Marshal, Erosion Control Officer, Storm Water engineer, Building Permits and Inspections Dir., Floodplain Ordinance Administrator, Subdivision Ordinance Administrator, Zoning Staff	2031, Annual review	Each Ordinance is enforced through an individual department. However, the permitting software system Accela can link cases and approvals based on parcel number. There is an order for approval for development activities. The Accela software controls the order for approval of cases and prevents permits from being issued until approvals from other relevant Ordinance administrators is provided. Through this system, for example, building permits are not issued until subdivision approval has been provided, or a building permit for a structure in the floodplain is not issued until floodplain approval has been provided. Since the previous plan update, the Planning Department has added a second full-time Code Compliance Officer position to aid in ordinance enforcement and inspections. Planning and other County departments (Fire Marshal, Permits & Inspections, Environmental Health, and more) have also formed a Code Enforcement Team to monitor code compliance and mitigate potential hazards and risks as they pertain to cross-departmental code compliance issues. Another way that Ordinance administrators remain connected is through the Technical Review Committee. The Technical Review Committee consists of representatives from the Fire Marshal's office, Building Permits and Inspections, Planning (Zoning, Subdivision, Floodplain, Stormwater, Erosion Control), and Environmental Health. The Committee meets on a regular basis to review plans before they are presented to the Planning Board, and to discuss changes that are occurring within each of their departments related to Ordinance enforcement.
PP-8	Continue participation in the National Flood Insurance Program.	Flooding	High	Local	Floodplain Ordinance Administrator	2031, Annual review	The County's Flood Damage Prevention Ordinance regulates development within the 100-year floodplain. The County first adopted the Ordinance in August of 1980 when the County agreed to participate in the National Flood Insurance Program (NFIP). By joining the NFIP, flood insurance and federal assistance became available to the County and its residents. The Ordinance regulates development within the 100-year floodplain with the purpose of promoting public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas. As a condition of continued eligibility in the NFIP, the County must maintain floodplain management regulations that meet the standards of the NFIP regulations. In conjunction with adopting the revised floodplain maps that became effective in January 2010, the County adopted revisions to the Ordinance aimed at improving safety of residents and businesses within and surrounding the 100-year floodplain. Revisions included requiring an additional foot of freeboard (i.e., requiring elevations 2 feet above the base flood elevation) for new structures and utilities within the 100-year floodplain; prohibiting new habitable structures within the floodway; and requiring submission of an elevation certificate for new structures constructed in the 100-year floodplain. Procedurally, when the new maps and revised ordinance were adopted, the Planning Board and subsequently the Board of Commissioners found that these revisions and updates were reasonable, in

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							the public interest, and consistent with the Comprehensive Land Use Plan because they furthered the principles of managing sensitive environmental areas and conservation of critical environmental resources by restricting activities within the 100-year floodplain. It is anticipated that within this Hazard Mitigation Plan Update period, the floodplain maps for Buncombe County will again be updated, and our Ordinance reviewed for compliance with the NFIP requirements and compared with the State's model ordinance for floodplain management standards. With each new remapping, opportunities become available for communicating risk to persons whose property borders rivers and streams. Through public meetings and established communication channels (television, web, Twitter, e-zines, newspaper, etc.), many residents can be reached. For those properties within the 100-year floodplain, and especially for those properties that will be newly placed in the 100-year floodplain through the remapping effort, direct mail notices will be sent, informing residents of the new maps and proposed changes. The continued goals for floodplain management in the County include the following: -Effectively communicate risk for persons who are considering buying or building on properties within the 100-year floodplain; -Locate critical facilities and large scale development outside the 100-year floodplain; -Protect water resources and ecological systems/wildlife through the enforcement of the Flood Damage Prevention Ordinance; -Restore the natural resources and function of floodplains by promoting and working in collaboration with stream restoration and hazard mitigation grant programs; and -Educate the public to help them reduce their environmental footprints by locating businesses and residences outside the 100-year floodplain when possible.
PP-9	Purchase and install permanent water tanker truck hook ups at critical facilities throughout the County.	Flooding, Hurricane and Coastal Hazards, Geological (Landslide)	High	HMGP	Buncombe County Emergency Management	2027	New action for 2025. Water supply and sanitation were among the most pressing issues following Helene. Asheville's three-plant water system was designed with built-in redundancy, but Helene destroyed that safety net. The North Fork plant normally supplies about 80% of the county's drinking water, the William DeBruhl plant provides approximately 15%, and the Mills River plant contributes about 5%. When the hurricane hit, floodwater scoured and destroyed the transmission mains from both North Fork and DeBruhl, while the Mills River facility was physically isolated by washed-out roads. For the first time in modern history, all three plants were simultaneously compromised, creating a near-total system collapse. This loss of redundancy eliminated the utility's ability to shift production between sources, leaving communities with no fallback.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Emergency Services							
ES-1	E-911 addressing reform is needed.	All Hazards	Moderate	Local	County EM and Planning Dept.	2031	A current and conflict-free, road naming and property addressing system is necessary in order to provide timely and effective responses to emergencies of all scales. Effective addressing is also critical to County departments and agencies such as the Tax Department and the Board of Elections, as well as non-County entities such as utilities and mail delivery providers. Buncombe County's Emergency 911 (E-911) addressing program was established in 1993 with the adoption of Chapter 66, Article II.-Street Names and Street Addresses, of Buncombe County Code. At the present time, the Planning & Development Department administers this Ordinance. A revised draft of the ordinance is going before the Planning Board on Monday April 20, 2026. Check on result. The ordinance has not been updated since its adoption; technology and processes for managing road names and addressing have changed considerably since its adoption, and the ordinance needs to be modernized to account for NextGen addressing and other changes to technology and processes. Furthermore, while Buncombe County provides road naming and addressing services for all unincorporated areas and most municipalities within its boundaries, the City of Asheville maintains a separate road naming and addressing program. Having two, separate systems has limited the ability of both jurisdictions to resolve addressing and road name conflicts. Finally, Buncombe County's addressing program is fully administered by a single, Addressing Coordinator position. Such staffing will be evaluated for additional needs as the county continues to urbanize. Buncombe County will: • Develop and adopt a modern road naming and addressing ordinance. • Evaluate staffing levels within the E-911 program. • Collaborate with the City of Asheville to evaluate consolidation of their separate road naming and addressing programs. Constraints: Staffing analyses and consolidation efforts may result in increased staffing and other program costs to Buncombe County.
ES-2	Deploy portable landslide monitoring units integrated with the County's mass notification system and planned siren network to provide real-time detection and automated public warnings that enable timely evacuations and reduce loss of life and property.	Geological (Landslide)	High	HMGP	Buncombe County Emergency Management	1-5 years	New action for the 2026 update. The County's distinctive topographical features and geographic characteristics increase its vulnerability to landslides. Historically, the region has experienced numerous storm-induced slope failures. In 2004, Tropical Storm Frances delivered 18 inches of precipitation, resulting in extensive flooding across nearly all valley communities and causing over $13 million in localized damages. In 2005, landslides impacted critical infrastructure, including the Broad River Volunteer Fire Department. More recently, Hurricane Michael in 2018 and Tropical Storm Fred in 2021 contributed to increased flooding, slope destabilization, and prolonged recovery efforts. However, the most severe event to date was Hurricane Helene in 2024, which dropped up to 30 inches of rain over four

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							days, primarily affecting mountainous areas. This event initiated over 2,200 documented landslides throughout the region, with more than 1,100 affecting Buncombe County alone.
ES-3	Procure and deploy portable, easily fueled generators and supporting equipment to selected law enforcement, EMS, shelter, and emergency support facilities to ensure uninterrupted life-safety operations and services during extended outages.	All Hazards	High	HMGP	Buncombe County Emergency Management	2028	New action for the 2026 update. The County's mountainous geography and dependence on overhead power distribution lines make its infrastructure especially vulnerable to damage from high winds, heavy rainfall, snow, ice, and saturated soils. The cumulative effect of these hazards is that Buncombe County experiences both frequent smaller outages and catastrophic long-duration outages. Each type of hazard, whether large-scale hurricane or localized thunderstorm, has the potential to cut power to critical facilities at the very moment when residents depend on them for life safety, shelter, and emergency coordination.
ES-4	Install permanent redundant power systems (backup generators, solar PV arrays, and battery storage with transfers and controls) at six critical facilities to ensure continuous emergency operations, communications, sheltering, and life-safety services during extended outages caused by storms, landslides, winter events, and other hazards.	All Hazards	High	HMGP	Buncombe County Emergency Management	2028	New action for the 2026 update. The County's mountainous geography and dependence on overhead power distribution lines make its infrastructure especially vulnerable to damage from high winds, heavy rainfall, snow, ice, and saturated soils. The cumulative effect of these hazards is that Buncombe County experiences both frequent smaller outages and catastrophic long-duration outages. Each type of hazard, whether large-scale hurricane or localized thunderstorm, has the potential to cut power to critical facilities at the very moment when residents depend on them for life safety, shelter, and emergency coordination.
ES-5	Install strategically sited, real-time stream gauges to continuously monitor rainfall, streamflow, and soil moisture; the data will feed NC FIMAN, NWS, and the County EOC to improve the accuracy and speed of flood warnings.	Flooding	High	HMGP	Buncombe County Emergency Management	2027	New action for the 2026 update. The County is highly susceptible to flooding. Existing stream gauges are limited in number and spatial coverage, resulting in delayed flood warnings, reduced situational awareness, and suboptimal emergency response. This gap is especially harmful to socially vulnerable residents, who often have limited access to transportation, communication, and recovery resources.
ES-6	Install and integrate 72 modern sirens in locations prioritized based on hazard history, population density, and community input.	All Hazards	High	HMGP	Buncombe County Emergency Management	2028	New action for the 2026 update. The County's existing outdoor warning sirens are relics from the former Civil Defense system. These units are heavily outdated, non-functional, and provide no reliable coverage. Socially vulnerable populations, including low-income households, elderly residents, people with disabilities, and households without vehicles or smartphones face the greatest risks when alert systems fail. FEMA's Community Resilience Challenges Index (CRCI) identifies these populations as disproportionately impacted during disasters, underscoring the urgency of addressing communication gaps.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
ES-7	Install a network of advanced weather stations to deliver real-time local data (wind, rain, temperature, soil moisture, pressure) that integrates with NWS and the County EOC to improve forecasting, early warning, and emergency response.	Flooding, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms	High	HMGP	Buncombe County Emergency Management	2029	New action for the 2026 update. The County's weather monitoring capabilities are insufficient. The current network of stations is sparse, fails to cover remote and mountainous terrain, and is not fully integrated with modern data-sharing platforms. These limitations delay hazard detection, hinder forecasting accuracy, and restrict emergency managers' ability to provide timely, actionable warnings to residents.
Public Education and Awareness							
PEA-1	Educate the public regarding hazard mitigation.	All	High	Local	County EM	2031, Annual review and update	Public education is a continuous effort. Information is provided during key time periods such as severe weather awareness week, winter storm season, and severe storm/hurricane season as well as throughout the year as requested by various community groups. Information is provided via brochures and information on the county website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community.
PEA-2	Implement a 40-month, countywide risk-reduction campaign to deliver tailored household mitigation guidance that strengthens preparedness and minimizes potential losses.	Flooding, Hurricane and Coastal Hazards, Tornadoes/ Thunderstorms, Severe Winter Weather, Wildfires, Geological (Landslide)	High	HMGP	County Emergency Services	2029	New action for the 2026 update. The County faces multiple and overlapping natural hazards including flooding, hurricanes and severe storms, and wildfires that threaten the safety, health, and economic stability of its residents. These hazards are increasing in both frequency and severity due to emerging weather patterns. While the County has made important strides in infrastructure investment and planning, there remains a critical gap in public knowledge of household-level mitigation measures. Without a strong outreach and education effort, residents will continue to face preventable damages, losses, and fatalities.
PEA-3	Develop and launch a public, parcel-level Residential Wildfire Risk Database and web portal that consolidates hazard layers, structural ignitability, WUI boundaries, fuel conditions, and vulnerability overlays to empower homeowners and stakeholders with tailored mitigation guidance and decision-support tools.	Wildfires	High	HMGP	Buncombe County Emergency Management	2027	New action for the 2026 update. The County faces escalating wildfire risk due to its diverse landscapes, expanding development, and growth of the wildland-urban interface (WUI). The county contains 19 fire districts, but the majority of residents lack access to practical, household-level wildfire risk information. Without consistent, accessible tools, homeowners and communities are unable to adequately identify their level of risk, take cost-effective mitigation measures, or prepare for wildfire emergencies.

City of Asheville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the planning process.	All Hazards	Moderate	Local	Public Works-SW Division/ Assistant Fire Chief/ Planning, Parks & Rec and Capital Improvements Departments	2031, Annual review	On-going project. The Flood Damage Protection Ordinance was updated in January of 2025. Currently PW Stormwater Division is working with the Planning department on a full UDO and Comprehensive plan updated over the next 3 years. The Parks and Capital Improvement Departments are incorporating resilience and hazard mitigation as part of their master planning and facilities management planning. The City is participating in NCDEQ's Flood Resiliency Blueprint Tool Advisory Board and Program.
P-2	Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.	All Hazards	Moderate	Local	Public Works Director/Fire Chief/Planning Director/Chief Code Enforcement Officer	2031	Within the Swannanoa Risk Assessment, 2 mitigation projects were identified in the City. The Lake Craig project was completed in 2015, providing additional floodplain volume, removing fill from the banks in three areas. Enhanced flood attenuation requirements as part of this project resulted in larger areas of land to purchase reducing the benefit cost ratio needed to move the project forward. The Biltmore Ave bridge project was also identified. This project was to create an additional in-stream floodplain area. Due to conflicts in utility lines and little flood mitigation improvements, the cost benefit analysis did not meet requirements to move forward. As a result of Helene, the City, under the capital projects team, is conducting master planning and reconstruction of two Park systems. Along the Swannanoa River (parks include Recreation park, Azalea, Dog Park, Hardesty Ln) and along the French Broad River (FBR Park, Carrier, Amboy Riverfront, Jean Webb). The plans have a focus on building resilience and natural system functions to these parks. The design team is identifying potential flood and

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							hazard mitigation opportunities such as restoration of stormwater control measures ("SCMs"), constructed wetlands, creation of additional floodplain areas, natural system functions, stream restoration, streambank stabilization, heat mitigation, vegetated swales, and new SCMs.
P-3	Develop and implement a Landslide Susceptibility Model and Landslide Hazard Mitigation Plan to identify high-risk areas, guide land use and development decisions, and establish operational protocols for monitoring, warning, and response to landslide hazards.	Flooding, Landslides, Hurricanes and Coastal Hazards	High	Local, State, Federal	Planning and Urban Design Department (primary)- support Asheville Fire Department, Public Works, IT (GIS), BCEM	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes both a technical and operational framework for addressing landslide risk in Asheville's mountainous terrain. The Landslide Susceptibility Model will use GIS-based analysis of slope, soil type, rainfall, land cover, and historical landslide data to identify areas at the highest risk. This information will inform land use planning, infrastructure design, and development regulations, helping to reduce future risk. The accompanying Landslide Hazard Mitigation Plan will define operational protocols for monitoring conditions, issuing warnings, and coordinating response actions during high-risk periods, particularly during heavy rainfall events. Integration with the EOC and Incident Action Planning process will ensure that landslide risk is incorporated into operational decision-making. This action directly addresses vulnerabilities highlighted during Hurricane Helene, where saturated soils and terrain conditions increased landslide potential and impacted transportation and access. By proactively identifying and planning for these risks, the City can reduce damage, improve safety, and enhance resilience to future storm events.
P-4	Develop and implement a Multiple Fuel Type Resilience Plan to ensure continuity of fuel supply for emergency operations by diversifying fuel types (gasoline, diesel, propane, natural gas, and electric charging) and establishing redundant fueling capabilities for public safety, critical infrastructure, and essential services.	All Hazards	High	Local, State, Federal	Public Works- Fleet & Facilities (primary)- support Asheville Fire Department- EMS, Finance	2031, On-going Annual review & update	New Action for the 2026 update. This mitigation action establishes a diversified and resilient fuel supply system to support continuous operations during disasters. The plan will incorporate multiple fuel types, including traditional fuels (gasoline and diesel), alternative fuels (propane and natural gas), and emerging technologies such as electric vehicle charging infrastructure. Redundant fueling capabilities will be developed through on-site storage, mobile fueling assets, and pre-established contracts with multiple suppliers. The plan will also address generator fuel supply for critical facilities and ensure priority access for emergency response vehicles. By reducing reliance on any single fuel source or distribution method, the City can better withstand supply disruptions and maintain operational continuity during extended incidents.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							This action directly addresses challenges observed during Hurricane Helene, where fuel access constraints impacted response operations, and strengthens the City's ability to sustain critical services in complex and degraded environments.
P-5	Develop and implement a Citywide Training and Exercise Program to institutionalize emergency management capabilities across all departments through standardized training, progressive exercises, and integration into the Emergency Operations Plan (EOP) and Continuity of Operations Plan (COOP).	All Hazards	High	Local, State, Federal	Asheville Fire Department-EMS (primary - All City Departments, BCEM,	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a structured, sustainable training and exercise program to ensure that emergency management is institutionalized across the City rather than dependent on individual experience or relationships. The program will align with Homeland Security Exercise and Evaluation Program (HSEEP) principles and incorporate a progressive exercise cycle, including workshops, tabletop exercises, functional exercises, and full-scale exercises. Training will include baseline ICS courses for all personnel, advanced position-specific training for EOC staff, and leadership-focused sessions for executives and elected officials. The program will also reinforce the City's EOC battle rhythm, use of the Planning "P," and Incident Action Planning processes. By building familiarity and competency across all departments, the City will improve coordination, reduce confusion during initial response, and enhance overall operational readiness. This directly addresses gaps identified during Hurricane Helene and ensures that systems developed through planning efforts are effectively executed during real-world incidents.
Property Protection							

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PP-1	Ensure enforcement of ordinances.	All Hazards	Moderate	Local	Planning, Fire Marshal, Erosion Control Officer, Stormwater Engineer, Building Permits and Inspections, Floodplain Ordinance Administrator, Zoning Staff	2031, Annual review	On-going program. Continue all elements, records and metrics. Each ordinance is enforced through individual departments, yet is a collaborative effort. The permit system allows for enforcement officers to create cases and staff to take action based on the needs for each violation. This software system has mechanisms which prevent permits being issued until corrective actions and/or approval from all necessary ordinance administrators has been received. By the end of 2027, the City will implement a new permit software, which will have improved capabilities for case management, based on individual properties, as it is based on a GIS platform.
PP-2	Address the issues of storm water management and impervious surfaces.	Flooding	Moderate	Local	Director Public Works and staff	2031, Annually	On-going program. Updated Stormwater Management plan in 2020. The City is updating the Stormwater Management Plan with its application for renewing the MS4 permit. The City has implemented a number of stormwater improvement projects, this includes rehabilitation, upgrades, and maintenance to the existing system. The City is also installing new infrastructure as well as extending the current system to increase the inlet capacity.
PP-3	Continue participation in the National Flood Insurance Program (“NFIP”)and investigate participation in the NFIP’s Community Ratings System (“CRS”).	Flooding	High	Local	Public Relations Staff/Public Works Staff/ Development Services Staff	2031, Annual review	On-going program. The City’s Flood Damage Prevention Ordinance was first passed in August 1980, regulating development within the regulatory 100 year flood plain. The City continues to participate in the Nation Flood Insurance Program. Our current ordinance requires flood protection for a 2 foot freeboard, and prohibits new habitable structures in the floodway. The City was accepted in the Community Rating System program on October 1, 2014, at a Class 8. The City had a re-verification meeting in 2024, due to staffing and various government shutdowns, we have not received the results of this visit. We did not meet the goal of improving our CRS classification due to City staffing since 2021 as we were not able to implement any additional measures to improve our rating. Moving forward, we continue to strive to improve the program and hope to improve our rating status by 2031.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PP-4	Revise the flood hazard ordinance.	Flooding	High	Local	Public Works Staff/ Planning Department	2029, on-going updates	The Flood Damage Protection Ordinance was updated in January of 2025. Currently PW Stormwater Division is working with the Planning Department on a full UDO and Comprehensive plan updated over the next 3-4 years.
PP-5	Administer & enforce North Carolina and International Building Codes and Fire Codes for new construction.	All Hazards	Moderate	City's General Fund	Chief Code Enforcement Officer	Completed NC State Building Code was adopted in 2017; The International Building Code was adopted in 2009	On-going program. The City has continued to adopt the most recent NC Building code. The code in effect is the 2018 NC Building Codes and Technical Codes.
Structural Projects							
SP-1	Implementation of a North Fork Water Treatment Facility Resiliency Plan for the City of Asheville, which includes the design and construction of a pre-treatment system, debris removal within the North Fork Watershed, and a cross-country transmission line.	All Hazards	High	Local, State, Federal	Water Resources Department	2036	New Action for the 2026 plan: This mitigation action details a crucial strategy to counter the growing risks from increasingly frequent and intense severe weather, including hurricanes, tropical storms, and major flooding, which climate projections indicate will worsen. For Asheville, the key concern is ensuring continuous water supply. This resiliency initiative aims to guarantee the North Fork Water Treatment Plant and its infrastructure can treat and deliver potable water during and immediately following a major disaster. This capability is vital for two essential public safety and health requirements: 1. Fire Protection: Maintaining adequate water pressure and volume for fire protection, preventing catastrophic losses from uncontrolled fires after an event. 2. Public Health and Sanitation: A reliable supply of safe drinking water is necessary to prevent widespread disease outbreaks and compromised sanitation systems.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							This action strengthens the City's ability to provide drinking water for continued public health and fire protection, and integrates both immediate response and long-term resilience strategies.
SP-2	Implementation of a William DeBruhl Water Treatment Facility Resiliency Plan for the City of Asheville, which includes the design and construction of a pre-treatment system and debris removal within the Bee Tree Watershed.	All Hazards	High	Local, State, Federal	Water Resources Department	2031	New Action for the 2026 update: This mitigation action details a crucial strategy to counter the growing risks from increasingly frequent and intense severe weather, including hurricanes, tropical storms, and major flooding, which climate projections indicate will worsen. For Asheville, the key concern is ensuring a continuous water supply. This resiliency initiative aims to guarantee the William DeBruhl Water Treatment Plant and its infrastructure can treat and deliver potable water during and immediately following a major disaster. This capability is vital for two essential public safety and health requirements: 1. Fire Protection: Maintaining adequate water pressure and volume for fire protection, preventing catastrophic losses from uncontrolled fires after an event. 2. Public Health and Sanitation: A reliable supply of safe drinking water is necessary to prevent widespread disease outbreaks and compromised sanitation systems. This action strengthens the City's ability to provide drinking water for continued public health and fire protection, and integrates both immediate response and long-term resilience strategies.
SP-3	Implementation of a Mills River Water Treatment Facility Resiliency Plan for the City of Asheville, which includes a three-phase construction plan to double the capacity of the treatment facility from 7.5 million gallons per day (MGD) to 14 MGD.	All Hazards	High	Local, State, Federal	Water Resources Department	2031	New Action for the 2026 update: This mitigation action details a crucial strategy to counter the growing risks from increasingly frequent and intense severe weather, including hurricanes, tropical storms, and major flooding, which climate projections indicate will worsen. For Asheville, the key concern is ensuring a continuous water supply. This resiliency initiative aims to guarantee the Mills River Water Treatment Plant and its infrastructure can treat and deliver potable water during and immediately

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							following a major disaster. This capability is vital for two essential public safety and health requirements: 1. Fire Protection: Maintaining adequate water pressure and volume for fire protection, preventing catastrophic losses from uncontrolled fires after an event. 2. Public Health and Sanitation: A reliable supply of safe drinking water is necessary to prevent widespread disease outbreaks and compromised sanitation systems. This action strengthens the City's ability to provide drinking water for continued public health and fire protection, and integrates both immediate response and long-term resilience strategies.
Emergency Management and Prevention							
EM-1	Develop a comprehensive flood (hazard) warning and response plan. This would incorporate a flood (hazard) threat recognition system (FIMAN and CONTRAIL), methods/standards to warn the public through AVLAlert or other service providers, incorporate the existing and expand the plan for coordinated flood (hazard) response, and critical facilities coordination. Provide public outreach and information on the plan, annually.	All Hazard	High	Local, state, Federal	Fire Department (Emergency Management) Development Services, Public Works	2031	Update and improve the current flood warning and response plan. Expand the system from the existing 8 gauges, with an additional 22 stream gauges. Improve public warning system alerts through an Integrated Alert and Warning Plan and expand coordinated flood response plans.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
EM-2	Develop and implement an Extreme Heat Mitigation and Response Plan for the City of Asheville that includes identification of cooling centers, public messaging, outreach to vulnerable populations, urban heat reduction strategies, and integration into emergency operations.	Extreme Temperatures, Drought, Wildfire	High	Local, State, Federal	Asheville Fire Department - EMS (primary) - support Public Works, Parks & Rec, Communications (CAPE), BCH&HS	2031, On-going Annual review and update	New Action for the 2026 update: This mitigation action establishes a coordinated approach to addressing the increasing risk of extreme heat events, which are expected to become more frequent and severe. A key consideration for Asheville is the loss of tree canopy during Hurricane Helene, which has reduced natural shading and increased urban heat island effects in impacted areas. This change in the built and natural environment will have lasting impacts on temperature exposure, particularly in densely developed or previously shaded neighborhoods. The plan will include identification and operation of cooling centers, targeted outreach to vulnerable populations, and integration with public messaging systems to provide timely information on heat risks and protective actions. In addition, the plan will incorporate long-term mitigation strategies such as tree canopy restoration, shade infrastructure, and coordination with planning and zoning efforts to reduce heat exposure. This action strengthens the City's ability to protect public health, reduces heat-related illness and mortality, and integrates both immediate response and long-term resilience strategies into a unified approach.
EM-3	Develop and implement an Integrated Alert and Warning Plan that fully incorporates IPAWS capabilities with redundant digital and manual notification methods, including mobile public address (PA) systems, vehicle-based announcements, and personnel-driven outreach to ensure message delivery during all hazards and degraded communication environments.	All Hazards	High	Local, State, Federal	Communications (CAPE) & Asheville Fire Department - EMS (primary) - support Police, IT, Public Works - field operations & Stormwater	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a comprehensive, layered alert and warning system that ensures emergency messages reach the public under all conditions, including complete or partial communications failure. The plan will integrate IPAWS as the primary federal alerting platform, allowing for Wireless Emergency Alerts (WEA), Emergency Alert System (EAS) messaging, and other digital notifications. These systems will be complemented by local tools such as Everbridge and AVL Alert to expand reach. Recognizing that digital systems may fail or be inaccessible, the plan will incorporate manual and ground-based notification methods to ensure last-mile delivery of critical information. These methods will include mobile public address systems mounted on emergency vehicles, personnel conducting door-to-door notifications in high-risk areas, use of community partners for message dissemination, and deployment of fixed or temporary signage in key locations. Pre-scripted messaging will be developed to ensure consistency across all platforms.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							Operational protocols will define who sends alerts, how messages are approved, and how different methods are activated based on incident conditions, ensuring alignment with the EOC and JIC structure. Field units will be trained to support alerting operations as part of their mission, particularly in areas with known communication vulnerabilities. This action directly addresses gaps identified during Hurricane Helene, where reliance on digital communication alone was insufficient. It strengthens the City's ability to deliver timely, accurate, and actionable information to all residents. By combining modern technology with proven manual methods, the City ensures a resilient, redundant alerting system that supports life safety and informed decision-making during emergencies.
EM-4	Develop and implement a comprehensive Debris Management Plan to establish pre-disaster contracts, debris removal priorities, staging sites, and coordination procedures to enable rapid, efficient, and compliant debris clearance following major disasters.	Flooding, Hurricanes and Tropical Storms, Thunderstorms and Tornadoes, Earthquakes, Landslides, Severe Winter Weather, Dam Failure	High	Local, State, Federal	Public Works (primary) - support Asheville Fire Department, Parks & Rec, BCEM	2031, On-going Annual review & update	New Action: This mitigation action establishes a proactive framework for debris removal operations, which are critical to life safety, incident stabilization, and economic recovery following disasters. Key components include pre-event debris quantity estimation, identification and permitting of temporary debris management sites, pre-negotiated contracts for debris removal and monitoring, environmental and regulatory compliance procedures, and integration with ICS and EOC operations. The plan will prioritize clearance of emergency routes, critical facilities, and infrastructure to support response operations and expedite community recovery. This action directly addresses gaps identified during Hurricane Helene, where debris significantly impacted access, slowed response efforts, and complicated coordination. A formal debris management plan will improve operational efficiency, reduce recovery time, and increase eligibility for federal reimbursement while strengthening overall community resilience.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
EM-5	Develop and implement an Employee Support and Continuity of Operations Plan that provides emergency housing, feeding capability, and basic needs support for City personnel through pre-identified facilities, including kitchen upfits and sheltering operations at the Harrah's Cherokee Center Asheville.	All Hazards	High	Local, State, Federal	Asheville Fire Department - EMS (primary) - support Public Works, Human Resources, Finance, Communications (CAPE)	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a structured approach to sustaining the City workforce during disasters by addressing the basic needs of employees, including shelter, food, hygiene, and rest. The use of the Harrah's Cherokee Center Asheville during Hurricane Helene demonstrated the importance of having a centralized, scalable facility capable of supporting large numbers of personnel during extended operations. However, the operation also revealed gaps in pre-event planning, including the need for permanent or rapidly deployable kitchen capabilities, sleeping arrangements, and logistical coordination for essential services. By formalizing this capability, the City ensures that personnel can remain focused on response and recovery missions without being diverted by unmet personal needs. This action directly enhances operational endurance, supports continuity of government, and strengthens overall disaster resilience by recognizing that workforce sustainability is a critical component of emergency management.
EM-6	Develop and implement a Points of Distribution (POD) Plan to establish pre-identified locations, staffing models, resource typing, and operational procedures for the rapid distribution of life-sustaining commodities (water, food, ice, and essential supplies) following disasters.	All Hazards	High	Local, State, Federal	Asheville Fire Department - EMS (primary) - support Public Works, Police Department, Parks & Recreation	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a standardized and scalable system for distributing essential commodities to the public following disasters. The plan will include site selection and approval, traffic flow design, staffing models based on ICS structure, resource typing, and coordination with state and federal supply chains. Pre-identified POD locations will allow for rapid activation, reducing delays in delivering critical supplies during the initial response phase. The plan will also incorporate considerations for accessibility, including accommodations for individuals with disabilities and those without transportation. Public information strategies will be integrated to communicate POD locations, hours of operation, and available resources. This action directly addresses challenges identified during Hurricane Helene, where demand for water and essential supplies exceeded initial distribution capacity and coordination. By formalizing POD operations, the City will improve efficiency, reduce confusion, and ensure equitable access to life-sustaining resources during emergencies.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
EM-7	Develop and implement a Missing Persons Collection, Tracking, and Reunification Plan that establishes standardized procedures for collecting names, centralizing information, assigning follow-up responsibility, and coordinating reunification during and after large-scale incidents where communications are limited or unavailable.	All Hazards	High	Local, State, Federal	Asheville Fire Department-EMS (primary) - Support Police Department, Communications (CAPE), IT	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a clear, operational process for managing missing persons during incidents where traditional communication systems are unavailable. The plan will define where names are collected, how they are documented, where information is centralized, and who is responsible for follow-up and resolution. Collection points will include ERCs, shelters, PODs, hospitals, and field personnel. Standardized intake forms (paper and digital) will capture essential information such as name, last known location, physical description, reporting party, and contact information. Field units and staff will be trained to direct individuals to designated intake locations rather than creating ad hoc tracking systems. All collected information will be routed to a centralized tracking function within the EOC, likely within the Planning or Operations Section, where data will be consolidated, verified, and maintained on a master list. Redundant systems will be used, including paper logs and offline-capable digital tools, to ensure functionality during communications outages. Responsibility for follow-up will be clearly assigned, typically through law enforcement for confirmed missing persons investigations and through designated EOC staff for reunification tracking. The process will include status updates, cross-referencing individuals reported safe, and coordination with shelters, hospitals, and response agencies. Public information messaging will direct residents on where to report missing persons and where to check for reunification, reducing confusion and preventing duplication. This system ensures accountability, improves situational awareness, and provides a structured, compassionate approach to reunification, directly addressing the gaps experienced during Hurricane Helene.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
EM-8	Develop and implement a Volunteer and Donations Management Plan to coordinate the intake, management, and distribution of volunteers and donated goods following disasters, including the establishment of a Volunteer Reception Center (VRC) and Donations Management System.	All Hazards	High	Local, State, Federal	Asheville Fire Department-EMS (primary) - Support Communications (CAPE), BCEM	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a structured approach to managing one of the most complex and often underestimated aspects of disaster response: volunteers and donated goods. The plan will include procedures for activating a Volunteer Reception Center (VRC), credentialing and assigning volunteers, coordinating with established organizations such as VOAD, and managing donated goods through a centralized system that prioritizes requested and needed items. Public messaging strategies will be incorporated to guide the public toward appropriate donation methods, such as monetary contributions or specific requested goods, reducing the burden of unsolicited items. The plan will also define roles within the EOC and logistics structure to ensure alignment with ICS principles and operational objectives. By formalizing this capability, the City will improve efficiency, reduce waste, enhance coordination with community partners, and ensure that volunteer and donation efforts effectively support response and recovery operations rather than complicate them.
EM-9	Develop and implement an Emergency Reception Center (ERC) Plan to provide a standardized, scalable framework for establishing and operating reception centers during active violence incidents and within the first 12 hours of a disaster to support reunification, information sharing, and immediate basic needs.	All Hazards	High	Local, State, Federal	Asheville Fire Department-EMS (primary) - Support Police Department, Parks & Recreation, Communications (CAPE), BCEM, American Red Cross	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a critical capability to manage the immediate human needs and information demands that arise in the first operational period of a disaster or following an active violence incident. Emergency Reception Centers (ERCs) will serve as safe, centralized locations where individuals can receive verified information, reconnect with family members, and access initial support services. The plan will define site selection criteria, staffing models aligned with ICS, coordination with law enforcement for active violence scenarios, and integration with the Joint Information Center (JIC) to ensure consistent messaging. For disaster scenarios, ERCs will bridge the gap between immediate response and longer-term sheltering operations, particularly within the first 12 hours when situational awareness is limited and systems are still being established. Services may include reunification support, basic needs assistance, behavioral health support, and referrals to additional resources. This action directly addresses gaps identified during Hurricane Helene related to early information flow, coordination, and public uncertainty, and ensures

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							the City can rapidly establish a structured, compassionate, and effective point of contact for impacted individuals during high-stress incidents.
EM-10	Develop and implement a City Emergency Information Hotline and Status System to provide real-time information on hotel availability, restaurant operations, and essential services following disasters, accessible via phone, web, and mobile platforms.	All Hazards	Moderate	Local, State, Federal	Communications (CAPE) (primary) - support Asheville Fire Department - EMS, IT, BCEM	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a centralized, authoritative source of information for residents and visitors seeking essential services during disasters. The system will provide real-time updates on hotel availability, restaurant status, and other critical services, reducing confusion and improving access to resources. It will integrate with existing communication tools, including mass notification systems and public information platforms, while also providing a dedicated hotline for those without internet access. Partnerships with the private sector will be critical to ensure timely and accurate data, with protocols established for reporting operational status during incidents. This action reduces the burden on emergency services, enhances situational awareness for the public, and supports faster community stabilization and recovery by connecting people to available resources efficiently.
EM-11	Communication Interoperability and Resiliency. Replace aging portable and mobile radios while expanding GMRS and DMR infrastructure to create a redundant, multi-layered communications system that enhances interoperability and provides resilient backup communications for public safety, CERT, and community response operations.	All Hazards	High	Local, State, Federal	Asheville Fire Department- EMS & Communications (CAPE) (primary) - Support Police Department, BCEM,	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a layered, redundant communications framework by combining a modernized primary radio system with expanded GMRS and DMR infrastructure to ensure continuity of communications during disasters. Replacing outdated portable and mobile radios improves reliability and performance across all agencies, while the expansion of GMRS and DMR systems provides critical backup capabilities that are less dependent on centralized infrastructure. These systems will be strategically deployed to enhance coverage in challenging terrain and to support community-based responders, including CERT teams. Integration with existing LMR and LTE systems through gateways and interoperability solutions will ensure seamless communication across platforms. This approach directly addresses communication challenges observed during Hurricane Helene, where infrastructure disruptions limited redundancy and degraded coordination. By investing in both primary and backup systems, the City will improve operational resilience, enhance responder safety, and ensure that communication capabilities remain intact even in the most degraded

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
							environments.
Public Education and Awareness							
PEA-1	Educate the public regarding hazard mitigation.	All Hazards	High	Local	Communications (CAPE) & Asheville Fire Department, & Public Works	2031, Annually review program	Ongoing. The city continues to make efforts to reach out to and educate the public. Over the past 5 years, information has been provided via brochures and information on the city website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community. The City will continue to identify other opportunities to make hazard mitigation information available to the public.
PEA-2	Manually disperse and have a website plus social media posting which provides information about relevant emergency response and preparedness actions the public can take.	All Hazards	High	Local	Communications (CAPE) & Asheville Fire Department, & Public Works	2031, Annual review and update	On-going. The City has a number of outreach and public engagement platforms which provide information about relevant emergency response and preparedness actions, from our website, social media posts, YouTube channel, and hardcopy distribution of pamphlets. We also participate in each of the FEMA hazard awareness weeks.
PEA-3	Manually disperse and have a website plus social media posting which provides information about Buncombe County's Hazard Mitigation Plan and relevant mitigation measures the public can take.	All Hazards	High	Local	City and Fire Public Information Officer	2031, Annual review and update	On-going. The City has a number of outreach platforms which provide information about Buncombe County's Hazard mitigation plan, from our website, social media posts, and hardcopy distribution of pamphlets.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PEA-4	Develop and implement a comprehensive Public Information Campaign that includes pre-scripted ("canned") messaging for pre- and post-disaster conditions, delivered across multiple media platforms and translated into multiple languages to ensure consistent, accessible, and timely communication to all populations.	All Hazards	High	Local, State, Federal	Communications (CAPE) (primary) - support Asheville Fire Department - EMS, Public Works	2031, On-going Annual review & update	New Action for the 2026 update: This mitigation action establishes a proactive, standardized communication framework to support timely and effective public messaging before, during, and after disasters. The campaign will include pre-scripted messages aligned with protective actions, resource availability, and recovery information, ensuring rapid deployment without delays in message development. Messaging will be delivered across multiple platforms, including social media, SMS alerts, websites, traditional media, and community networks, to ensure redundancy during infrastructure disruptions. Materials will be translated into multiple languages and adapted for accessibility, including considerations for individuals with disabilities and access and functional needs. This action strengthens the City's ability to provide clear, consistent, and equitable communication, reduces public confusion, and supports life safety and recovery efforts. It directly addresses gaps identified during Hurricane Helene related to communication speed, consistency, and inclusivity, and reinforces a whole-community approach to emergency management.

Town of Biltmore Forest Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the planning process.	All Hazards	Moderate	Local	Town Manager	2031, Annual review	The Town has started taking a more robust and active role in planning review. As part of this, we are actively considering stormwater conditions as a voluntary comment when reviewing new development. Our existing planning processes for residential renovations also focus on mitigation of hazards.
P-2	Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.	All Hazards	Moderate	Local	Director of Public Works	2031, Annual review	This is an ongoing process involving updates to the hazard mitigation plan. The Town has also participated in regional resiliency workshops to ensure adequate preparedness and reaction to hazards.
Property Protection							
PP-1	Ensure enforcement of ordinances.	All Hazards	Moderate	Local	Zoning Administrator	2031	The Town continues to perform code enforcement. In the event code issues may impact the public (such as dangerous trees leaning over the roadway) the town is being proactive and removing these hazards after allowing time for the property owner to perform this work.
PP-2	Address the issues of storm water management and impervious surfaces.	Flooding	Moderate	Local	Director Public Works	2031	Stormwater management has been a focal point of the Town since 2015. During this time, the Town has contracted with a consultant to develop a stormwater master plan for the Town and is beginning the process this year of making repairs to the ten (10) highest risk areas. This work will be ongoing for at least the next ten years. Preventative maintenance and design review has also been stepped up to ensure appropriate construction is performed on new infrastructure.
Public Education and Awareness Activities							
PEA-1	Educate the public regarding hazard mitigation.	All Hazards	High	Local	Town Manager	2031, annually review program	This process is ongoing, and the Town has taken a broader approach in the past few years to incorporate citizen comment in stormwater design, park re-design (including stream restoration in an easily flooded area), and working with residents and corporate entities to perform adequate power line maintenance and reduce the chances of wildfires.

Town of Black Mountain Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the Black Mountain planning process by continuing to Integrate HM planning into development plan review processes within the Planning and Development Department.	All Hazards	Moderate	Local	Building & Zoning Dept/Planning & Development Dept	2031, Annual review	This is done as the projects develop. For instance, if a developer wants to build in an area that is prone to flooding, the P&D Department will work with the developer to look at different options for construction such as relocating or elevating. The town will continue to work to incorporate hazard mitigation into the overall planning process.
P-2	Update the Land Use Ordinances (including building regulations, subdivision ordinances and zoning regulations) to be consistent with the 2005 NCGS updates to authorizing statutes and to better incorporate HM and public safety needs into land use policies.	All Hazards	Moderate	Local	Building & Zoning Dept/Planning & Development Dept	2031, Annual review	Our land use code was updated in 2010. We will continue to incorporate HM planning into development process.
P-3	Establish/Continue to implement Best Management Practices and Measurable Goals for each of the six required components for the Black Mountain Stormwater Plan.	Flooding	Moderate	Local	Stormwater Manager	2031, Annual review	The town has made great strides towards implementing best practices and continues to work on this. Any new projects are subject to our storm water ordinance. Among other requirements, this ordinance requires larger development projects to include a plan for retaining the first inch of rainwater runoff.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-4	Participate in regional work to mitigate flooding through Senate Bill 7 funding.	Flooding	Moderate	Local	Building & Zoning Dept/Planning & Development Dept	2031	Thus far, the town has not participated in regional work to mitigate flooding due to lack of staff time. This will continue to be a goal going forward.
p-6	Develop a database that identifies each property that has received damage due to hazards identified within this mitigation plan. The database should also include a tax identification number of the property, a description of the property damage, the value of the damage, and links to photographs of the damage. Developing this database will allow the Town to easily identify properties at high risk of damage from certain hazards as well as properties, which receive repetitive damage from multiple hazards.	All Hazards	Moderate	Local	Building & Zoning Dept/Planning & Development Dept	2031	So far, this activity hasn't been completed. This action will remain in the plan going forward.
Property Protection							
PP-1	Ensure consistency in zoning and building inspections enforcement and continue to enforce the International Building Code. Involve local emergency staff and HM principles in development and permitting review.	All Hazards	Moderate	Local	Building & Zoning Dept/Planning & Development Dept	2031, Annual review	This is done on a daily basis and as projects develop. The town will continue to ensure consistency in zoning and building inspections in the future.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PP-2	Investigate participation in the National Flood Insurance Program's Community Ratings System.	Flooding	Moderate	Local	County EM Planner/Town Floodplain Administrator	2031	The town does not currently participate in the CRS but it will continue to evaluate the viability of participating in the future. There has not been sufficient staff availability to pursue this action.
PP-3	Increase resiliency to hazard impacts on water and sewer infrastructure through improvements to utility, distribution, collection, and treatment system components.	All Hazards	High	Grant funding, local enterprise revenues	Public Works	2028	Action identified after Hurricane Helene. Applying for funding, ongoing grant application development and submission.
Public Education and Awareness Activities							
PEA-1	Educate contractors, developers and designers on code changes and new development issues.	All Hazards	High	Local	Building & Zoning Dept/Planning & Development Dept	2031	Our building inspector does a good job with this with in-office interactions and by making information available online. He will continue to do so as part of his job duties. The town will continue to outreach to contractors/developers.
PEA-2	Provide new homebuilders with information on quality redevelopment and safe housing development.	All Hazards	High	Local	Building Inspections Dept.	2031	We do provide builders with information via our website as well as in office materials. The town will continue to outreach to its citizens.
PEA-3	Manually disperse and have a website posting which provides information about relevant emergency response and preparedness actions the public can take.	All Hazards	High	Local	Fire Prevention Officer	2031	This has been done to some extent w/Code Red. Code Red is the town's emergency notification system. The town will continue to outreach to its citizens.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PEA-4	Manually disperse and have a website posting which provides information about Buncombe County's Project Impact and the County's Hazard Mitigation Plan and relevant mitigation measures the public can take.	All Hazards	High	Local	Town Manager/Fire Chief/Police Chief	2031	This hasn't been done due to lack of staff time, but we do provide a link to Buncombe County's on our website. The town will continue to outreach to its citizens.

Town of Montreat Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Appoint a representative to the Hazard Mitigation Plan Evaluation and Revision Committee. Continue to meet as needed.	All Hazards	High	Local	Town Administrator /Public Works Director	2031, Annual review	The town has appointed a representative to the Hazard Mitigation Plan Committee and that representative participated in the plan update process. The town will continue to provide a representative to HMP Committee going forward.
P-2	Review resources discussing hazard mitigation concepts.	All Hazards	High	Local	Town Administrator	2031, Annual review	The town has annually reviewed all resources discussing hazard mitigation concepts. The town will continue to review these resources and integrate new resources as necessary.
P-4	Develop a checklist in our zoning and building inspections department to ensure consistency in zoning enforcement and to prevent omissions in the evaluation of projects.	All Hazards	High	Local	Building Inspector/ Code Administrator	2031, Annual review	The town has developed a building/zoning checklist to ensure consistency in zoning enforcement. This checklist will need to be reviewed and updated annually to ensure applicability of checklist.
P-6	Report results of inspection/enforcement measures to the Project Impact Coordinator/Emergency Management Planner on a semi-annual basis.	All Hazards	High	Local	Town Administrator	2031, Semi-Annual review	On a semi-annual basis, the town has reported the results of inspection/enforcement measures to the PIC or EM Planner. In the future, this reporting process will continue to take place semi-annually.
P-8	Continue to update the Town of Montreat Emergency Response Ordinance on an annual basis including relevant positions and contact information changes.	All Hazards	High	Local	Building Inspector/ Code Administrator	2031, Annual review	The town has worked on updating its ERO an annual basis and will continue to make updates and changes to the ordinance during an annual review period.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-14	Purchase a complete GPS setup and provide training on said setup to all pertinent town personnel.	All Hazards	High	General Fund Revenue/ Grants	Town	2031	Although some GPS technology is available, the town would like to look into additional components. The town will continue to work to train all pertinent town staff in the latest updates in GPS technology.
Property Protection							
PP-1	Update the zoning ordinance to reflect mitigation planning and safety factors.	All Hazards	High	Local	Town Administrator	2031	The zoning ordinance has been updated in many ways to reflect mitigation planning, however there are additional measures that could be added to improve mitigation so the town will work to include those going forward.
PP-5	Investigate participation in the National Flood Insurance Programs Community Ratings System.	Flooding	High	Local	Town	2031	The town has not joined the CRS, but it will continue to look into the program and work towards developing the necessary programs to join. There has not been sufficient staff availability to pursue this action.
PP-7	Develop a database that identifies each property that has received damage due to hazards identified within this mitigation plan. The database should also include a tax identification number of the property, a description of the property damage, the value of the damage, and links to photographs of the damage.	All Hazards	High	Local	Town	2031	The town has not fully developed a database that identifies properties that have been damaged by past events, in large part because there have not been enough historic events to gain a full perspective of risk. The town will work to continue to develop this database over the next several years.
Public Education and Awareness Activities							
PEA-1	Educate contractors, developers and designers on code changes and new development issues.	All Hazards	High	Local	Planning and Inspections Department	2031, Annually	The town has worked to ensure developers and contractors are well- educated on code changes (by providing in-office information and by making information available online) and will continue to keep these interests up to date as new information is developed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PEA-2	Provide new homebuilders with information on quality redevelopment and safe housing development.	All Hazards	High	Local	Planning and Inspections Department	2031, Annual review	The town has provided information on quality redevelopment and safe housing to homebuilders over the past several years (through both in-office education and online resources) and will continue to provide this information. Updates to information will be integrated as well.
PEA-3	Manually disperse and have a website posting which provides information about relevant emergency response and preparedness actions the public can take.	All Hazards	High	Local	Planning and Inspections Department	2031, Annual review and update	The town has developed a number or resources for the public to utilize to help with preparedness and these have been dispersed both manually and through the website. The town will work to reach out in new ways going forward, such as through social media, and will also maintain current outreach strategies.
PEA-4	Manually disperse and have a website posting which provides information on Buncombe County's Project Impact and the County's HMP and relevant mitigation measures the public can take.	All Hazards	High	Local	Planning and Inspections Department	2031, Annual review and update	The town has developed a number or resources for the public to utilize to help with understanding Project Impact and mitigation and these have been dispersed both manually and through the website. The town will work to reach out in new ways going forward, such as through social media, and will also maintain current outreach strategies.

Town of Weaverville Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the planning process.	All Hazards	High	Local	Town Manager	2031, Annual review	Ongoing project. One example of how the Town is integrating hazard mitigation into the day-to-day planning process is by enforcing the Flood Damage Prevention Ordinance. The Town will continue to do this and attempt to identify other ways to integrate hazard mitigation into planning.
P-3	Refine the Stormwater Management Program and enforce the regulations.	Flooding	High	Local	Town Manager	2031, Annual review	The town is always working to enforce the regulations of the Stormwater Management Program and will look at refining the program on an annual basis. No major refinements have been made over the past 5 years.
P-4	Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.	All Hazards	High	Local	Town Manager	2031	This is happening currently as evidenced by update of existing actions. The Town has not applied for hazard mitigation funding in the past 5 years but will continue to monitor our Mitigation Action Plan and work to implement actions.
Property Protection							
PP-1	Evaluate and strengthen existing ordinances as needed.	All Hazards	High	Local	Town Manager	2031, Annual review	The town has attempted to provide strong ordinances to reduce risk and will continue to look at how it can integrate more mitigation-oriented practices going forward. No major changes to ordinances were made during the past 5 years.
PP-2	Ensure enforcement of ordinances.	All Hazards	High	Local	Town Manager	2031, Annual review	Town Staff actively pursues enforcement issues and maintains records & metrics and will continue to do so going forward.
Public Education and Awareness Activities							

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PEA-1	Educate the public regarding hazard mitigation using newsletters and special alerts, etc.	All Hazards	High	Local	Town Manager	2031, Annually review program	The town has made many efforts to reach out to and educate the public and will continue to do so going forward. Information is provided via brochures and information on the county/town websites regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community.

Town of Woodfin Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Incorporate hazard mitigation into the planning process.	All Hazards	High	Local	Planning Director / Town Manager	2026, Annual review	Ongoing project. One example of how the Town is integrating hazard mitigation into the day-to-day planning process is by requiring geotechnical reports for the development of properties located in steep slope areas to inform property owners of the risks. As codes and processes are incrementally updated, the Town will continue identify other ways to integrate hazard mitigation into planning.
P-2	Investigate participation in the National Flood Insurance Programs Community Rating System.	Flooding	Moderate	Local	Town	2026	The town has not joined the CRS, but has committed to evaluating the potential benefits of the program and determining whether it is worth pursuing.
P-3	Refine the Stormwater Management Program and enforce the regulations.	Flooding	High	Local	SW Administrator/ Town Manager	2026, Annual review	The town assumed responsibility of administering and enforcing its stormwater ordinance from Buncombe County in 2024. Along with this move, a comprehensive update to the SW ordinance was performed including the addition of a new stormwater fee. Overall enhancements to the program were also made including the hiring of a dedicated stormwater administrator. An inventory and prioritization of all stormwater infrastructure is planned for 2026 with repairs to follow.
P-4	Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.	All Hazards	High	Local	Town Manager	2026, Annual review	The Town has applied for five different grants in the last 12 months related to hazard mitigation including HMGP and DRMF to address a variety of needs. Additional grants are being considered.
Property Protection							
PP-1	Evaluate and strengthen existing ordinances as needed.	All Hazards	High	Local	Planning Director/Town Manager	2026, Annual review	The town has attempted to balance ordinance requirements against economic development, prioritizing those standards intended to address public health, safety, and welfare. Significant updates to both the stormwater and flood ordinances were completed, and steep slope development standards were adopted within the last five years. The town also currently has a comprehensive Land Development Ordinance update underway to be completed late 2026/early 2027.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
PP-2	Ensure enforcement of ordinances.	All Hazards	High	Local	Town Manager	2026, Annual review	Town staff actively respond to complaints and work with property owners to address known code violations across all categories. Records of the nature of the violation(s), their status, and remedies are maintained.
PP-3	Identify and address issues resulting from inadequate storm water management and impervious surfaces.	Flooding	Moderate	Local + state & federal grants	Project & Facilities Dir./ Town Manager	2031, Annually	City Staff has an active stormwater program to identify projects and maintain current public infrastructure. An inventory and prioritization of all stormwater infrastructure is planned for 2026 with repairs to follow. The town will monitor and continue to upgrade as necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Public Education and Awareness Activities							
PEA-1	Educate the public regarding hazard mitigation through a variety of means.	All Hazards	High	Local	Town Manager/ Town Council/ Police Department	2026 Annually review	The town has made many efforts to inform and educate the public including, but not limited to: bi-annual newsletters, emergency text alerts, first class mail, public meetings, and local media. The town has also formed a Communications Subcommittee of council to help staff with prioritization and outreach.
PEA-2	Connect contractors, developers, design professionals, and property owners to data regarding known hazards.	All Hazards	High	Local	Town Manager	2026, Annual review	Make data easily accessible through the town's website connecting stakeholders to information regarding risk and vulnerability to certain hazards.

Madison County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Continue participation in the National Flood Insurance Program without suspension.	Flooding	High	Local	EM	2031, Annual review	The county is currently a participant in the NFIP and will continue to work to maintain compliance going forward.
P-2	Inventory of residential and commercial properties in the 100 year floodplain to mitigate the hazards of flooding– In addition to clearing debris in County creeks and the work now being considered by the US Army Corps of Engineers in the French Broad River in the vicinity of Marshall to reduce future flood impacts, it is recommended that an inventory of those public and private structures located in the floodplain be conducted and list of priority properties be identified for acquisition and relocation, or if appropriate, elevation of structures.	Flooding	Moderate	Local	EM	2031, Annual review	During this plan update, the inventory of properties in the 100 year floodplain was updated. However, this list will need to be updated when future map updates occur and as mitigation actions are taken.
P-3	Inventory of dams in the County to mitigate the hazards of dam failure and flooding. – Conduct a full inventory of all publicly and privately maintained dams in the County. The information collected will identify problem areas and opportunities for rehabilitation or removal of decaying dams.	Dam Failure/ Flooding	Moderate	Local	EM	2031, Annual review	During this plan update, the inventory of dams was updated. However, this list does not include all privately owned smaller dams and the list will need to be updated periodically so there is still some work to be completed on this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-4	Terrorism assessment and public health survey to mitigate the hazards of terrorism– By all accounts, the risk of a terrorist attack occurring in Madison County is small but it cannot be totally ignored. It is recommended that the County conduct a full assessment of its terrorist risk and of the capabilities of the public health system. Included in the appendices to this report is a community terrorism assessment. Public health system terrorism assessment tools are currently under development. The results of these two surveys should identify opportunities to reduce the impact of both a terrorist incident but also natural hazards such as floods, hurricanes, tornadoes, etc.	Terrorism	Moderate	Local	EM	2031	The county will need to carry out a full assessment of its risk to a terrorist attack and the threats to the public health system.
P-6	Link County, municipal and other computer systems and networks for use in mitigation and response efforts – It is recommended that County officials explore linking existing County computer systems to collect and process hazard data in order to provide information on hazard mitigation opportunities and to assist in disaster response and recovery efforts. There are numerous computer software products on the market or in development that could be used to integrate multiple data sources and assess the data collected.	All Hazards	Moderate	Local	IT/EM	2031	The county has looked into ways to integrate its computer systems and has done so in many ways to support productivity including having a countywide GIS layer of critical facilities. Although some of these initiatives have supported mitigation activities, additional integration is needed to fully support mitigation efforts.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-7	Establish a local funding source for mitigation projects – Consideration should be given to establishing a local funding source designed to provide incentives to developers to build disaster resistant homes and subdivisions. Funds from this account could also be used to provide loans and/or grants to homeowners and businesses for hazard mitigation projects. Funding mechanisms to be considered should include but not be limited to: sales tax increase, real estate tax, bond issue, utility charge and others.	All Hazards	Moderate	Local	EM	2031	The county has not yet established a local funding source to incentivize builders to develop disaster-resistant homes and businesses because it was not economically feasible. The county will look to establish this going forward.
P-8	Creative initiatives already under consideration to take advantage of tourist revenues should continue and other opportunities explored. Opportunities represented by the increase in market of second/vacation homes need to be explored.	All Hazards	Moderate	Local	County Board	2031	Thus far, the county has not yet looked into utilizing additional funding from tourist revenues to support mitigation initiatives to any great degree because those funds were needed for other projects/initiatives. The county will investigate whether this would be a viable option going forward.
P-9	Staffing for first responders – Staffing levels at some of the County fire installations. Priority should be given to finding ways to attract additional staff and resources.	All Hazards	Moderate	Local	EM	2031	The county has worked hard to ensure adequate staffing at its first responder facilities, but more staff is needed to have a sufficient coverage for all response needs.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
P-10	Ambulance Shortfall – Severe concerns were raised over the lack of ambulance capacity within the County. The distances within the County and potential for multiple incidents, in addition to the more routine medical emergencies requires the County to explore means to increase the number of ambulances available to serve the County, even in non-disaster circumstances.	All Hazards	Moderate	Local	EM	2031	The county has worked hard to ensure adequate ambulances, but this capacity remains an issue and additional funding will need to be pursued.
P-11	Application for emergency funds from the US Department of Transportation for impacts in I-26 corridor – County officials should approach the US Department of Transportation (DOT) to inquire if DOT emergency funds may be available to address flooding issues in the new I-26 corridor.	Flooding	Moderate	Federal	EM	2031	Many of the flooding issues in the new I-26 corridor remain and so the county will continue to pursue funding and efforts to try to address these issues. This type of funding has been discussed over the past 5 years, but there has been minimal advancement in terms of applying those funds to I-26.
Property Protection							
PP-1	Remove debris from streams across County.	Flooding	High	Grants	EM	2031, After events	The county has worked to remove debris from streams and ensure adequate flow of water. The county will continue to address any debris issues in streams and will seek funding to do so, especially in the wake of a disaster event.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026Action Implementation Status
PP-2	Update and enforce Land Use Ordinances and Building Codes to mitigate the hazards of structure fires, flooding, and landslides. Critical segments of this ordinance are the requirements for transportation ingress and egress to subdivisions and the grade of subdivision roadways. These requirements must be properly enforced to ensure that emergency vehicles will have adequate access to hazards in subdivisions and that floodplain restrictions are met.	Wildfires/ Flooding/ Landslides	Moderate	Local	Planning and Zoning	2031, Annual review	The county has enforced its land use ordinances and building codes and will continue to update these codes as necessary to improve the county's resilience and mitigate the impacts of hazards.
PP-3	Clear fire fuel from forest floor in Wolf Laurel and other targeted areas in the County to mitigate the hazards of wildfire– The recent drought and the southern pine beetle epidemic has resulted in significant levels of additional fuel on the forest floor in several areas in the County. Removing this fuel should be a priority for fire prevention efforts in the County in the coming months.	Wildfires	Moderate	Local	EM	2031, Annual process	The county has worked with staff at NC Forestry to clear fire fuel from the forest floor and reduce the potential impacts from wildfire. This will continue to be a priority going forward, especially in dry times when wildfires are more likely.
PP-4	Actively buyout targeted residential and commercial properties in the 100-year floodplain – Based on the priorities established as part of the countywide inventory, begin the acquisition, relocation or elevation of structures. This is a voluntary involvement project. It is further noted that the Town of Marshall is opposed to the demolition of any historical buildings in the Downtown area.	Flooding	Low	FEMA/Federal Grants	EM	2031	In recent years, the county has not acquired or elevated many homes due to a combination of factors including lack of funding and lack of interest, but it would like to look at implementing more voluntary buyouts and elevations in the future to reduce flood risk. The County is currently working to obtain funding for a landslide buy-out.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Emergency Services							
ES-1	Assess the need and seek funds to acquire warning systems – It is recommended that the County assess the need for various warning systems to address the hazards in the County. These systems would include a siren based system to alert residents to wildfire activities and threats, a series of stream gauges to alert residents and public officials to flood threats and conditions in the creeks in the County and in the French Broad River and a reverse 911 systems capability for use by County officials in alerting residents to threats and evacuation orders.	All Hazards	Moderate	Local	EM	2031	The county has installed some warning system capability, but in many ways it is not sufficient in terms of its total coverage due to some populations not being reached. The county would like to work to continue expanding its warning system capability.
ES-2	It is also recommended that the County sponsor Community Emergency Response Training (CERT) for individuals and business owners.	All Hazards	Moderate	Local	EM	2031	The county has not had as much success as it would like in developing a CERT team so it will continue to work to improve this resource in the future by training more individuals.
ES-3	Training for first responders – County police, fire, EMS and public health officers require additional training in responding to hazardous materials transportation incidents and biological and chemical incidents.	Hazardous Materials	Moderate	Local	EM	2031	Although first responders have been well trained in the county, there are always new strategies for improving this capability so additional training will be pursued.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
ES-4	Improved operations and communications- It is recommended that County officials regularly exercise their response plan to natural and manmade disasters in order to maintain and refine coordination and communications among first responders. The County should hold at least one full exercise annually followed by a full debriefing of participants. Consideration should also be given to conducting 1-2 tabletop exercises annually including at least one tabletop exercise with a terrorism scenario.	All Hazards	Moderate	Local	EM	2031, Annual exercise	The county has held an annual exercise to practice and train for major disaster events. It will continue to hold an exercise at least annually going forward.
ES-5	Seek agreements with hospitals outside of the County on mass casualty requirements – County officials should approach hospitals located outside the County, including Tennessee, to establish mutual aid agreements concerning protocols if a mass casualty event occurs in the County. It is recommended that these new agreements build on existing agreements and expand to new facilities in order to achieve a reasonable capacity for mass casualties should an event occur in Madison County.	All Hazards	Moderate	Local	EM	2031	The county has worked to expand its capability in terms of hospitals and medical care with regard to mass casualty events. The county will continue to work on maintaining existing resources while expanding to new resources.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
ES-6	Seek agreements with rail carriers in the County on notification requirements for HZM transported in and through the County – County officials should contact the Norfolk Southern railway concerning the shipment of hazardous materials on the rail line in the County and to determine roles and responsibilities of notification and response requirements for incidents involving a rail incident involving hazardous materials in the County.	Hazardous Materials	Moderate	Local	County Officials/EM	2031	The county has worked with rail carriers on notification requirements for materials passing through the county, but increased coordination is likely going to be necessary to maintain and improve the system of coordination and ensure safety.
ES-7	Acquire HZM equipment for fire, police and EMS – Each of the volunteer fire departments in the County consider the acquisition of additional hazardous materials response equipment a top priority. This equipment will provide needed protection to County first responders and improve their response capabilities. As a result, threat of injury and death to first responders and accident victims in hazardous materials incidents will be reduced which also result in reduced insurance costs and improved public safety.	All Hazards	Low	Federal and Private Grants	EM	2031	The county has provided adequate equipment and resources for responders, but this capability could be improved with additional resources.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
ES-8	Establish a second HazMat response team – Based on a needs assessment and the increased traffic in hazardous materials expected in the County in the future when the I-26 corridor is completed requires that the County consider establishing a second HazMat response team. Establishing this new team will require additional training for fire, police and EMS personnel, additional HazMat equipment for first responders and revisions to existing response protocols among volunteer fire departments. Consideration must also be given to where to locate this new team.	Hazardous Materials	Low	Federal and Private Grants	EM	2031	The county has not established a second HazMat team due to lack of funding, but it will look into funding for one in the future.
ES-9	Acquire fire equipment – Each of the volunteer fire departments in the County has fire equipment needs including fire vehicles, turnout gear, breathing apparatus and other equipment.	Wildfires	Low	FEMA/Federal Grants	EM	2031	Although fire equipment has been provided, staff are always in need of the latest resources that can be acquired to respond to wildfire events.
Structural Projects							
SP-1	Construct County Emergency Operations Center (EOC) – The County should consider building an Emergency Operations Center (EOC) that would allow centralization of communications equipment, consolidation on command and control functions and a mitigation and preparedness planning and education center.	All Hazards	Low	FEMA/Federal Grants	EM	2031	The county has not established a specific building to act as an EOC, but it will continue to look into funding and constructing this facility.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Public Education and Awareness							
PEA-1	Citizen Program – Design and implement a public education campaign designed to inform County residents about hazard and terrorism mitigation efforts. This campaign would also outline County response capabilities and plans and identify the role individual citizens can play in a disaster incident.	All Hazards	Moderate	Local	EM	2031	The county is constantly reaching out to citizens to inform them of best practices in hazard mitigation and preparedness for emergency events. However, as new ways of communicating become available (such as social media), the county will expand its practices to attempt to reach as many citizens as possible. Information is provided via brochures and information on the county website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community.

Town of Hot Springs Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Continue participation in the National Flood Insurance Program without suspension.	Flooding	High	Local	Town Admin	2031, Annual review	The town is currently a participant in the NFIP and will continue to work to maintain compliance going forward.
Property Protection							
PP-2	Floodproof commercial buildings on Main Street.	Flooding	High	BRIC/HMGP Grants	EM	2031	The town has encouraged local business owners to floodproof their structures but this action is not complete as the town is looking into ways that it could help commercial property owners with this process.
PP-3	Clear creeks of debris to mitigate the hazards of flooding – Creek flooding is an issue in several areas in the County and one potential strategy for reducing creek flooding is removing debris directly from the creeks that reduces water flows in the creeks. This is not the only solution to creek flooding and will likely need to be repeated in the future. However, if done properly, clearing the debris can reduce flooding impacts in the future and provide additional protection to the County's natural resources. In order to reduce flooding problems in Madison County, debris will be regularly removed from the French Broad River in Hot Springs.	Flooding	High	Local	Public Works Dept.	2031, After events	The county/town have worked to remove debris from creeks and ensure adequate flow of water. The county/town will continue to address any debris issues in creeks and will seek funding to do so, especially in the wake of a disaster event.
Structural Projects							

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
SP-1	Support construction of a new County Emergency Operations Center (EOC) – the Town supports the County as they consider building an Emergency Operations Center (EOC) that would allow centralization of communications equipment, consolidation on command and control functions and a mitigation and preparedness planning and education center. This would be a great benefit for the Town.	All Hazards	Low	FEMA/Federal Grants	County EM Town of Hot Springs	2031	The county has not yet established a specific building to act as an EOC, but it will continue to look into funding and constructing this facility. The Town continues to support this effort and will continue to do so until it is completed.
Public Education and Awareness Activities							
PEA-1	Citizen Program – Assist County EM with design and implement a public education campaign designed to inform Town residents about hazard and terrorism mitigation efforts. This campaign would also outline County EM and Town response capabilities and plans and identify the role individual citizens can play in a disaster incident.	All Hazards	Moderate	Local	County EM and Town of Hot Springs	2031	With support from County EM, the Town is constantly reaching out to citizens to inform them of best practices in hazard mitigation and preparedness for emergency events. However, as new ways of communicating become available (such as social media), the Town, with support from County EM, will expand its practices to attempt to reach as many citizens as possible. Information is provided via brochures and information on the County website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community. The Town directs residents (through in-person interactions and online messaging) to the County site for information.

Town of Marshall Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Continue participation in the National Flood Insurance Program without suspension.	Flooding	High	Local	EM	2031, Annual review	The town is currently a participant in the NFIP and will continue to work to maintain compliance going forward.
P-2	The Town would like to study options for road stabilization and mitigation from stormwater impacts.	Landslides, Flooding	High	State and Federal Grant Funding	County EM and Town of Marshall	2031	New Action for the 2026 update.
Property Protection							
PP-2	Flood-proof commercial buildings on Main Street.	Flooding	High	BRIC/HMGP Grants	EM	2031	The town has encouraged local business owners to flood proof their structures but this action is not complete as the town is looking into ways that it could help commercial property owners with this process.
PP-3	Clear creeks of debris to mitigate the hazards of flooding – Creek flooding is an issue in several areas in the County and one potential strategy for reducing creek flooding is removing debris directly from the creeks that reduces water flows in the creeks. This is not the only solution to creek flooding and will likely need to be repeated in the future. However, if done properly, clearing the debris can reduce flooding impacts in the future and provide additional protection to the County's natural resources. In order to reduce flooding problems in Madison County, debris will be regularly removed from the French Broad River in Marshall.	Flooding	High	Local	Public Works Dept.	2031, After events	The county/town has worked to remove debris from creeks and ensure adequate flow of water. The county/town will continue to address any debris issues in creeks and will seek funding to do so, especially in the wake of a disaster event.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Structural Projects							
SP-1	Support construction of a new County Emergency Operations Center (EOC) – the Town supports the County as they consider building an Emergency Operations Center (EOC) that would allow centralization of communications equipment, consolidation on command and control functions and a mitigation and preparedness planning and education center. This would be a great benefit for the Town.	All Hazards	Low	FEMA/Federal Grants	County EM and Town of Marshall	2031	The county has not yet established a specific building to act as an EOC, but it will continue to look into funding and constructing this facility. The Town continues to support this effort and will continue to do so until it is completed.
SP-2	The Town is working to identify ways to make their sewer system (lids in particular) flood resilient.	Flooding	High	State and Federal Grant Funding	County EM and Town of Marshall	2031	New Action for the 2026 update.
Emergency Services							
ES-1	The Town needs an EOC area to use during major events, in particular flooding in downtown Marshall. The Town is currently looking to construct a new maintenance facility that can operate as a EOC and temporary office location during these events if the downtown area is inaccessible.	All Hazards	High	State and Federal Grant Funding	County EM and Town of Marshall	2031	New Action for the 2026 update.
ES-2	The Town would like to construct a salt and sand shed that would allow housing of their own salt supply during the winter for better preparation and access during winter storms. The Town recently acquired a second plow and salt spreader so they can be better prepared for winter weather. The sand would allow us both winter options but can also support flood preparedness for the	Severe Winter Weather Flooding	High	State and Federal Grant Funding	County EM and Town of Marshall	2031	New Action for the 2026 update.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
	Town. It would allow us to potentially provide sand and sandbags to downtown business owners and residents to help mitigate flood risk.						
Public Education and Awareness Activities							
PEA-1	Citizen Program – Assist County EM with design and implement a public education campaign designed to inform Town residents about hazard and terrorism mitigation efforts. This campaign would also outline County EM and Town response capabilities and plans and identify the role individual citizens can play in a disaster incident.	All Hazards	Moderate	Local	County EM and Town of Marshall	2031	With support from County EM, the Town is constantly reaching out to citizens to inform them of best practices in hazard mitigation and preparedness for emergency events. However, as new ways of communicating become available (such as social media), the Town, with support from County EM, will expand its practices to attempt to reach as many citizens as possible. Information is provided via brochures and information on the County website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community. The Town directs residents (through in-person interactions and online messaging) to the County site for information.

Town of Mars Hill Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Prevention							
P-1	Continue participation in the National Flood Insurance Program without suspension.	Flooding	High	Local	Town Admin	2025, Annual review	The town is currently a participant in the NFIP and will continue to work to maintain compliance going forward.
P-2	Staffing for first responders – Staffing levels at some of the County fire installations, such as Mars Hill are considered inadequate. Priority should be given to finding ways to attract additional staff and resources.	All Hazards	Moderate	Local	EM	2025	The county has worked hard to ensure adequate staffing at its first responder facilities, but more staff is needed to have a sufficient coverage for all response needs.
Property Protection							
PP-2	Clear creeks of debris to mitigate the hazards of flooding – Creek flooding is an issue in several areas in the County and one potential strategy for reducing creek flooding is removing debris directly from the creeks that reduces water flows in the creeks. This is not the only solution to creek flooding and will likely need to be repeated in the future. However, if done properly, clearing the debris can reduce flooding impacts in the future and provide additional protection to the County's natural resources. In order to reduce flooding problems in Madison County, debris will be regularly removed from the Ivy River in Mars Hill.	Flooding	High	Local	Public Works Dept.	2025, After events	The county/town have worked to remove debris from creeks and ensure adequate flow of water. The county/town will continue to address any debris issues in creeks and will seek funding to do so, especially in the wake of a disaster event.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2026 Action Implementation Status
Structural Projects							
SP-1	Support construction of a new County Emergency Operations Center (EOC) – the Town supports the County as they consider building an Emergency Operations Center (EOC) that would allow centralization of communications equipment, consolidation on command and control functions and a mitigation and preparedness planning and education center. This would be a great benefit for the Town.	All Hazards	Low	FEMA/Federal Grants	County EM and Town of Mars Hill	2025	The county has not yet established a specific building to act as an EOC, but it will continue to look into funding and constructing this facility. The Town continues to support this effort and will continue to do so until it is completed.
Public Education and Awareness Activities							
PEA-1	Citizen Program – Assist County EM with design and implement a public education campaign designed to inform Town residents about hazard and terrorism mitigation efforts. This campaign would also outline County EM and Town response capabilities and plans and identify the role individual citizens can play in a disaster incident.	All Hazards	Moderate	Local	County EM and Town of Mars Hill	2025	With support from County EM, the Town is constantly reaching out to citizens to inform them of best practices in hazard mitigation and preparedness for emergency events. However, as new ways of communicating become available (such as social media), the Town, with support from County EM, will expand its practices to attempt to reach as many citizens as possible. Information is provided via brochures and information on the County website regarding grant programs and preparedness efforts individual citizens can take to be ready when a hazard impacts the community. The Town directs residents (through in-person interactions and online messaging) to the County site for information.

SECTION 10
PLAN MAINTENANCE

This section discusses how the Buncombe Madison Regional 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

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44 CFR Requirement

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

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

10.1 IMPLEMENTATION AND INTEGRATION

Each agency, department or other partner participating under the Buncombe Madison Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific "lead" agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The participating jurisdictions in the Buncombe Madison 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 Buncombe Madison 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 Buncombe Madison Region.

Since the initial regional plan was adopted in 2016 and with each County-specific plan prior to that, both Counties and the participating municipalities have worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

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

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

10.2 MONITORING, EVALUATION AND ENHANCEMENT

Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

When determined necessary, the Buncombe Madison 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 Buncombe Madison Region. For future updates of the plan, Buncombe and Madison County Emergency Management Directors will help coordinate the reconvening the Regional Hazard Mitigation Planning Committee for these reviews. Additionally, the Emergency Management Director from Buncombe and Madison 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 Buncombe Madison 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. The Buncombe and Madison County Emergency Management Directors will help coordinate the reconvening the Regional Hazard Mitigation Planning Committee and conducting the five-year review.

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

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

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Buncombe Madison Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Because the plan update process can take several months to complete, and because Federal funding may be needed to update the plan, it is recommended that the five-year review process begin at the beginning of the third year after the plan was last approved. This will allow the participants in the Buncombe Madison Regional Hazard Mitigation Plan to organize in order to seek Federal funding if necessary and complete required plan update documentation before the plan expires at the end of the fifth year.

Disaster Declaration

Following a disaster declaration, the Buncombe Madison Regional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the Buncombe and Madison County Emergency Management Directors to coordinate the reconvening of the Regional Hazard Mitigation Planning Committee, and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

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

Plan Amendment Process

Plan amendments are sometimes needed before the 5-year plan update takes place. Potential reasons why an update could be needed include the following:

- Errors, inaccuracies, or omissions in the current Plan to include missing or newly identified mitigation actions.
- New issues or needs not addressed in the Plan.
- Changes in data or assumptions used in the Plan.

When an amendment process is needed, the jurisdiction proposing the amendment will share details of the proposed changes with all relevant parties, including affected departments, residents (if needed), businesses (if needed), and North Carolina Emergency Management.

Once the proposed amendment has been circulated, the prosing jurisdiction will coordinate with NCEM and FEMA to adopt the amended plan. Other jurisdictions participating in the plan will not be required to re-adopt the amended plan until the 5-year update.

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 and municipal office buildings
- Designating willing and voluntary citizens and private sector representatives as official members of the Regional Hazard Mitigation Planning Committee
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place
- Utilizing the county and municipal websites to advertise any maintenance and/or periodic review activities taking place, and

- Keeping copies of the Plan in public libraries.

10.4 EVALUATION OF 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 2026. That said, the jurisdictions 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 2026 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 when North Carolina Emergency Management made the decision to set aside HMGP funding for the update of the Buncombe Madison 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 Buncombe-Madison representatives in July of 2025 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 local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This appendix includes the following:

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

English-US

Buncombe Madison Hazard Mitigation Plan Survey

We need your help!

Buncombe County and Madison County, along with their local municipalities, are working together to become less vulnerable to natural disasters, and your participation in the process is important to us!

These counties, local jurisdictions, and other key partners are currently updating the previous Buncombe Madison Regional Hazard Mitigation Plan ahead of its 2026 expiration. This plan identifies and assesses the region's various hazard risks and identifies mitigation strategies designed to best minimize or manage those risks.

Plan Update Project Website: https://arcg.is/0P9y940

This survey is an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help both (1) inform local hazard planning and (2) develop targeted mitigation actions to lessen the impacts of future hazard events.

If you have any questions regarding this planning process or want to contribute your comments for the plan, please use the "Contact Us" feature included on the plan website (see link above). Thank you for your participation!

1. Where do you live?*

- Asheville
- Black Mountain
- Biltmore Forest

- ○ Hot Springs
- ○ Marshall
- ○ Mars Hill
- ○ Montreat
- ○ Weaverville
- ○ Woodfin
- ○ Unincorporated Buncombe County
- ○ Unincorporated Madison County

2. How concerned are you about the possibility of your community being impacted by future disasters?*

- ○ Extremely concerned
- ○ Somewhat concerned
- ○ Not concerned

3. Please select the TOP THREE (3) hazards you think are the greatest threat to your neighborhood:*

- ☐ Cyberattack
- ☐ Civil Disturbance
- ☐ Dam Failure
- ☐ Drought
- ☐ Earthquakes
- ☐ Electromagnetic Pulse (EMP)
- ☐ Erosion
- ☐ Excessive Heat
- ☐ Flooding
- ☐ Food Emergency
- ☐ Hazardous Substances
- ☐ Hurricane and Coastal Hazards
- ☐ Infectious Disease
- ☐ Landslides
- ☐ Lightning
- ☐ Radiological
- ☐ Severe
- ☐ Severe Winter

Emergency

Thunderstorms and High Winds

Weather

- [ ] Terrorism
- [ ] Tornadoes
- [ ] Wildfire

4. Are there any other hazards that you feel pose a wide-scale or increasing threat to your community? If so, please explain:

1000

5. Is your home located in a floodplain?*

- ○ Yes, my home is located in a floodplain, and I DO have flood insurance
- ○ Yes, my home is located in a floodplain, but I DO NOT have flood insurance
- ○ No, my home is not located in a floodplain and I do not have flood insurance
- ○ I'm not sure

6. If you do not have flood insurance, why not?

- [ ] Not located in floodplain
- [ ] Too expensive
- [ ] Not necessary because it rarely floods

- [ ] Not necessary because I am elevated or otherwise protected
- [ ] Never really considered it
- [ ] Other

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

- ○ Yes
- ○ No
- ○ I'm not sure

8. If "Yes," please explain below:

1000

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

- ○ Yes
- ○ No

10. 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

11. What are the most effective and preferred ways for you to receive

information about how to make your home and neighborhood more resistant to hazards?*

- [ ] Automated Phone Calls
- [ ] Internet (including social media)
- [ ] Mail
- [ ] Newspaper
- [ ] Public Workshops and Meetings
- [ ] Radio
- [ ] School Meetings
- [ ] Television
- [ ] Text Messages and Alerts

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

1000

13. In the following table, please rate HOW IMPORTANT you think each activity category is for your community to pursue.

- **Prevention**: Examples include zoning, building codes, open space preservation or conservation, and floodplain regulations
- **Property Protection**: Examples include buyouts, relocation, elevation (to protect from floods), retrofitting/reinforcing buildings, and adding improvements like storm shutters
- **Natural Resource Management**: Examples include habitat preservation, slope stabilization, and river/forest management
- **Structural Projects**: Examples include dams, levees, retention ponds, retaining walls, and storm sewers
- **Emergency Services**: Examples include evacuation planning, warning systems, and protecting emergency facilities/systems

	Very important	Somewhat important	Not important

How important would you rate Prevention?			
How important would you rate Property Protection?			
How important would you rate Natural Resource Management?			
How important would you rate Structural Projects?			
How important would you rate Emergency Services?			

14. Name?

15. Position/Organization?

16. Email?

Submit

Powered by ArcGIS Survey123

Points System for Capability Ranking

0-19 points = Limited overall capability
20-39 points = Moderate overall capability
40-68 points = High overall capability

I. Planning and Regulatory Capability
(Up to 43 points)

Yes = 3 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- National Flood Insurance Program
- NFIP Community Rating System

Yes = 2 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Open Space Management Plan / Parks & Recreation Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point
No = 0 points

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

II. Administrative and Technical Capability
(Up to 15 points)

Yes = 2 points
Service provided by County = 1 point
No = 0 points

- Planners with knowledge of land development and land management practices
- Engineers or professionals trained in construction practices related to buildings and/or infrastructure
- Planners or engineers with an understanding of natural and/or human-caused hazards
- Emergency manager
- Floodplain manager

Yes = 1 point
No = 0 points

- Land surveyors
- Scientist familiar with the hazards of the community
- Staff with education or expertise to assess the community's vulnerability to hazards
- Personnel skilled in Geographical Information Systems (GIS) and/or Hazus
- Resource development staff or grant writers

III. Fiscal Capability
(Up to 10 points)

Yes = 1 point
No = 0 points

- Capital Improvement Programming
- Community Development Block Grants (CDBG)
- Special Purpose Taxes (or tax districts)
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation / Revenue / Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

MITIGATION ACTION WORKSHEETS

Mitigation Action Worksheets are used to identify potential hazard mitigation actions that participating jurisdictions in the Buncombe Madison Region will consider to reduce the negative effects of identified hazards. The worksheets provide a simple yet effective method of organizing potential actions in a user-friendly manner that can easily be incorporated into the Region's Hazard Mitigation Plan.

The worksheets are to be used as part of a strategic planning process and are designed to be:

a.) completed electronically (worksheets and instructions will be e-mailed to members of the Hazard Mitigation Planning Team following the Mitigation Strategy Workshop);
b.) reviewed with your department/organization for further consideration; and
c.) returned according to the contact information provided below.

Electronic copies may be emailed to: nslaughter@espassociates.com
Hard copies can be mailed to:
Nathan Slaughter
2200 Gateway Centre Blvd, Suite 216
Morrisville, NC 27560

INSTRUCTIONS

Each mitigation action should be considered to be a separate local project, policy or program and each individual action should be entered into a separate worksheet. By identifying the implementation requirements for each action, the worksheets will help lay the framework for engaging in distinct actions that will help reduce the community's overall vulnerability and risk. Detailed explanations on how to complete the worksheet are provided below.

Proposed Action: Identify a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.

Site and Location: Provide details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be citywide, countywide or regional, etc.

History of Damages: Provide a brief history of any known damages as it relates to the proposed action and the hazard(s) being addressed. For example, the proposed elevation of a repetitive loss property should include an overview of the number of times the structure has flooded, total dollar amount of damages if available, etc.

Hazard(s) Addressed: List the hazard(s) the proposed action is designed to mitigate against.

Category: Indicate the most appropriate category for the proposed action as discussed during the Mitigation Strategy Workshop (Prevention; Property Protection; Natural Resource Protection; Structural Projects; Emergency Services; Public Education and Awareness).

Priority: Indicate whether the action is a "high" priority, "moderate" priority or "low" priority based generally on the following criteria:

1. Effect on overall risk to life and property
2. Ease of implementation / technical feasibility
3. Project costs versus benefits
4. Political and community support
5. Funding availability

Estimated Cost: If applicable, indicate what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined. Some actions (such as ordinance revisions) may only cost "local staff time" and should be noted so.

Potential Funding Sources: If applicable, indicate how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, a cost-sharing federal or state grant program, etc.

Lead Agency/Department Responsible: Identify the local agency, department or organization that is best suited to implement the proposed action.

Implementation Schedule: Indicate when the action will begin and when the action is expected to be completed. Remember that some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

Comments: This space is provided for any additional information or details that may not be captured under the previous headings.

MITIGATION ACTION	
Proposed Action:	
BACKGROUND INFORMATION	
Site and Location:	
History of Damages:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	
Category:	
Priority (High, Moderate, Low):	
Estimated Cost:	
Potential Funding Sources:	
Lead Agency/Department Responsible:	
Implementation Schedule:	

COMMENTS

Appendix C
Local Mitigation Plan Review Tool

Local Mitigation Plan Review Tool

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)	Buncombe County, Asheville, Biltmore Forest, Black Mountain, Montreat, Weaverville, Woodfin; Madison County, Hot Springs, Marshall, Mars Hill
Title of Plan	Buncombe Madison Regional Hazard Mitigation Plan
New Plan or Update	Update
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	4/24/2026
Local Point of Contact	
Title	Nathan Slaughter, Hazard Mitigation Department Manager, ESP Associates
Agency	ESP Associates
Address	2200 Gateway Centre Blvd, Suite 310, 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	Click or tap here to enter text.
Email	Click or tap here to enter text.

Review Information	
State Review	
State Reviewer(s) and Title	Click or tap here to enter text.
State Review Date	Click or tap to enter a date.
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	**Buncombe County**								
2	Asheville								
3	Biltmore Forest								
4	Black Mountain								
5	Montreat								
6	Weaverville								
7	Woodfin								
8	**Madison County**								
9	Hot Springs								
10	Marshall								
11	Mars Hill								

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:** **2.3 Updating the Plan in 2026** **2.4 Buncombe Madison Regional HMPC** **2.5 Community Meetings and Workshops** **2.6 Involving the Public** **2.7 Involving the Stakeholders** **Appendix D**	
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 in 2026 2.4 Buncombe Madison Regional HMPC 2.5 Community Meetings and Workshops 2.6 Involving the Public 2.7 Involving the Stakeholders	Choose an item.

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 Buncombe Madison Region 2.3 Updating Developing the Plan in 2026 2.4 Buncombe Madison Regional HMPC 2.5 Community Meetings and Workshops 2.6 Involving the Public 2.7 Involving the Stakeholders Appendix D	Choose an item.
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 Appendix D	
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 Appendix D	Choose an item.

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
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 Appendix D	
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 Appendix D	Choose an item.
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))	7.2 Conducting the Capability Assessment and throughout Section 7	
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	7.2 Conducting the Capability Assessment and throughout Section 7.	Choose an item.
ELEMENT A REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

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))	Sections 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?	Sections 4 and 5 throughout	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?	Section 5, Location subsection provided for each hazard	Choose an item.
B1-c. Does the plan describe the extent for each identified hazard?	Section 5, Extent subsection provided for each hazard	Choose an item.
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	Section 5, Historical Occurrences subsection provided for each hazard	Choose an item.
B1-e. Does the plan include the probability of future events for each identified hazard, including the type, location and range of anticipated intensities?	Section 5, Probability of Future Occurrences subsection provided for each hazard	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?	Section 5, Hazard Summary by Jurisdiction provided for each hazard	Choose an item.
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 5, Hazard Summary by Jurisdiction provided for each hazard. Repetitive Loss Analysis begins on page 5-57	
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Section 5, Hazard Summary by Jurisdiction provided for each hazard	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?	Section 5, Hazard Summary by Jurisdiction provided for each hazard	Choose an item.
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Repetitive Loss Analysis begins on page 5-57	Choose an item.

ELEMENT B REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

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))	Section 7: Capability Assessment – entire section	
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.

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
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: 7.3.1,3 pages 7:9-7:18; Table 7.2 NFIP Policy and Claim Information	
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Section 7: 7.3.1,3 pages 7:9-7:18; Table 7.2 NFIP Policy and Claim Information and SDE Procedures begin on page 7:13	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, page 8:3	
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 8.2, page 8:3	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.
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.

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Section 9 throughout	Choose an item.
ELEMENT C REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

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 10:4	
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 10:4	Choose an item.
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	
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 10, 10.2, pages 10:2 through 10:4	Choose an item.

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
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 10.1	
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 10.1	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 10.1	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 10.1	Choose an item.
ELEMENT D REQUIRED REVISIONS		
Required Revision**:** Click or tap here to enter text.		

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, page 3:11, throughout section 6	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))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Section 8.5, Section 9 throughout	Choose an item.

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Section 9 throughout and Appendix E	Choose an item.
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Section 10.1, Section 9 throughout and Appendix E	Choose an item.
ELEMENT E REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	Click or tap here to enter text.	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?	Click or tap here to enter text.	Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element G: High Hazard Potential Dams

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?	Click or tap here to enter text.	Choose an item.
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	Click or tap here to enter text.	Choose an item.
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	Click or tap here to enter text.	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?	Click or tap here to enter text.	Choose an item.
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	Click or tap here to enter text.	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?	Click or tap here to enter text.	Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	Click or tap here to enter text.	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?	Click or tap here to enter text.	Choose an item.
HHPD Required Revisions		
Required Revision**:** Click or tap here to enter text.		

Element H: Additional State Requirements (Optional)

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements.		
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Plan Assessment

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

Element A. Planning Process

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element B. Risk Assessment

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element C. Mitigation Strategy

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element D. Plan Maintenance

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element E. Plan Update

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Appendix D
Planning Process Documentation

This appendix includes:

1. Meeting Agendas
2. Meeting Minutes
3. Meeting Sign-In Sheets
4. Neighboring Jurisdiction Outreach Documentation
5. Public Survey Advertising Documentation
6. Public Survey Summary Results

BUNCOMBE MADISON MEETING PARTICIPANTS

Meeting Participant Summary

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Buncombe County and Municipalities				
Ammons, Christopher	Woodfin PD, Police Captain			X
Bell, Vance	Buncombe County, Operational Service Manager		X	
Boykin, Jacqui	Woodfin PD, Police Chief		X	X
Bradley, Carmen	Buncombe County, EMS Coordinator			X
Buckner, Harry	Biltmore Forest, Public Works Director		X	X
Carreiro, Leslie	Asheville, Water Resources Assistant Director		X	
Chandler, Brian	Buncombe County, Maintenance Tech		X	X
Cole, Ryan	Buncombe County, ES Assistant Director		X	
Cook, Brenna	Asheville, Water Dept. Compliance Manager		X	
Crawford, Graham	Weaverville, Town Planner		X	
Cutshall, Eric	Weaverville, Assistant Director of Public Works		X	X
Deyton, Amy	Asheville, Public Works Director			X
Early, Scott	AB Tech Asheville, Police Lieutenant		X	
Eckard, Seth	Woodfin Water & Sewer District, Director		X	
Eller, James	Weaverville, Planning Director			X
Gardner, Joseph	French Broad VFD, Deputy Fire Chief		X	
Goodwin, Mark	Buncombe County, CISO		X	X
Gosnell, John	Buncombe County, MDS Supervisor		X	X
Grau, Eric	Buncombe County, IT Director		X	
Greene, Nathan	Buncombe County, EMS Paramedic		X	
Gudger, Jared	West Buncombe FD, Assistant Fire Chief		X	
Harris, Scottie	Weaverville, Town Manager		X	
Harrold, Josh	Black Mountain, Town Manager		X	
Haynes, Jason	Buncombe County, Radio Systems Manager		X	
Hughes, Brad	Buncombe County, Mitigation, Preparedness, & Recovery Manager	X	X	X
Hume, Gene	Buncombe County, GIS Manager		X	X
Hurley, Ricky	Woodfin, Planning Director		X	X
Jones, Taylor	Buncombe County, ES Director	X	X	
Judd, Jamie	Buncombe County, EMS Division Manager		X	
Kearns, Griffin	Buncombe County, Planner II	X		X
Kelly, Tom	Riceville VFD, Fire Chief		X	
Knighton, Jeremy	Asheville FD, EM Chief		X	

BUNCOMBE MADISON MEETING PARTICIPANTS

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Looper, Billy	Buncombe County, Public Safety & Security Manager		X	
McEntire, Jason	Riceville VFD, Division Chief		X	
McKnight, Alex	Buncombe County, 911 Business Manager		X	
Mundy, Kevin	Barnardsville FD, Fire Chief		X	
Odderstol, Elizabeth	Buncombe County, Economic Development		X	
Parkinson, Ross	Asheville FD, Fire Captain			X
Pegg, Lynn	Buncombe County, EM Admin Coordinator			
Pennington, Nathan	Buncombe County, Planning Director	X	X	
Prestwood, Nick	Buncombe County, EMS Training Officer		X	
Prestwood, Shane	Upper Hominy FD, Fire Chief		X	
Quinn, Chris	Buncombe County, IT Network Engineer		X	X
Reece, Angela	Weaverville, Public Works Director			X
Rhodarmer, Brent	Buncombe County, IT Division Manager		X	X
Stowe, Jeremy	BCS, Transportation Director		X	
Tipton, Kevin	Buncombe County EM, Fire Marshal		X	
Trotman, Jessica	Black Mtn Assistant Town Manager			X
Tuch, Shannon	Woodfin, Town Manager			X
Watford, Nancy	Asheville, Stormwater Supervisor		X	X
Wyatt, Clark	BCS, Facilities & Maintenance Director		X	X
Madison County and Municipalities				
Bennett, Nathan	Mars Hill, Town Manager		X	X
Cody, Ryan	Marshall, Town Administrator		X	X
Greene, James	Madison County, EM Staff		X	
Honeycutt, Rod	Madison County, County Manager	X		
Waldrup, Nathan	Mars Hill, Fire Chief			X
Ward, Patrick	Madison County, EM Director			X
Wilson, Chad	Mars Hill, Police Chief			X
Other Stakeholders				
Baker, Carl	NCEM, Mitigation Plans Manager	X		X
Bennett, Jennifer	Duke Energy, Government & Community Relations		X	X
Chaney, Clay	National Weather Service, Meteorologist		X	
DeLude, Hannah	ESP Associates, Hazard Mitigation Planner	X		X
Flores, John	ESP Associates, Hazard Mitigation Planner	X	X	X
Garland, Caleb	NCFS, County Ranger		X	
Hembree, Larry	NCEM, Area 14 Coordinator	X	X	
Mello, John	NCEM, Hazard Mitigation Planner	X	X	X
Petty, Matt	UNCA, EM Director		X	X

BUNCOMBE MADISON MEETING PARTICIPANTS

NAME	DEPARTMENT / AGENCY / TITLE	Attended Internal Kickoff Meeting 8/13/25	Attended Stakeholder Kickoff Meeting 9/3/25	Attended HIRA Mitigation Meeting 2/11/26
Rahman, Fabiha	ESP Associates, Hazard Mitigation Planner	X	X	X
Roderick, Mary	Land of Sky Regional Council, Planning Director		X	X
Slaughter, Nathan	ESP Associates, Hazard Mitigation Dept. Manager	X	X	X
Smith, Kelly	Asheville Regional Airport, Public Safety Deputy Chief		X	
Stanley, Sealy	FernLeaf Interactive, COO		X	
Thompson, Hannah	NCAGR, CMAT Manager		X	

Email Correspondence

Hi All,

I hope this message finds you well.

I am reaching out to inform you that Buncombe Madison Region is 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: Buncombe Madison NC Hazard Mitigation Plan Update.

This site contains important information about the project and ongoing updates, including the draft plan. There is a feedback loop located on the website under "Contact Us" where you can ask questions or provide input on the draft plan.

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

Agency	Name	Title	Email
Neighboring Jurisdictions			
Haywood County	Travis Donaldson	EM Director	travis.donaldson@haywoodcountync.gov
Henderson County	Jimmy Brissie	EM Director	jbrissie@hendersoncountync.gov
McDowell County	Craig Walker	EM Director	craig.walker@mcdowellgov.com
Polk County	Bobby Aldredge	EM Director	barledge@polknc.org
Rutherford County	Frankie Hamrick	EM Director	frankie.hamrick@rutherfordcountync.gov
Transylvania County	Kevin Shook	EM Director	kevin.shook@transylvaniacounty.org

BUNCOMBE MADISON MEETING AGENDAS

Internal Stakeholder Meeting Kickoff
August 13th, 2025
11:00am – 11:30am
Microsoft Teams

Welcome and Introductions

I. KICKOFF PLANNING PROCESS
II. PROJECT TEAM INTRODUCTIONS
III. PLANNING TEAM INTRODUCTIONS

Project Overview

I. REQUIREMENTS FOR UPDATE
II. TRENDS IN DISASTERS – WHY PLAN?
III. FOUR-PHASE PLANNING PROCESS
IV. SCOPE OF WORK

Project Schedule

I. INTERNAL KICK-OFF MEETING – 8/13/25
II. PROPOSED DRAFT DELIVERY – SPRING 2026
III. EXISTING PLAN EXPIRATION DATE – 6/20/26

Next Steps

I. SHARE PUBLIC SURVEY
I. IDENTIFY/CONFIRM ALL STAKEHOLDERS/CONTACTS
II. SCHEDULE LARGER STAKEHOLDER MEETING

BUNCOMBE MADISON MEETING AGENDAS

Larger Stakeholder Meeting Kickoff
September 30th, 2025
1:00pm – 3:00pm
Woodfin, NC

Welcome and Introductions

I. KICKOFF PROJECT
II. PROJECT TEAM INTRODUCTIONS
III. MEETING OBJECTIVES

Mitigation Overview

I. MITIGATION DEFINITIONS
II. TYPES OF MITIGATION
III. MITIGATION TECHNIQUES

Purpose of Update

I. REFLECT ON CHANGING RISKS
II. INCREASE COMMUNITY RESILIENCE
III. ENSURE COMPLIANCE AND FUNDING
IV. INCREASE PREPAREDNESS

Plan Update Process

I. ORGANIZE RESOURCES
II. PERFORM RISK ASSESSMENT
III. DEVELOP MITIGATION PLAN
IV. ADOPTION AND IMPLEMENTATION

Next Steps

I. SHARE PUBLIC SURVEY ON MUNICIPAL SITES
II. ENGAGE SMALLER COMMUNITIES TO ENCOURAGE PARTICIPATION

Stakeholder Meeting
September 30th, 2025
Woodfin, NC
1:00pm – 3:00pm

Introductions & Meeting Objectives

The Stakeholder Meeting for the Buncombe Madison Hazard Mitigation Plan Update 2026 was held in Woodfin, North Carolina at the Buncombe County Emergency Services Training Center with a virtual option to facilitate efficient collaboration. Nathan Slaughter, Project Manager, welcomed all participants to the meeting and gave a brief overview of the meeting agenda and objectives. Meeting objectives included (1) Review scope and planning process, (2) Identify and engage key stakeholders, and (3) Outline roles and responsibilities. Participants were asked to sign-in or enter their information in the Teams chat for documentation purposes.

Roles & Responsibilities

Carl Baker, Mitigation Plans Manager, was then introduced to touch on the roles and responsibilities of all parties as well as the plan review and approval process. NCEM oversees the plan review and approval process, including elements such as plan updates funded through HMGP, with the State covering the non-federal share. NCEM also supports jurisdictions throughout the update process by reviewing draft plans for accuracy and federal compliance, submitting them for FEMA approval, and coordinating adoptions before final submittal to FEMA.

The local jurisdictions' roles were outlined, emphasizing their responsibilities to invite stakeholders, participate in HMPC meetings, provide input (particularly on the Capability Assessment and Mitigation Action Strategy), and review draft plans. They also present the adoption notice for approval by local or county boards.

The contractor's role was described as facilitating HMPC meetings, researching and updating all sections of the HMP, coordinating input from the local HMPC, and submitting drafts for review. The contractor also manages the coordination of adoptions and submission of the final plan.

Plan review and approval process was reviewed, which involves NCEM's evaluation of 33 review elements, including mitigation actions that may require revisions. The process includes submitting draft plans to FEMA, initiating the adoption process, and awaiting FEMA's approval letter. Once fully adopted, the final plan is submitted to FEMA for official approval.

Brief Mitigation Overview

During the meeting, mitigation was reviewed, which refers to *proactive measures taken to reduce the impact of hazards before they occur*, with the goal of minimizing future risks and damages. It was noted that all mitigation actions are categorized into two major groups (existing development and future development) and fall under one of the six techniques summarized (prevention, preparedness, natural resource protection, emergency services, property protection, and education and awareness).

Purpose of Update

The purpose of the plan update was discussed, and its importance was emphasized. The update is necessary to reflect changing risks, such as population increases, community growth, the emergence of new hazards and man-made threats, shifting conditions, and evolving development patterns. The plan aims to enhance community resilience across social, economic, and environmental dimensions, ensuring the community is better prepared to withstand and recover from disasters.

Furthermore, the update is essential for maintaining compliance with Federal and State requirements, including DMA 200, NC GS 166 A, and funding programs like HMGP and FMA, which are critical for securing ongoing support and funding. CRS elements were also highlighted at this time along with the key benefits of CRS participation. Finally, the plan contributes to heightened preparedness by addressing both existing and emerging threats, with the goal of protecting lives and property, and ensuring the continuity of essential services during and following disasters.

Plan Update Process

The planning process was reviewed, which outlined four essential steps:

1. Organizing resources – The planning team has started working with participating counties and municipalities within this region and will conduct public outreach/stakeholder engagement for diverse perspectives.
2. Conducting a risk assessment – This will begin with hazard identification (*What can happen here*?) considering historical occurrence and emerging hazards. After hazards have been identified, the planning team will examine hazard impact (*What do these hazards do when they occur within the region*?), while considering capability to act.
    a. Previously identified high hazards include severe winter weather, tornadoes/thunderstorms, flooding, geological, and cyber.
    b. Wildfire and dam failure are two hazards that will likely be updated to high risk for this update.
    c. There is a new grant program called the High Hazard Potential Dam (HHPD) that regional jurisdictions can apply for. High hazard dams graded “poor” or

"unsatisfactory: can apply through the NCDEQ Dam Safety Officer when the updated NOFO is available. This requires additional mapping and planning work for applicants.

3. Developing a mitigation plan – Existing actions from the previous update must be reviewed, including project implementation status updates (as required by FEMA). In addition to project status updates, new mitigation actions will be discussed during the Mitigation Strategy Meeting and integrated into the mitigation plan.
4. Final adoption and implementation – The final step is to adopt the plan and begin action implementation. The draft plan will be sent to the Planning Committee and then will go through its first round of review by NCEM. FEMA will provide the final review and approval of the plan.

SWOT Analysis

A Menti Poll was conducted to engage participants and gather feedback that will be used to guide the planning process. The questions are provided below:

1. What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?
2. Has your recently community completed projects/implemented actions to address vulnerability? Please share & include your community's name!
3. What weaknesses, challenges, or barriers have hindered mitigation efforts in the past?
4. Can you identify opportunities (e.g. partnerships, funding sources, or new technologies) that we could leverage to enhance the planning process?
5. Are there any existing planning efforts/initiatives that we should integrate into the plan update to maximize efficiency and effectiveness?
6. Are there any specific stakeholders (businesses, academia, community groups, etc.) that should be included in the planning process?

Results to this Menti activity are provided in a separate PDF.

Project Information/Resources

Participating counties and municipalities were asked to post relevant project information and updates to facilitate ongoing communication. The team highlighted that the project website and public survey were already accessible online and would be updated regularly throughout the planning process. The website provides key resources, including the project overview, meeting minutes and presentations, the public survey, the previous 2021 HMP, and relevant planning resources.

Additionally, the critical role of participating jurisdictions was reiterated, emphasizing that their input and expertise will be essential to enhance the plan and ensure it remains relevant and useful. The active involvement of local stakeholders was recognized as vital to the success of the update process. The primary role and key tasks assigned to local jurisdictions was also shared at this time to give a general overview. It was requested that the list of stakeholders in attendance of these meetings be put on the project website.

Meeting Closeout

The meeting concluded with a call for collaborative updates among counties and municipalities. Contact information was shared at this time. Meeting minutes and the presentation will be shared with participants, as requested, and uploaded to the project website for documentation purposes. The meeting officially adjourned at 3:00pm. The follow-up tasks can be found below.

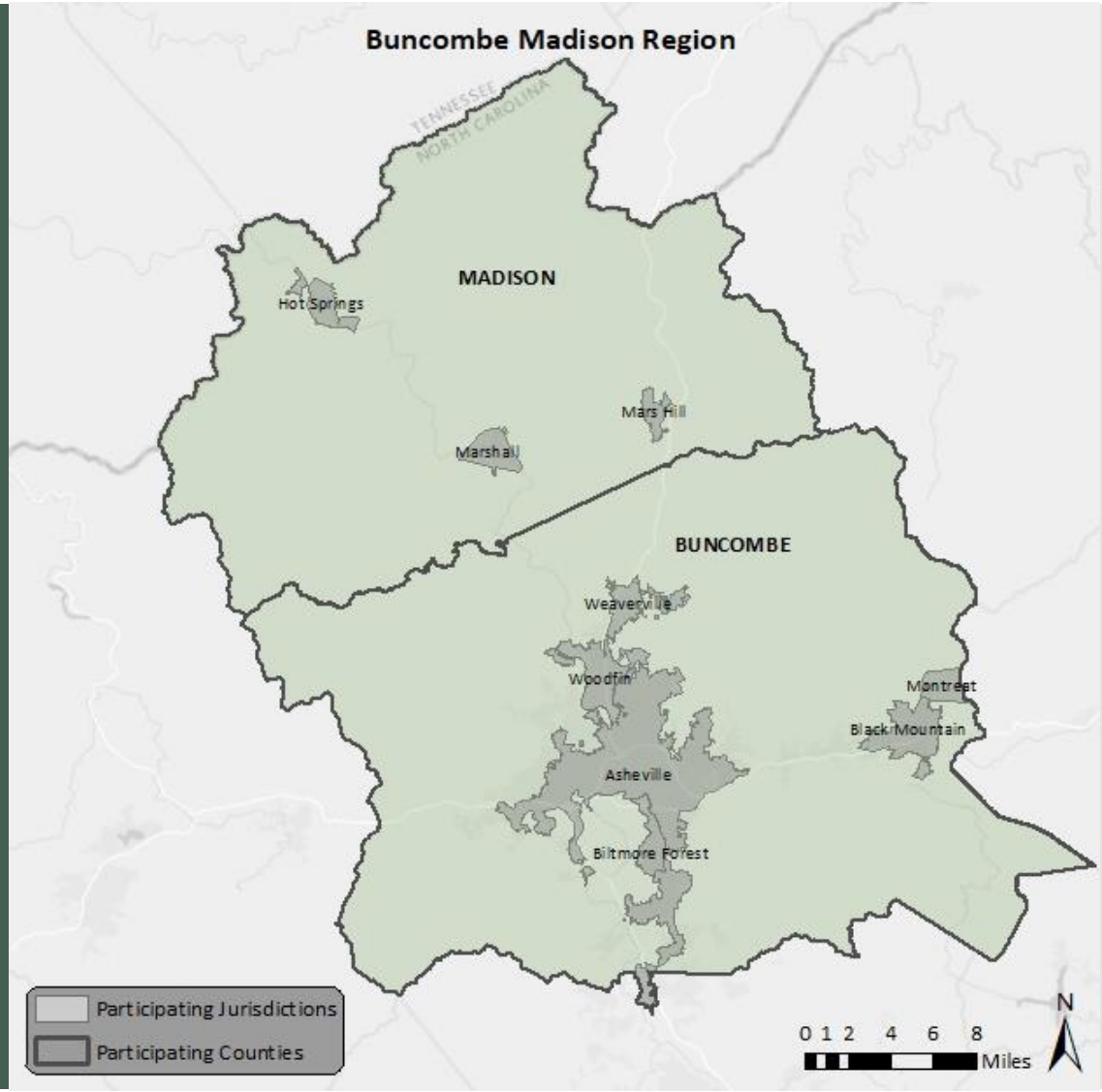
Task	Assigned to	Bucket
Inform project team of who should be involved in the planning process	All	To do
Review your existing regional HMP, including the Risk/Capability Assessments and Mitigation Action Plan sections	All	To do
Share project website/survey to municipal webpages and local stakeholders (will be sent out with follow-up materials this week	All	To do
Reach out to smaller jurisdictions to ensure their participation in the planning process	All	To do
Ensure ongoing collaboration with other agencies/departments involved in the planning process	All	To do
Determine location/date/times for upcoming plan meetings	All	To do

Buncombe Madison

Regional Hazard Mitigation Plan Update

Stakeholder Meeting

September 30th, 2025



Agenda

- Introductions & Meeting Objectives
- Roles & Responsibilities (NCEM)
- Brief Mitigation Overview
- Interactive Session
- Purpose of Update
- Plan Update Process
- Project Information/Resources
- Q&A

Meeting Kickoff

- Welcome & Introductions
- Reminder to Sign In!

Meeting Objectives



Review Scope and Planning Process



Identify & Engage Key Stakeholders



Outline Roles & Responsibilities

Project Roles and Approval Process

NCEM Facilitated

Carl Baker, Mitigation Plans Manager with NCEM, will be reviewing:

1. Project Team Roles & Responsibilities (NCEM, Local Jurisdictions, and Contractor)
2. Plan Review & Approval Process (Elements, Timeline, Issuance)

Hazard Mitigation Plan (HMP) Update Process

- NCEM Role
- Local Jurisdiction Role
- Contractor Role
- Plan Review and Approval Process
- NCEM Hazard Mitigation Plans (Use QR Code)



NCEM Role

- Plan updates are funded through the HMGP (State pays the non-fed share)
- Support jurisdictions throughout the plan update process
- Review draft plans for accuracy and compliance with Federal guidance
- Submit plans for FEMA approval
- Coordinate plan adoptions and submit final plan to FEMA

Local Jurisdiction Role

- Invite stakeholders and attend Hazard Mitigation Planning Committee (HMPC) meetings
- Provide input for plan update, particularly the Capability Assessment and Mitigation Action Strategy/Plan
- Review the draft plan
- Present adoption notice to local/county board for approval

Contractor Role

- Facilitate HMPC meetings
- Research and update all sections of the HMP
- Coordinate input from local HMPC into plan update (HIRA, Capability Assessment, Mitigation Actions, etc.)
- Submit draft plan to NCEM for review
- Coordinate adoptions and submit final plan

Plan Review and Approval Process

- NCEM reviews submitted draft plan
  - 33 review elements
  - Mitigation Actions, may require revisions such as category, status, etc. Must have one per hazard, or one all hazard action. Emergency Services actions do not count towards the minimum requirements.
- Submit draft plan to FEMA for review and approval
  - Begin adoption process
- FEMA issues approval letter
  - Once plan is fully adopted a final plan is submitted to FEMA

Background/ Overview

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

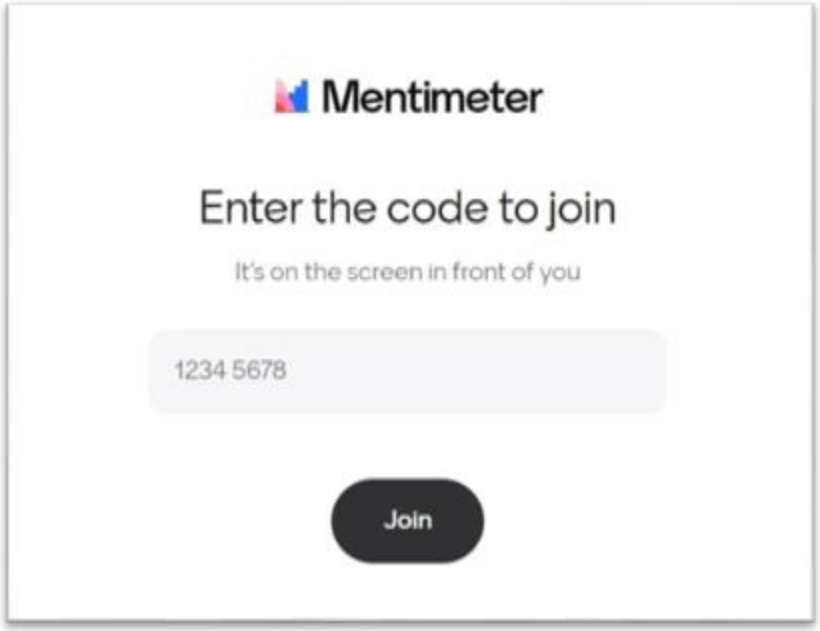
Interactive Session

SWOT Analysis

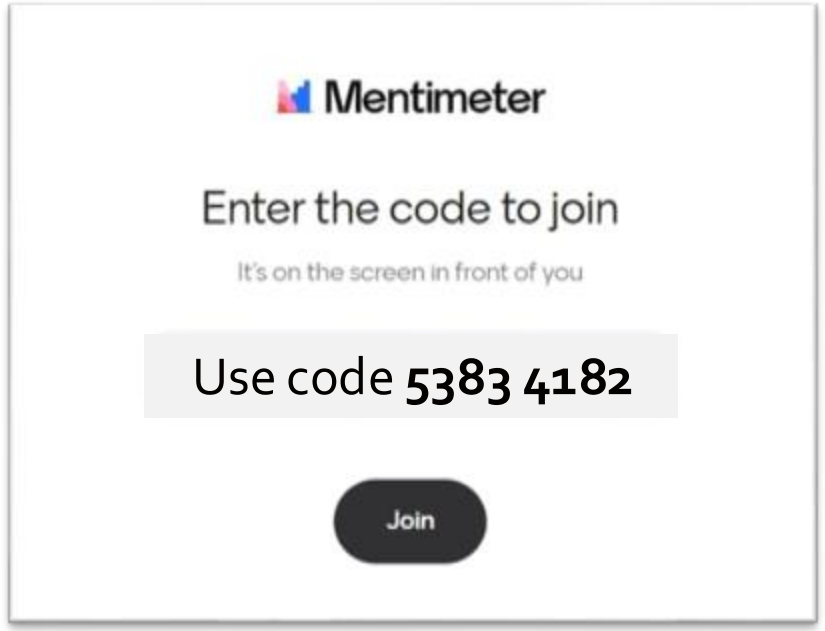
We'll be going through a series of open-ended questions that will be used to inform the plan update.

Your input matters!

Please open menti.com



Menti Poll



Scan the QR Code for Access to the **Menti Poll**

Purpose of Plan Update

Why is it Necessary?

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

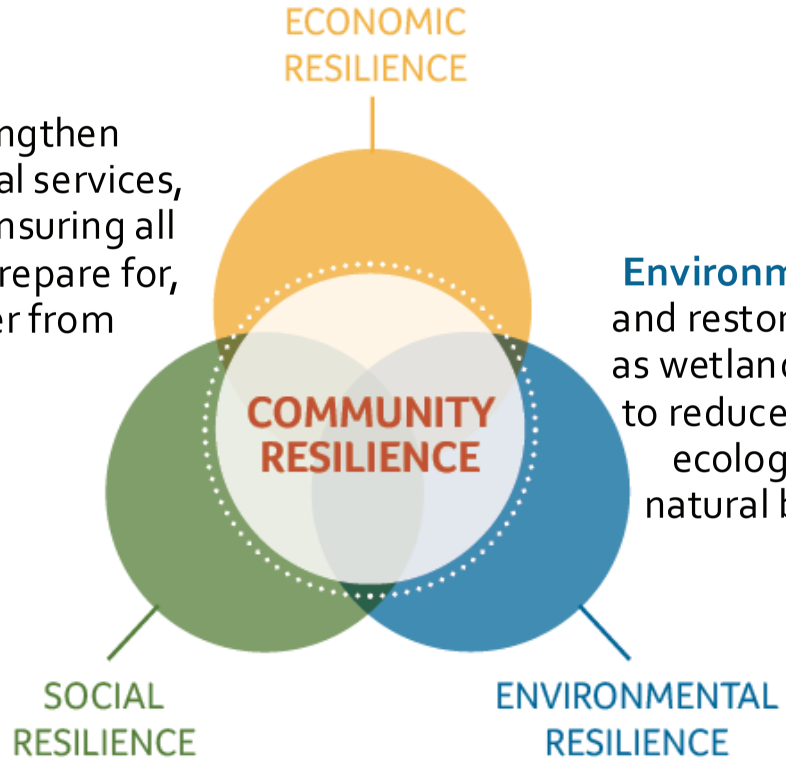
Addressing Changing and Emerging Risk

Population Increase and Community Growth	Greater Exposure to Hazard Risk Increased Exposure = More Damage
More Hazards (Man-Made)	Included in State Plan Ex. Technological, Civil Disturbance, Terrorism
Changing Conditions	Anticipated Increase in Frequency and Magnitude **Optional Inclusion/Reference to Climate Change
Development Patterns	Increased Impermeable Surfaces More Infrastructure and Assets at Risk

Increasing Community Resilience

Economic Resilience: Support the stability and recovery of local businesses and employment opportunities to ensure the community can withstand and bounce back from hazard impacts.

Social Resilience: Strengthen community networks, social services, and access to resources, ensuring all residents can effectively prepare for, respond to, and recover from hazards.



Environmental Resilience: Protect and restore natural ecosystems such as wetlands, forests, and floodplains to reduce hazard impacts, promote ecological health, and sustain natural buffers against disasters.

Ensuring 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

Community Rating System (CRS)

Specific CRS elements will be integrated into the hazard mitigation planning process including:

1. Public and Targeted Outreach (Public Meetings Timing)
2. Hazard Mapping and Regulations
3. Flood Damage Reduction Activities (SDE Procedures)
4. CRS Steering Committee (50% NGO/Public)
5. Thorough Documentation of Process (Section 2)

CRS Key Benefits

Participation in the CRS offers economic benefits and supports hazard mitigation efforts:

1. **Financial Incentives** – Potential for reduced insurance premiums and access to mitigation grants
2. **Recognition and Credibility** – Demonstrates community's commitment to risk reduction and transparency
3. **Compliance and Stakeholder Engagement** – Encourages collaboration among agencies, insurers, and residents

Heightening Preparedness

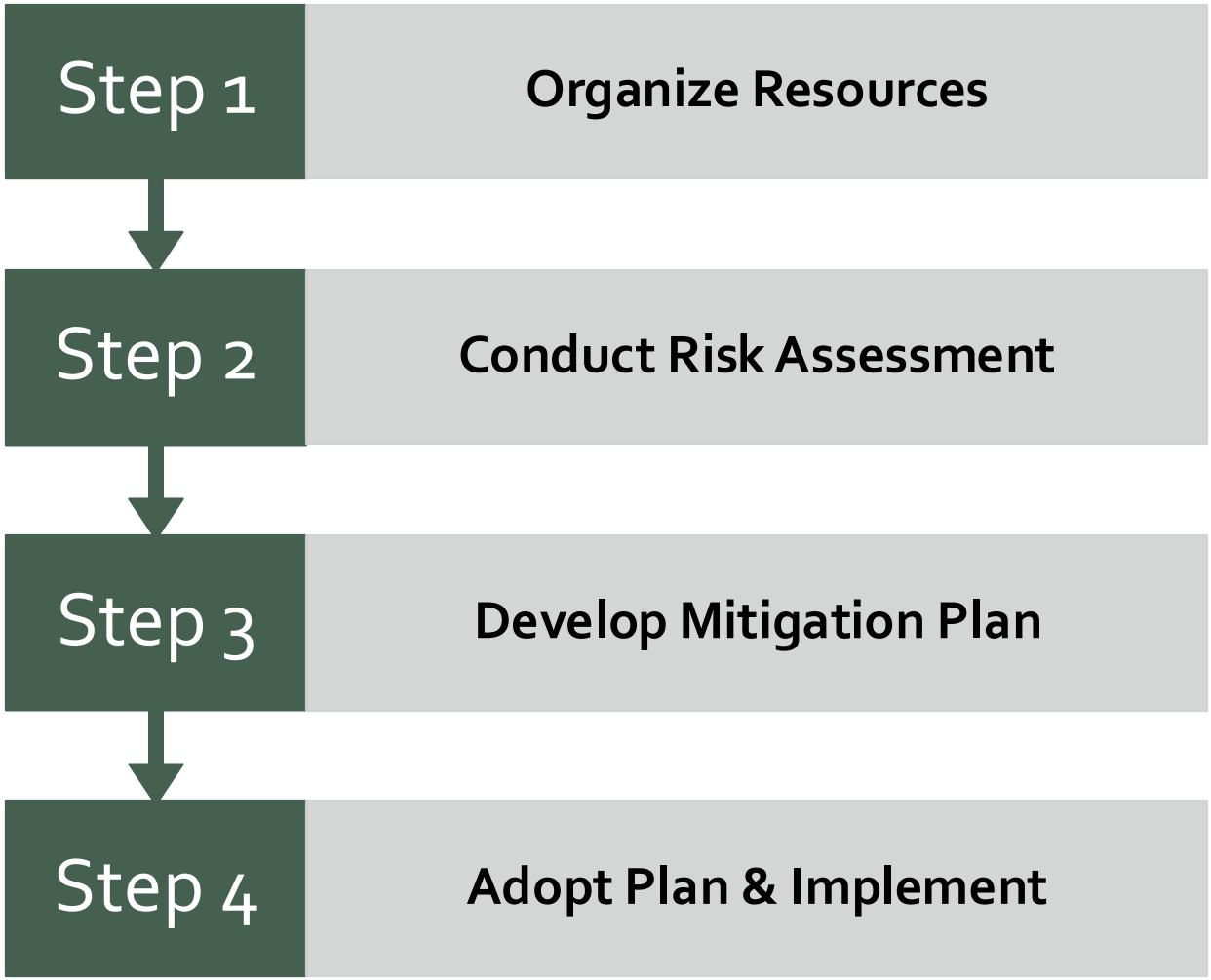
This plan update ensures that the participating jurisdictions are better prepared to:

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



Planning Process

How will it be done?



Step 1: Organize Resources

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



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

What Can We Do About It?

- What Mitigation Actions are Feasible
- Where Gaps Exist

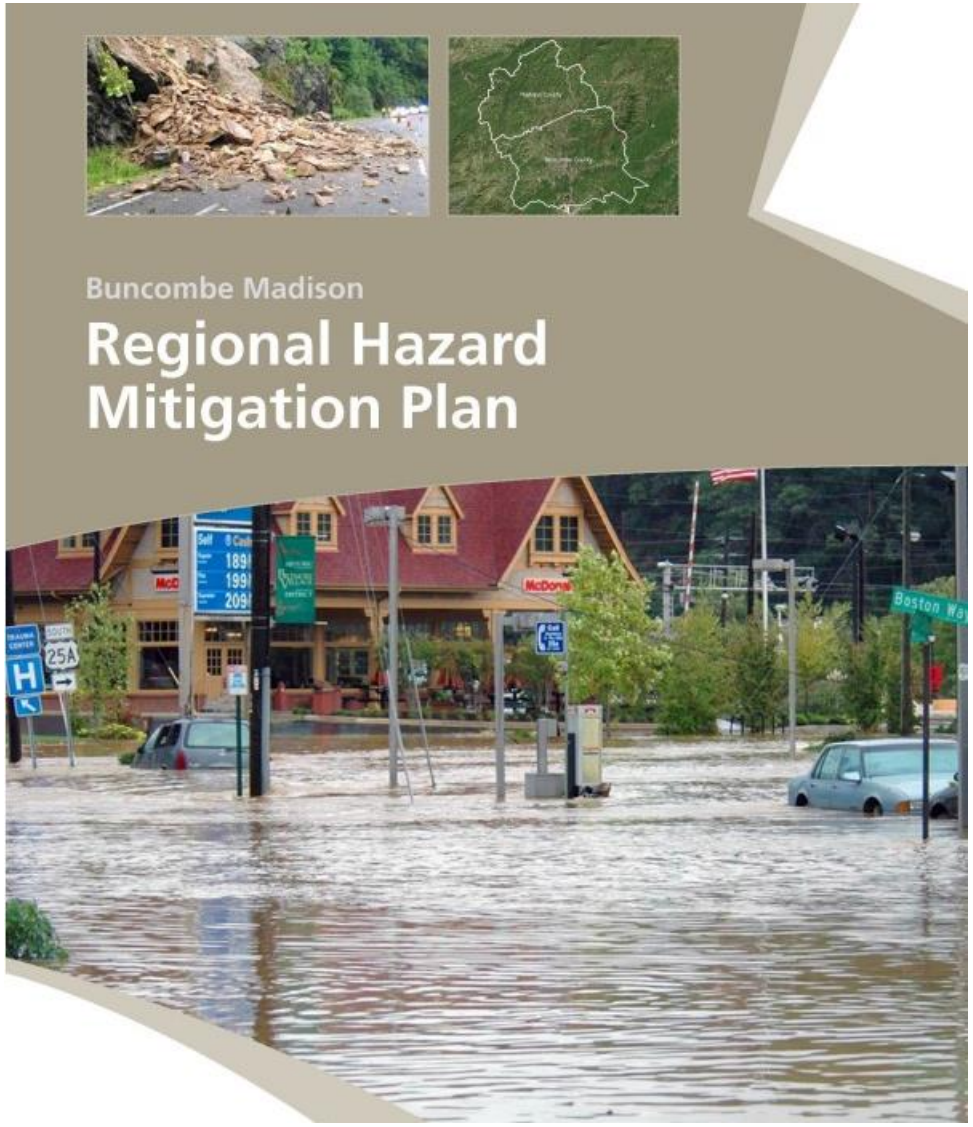
Step 2: Risk Assessment

Previously Identified Hazards (2021)

HIGH RISK	Severe Winter Weather Tornadoes / Thunderstorms Flood Geological Hazards (Landslide) Cyber
MODERATE RISK	Drought Wildfire Hazardous Substances Hurricane /Coastal Hazards Earthquake Dam Failure Infectious Disease
LOW RISK	Terrorism Radiological Emergencies EMP

Step 3: Develop a Mitigation Plan

- **Setting Planning Goals**
- **Reviewing Mitigation Alternatives**
- **Drafting an Action Plan**



Step 4: Adopt Plan and Implement Actions

- 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

Integration Efforts

Leveraging existing efforts ensures a more robust and efficient hazard mitigation plan, supporting:

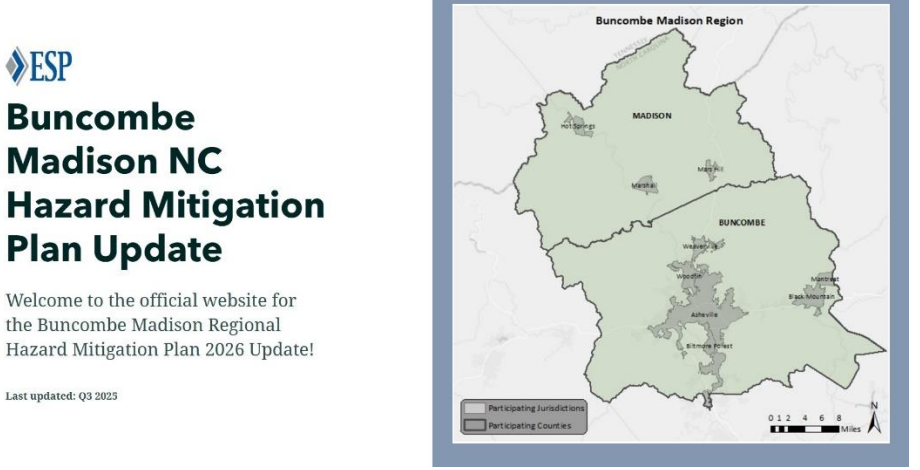
1. Comprehensive Risk Perspective
2. Resource Optimization
3. Regional Coordination
4. Plan Continuity and Alignment
5. Stakeholder Buy-In

Project Information

Where is information being shared?

- Project Team requests counties/municipalities post relevant project information and updates
- Can be used as a Tool for HMPC Coordination and Public Outreach
- Project Website & Public Survey are readily available online!

Visit and Share the Project Website



The Project Website will be updated regularly throughout the planning process to provide access to:

1. Project Overview
2. Meeting Information
3. Public Survey
4. Previous HMP (2021)
5. Relevant Planning Resources

Complete and Share the Public Survey!



Scan the QR Code for Access to the Public Survey

Project Schedule

Project Kickoff – 8/13/25	Larger Stakeholder Meeting – 9/30/25	Public Meeting #1 – TBD
HIRA Meeting – Fall 2025	Mitigation Strategy Meeting – Winter 2025	Public Meeting #2 – TBD
Proposed Delivery of Draft Plan – January 2026	Existing Plan Expiration – 6/20/26	



Your Role Moving Forward

Participating local jurisdictions play a critical role in the plan update and we wanted to reiterate that your input/expertise ensures plan relevance and usefulness:

1. **Tell us who should be involved in the process.** Have we missed anyone? This can include community groups, non-profits, businesses, etc.
2. **Share the project website to your county/municipal page.** We're actively updating this site, so sharing/promoting is all you need to do!
3. **Complete the survey and encourage others to do so**. Print copies and place them in community buildings. Let us know if translation is needed.
4. **Determine location, date, and times for meetings in a timely fashion.** Our aim is to send invites out with at least 2 weeks notice.

Your Role Moving Forward cont.

Participating local jurisdictions play a critical role in the plan update and we wanted to reiterate that your input/expertise ensures plan relevance and usefulness:

5. **Review your Capability Assessment.** Identify new capabilities or adjust existing capabilities. Efforts underway should be noted.
6. **Review your Mitigation Plan.** Provide a detailed status update on each action and brainstorm new actions that address existing gaps/weaknesses.
7. **Collaborate amongst other agencies/departments.** This update spans beyond EM and will benefit from the cross-sectoral collaboration/expertise.
8. **Reach out to smaller jurisdictions to ensure their participation.** Whether actively present or represented through the county, this will help expedite the update and adoption process.



Questions

Questions/Comments/Concerns

Adjourn – Thank you!

Contact Information:

- Nathan Slaughter, Project Manager - nslaughter@espassociates.com
- Hannah DeLude, Planner - hdelude@espassociates.com
- John Flores, Planner - jflores@espassociates.com
- Fabiha Rahman – frahman@espassociates.com

Mentimeter

What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?

53834182

Roles and responsibilities

Interagency/ organization communication and accessibility

Communication between agencies

Resiliency of our citizens

Knowing the dangers, working together and planning ahead for the next

It's ability to adapt

Public support for resilience and mitigation measures

3 31

Mentimeter

What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?

Centralized resources including mobile equipment and people

Infrastructure such as road, bridge, culvert maintenance

The forest service has multiple hazard mitigation specialists along with multiple cost share programs for landowners to apply for.

Roads

Staff that are eager to implement new ideas, systems and processes to improve infrastructure.

Our teams and Human Resources are our strongest resources.

Our community interest

The innovative and creative people of the region

3 31

What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?

Collaborative work groups

Communication

It's people....

Community is willing to work together and combine resources.

Respurces

Partnerships and relationships

Providing forecasts and alerts for hazardous weather. We also make efforts for public education and help in any way for communication preparedness.

New COOP, new comp plan

What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?

Knowledge of areas by local responders

Experience

Public support Established relationships Leadership buy in

People came together

Established relationships

willingness to do the work needed by a diverse group of people

Hazard mitigation and resilience in the comprehensive plan

The teamwork within the community.

Mentimeter

What do you see as the most significant strengths your region has when it comes to hazard mitigation and resilience?

On-going vulnerability/risk assessment at the parcel scale for flooding, wildfire and landslides across the region

Strength

People

Site visits to see what we can improve for county buildings.

Silos Competition

3 31

Mentimeter

Has your community recently completed projects/implemented actions to address vulnerability? Please share & include your community's name!

53834182

We are working on plans to become more resilient.

Buncombe County worked with Land of Sky for Vulnerabilities and risk analysis

Buncombe County

Riceville Community of Buncombe County

BC, new mitigation goals in comp plan, text amendment implementation process started

No

Yes . Partnership with both NC and US Forestry in the Riceville Shope Creek area timber salvage operation

20

Mentimeter

Has your community recently completed projects/implemented actions to address vulnerability? Please share & include your community's name!

Commercial property debris removal

Grid reliability and resilinecy projects - Duke Energy

Built relationships with other teams/Church's in our community

Streambank stabilization - live staking, seeding, and native species programming

We are moving forward with a new police department that will also house an EOC for our community (Town of Biltmore Forest). Helene highlighted a deficiency in this area of adequate facilities.

RiverLink - Middle Swannanoa repair and improvement study

Updated EOP, IPP, COOP, and climate resilience assessment ... Asheville

Buncombe County is submitting applications for several HMGP Infrastructure, 5% initiative, and 7% planning projects. To be determined how we move forward!

20

Mentimeter

Has your community recently completed projects/implemented actions to address vulnerability? Please share & include your community's name!

Infrastructure assessments (COA) Swannanoa River flood mitigation study -74A to 25 (COA)

We completed a pre- and post-Helene bridge structure evaluation for all Biltmore Forest maintained bridges, and we have completed a Town-wide stream quality and stabilization assessment.

We have completed the region-wide vulnerability and risk assessment at the parcel scale for residential, commercial, government and critical facilities, and natural resources (LOSRC)

We are supporting the Swannanoa Small Area and Resilience Plan with Buncombe County planning staff.

Flood Inundation Mapping showing the max extent of inundation at a particular location based on the river levels. National Weather Service.

ESP

Protecting current infrastructure and reassessing future planning.

Not yet

Mentimeter

Has your community recently completed projects/implemented actions to address vulnerability? Please share & include your community's name!

ESP

landslide assessments, road and bridge assessments

Mentimeter

What weaknesses, challenges, or barriers have hindered mitigation efforts in the past?

Lack of funding, red tape, state rules

Communication from other stakeholders and buy in from boots on the ground as well as senior leadership

Intergovernmental & organization coordination Costs

Cost benefit and unwillingness for partnership between agencies.

Attitude that we don't want our community to change, therefore things (processes and procedures) don't need to change. (Biltmore Forest)

Having a comprehensive tool or place for all the information. There's blueprint, land of sky etc...

FEMA funding

WNC geography

1 14

Mentimeter

What weaknesses, challenges, or barriers have hindered mitigation efforts in the past?

Lack of funding

. Distrust of Buncombe county EM/government .

People not willing to capture hazard mitigation ideas for fear of not having staff capacity to manage projects

Communication

Developers and real estate pushing back both on hazard information sharing (for flooding and landslides) and on requirements to address the hazards.

Funding; lack of capacity to implement mitigation efforts.

ESP

Staff capacity to apply, follow, manage grants & the projects

1 14

Mentimeter

What weaknesses, challenges, or barriers have hindered mitigation efforts in the past?

Financial.

Terrain and cost, specifically related to telecommunications infrastructure (cellular, terrestrial fiber (buried and aerial), microwave)

1 14

Mentimeter

Can you identify opportunities (e.g. partnerships, funding sources, or new technologies) that we could leverage to enhance the planning process?

Technology Regional alert and response systems

Include private industry., keep from reinventing the wheel

PA Consultants

ESP

1

4

Mentimeter

Are there any existing planning efforts/initiatives that we should integrate into the plan update to maximize effectiveness?

Don’t know

Recovery and Hazard Mitigation projects in the hopper already.

2

Are there any specific stakeholders (businesses, academia, community groups, etc.) that should be included in the planning process?

Private industry that can help provide ideas and programs without the hoops of government.

I believe the Biltmore Estate should be included in the process both because they are a significant land owner and because of their economic impact to the region.

BUNCOMBE MADISON MEETING AGENDAS

HIRA/Mitigation Meeting
February 11th, 2026
Woodfin, NC
10:00am – 12:00pm

Meeting Objectives

I. IDENTIFY HAZARD
II. ASSESS HAZARDS AND VULNERABILITY
III. DETERMINE POTENTIAL IMPACTS AND PRIORITIES
IV. DISCUSS FINDINGS
V. EDUCATE AND INFORM

Hazard Identification and Risk Assessment

I. IDENTIFIED & PROFILED HAZARDS
II. INVENTORIED ASSETS & ESTIMATED LOSSES
III. PRIORITY RISK INDEX (PRI) SCORES
I. CAPABILITY INDICATORS & OVERALL RATINGS
II. PUBLIC SURVEY FINDINGS

Mitigation Strategy

I. MITIGATION GOALS
II. MITIGATION ALTERNATIVES (EXISTING AND NEW)

Next Steps

I. SUBMIT UPDATED AND NEW MITIGATION ACTIONS
II. SUBMIT DRAFT PLAN – SPRING 2026

HIRA/Mitigation Meeting
February 11th, 2026
Woodfin, NC
10:00am – 12:00pm

Introductions & Meeting Objectives

The Hazard Identification and Risk Assessment (HIRA) Meeting and the Mitigation Strategy Meeting for the Buncombe Madison Regional Hazard Mitigation Plan Update 2026 were combined and held in Woodfin, NC at the Madison County Emergency Services Training Center with a virtual option to facilitate efficient collaboration. Nathan Slaughter, Project Manager with ESP Associates, gave a brief overview of the meeting agenda and objectives. Meeting objectives included (1) Identify hazards, (2) Assess hazards and vulnerability, (3) Determine potential impacts and priorities, (4) Discuss findings, and (5) Obtain stakeholder feedback. Stakeholder input was emphasized as a critical component of this meeting. Participants, online and in-person, were asked to introduce themselves, their role, and their organization/agency. They were also asked to sign-in or enter their information in the Teams chat for documentation purposes.

Planning Process & HIRA Overview

The meeting provided an in-depth review of Hazard Identification and Risk Assessment (HIRA) and its critical role in mitigation planning. HIRA is essential for state and federal compliance and serves as the foundation for effective hazard mitigation plans (HMP). Understanding various hazards enables communities to secure funding from programs like the Hazard Mitigation Grant Program.

The project team provided a recap of the FEMA-compliant planning process, emphasizing that hazard mitigation planning is designed to identify hazards, assess risk, and develop actions that reduce long-term vulnerability. The HIRA serves as the foundation for the mitigation strategy and focuses on evaluating both natural and technological hazards based on hazard frequency, severity, and exposure. This is referred to as an “All-Hazards” plan and aligns with the State HMP.

The region’s FEMA Major Disaster Declarations were summarized, totaling 19 Federal declarations to date, with Tropical Storm Helene as the most recent declaration in 2024. The project team acknowledged the devastating impacts of Helene on the region and has begun developing a Post-Helene Vulnerability Report to integrate into the 2026 Plan Update. More specifically, this report will be included as an appendix to document observed damages and heightened vulnerabilities following Helene to support and validate the Risk and Vulnerability Assessment. This will help to ensure the plan update reflects recent hazard impacts and current community conditions, enhancing plan relevance and informing mitigation priorities.

Hazard Profiles: Risk & Vulnerability

The project team presented the list of hazards included in the 2026 plan update. These consist of natural, technological, and human-caused hazards. For the sake of time, the presentation focused on hazards that initially ranked as "high risk" through the Priority Risk Index (PRI) methodology. Before sharing findings, it was noted that National Center for Environmental Information (NCEI) data represents the best available, nationally consistent source for documenting hazard events and losses. However, it is understood that NCEI is under-reported because it relies on post-event reporting and voluntary data submissions. The following summarizes the key discussions by hazard category:

1. Flooding – Identified as one of the top hazards, flooding poses a recurring threat due to increased storm intensity and the region's topography. Flood events have resulted in over $13 million in damage in the region.
2. Thunderstorms and Tornadoes – With nearly 400 recorded thunderstorm/high wind events since 1950 resulting in over $7 million in damages, these hazards remain a high concern. Increasing frequency and clustering of severe storm events were noted, aligning with state climate projections.
3. Severe Winter Weather – Frequent in the region, winter storms have led to three Federal disaster declarations and more than 600 recorded events. This hazard was ranked higher based on the sheer volume of events.
4. Geological Hazards – Landslides were noted as a persistent concern due to steep terrain, with over 458 reported incidents. The frequency of landslides is projected to rise alongside heavier rainfall patterns.
5. Cyber Threat – This is an emerging threat that wasn't a large concern during the last plan update. These events can be extremely costly and duration varies based on severity. As reliance on technology increases, this is a hazard of concern.

Asset Inventory & Vulnerability Assessment

During the discussion surrounding the Asset Inventory and Vulnerability Assessment, participants reviewed the primary data sources and upcoming updates that would inform the analysis. It was noted that Buncombe County regularly updates parcel tax data on a quarterly basis, and that North Carolina OneMap data was anticipated to reflect upcoming changes and increases in assessed values. North Carolina Emergency Management (NCEM) was identified as the source for building footprint data, with staff explaining that this dataset had recently undergone quality control updates. As part of this process, North Carolina Flood Risk Information System (NC FRIS) data was expected to be updated shortly, which would subsequently update the NCEM Risk Management Tool (RMT) by replacing all 2010 data with 2020-based data.

The group also discussed plans to review and confirm critical facility counts using NC OneMap data. This included replacing public school-only counts with a combined total that captures public schools, private

schools, and colleges, as well as ensuring facilities in smaller jurisdictions were accurately reflected. Specifically, it was noted that Biltmore Forest includes both a fire station and a school that should be incorporated into the inventory. Mary Roderick, with Land of Sky, offered her help/expertise for any follow-up questions related to the AccelAdapt decision support tool developed by Fernleaf, which integrates assessment results, localized information, and hazard data into one platform.

PRI Findings & Discussion

The initial Priority Risk Index (PRI) scores were then reviewed. The index operates on a scale where higher numbers indicate greater concerns, helping to inform the overall mitigation strategy. Many hazards identified fall into the “high” and "moderate" category, suggesting a significant level of risk that requires attention. While the PRI represents regional risks, it was acknowledged that these initial scores are subject to change based on stakeholder input/feedback. For example, local nuances might not be fully captured, prompting discussions on potential adjustments to the index. These adjustments aim to enhance the accuracy and relevance of the PRI in reflecting specific community needs and vulnerabilities. Initial PRI findings are shown below:

Initial PRI Scores

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

Revisions to the PRI and additional considerations (e.g. sub-hazards) based on HMPC discussion include:

1. Revisiting the addition of **excessive heat** as a hazard (currently not included due to no events reported in NCEI)
2. Increasing **hurricane and coastal hazards** to high risk (can have a critical impact)
3. Increasing **wildfire** to high risk (this varies per jurisdiction within the plan which can affect probability and impact)

4. Explicitly noting **high wind** as a sub-hazard to tornadoes/thunderstorm
5. Further investigating **food emergency** PRI scoring (more of a hazard impact but may occur independently)
6. Dialing up spatial extent and duration for **radiological emergency** (mention of nuclear power/transport in Erwin, TN)
7. Documenting the impact of hazards on communication systems/communication outages
8. Considering contamination of watersheds under **hazard substances**
9. Clearly differentiating between **terrorism** (active shooter sub-hazard) and **civil disturbances** (more likely in regional population centers like Asheville so revisit probability and trends)

Additionally, a few mapping improvements were noted including:

1. Mapping all effective floodplains and any other identified risk areas
2. Investigating potential improvements to landslide susceptibility mapping

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Mitigation Overview

Transitioning from the Risk Assessment to the Mitigation Strategy, the project team defined mitigation as "an action that reduces the long-term impact of hazards on people and property." All mitigation actions are categorized into two major groups (existing development and future development) and fall under one of the six techniques summarized (prevention, preparedness, natural resource protection, emergency services, property protection, and education and awareness). The plan is required to be updated every five years, although some communities revise it more frequently in response to emerging risks.

Mitigation Strategy

Transitioning from the problem identification to problem solution, the conversation shifted toward the Mitigation Strategy. The Mitigation Strategy has three primary components: mitigation goals, mitigation actions, and the Mitigation Action Plan. The project team defined mitigation as "an action that reduces the long-term impact of hazards on people and property." All mitigation actions are categorized into two major groups (existing development and future development) and fall under one of the six techniques summarized (prevention, preparedness, natural resource protection, emergency services, property protection, and education and awareness). The plan is required to be updated every five years, although some communities revise it more frequently in response to emerging risks.

This portion of the plan will translate the findings of the HIRA into specific, actionable measures for reducing regional risk. The team outlined three key objectives guiding the strategy:

1. Reduce vulnerability to natural and technological hazards.
2. Prioritize and allocate resources effectively among jurisdictions.

3. Promote regional collaboration and long-term capacity building.

To start, participants reviewed the 11 existing regional mitigation goals from the 2021 plan and began discussing whether these still align with current needs and priorities. Participants agreed that revisions are needed as many of those listed qualify as an action versus a goal. Seemingly, this list of goals is a consolidated list from previous county-level hazard mitigation plans and many of which can be consolidated, refined, or removed altogether. New suggestions included adding "redundancy" language and reference of socially vulnerable population where appropriate. The existing mitigation goals are as follows:

1. Incorporate hazard mitigation into the planning process of each jurisdiction and continue to carry out hazard mitigation by seeking funding when available.
2. Evaluate, strengthen, and enforce ordinances.
3. Increase and enhance public education and awareness regarding disasters and hazard mitigation. → This can be combined with another similar goal.
4. Address stormwater management and impervious surface issues.
5. Continue participation in the National Flood Insurance Program and investigate participation in the NFIP's Community Rating System.
6. Conduct future development (including infrastructure) in a way that protects human life and property through management of natural features such as floodplains and wetlands and avoids development in known hazard areas. This will also reduce the risk to emergency workers.
7. Ensure that population growth does not exceed the capacity of evacuation routes. → Remove language regarding population control
8. Protect existing structures through retrofitting or other means.
9. Enhance the community's capability through the use of mutual aid agreements and sharing of resources at the county and regional level.
10. Ensure that community officials are well-educated and aware of existing resources, regulations, and procedures related to disasters.
11. Maintain and monitor the current plan and renew and revise as necessary.

The Mitigation Strategy will be reviewed and updated to align with ongoing recovery efforts across the region following Helene. Integration of lessons learned and identified needs from post-Helene conditions will be used to inform future risk reduction efforts. Using this approach, mitigation goals and priorities should align with the 10 key focus areas identified in Envision Buncombe to advance community-driven goals while supporting efficient use of resources.

Each participating jurisdiction has a mitigation action plan in place from the previous plan update (2021), which must be reviewed and updated to ensure compliance with FEMA requirements. Additionally, there is an opportunity to incorporate new projects as part of the mitigation action plan. Existing recovery projects (recommended or underway) will be evaluated alongside mitigation actions to help identify opportunities to build on current investments, avoid duplication of efforts, and ensure that recovery activities are leveraged to support long-term hazard risk reduction.

Mitigation action ideas/examples for all identified high risk hazards were shared at this time in addition to valuable State and Federal resources that can be used to draft new actions. New mitigation actions discussed include:

1. Adding an overarching mitigation action for the region that states communities will monitor and apply for funding as it becomes available
2. Buncombe County has been contemplating the development of a vulnerable populations registry, which would apply to all-hazards
3. Reviewing and revising flood ordinances based on lessons learned, which can also apply to landslides
4. Henderson County's recent effort in natural floodplain restoration was mentioned as it has been largely successful in flood reduction along with other benefits

Existing mitigation action plans will be shared in the meeting follow-up communication.

Project Information/Resources

The team highlighted that the project website and public survey were already accessible online and would be updated regularly throughout the planning process. The website provides key resources, including the project overview, meeting minutes and presentations, the public survey, the previous 2021 HMP, and relevant planning resources. Initial public survey responses were shared at this time, but due to limited response rates, the public survey will be re-opened through mid-March for one final push.

Project Website QR Code

Project Schedule & Next Steps

The tentative project schedule was then reviewed, which is summarized below:

- Project Kickoff – August 2025
- Stakeholder Meeting – September 2025
- Risk Assessment & Mitigation Strategy Meeting – February 2026
- Draft Plan Delivery – Target completion by Spring 2026
- Plan Expiration – June 20th, 2026

Next steps include:

- ESP will distribute jurisdiction-specific mitigation action spreadsheets for review and update.
- A follow-up email will include resource links, planning tools, and FEMA reference materials.
- The regional website will be updated regularly with project materials, public survey results, and meeting summaries.

Meeting Closeout

The meeting adjourned with appreciation extended to all attendees for their continued engagement and collaboration in advancing regional resilience and hazard preparedness across the Buncombe Madison Region. The meeting officially adjourned at 12:00pm.

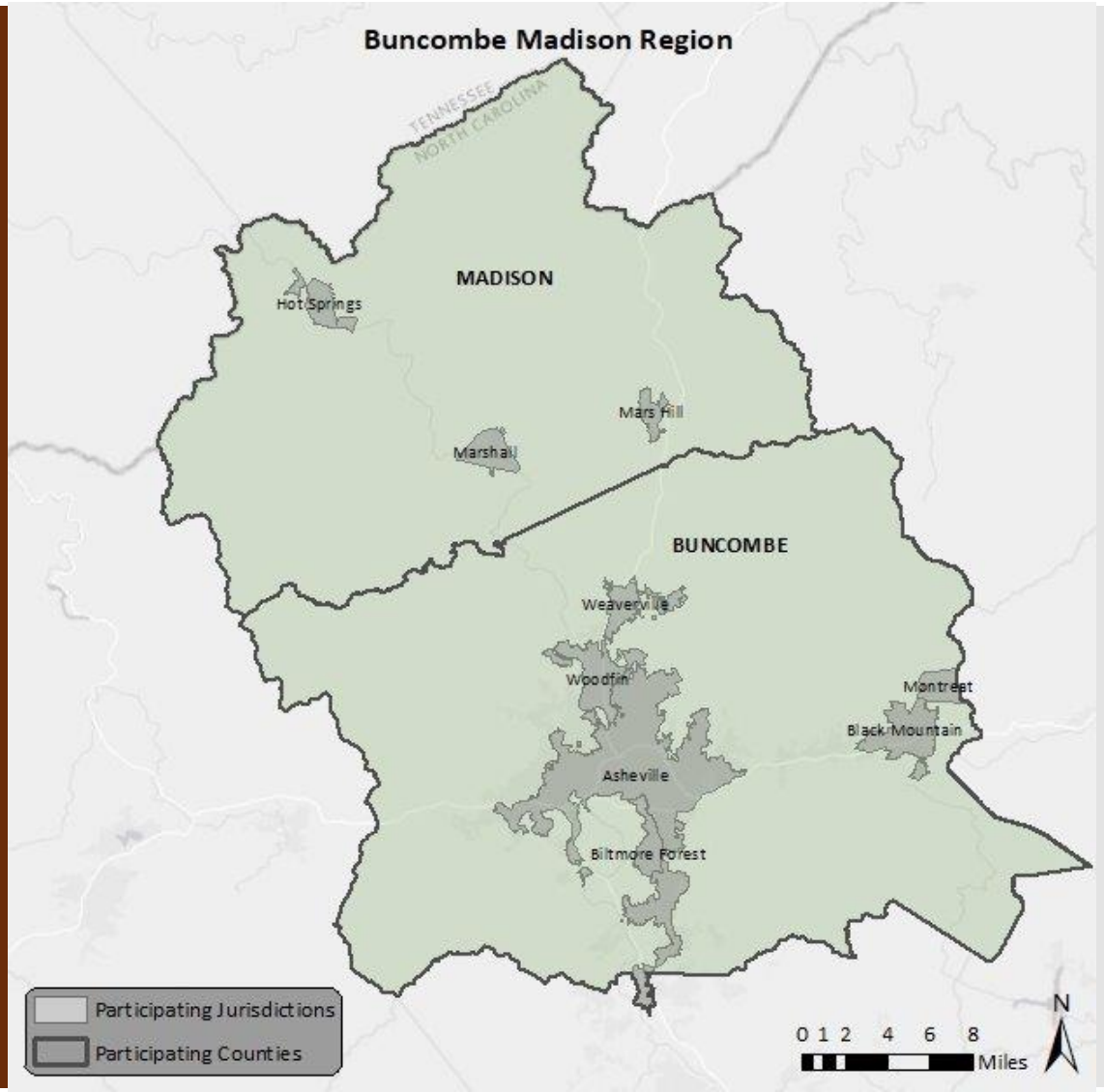
Buncombe Madison

2026 Hazard Mitigation Plan Update

HIRA/Mitigation Strategy Meeting

February 11, 2026

Woodfin, NC



Agenda

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

Introductions

- Welcome to 2nd HMPC Meeting!
- Reminder to Sign-In (In-Person)
- Intros: Project Team & 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

Hazard Identification

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.

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

FEMA Major Disaster Declarations

Total Declarations: 19

Year	Disaster Number	Description	Buncombe County	Madison County
1973	394	SEVERE STORMS & FLOODING	X	
1977	542	SEVERE STORMS & FLOODING	X	X
1995	1073	SEVERE STORMS, FLOODING, HIGH WINDS		X
1996	1087	BLIZZARD OF 96	X	X
1996	1103	WINTER STORM		X
1996	1134	HURRICANE FRAN	X	
1998	1200	SEVERE STORMS AND FLOODING		X
2004	1546	TROPICAL STORM FRANCES	X	X
2004	1553	HURRICANE IVAN	X	X
2010	1871	SEVERE WINTER STORMS AND FLOODING	X	X
2013	4146	SEVERE STORMS, FLOODING, LANDSLIDES AND MUDSLIDES	X	X
2018	4393	HURRICANE FLORENCE		X
2020	4487	COVID -19 PANDEMIC	X	X
2020	4553	SEVERE STORMS, TORNADOES AND FLOODING		X
2020	4568	HURRICANE ISAIAS	X	X
2021	4617	REMNANTS OF TROPICAL STORM FRED	X	
2022	3586	HURRICANE IAN	X	X
2024	3617	HURRICANE HELENE	X	X
2024	4827	TROPICAL STORM HELENE	X	X

- Provide record of hazards that exceeded state and local response capacity
- Highlight hazards that caused significant impacts to people, property, and infrastructure

Review of Existing Plan Hazards

Comparing hazards across the previous regional plan (2021) and the State HMP (2023) helps identify **core hazards** that persist and **emerging risks**

Hazard	Included in 2023 State HMP?	Included in 2021 Regional Plan?	Included in 2026 Regional Plan?
Flooding	X	X	X
Hurricanes and Coastal Hazards	X	X	X
Severe Winter Weather	X	X	X
Excessive Heat	X		
Earthquakes	X	X	X
Wildfires	X	X	X
Dam Failure	X	X	X
Drought	X	X	X
Tornadoes/Thunderstorms	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	X	X	X
Electromagnetic Pulse	X	X	X
Civil Disturbance (new)	X		X
Food Emergency (new)	X		X

Hazard Profiles

44 CFR Requirement

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

Hazards Profiled

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

Hazards in **RED** scored "high risk" based on initial PRI scores

Hazard Profiles to include:

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

Categorized PRI Results

*__Note__: table is not ordered in succession & low-risk hazards are not prioritized for mitigation

HIGH RISK	Severe Winter Weather Tornadoes/Thunderstorms Flooding Geological (Landslides) Cyber
MODERATE RISK	Drought Wildfire Hazardous Substances Hurricane /Coastal Hazards Earthquake Dam Failure Infectious Disease Food Emergency Civil Disturbance
LOW RISK	Terrorism Radiological Emergencies EMP

- PRI is a starting point, not a final determination
- Discussion will focus on hazards that ranked high risk based on PRI
- Helps prioritize time on hazards with the greatest potential impact

Priority Risk Index (PRI) Explained

Probability – Likelihood the hazard will occur based on past events and trends

Impact – Severity of effects on people, property, infrastructure, and services

Spatial Extent – How much of the community or region could be affects

Warning Time - Typical amount of advance notice available before an event

Duration – Length of event and how long impacts may persist

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	

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

Severe Winter Weather

*__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.

- Severe winter weather can lead to dangerous driving conditions, communications and utility disruptions, and severe injuries
- Winter weather has resulted in 3 disaster declarations

SUMMARY OF WINTER WEATHER EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Buncombe County	**283**	**0/0**	**$125,146**
Asheville	0	0/0	$0
Biltmore Forest	0	0/0	$0
Black Mountain	0	0/0	$0
Montreat	0	0/0	$0
Weaverville	0	0/0	$0
Woodfin	0	0/0	$0
Unincorporated Area	283	0/0	**$125,146**
Madison County	**326**	**0/0**	**$0**
Hot Springs	0	0/0	$0
Marshall	0	0/0	$0
Mars Hill	0	0/0	$0
Unincorporated Area	326	0/0	$0
REGION TOTAL	**609**	**0/0**	**$125,146**

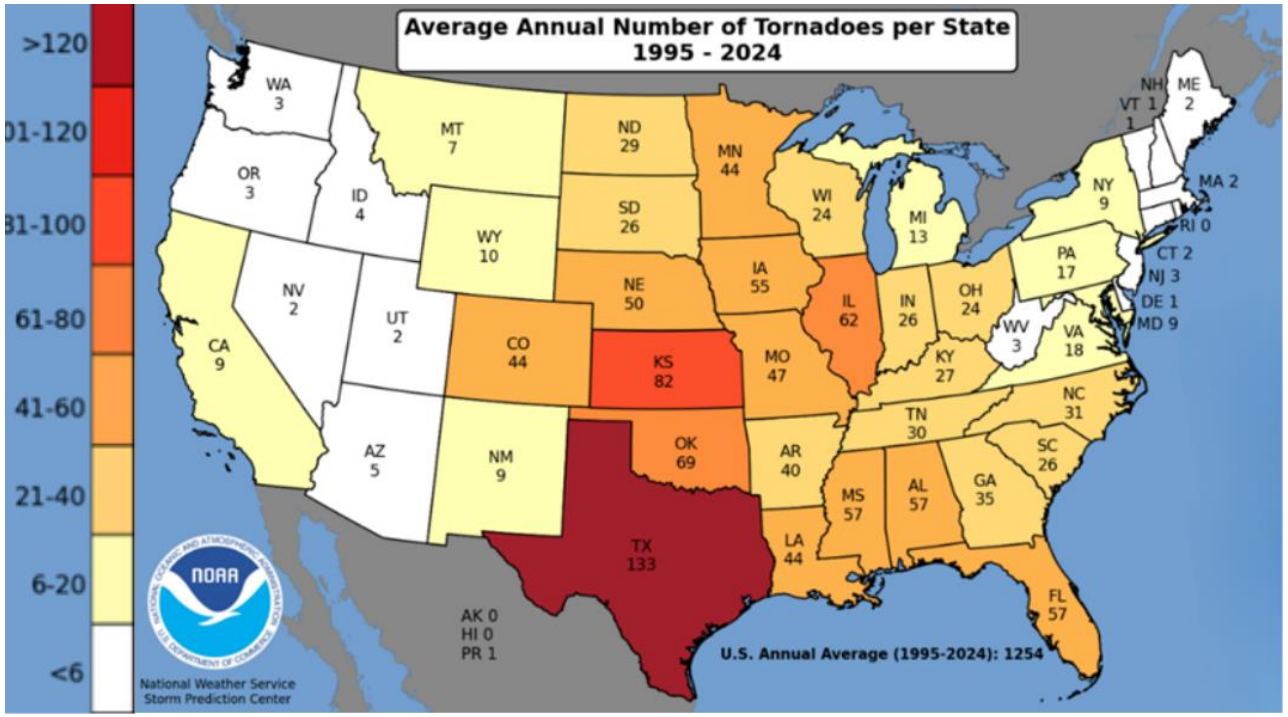
Source: National Centers for Environmental Information

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**.

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

Tornadoes / Thunderstorms

TORNADO ACTIVITY IN THE UNITED STATES



Source: NOAA SPC

North Carolina averages 31 tornadoes per year, formation most likely between March-May

202 tornadoes events recorded have resulted in 1 disaster declaration (2020) and $6.8 million in damages

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

Tornadoes / Thunderstorms

*__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.

- Although thunderstorms generally affect a small area, they are very dangerous and may cause extensive damages
- According to NOAA, severe storm events are likely to become more frequent and intense throughout the Southeast U.S. over time

SUMMARY OF THUNDERSTORM/HIGH WIND EVENTS

Location	Number of Occurrences	Deaths / Injuries	Property Damage
Buncombe County	**253**	**2/9**	**$4,970,160**
Asheville	27	0/1	$462,113
Biltmore Forest	0	0/0	$0
Black Mountain	4	0/0	$$1,805
Montreat	2	0/0	$0
Weaverville	16	0/1	$$16,249
Woodfin	4	0/3	$0
Unincorporated Area	200	2/6	$4,508,047
Madison County	**136**	**0/0**	**$2,255,479**
Hot Springs	10	0/0	$0
Marshall	20	0/0	$32,222
Mars Hill	10	0/0	$3,438
Unincorporated Area	62	0/0	$2,219,819
REGION TOTAL	**389**	**2/9**	**$7,225,639**

Source: National Centers for Environmental Information

Thunderstorms have resulted in 4 disaster declarations in the region

Several straight-line wind events occur per year in the region

389 recorded events resulting in more than $7 million in damages

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Limited	Moderate	6 to 12 hours	Less than 24 hours

Flooding

*__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.

SUMMARY OF FLOOD OCCURRENCES

Location	Number of Occurrences	Injuries	Deaths	Property Damage	Crop Damage
Buncombe County	**52**	**0**	**26**	**$686,293,000**	**$1,000,000**
Asheville	4	0	0	$10,000	$0
Biltmore Forest	0	0	0	$0	$0
Black Mountain	4	0	0	$54,000	$0
Montreat	1	0	0	$500	$0
Weaverville	4	0	0	$40,000	$0
Woodfin	1	0	0	$2,500,000	$0
Unincorporated Area	38	0	26	$683,688,500	$1,000,000
Madison County	**44**	**2**	**6**	**$52,758,000**	**$12,170,000**
Hot Springs	2	0	0	$2,500,000	$0
Marshall	15	0	0	$2,835,000	$7,500,000
Mars Hill	2	0	0	$0	$0
Unincorporated Area	25	2	6	$47,423,000	$4,670,000
REGION TOTAL	**96**	**2**	**32**	**$739,051,000**	**$13,170,000**

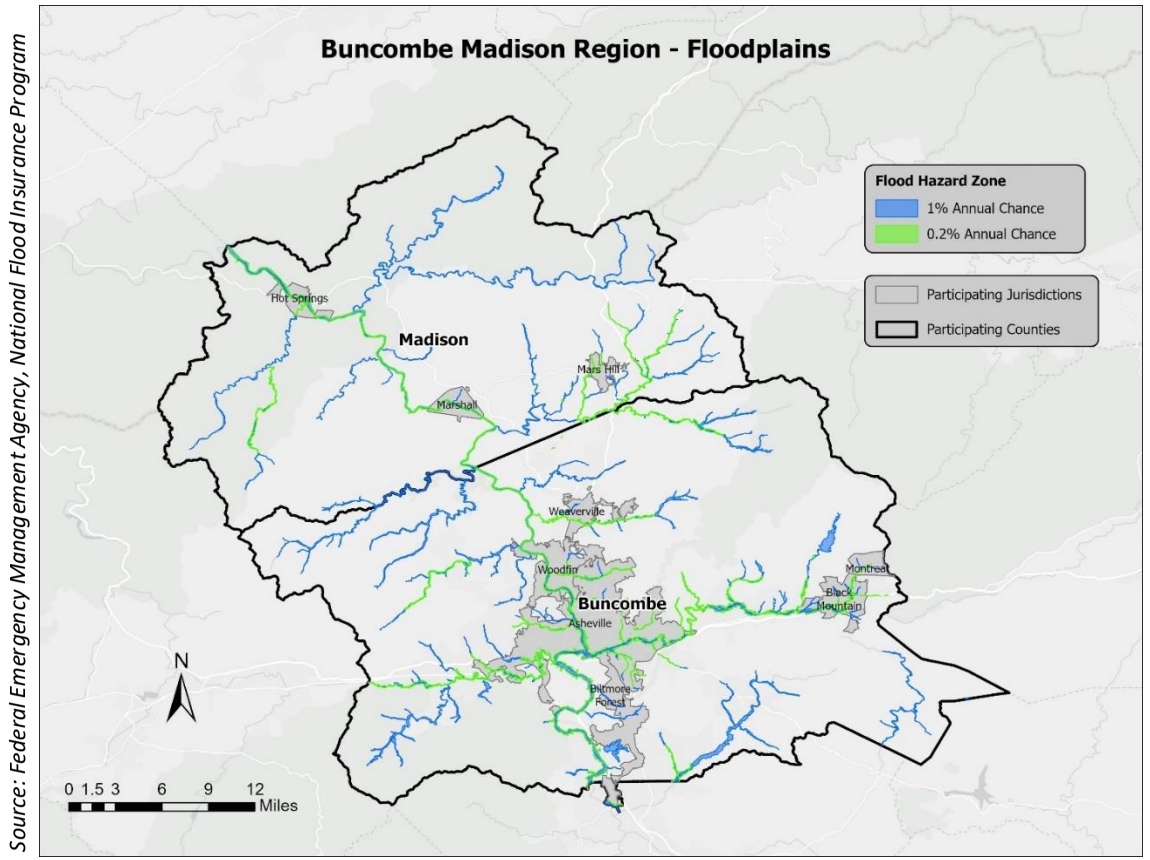
Source: National Centers for Environmental Information

- Flooding is a top hazard in the nation for weather-related mortality and the most common and costly natural hazard
- NC climate projections suggest a likely increase in total annual precipitation and a very likely increase in extreme precipitation frequency/intensity

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Limited	Moderate	6 to 12 hours	Less than 24 hours

Flooding

SPECIAL FLOOD HAZARD AREAS



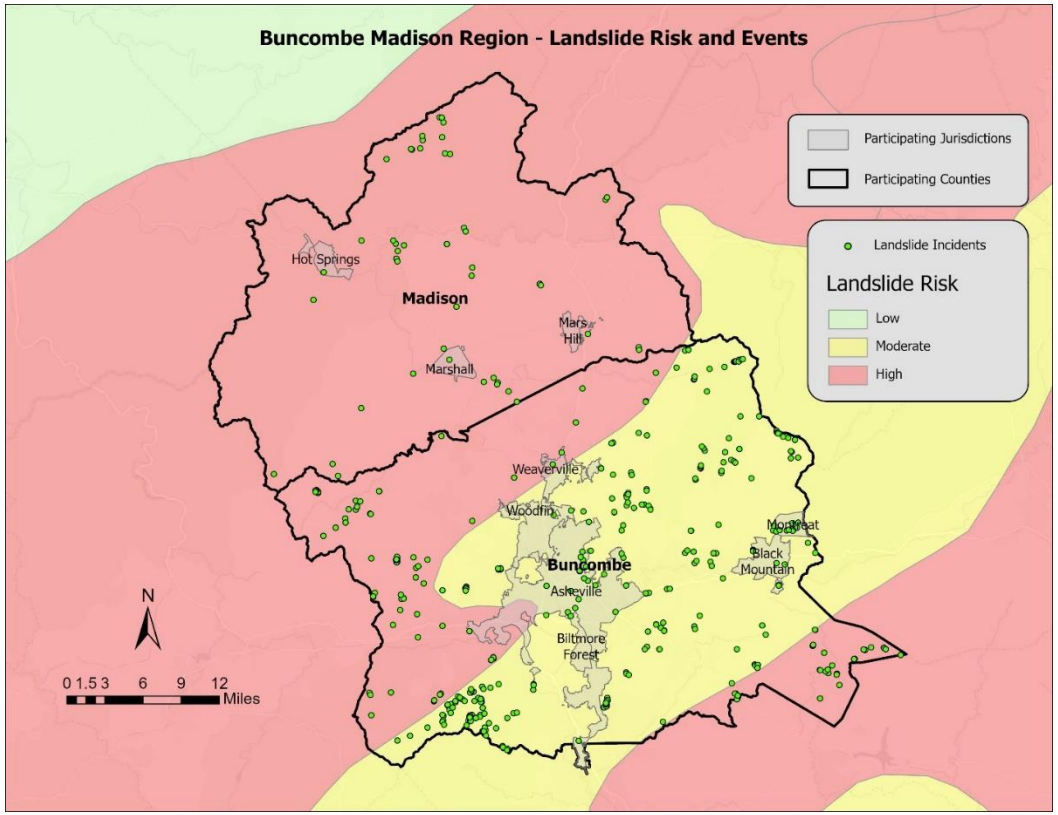
Source: Federal Emergency Management Agency, National Flood Insurance Program

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

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours

Geological (Landslides)

LANDSLIDE SUSCEPTIBILITY AND INCIDENCE MAP



Source: United States Geological Survey

- Steep regional topography increases susceptibility to landslides, although soil profiles suggest sinkholes and erosion are uncommon
- NCGS records 458 landslide events since 1940
  - *Noted as incomplete dataset by NCGS*
- The number of landslides is projected to increase due to more extreme rainfall events

Probability	Impact	Spatial Extent	Warning Time	Duration
Possible	Critical	Large	Less than 6 hours	Less than 1 week

Cyber Threat

- **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 **62% of breaches involving external actors** and **88% of them being financially motivated** (2025 Verizon Data Breach Investigations Report)
- Highest # of cybercrimes in NC are phishing/spoofing (FBI IC3, 2024)
- Ongoing regional preparedness and training for future threats is crucial

Categorized PRI Results

*__Note__: table is not ordered in succession & low-risk hazards are not prioritized for mitigation

HIGH RISK	Severe Winter Weather Tornadoes/Thunderstorms Flooding Geological (Landslides) Cyber
MODERATE RISK	Drought Wildfire Hazardous Substances Hurricane /Coastal Hazards Earthquake Dam Failure Infectious Disease Food Emergency Civil Disturbance
LOW RISK	Terrorism Radiological Emergencies EMP

- Initial PRI results are based solely on the quantitative analysis performed to date
- Stakeholder input / qualitative feedback received will be used to adjust initial scores

**Review tabulated results on following slides

Natural Hazard Risk Summary – Tabulated PRI

Hazard	Sub hazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought		Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hurricane and Coastal Hazards		Possible	Critical	Large	More than 24 hours	Less than 24 hours	2
Tornadoes/ Thunderstorms	Hailstorm, Lightning	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	3.2
Severe Winter Weather		Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	3.3
Earthquakes		Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.3
Geological	Landslide, Sinkholes, Erosion	Highly Likely	Critical	Small	Less than 6 hours	Less than 6 hours	2.8
Dam Failure		Unlikely	Critical	Moderate	More than 24 hours	Less than 6 hours	2
Flooding		Highly Likely	Limited	Moderate	6 to 12 hours	Less than 24 hours	2.9

Other & Technological Hazard Risk Summary – Tabulated PRI

Hazard	Sub hazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Other Hazards							
Wildfires		Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.2
Infectious Disease		Possible	Critical	Small	More than 24 hours	More than 1 week	2.4
Technological Hazards							
Hazardous Substances		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	2.2
Radiological Emergency	Fixed Nuclear Facilities	Unlikely	Critical	Small	6 to 12 hours	Less than 1 week	2.2
Terrorism		Unlikely	Critical	Small	Less than 6 hours	Less than 6 hours	2.1
Cyber		Possible	Critical	Large	Less than 6 hours	Less than 1 week	3
Electromagnetic Pulse		Unlikely	Minor	Large	12 to 24 hours	Less than 6 hours	1.7
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**

Asset Inventory

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.

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

Asset Inventory – Parcels & Building Exposure (2010+)

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

IMPROVED PROPERTIES IN THE REGION

Location	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Buncombe County	133866	$51,386,896,747	105218	$38,179,643,221
Asheville	39533	$21,353,272,805	33809	$15,705,614,912
Biltmore Forest	757	$958,978,450	704	$624,449,200
Black Mountain	5156	$1,701,122,125	4066	$1,290,440,900
Montreat	919	$360,452,200	642	$270,432,300
Weaverville	2703	$1,197,088,300	2305	$905,742,400
Woodfin	4275	$1,301,795,100	2875	$956,718,700
Unincorporated Area	80,523	$24,514,187,767	60,817	$18,426,244,809
Madison County	21525	$3,053,482,821	12,030	$1,535,221,560
Hot Springs	468	$89,539,544	337	$46,008,504
Marshall	636	$88,775,839	637	$56,377,248
Mars Hill	896	$161,813,570	450	$123,714,353
Unincorporated Area	19,525	$2,713,353,868	10,606	$1,309,121,455
Regional Total	**155,391**	**$54,440,379,568**	**117,248**	**$39,714,864,781**

Asset Inventory – Critical Facilities

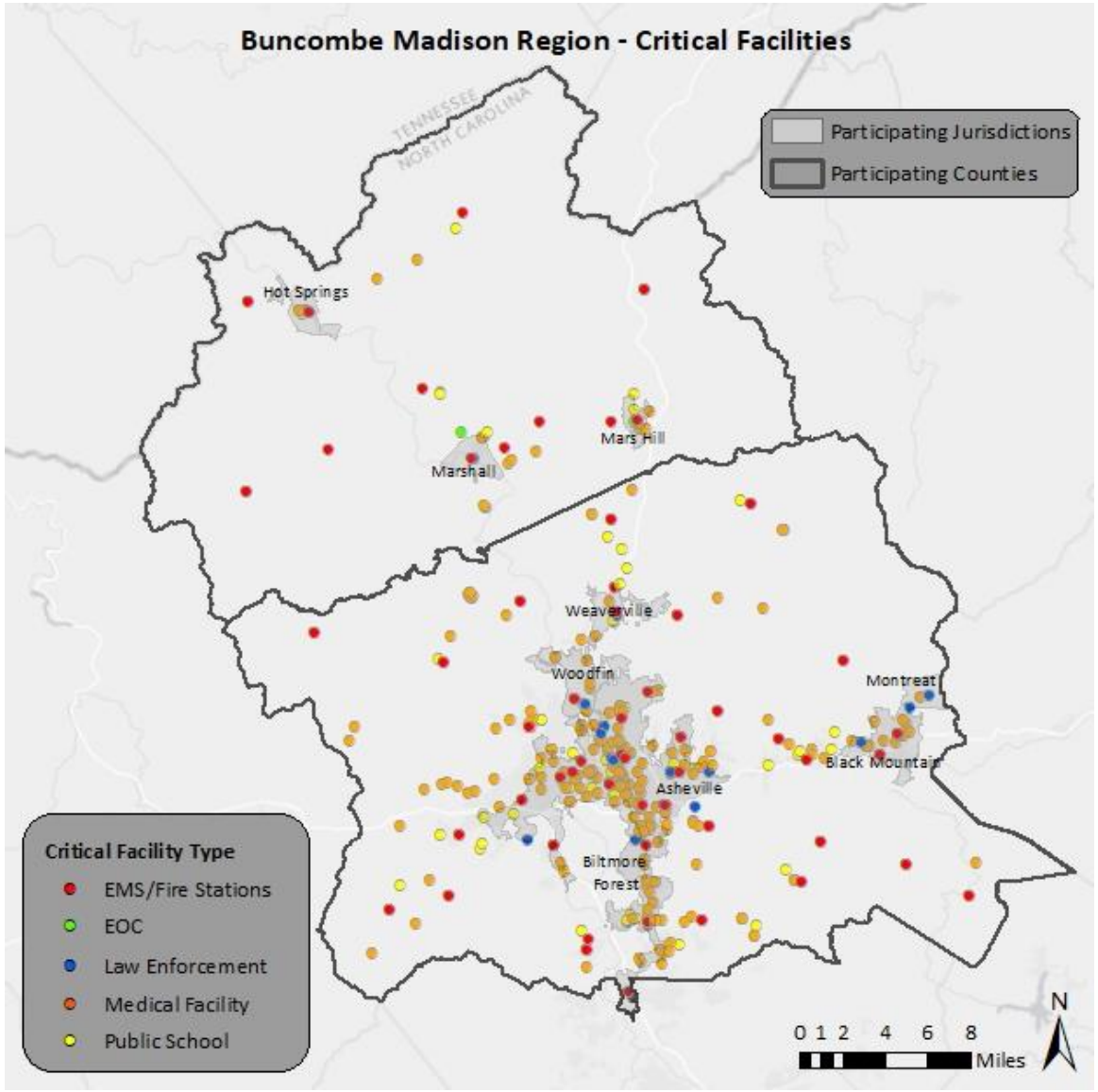
*__Note__: approximate counts using available georeferenced facility data (NC OneMap) and updated municipal boundaries

IMPROVED PROPERTIES IN THE REGION

Location	Fire/EMS Stations	Police Stations	Medical Care Facilities	Schools	Other
Buncombe County	**84**	**22**	**249**	**54**	**1**
Asheville	32	14	133	22	1
Biltmore Forest	0	1	4	0	0
Black Mountain	4	2	14	2	0
Montreat	0	1	1	0	0
Weaverville	3	1	2	2	0
Woodfin	2	1	10	1	0
Unincorporated Area	43	2	85	27	0
Madison County	**17**	**4**	**18**	**7**	**2**
Hot Springs	2	1	4	1	0
Marshall	1	2	2	0	0
Mars Hill	2	1	3	1	1
Unincorporated Area	12	0	9	5	1
Regional Total	**101**	**26**	**267**	**61**	**3**

Asset Inventory – Critical Facilities

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



Source: Local Governments

Estimated Losses

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



NRI Expected Annual Losses

Hazard	Buncombe County	Madison County	Total
Drought	$16,030	$1,037	$17,067
Excessive Heat	Negligible	Negligible	Negligible
Hurricane/Coastal Hazards	$798,479	$47,382	$845,861
Tornadoes/Thunderstorms	$3,828,342	$327,417	$4,155,759
Severe Winter Weather	$7,677	$40,274	$47,951
Earthquakes	$1,508,276	$102,289	$1,610,565
Geological	Negligible	Negligible	Negligible
Dam Failure	Negligible	Negligible	Negligible
Flooding	$8,736,210	$2,034,203	$10,770,413
Wildfires	$198,751	$79,714	$278,465
Infectious Disease	Negligible	Negligible	Negligible
Hazardous Substances	Negligible	Negligible	Negligible
Radiological Emergency	Negligible	Negligible	Negligible
Terrorism	Negligible	Negligible	Negligible
Cyber	Negligible	Negligible	Negligible
Electromagnetic Pulse	Negligible	Negligible	Negligible
Civil Disturbance	Negligible	Negligible	Negligible
Food Emergency	Negligible	Negligible	Negligible

Source: National Risk Index

The **NRI Expected Annual Loss** quantifies the average economic loss expected per year from natural hazards, including property damage, crop loss, and population impacts.

It combines historical hazard frequency, exposure, and vulnerability data to estimate annualized losses for each county.

Post-Helene Vulnerability Report

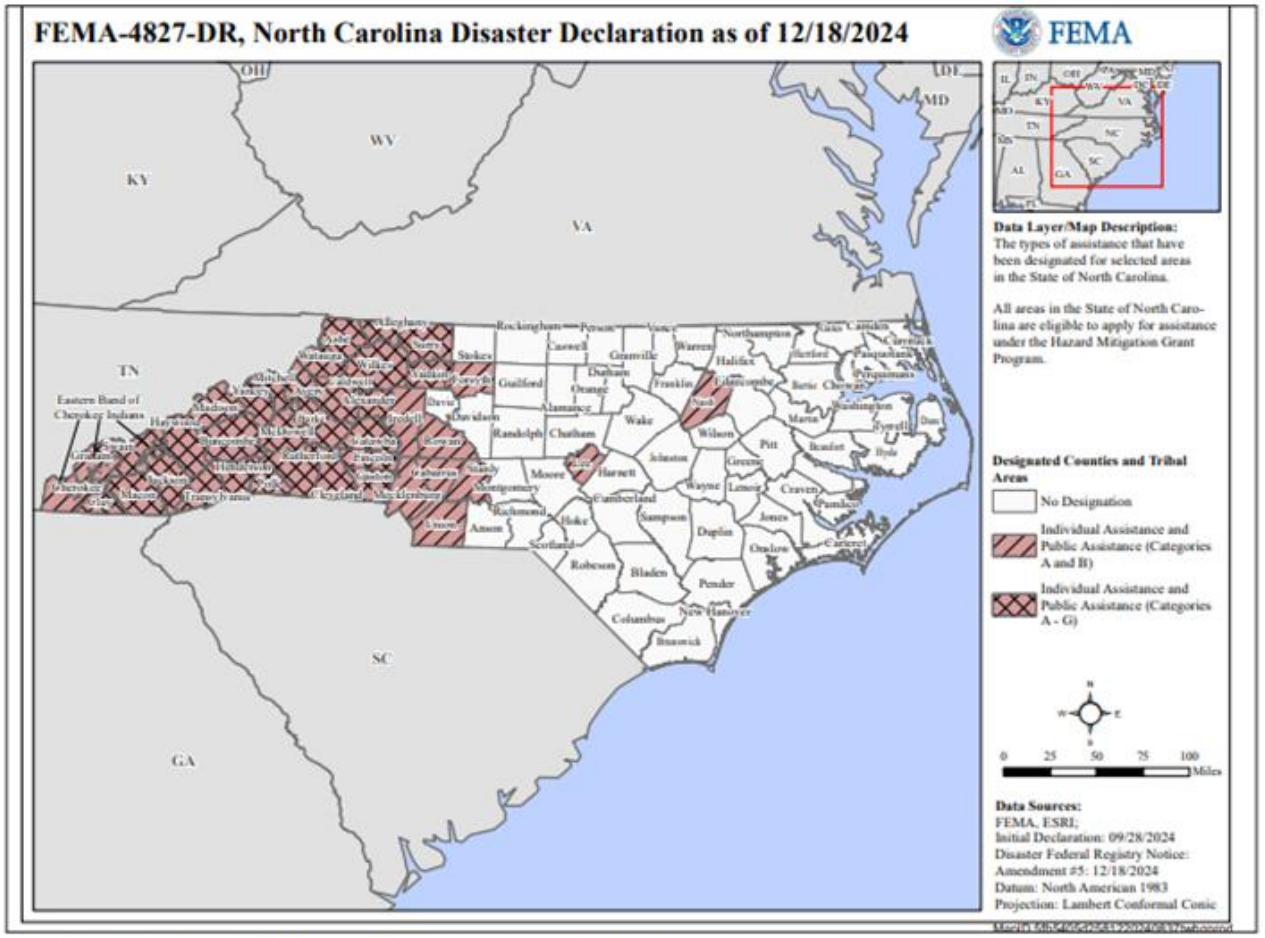


Figure 3: A map of Designated Counties and Tribal Areas in North Carolina for DR-4827 NC.

Regional Impacts of Helene

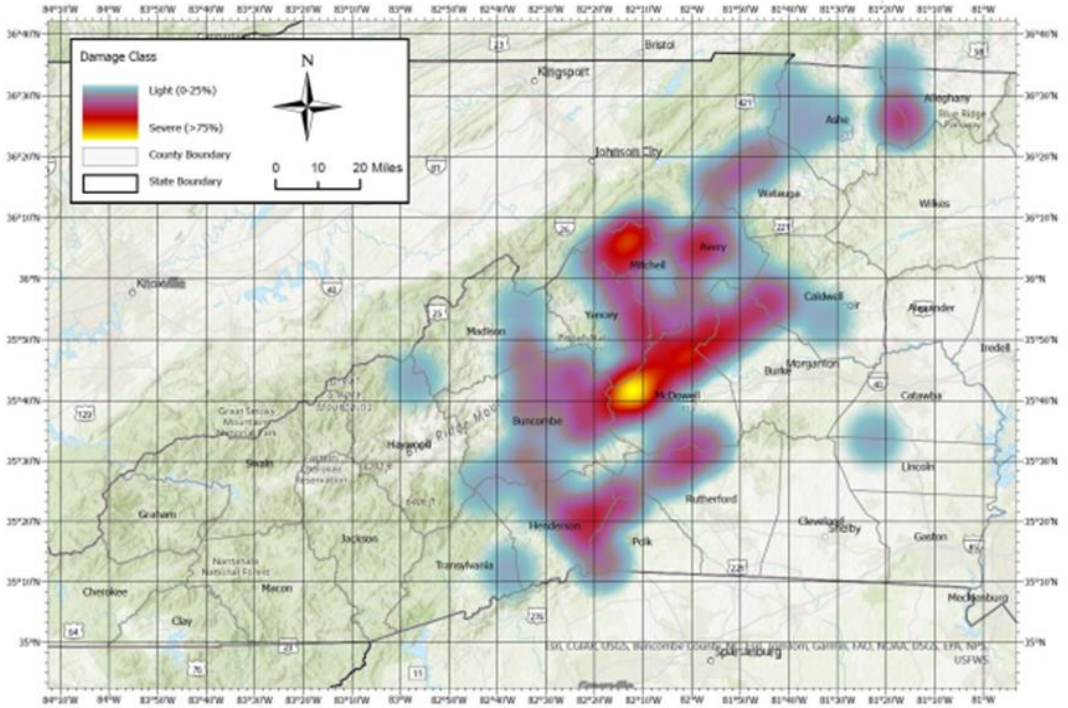


Figure 2. Hurricane Helene damage assessment map.

- 12,239 residential units suffered damage, exacerbating the housing crisis
- NC Office of State Budget and Management estimated nearly $4.9 billion in agricultural damage across state
- NC Forest Service estimated $214 million in value lost in damaged timberland
- Buncombe County experienced highest level of damage of the 26 western counties impacted

Questions

Questions/Comments/Concerns

Mitigation Strategy

Mitigation Overview

What is Mitigation?

- Mitigation is ***an action that reduces the impact of natural, technological, and human-caused hazards on property and life***
- The HIRA focuses on problem identification whereas the Mitigation Strategy will focus on problem solutions

Benefits of Mitigation:

1. Support Prevention and Protection Activities
2. Ease Response and Speed Recovery
3. Create More Resilient Communities

Mitigation Strategy

The Mitigation Strategy has **3 primary requirements**:



Mitigation Goals

What long-term goals does the Region want to achieve?



Mitigation Actions

What specific actions are needed to reduce risk?



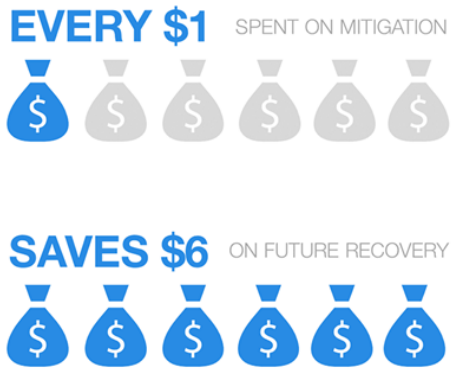
Mitigation Action Plan

How will the actions be prioritized and implemented?

Mitigation Purpose

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

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

Aligning with Ongoing Recovery Efforts



Recovery Priorities Identified in Envision Buncombe:

1. Investing in Infrastructure
2. Damage Prevention and Resiliency Investments
3. Wildfire Prevention
4. Floodplain Management
5. Restoring Streambanks
6. Rebuilding Parks
7. Preserving Flood-Prone Properties
8. Landslide Stabilization
9. Building More Affordable Housing
10. Funding to Promote Food Security

Mitigation Goals

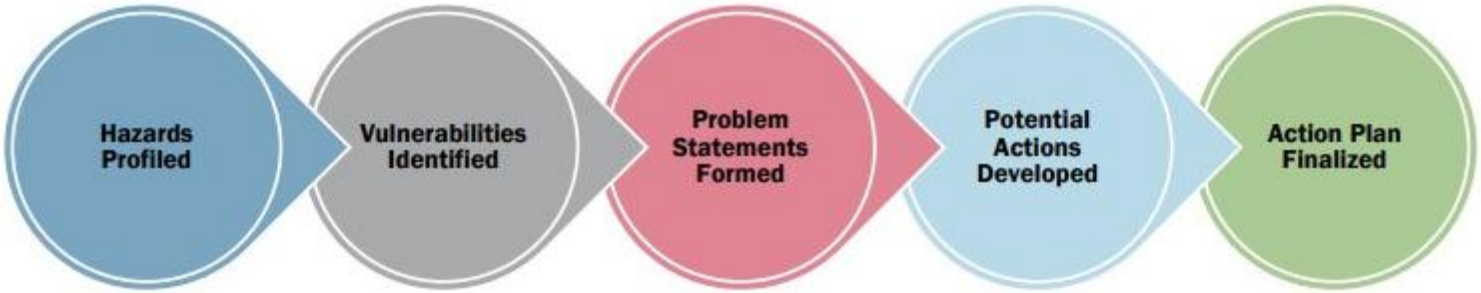
Review existing mitigation goals from the 2021 plan to determine if these goals **still align with current priorities.**

	Proposed Goal
Goal #1	Incorporate hazard mitigation into the planning process of each jurisdiction and continue to carry out hazard mitigation by seeking funding when available.
Goal #2	Evaluate, strengthen, and enforce ordinances.
Goal #3	Increase and enhance public education and awareness regarding disasters and hazard mitigation.
Goal #4	Address stormwater management and impervious surface issues.
Goal #5	Continue participation in the National Flood Insurance Program and investigate participation in the NFIP's Community Rating System.
Goal #6	Conduct future development (including infrastructure) in a way that protects human life and property through management of natural features such as floodplains and wetlands and avoids development in known hazard areas. This will also reduce the risk to emergency workers.
Goal #7	Ensure that population growth does not exceed the capacity of evacuation routes.
Goal #8	Protect existing structures through retrofitting or other means.
Goal #9	Enhance the community's capability through the use of mutual aid agreements and sharing of resources at the county and regional level.
Goal #10	Ensure that community officials are well-educated and aware of existing resources, regulations, and procedures related to disasters.
Goal #11	Maintain and monitor the current plan and renew and revise as necessary.

Informing the Mitigation Strategy

Each step in the plan's development builds upon the others. As such:

1. The **risk assessment informs the actions** chosen for the mitigation strategy
2. Any significant hazard profiled in the plan must have **at least 1 mitigation action** associated with it



Action Plan Development

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.

All participating jurisdictions have an existing mitigation action plan from the previous plan update (2021)

Updating the mitigation action plan will involve **two key components**:

1. Review **existing mitigation actions** to determine action status
2. Identify, refine, and integrate **new mitigation actions** to address evolving needs and challenges

Existing Mitigation Actions

Review the previous plan to determine the status of **existing mitigation actions:**

- **Status update** required by FEMA
- **Designate each action** as: *Completed, Deleted, or Carried Forward (include any details)*
- **Identify** existing gaps and weaknesses

New Mitigation Actions

Brainstorm and discuss a full range of potential **new mitigation actions** and successful mitigation techniques, ensuring they:

- **Align** with mitigation goals and other community objectives
- **Reflect** hazard risk and local capability
- **Address** existing gaps or weaknesses

Mitigation Strategy – Examples



Potential Actions to Mitigate Severe Winter Weather:

1. Designate/Equip Regional Warming Centers
2. Strengthen Utility/Power Grid Resilience
3. Pre-Stage Salt, Plows, & Fuel Regionwide
4. Maintain Registry for Vulnerable Winter Residents

Mitigation Strategy – Examples

Potential Actions to Mitigate Thunderstorms/Tornadoes:

1. Enhance Early Warning Systems
2. Harden Critical Facilities & Shelters
3. Bury or Reinforce Power Lines & Communication Infrastructure
4. Require/Designate Safe Rooms in Certain Types of Buildings

Mitigation Strategy – Examples

Potential Actions to Mitigate Flooding:

1. Identify and Prioritize RL or Substantially Damaged Properties
2. Retrofit Bridges, Culverts, and Road Crossings
3. Develop Regional Stormwater Management Plans
4. Expand CRS and Flood Awareness Programs

Mitigation Strategy – Examples



Potential Actions to Mitigate Landslides:

1. Map/Monitor Landslide-Prone Slopes
2. Implement Slope Stabilization & Drainage Projects
3. Integrate Landslide Risk into Local Zoning
4. Inspect Landslide Sites After Major Rain Events
5. Educate Homeowners on Slope Safety Practices

Cyber Mitigation Action Examples

Potential Actions to **Mitigate Cyber Threats/Issues**:

1. Conduct comprehensive cybersecurity assessments
2. Implement cybersecurity training programs
3. Establish a regional cybersecurity task force
4. Enhance incident response plans
5. Invest in advanced cybersecurity technologies

Action	Description	Hazard(s) Addressed	Priority	Lead Agency	Potential Funding Sources	Implementation Schedule	Implementation Status
P-2	Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.	Flood	Medium	Emergency Management	Local	2025	No policy has been developed as of 2020. This is to be completed in 2025 pending funding, staff resources and political will.

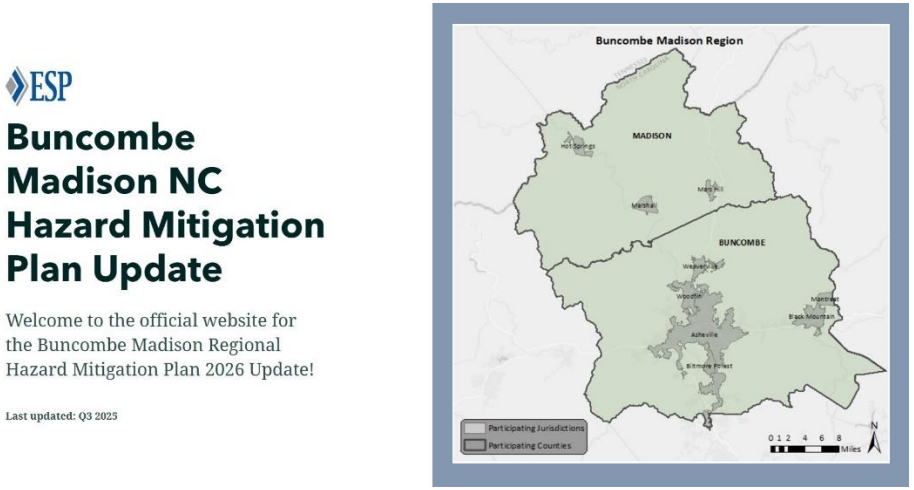
Mitigation Action Information

Leverage Guides & Resources

Use available resources to aid in strategy development:

- FEMA Local Mitigation Planning Handbook
- FEMA Mitigation Ideas
- FEMA Economic Development Strategy and Hazard Mitigation Plan Alignment
- NCORR North Carolina Resilience Exchange
- NCORR North Carolina Resilient Communities Planning Guide

Visit and Share the Project Website



The Project Website will be updated regularly throughout the planning process to provide access to:

1. Project Overview
2. Meeting Information
3. Public Survey
4. Previous HMP (2021)
5. Relevant Planning Resources

Initial Public Survey Results

Key findings are summarized below:



45% of respondents reside in Unincorporated Buncombe County.



Flooding was identified as the #1 threat, followed by wildfire.



66% of respondents have taken steps to make their home more resistant against hazards.



94% of respondents are interested in making their home more resistant to hazards.



81% of respondents do not know what office to contact to reduce their risk to hazards in their area.

Initial Public Survey Results

Key findings are summarized below:



Emergency Services – 85% of respondents ranked this technique as "Very Important."



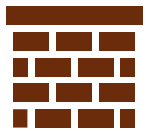
Prevention - 85% of respondents ranked this technique as "Very Important."



Natural Resource Protection - 85% of respondents ranked this technique as "Very Important."



Structural Projects - 68% of respondents ranked this technique as "Very Important."



Property Protection - 58% of respondents ranked this technique as "Very Important."

Complete and Share the Public Survey!



Scan the QR Code for Access to the Public Survey

Project Schedule

Project Kickoff – 8/13/25	Larger Stakeholder Meeting – 9/30/25	HIRA Mitigation Meeting – 2/11/26
Public Meeting – TBD	Proposed Delivery of Draft Plan – Spring 2026	Existing Plan Expiration – 6/20/26





Questions

Questions/Comments/Concerns

Next Steps

1. Use and Reference Project Resources
   - Previous 2021 Plan
   - Meeting follow-up materials
   - FEMA/NC Planning Resources
   - Project Website
2. Review Existing Mitigation Action Plan from 2021 HMP
   - Provide Status Updates for Each Action
3. Brainstorm New Mitigation Strategies for 2026 HMP
   - Consider Evolving Needs
4. Draft Plan Delivery

Adjourn – Thank you!

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Public Survey Results

As part of the planning process, the Buncombe Madison Regional Hazard Mitigation Plan included a public survey to gather community input on local hazards, impacts, and mitigation priorities. The survey received a total of **64 responses**, providing valuable insight into regional risk perception and community needs.

For the sake of brevity, detailed survey results were not included directly in this plan. However, the full survey results are available upon request. Please contact **nslaughter@espassociates.com** to obtain a copy of the complete survey findings

Appendix E
Completed Mitigation Actions

Buncombe County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
PP-1	Strengthen the road design and construction as it pertains to the Manufactured Home Park Ordinance.	All	Moderate	Local	County EM/Planning Dept.	Completed	Buncombe County adopted the Manufactured Home Park Ordinance in April 1996. The purpose of the Ordinance is to protect the health, safety and general welfare of citizens of the County, particularly those who are residents of manufactured home parks. New parks and expansions of current parks are required to apply for a manufactured home park permit for construction. Plans are required to contain title block information; project data including the number of lots and acreage disturbed; road and utility information; location of natural features affecting the site, including the location of the 100-year floodplain and floodway; and other information specified in Section 46-65.5 in the Buncombe County Code of Ordinances. In 2006, the

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
							requirement was added that all plans or requests must comply with the Buncombe County Fire Prevention Ordinance, and that the County fire marshal provide approval prior to a permit being issued. There are specific street construction standards required in the Ordinance, including a minimum drive width of 16', with all weather surface. Other street considerations include road intersection standards; minimum number of parking spaces per unit; minimum recorded access road right-of-way width; required turnarounds for street lengths over 500'; and road standards determined by road grade. Manufactured home spaces are required to have certain square footage depending on whether the park is served by sewer or septic systems. Each new home space must be located on ground not susceptible to flooding and graded so as to prevent any water from ponding. Each home shall be located at least 20' from any other home, at least 15' from the manufactured home park boundary, and at least 10' from the edge of any interior street. The Ordinance has requirements for all manufactured home parks, related to the provision of solid waste receptacles; the maintenance and safety of the park; adequate potable water supply; and responsibility for ensuring that each home be equipped with anchored steps or stairs from at least two exits. Finally, the Ordinance has penalties for violation and procedures for enforcement. At this time, there is no plan for further amending the road design standards in this Ordinance.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
PP-4	Revise the Erosion Control Ordinance.	FL	Moderate	Local	Planning Dept.	Completed	The County's Soil Erosion and Sedimentation Control Ordinance has been in existence since 1993, and was adopted pursuant to the authority granted in the North Carolina Sedimentation Pollution Control Act of 1973. The purpose of the Ordinance is to regulate certain land disturbing activity to control accelerated erosion and sedimentation in order to prevent the pollution of water and other damage to lakes, watercourses, and other public and private property. The general requirements of the Ordinance include requiring a plan for any land disturbing activity which uncovers one or more acres on a tract of land. In addition, a plan is required for any residential land disturbing activity which uncovers one-quarter acre or more on a lot, parcel, or tract with an average slope of 25% or greater in its natural state, or any residential land disturbing activity which uncovers one-half acre or more on a lot, parcel or tract with an average slope of 15-25% in its natural state, and applies to the Subdivision Ordinance, section 70-68. An additional requirement is that all persons conducting land-disturbing activity shall take all reasonable measures to protect all public and private property from damage caused by such activities. Plans are required to identify critical areas; limit time of exposure; limit exposed areas; control surface water; control sedimentation; and manage stormwater runoff. A notarized statement of financial responsibility and ownership is also required. Maintenance of ground cover following development is required. Civil penalties can be assessed for various violations, with a daily charge, and injunctive relief procedures are outlined. The Ordinance was revised in 2006, and the fee schedule changed in 2011. There are no plans to further revise this Ordinance.

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 TS = Thunderstorms EM = Buncombe County Emergency Management

City of Asheville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Property Protection							
PP-4	Revise the flood hazard ordinance.	FL	High	Local	Chief Code Enforcement Officer/Public Works Staff/ Development Services Staff	Completed 1/6/2010	Enforce the current ordinance (no revisions planned at this time)
Old PP-5	Administer & enforce International Building Codes and Fire Codes for new construction.	All	Moderate	City's General Fund	Chief Code Enforcement Officer	Completed NC State Building Code was adopted in 2012; The International Building Code was adopted in 2009	The city has adopted the NC State Building Code and International Building Code. This action is complete.
PP-7	Address the issues of storm water management and impervious surfaces.	Flooding	Moderate	Local	Stormwater Ordinance Administrator	Action deleted.	This will be addressed through implementation of PP-5. Action to be removed from future updates.

Town of Biltmore Forest Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Property Protection							
PP-3	Adopt the Stormwater Management Ordinance.	FL	High	Local	Board of Commissioners	Completed	The town has adopted a Stormwater Management Ordinance.

PP-4	Adopt the Flood Damage Prevention Ordinance.	FL	High	Local	Board of Commissioners	Completed	The town has adopted a Flood Damage Prevention Ordinance.

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 TS = ThunderstormsEM = Buncombe County Emergency Management Town = Town of Biltmore Forest

Town of Black Mountain Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
P-5	Record and maintain all tax parcel information and floodplain locations in a GIS system in order to build the Town's capability to identify areas needing future mitigation.	FL	Moderate	Local	GIS	Completed	This has been done and is in our on-site GIS.

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 TS = Thunderstorms EM = Buncombe County Emergency Management Town = Town of Black Mountain

Town of Montreat Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
P-3	Develop a mechanism that will ensure review of appropriate policies and procedures following a natural disaster event.	All	High	Local	Town Administrator	Completed	The town has developed a mechanism in conjunction with the county to ensure appropriate policies and procedures are followed in the wake of a disaster event. In the future, the town will continue to follow these policies. This action will be removed from the next update as a capability.
P-5	Develop a tracking system in the building inspections department to record the number of plans accepted and rejected and the number of warning and citation issued.	All	High	Local	Building Inspector/ Code Administrator	Completed	The town has developed a tracking system for building inspections to record plans that were accepted/rejected. Since this system is in place, this action will be removed from the next update as a capability.
P-7	Continue to enforce the International Building Code.	All	High	Local	Building Inspector/ Code Administrator	Completed	The International Building Code has been adopted and will continue to be enforced. This action will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
P-9	Create a storm sewer system map that identifies and locates stormwater drainage components that include outfalls and receiving streams.	FL	High	Local	Town	Completed	The stormwater sewer system map has been created, so this action will be removed from the next update as a capability.
P-10	Establish a system for inspecting illicit discharges, which shall include employee cross-training for town staff on detecting and reporting illicit discharges.	FL	High	Local	Town	Completed	A system for inspecting illicit discharges has been established, so this action will be removed from the next update as a capability.
P-11	Establish a reporting mechanism for the public to report illicit discharges.	FL	High	Local	Town	Completed	A mechanism has been established for the public to report illicit discharges, so this action will be removed from the next update as a capability.
P-12	Provide a reporting mechanism for the public to notify the appropriate authorities of observed erosion and sedimentation problems.	ER	High	Local	Town	Completed	A reporting mechanism for the public to report erosion/sedimentation problems has been put in place, so this action will be removed from the next update as a capability.
P-13	Conduct annual review and update plans for permitted facilities as needed for the Stormwater Management Plan.	FL	High	Local	Town	Completed	The town has developed a list of facilities that need to have plans updated for the Stormwater Management Plan, so this action will be removed from the next update as a capability.
Property Protection							
PP-2	Develop, implement and enforce an Illicit Discharge Ordinance.	FL	High	Local	Town	Completed	An Illicit Discharge Ordinance has been implemented, so this action will be removed from the next update as a capability.
PP-3	Develop an ordinance to implement and enforce post-construction runoff controls for new development and redevelopment.	FL	High	Local	Town	Completed	An ordinance has been developed to regulate post-construction runoff, so this action will be removed from the next update as a capability.
PP-4	Inspect all facilities and operations with the potential for generating polluted stormwater runoff. Document deficiencies and corrective actions.	FL	High	Local	Town	Completed	A system is in place to have regular inspections for stormwater runoff, so this action will be removed from the next update as a capability.

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
PP-6	Maintain all tax parcel information and floodplain locations in a GIS system in order to build the Towns capability to identify areas needing future mitigation.	All	High	Local	Town	Completed	All tax parcel information is maintained in GIS, so this action will be removed from the next update as a capability.
Natural Resource Protection							
NRP-1	Develop post-construction runoff control measures for protecting Trout Waters in accordance with 15A NCAC .0126	FL	High	Local	Town	Completed	An ordinance has been developed to regulate post-construction runoff, so this action will be removed from the next update as a capability
Public Education and Awareness Activities							
PEA-5	Prepare a public education program for the Stormwater Management Plan.	FL	High	Local	Regional Stormwater Planning Committee	Completed	The town has implemented the public education program for the Stormwater Management Plan, so this action will be removed from the next update as a capability
PEA-6	Develop and maintain a web site that will offer information on water quality, stormwater projects and activities and ways to contact stormwater program staff.	FL	High	Local	Regional Stormwater Planning Committee	Completed	The town has developed a website on water quality and stormwater projects, so this action will be removed from the next update as a capability
PEA-7	Develop general stormwater educational material targeting school children, homeowners and business.	FL	High	Local	Regional Stormwater Planning Committee	Completed	Educational information on stormwater has been developed, so this action will be removed from the next update as a capability
PEA-8	Distribute written material on stormwater management through utility mail outs and at special events.	FL	High	Local	Regional Stormwater Planning Committee	Completed	Material on stormwater has been distributed through a number of ways, so this action will be removed from the next update as a capability
PEA-9	Conduct at least one public meeting during the application process to explain the Phase II program. Allow the public an opportunity to review and comment on the stormwater management program.	FL	High	Local	Regional Stormwater Planning Committee	Completed	Public meetings were held during the application process for Phase II to allow review and comment, so this action will be removed from the next update as a capability
PEA-10	Develop educational materials for local developers explaining the local post-construction approval process for stormwater management.	FL	High	Local	Town	Completed	Educational materials have been developed for local developers, so this action will be removed from the next update as a capability

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
PEA-11	Conduct training on pollution prevention and good housekeeping procedures for the Stormwater Management Plan.	L	High	Local	Town	Completed	Training on pollution prevention and housekeeping procedures for the Stormwater Management Plan have taken place, so this action will be removed from the next update as a capability
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 TS = Thunderstorms EM = Buncombe County Emergency Management Town = Town of Montreat							

Town of Weaverville Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
P-2	Identify storm water management best practices, develop a storm water management program, and adopt a stormwater ordinance.	FL	High	Local	Town Manager	Completed	The town has developed a stormwater management program and ordinance and enforces on a regular basis, so this action will be removed from the next update as a capability.
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 TS = Thunderstorms EM = Buncombe County Emergency Management Town = Town of Weaverville							

Town of Woodfin Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
P-2	Identify storm water management best practices will be and develop a storm water management program and adopt a stormwater ordinance.	FL	High	Local	Town Administrator/ Board of Aldermen	Completed	The town has developed a stormwater management program and ordinance and enforces on a regular basis, so this action will be removed from the next update as a capability.
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 TS = Thunderstorms EM = Buncombe County Emergency Management Town = Town of Woodfin							

Madison County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Prevention							
P-5	Prepare a needs assessment for a second hazmat team to mitigate the hazards of hazmat.	HZ	Moderate	Local	EM	Completed	The county has developed a needs assessment and will look at investing in a second HazMat team. See ES-8
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 TS = Thunderstorms EM = Madison County Emergency Management							

Town of Hot Springs Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
PP-1	Remove debris from streams across County.	FL	High	Grants	EM	Deleted	This action was deleted because it is more or less the same as Action PP-3.

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 TS = Thunderstorms EM = Madison County Emergency Management Town = Town of Hot Springs

Town of Marshall Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Property Protection							
PP-1	Remove debris from streams across County.	FL	High	Grants	EM	Deleted	This action was deleted because it is more or less the same as Action PP-3.

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 EM = Madison County Emergency Management Town = Town of Marshall

Town of Mars Hill Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Funding Sources	Responsible Party	Target Completion Date	2014 Action Implementation Status
Property Protection							
PP-1	Remove debris from streams across County.	FL	High	Grants	EM	Deleted	This action was deleted because it is more or less the same as Action PP-2.

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 TS = Thunderstorms EM = Madison County Emergency Management Town = Town of Mars Hill

Appendix F
Flood Hazard Maps

This section of the plan includes **(1)** a table of potential flood extent for each participating county and municipality in the Buncombe Madison Region based on maximum height streamgage data coupled with base flood elevations (BFE) and **(2)** Special Flood Hazard Area (SFHA) floodplain maps for each participating county and municipality in the Buncombe Madison Region based on effective county data from the Federal Emergency Management Agency (FEMA).

Potential Flood Extent by Jurisdiction

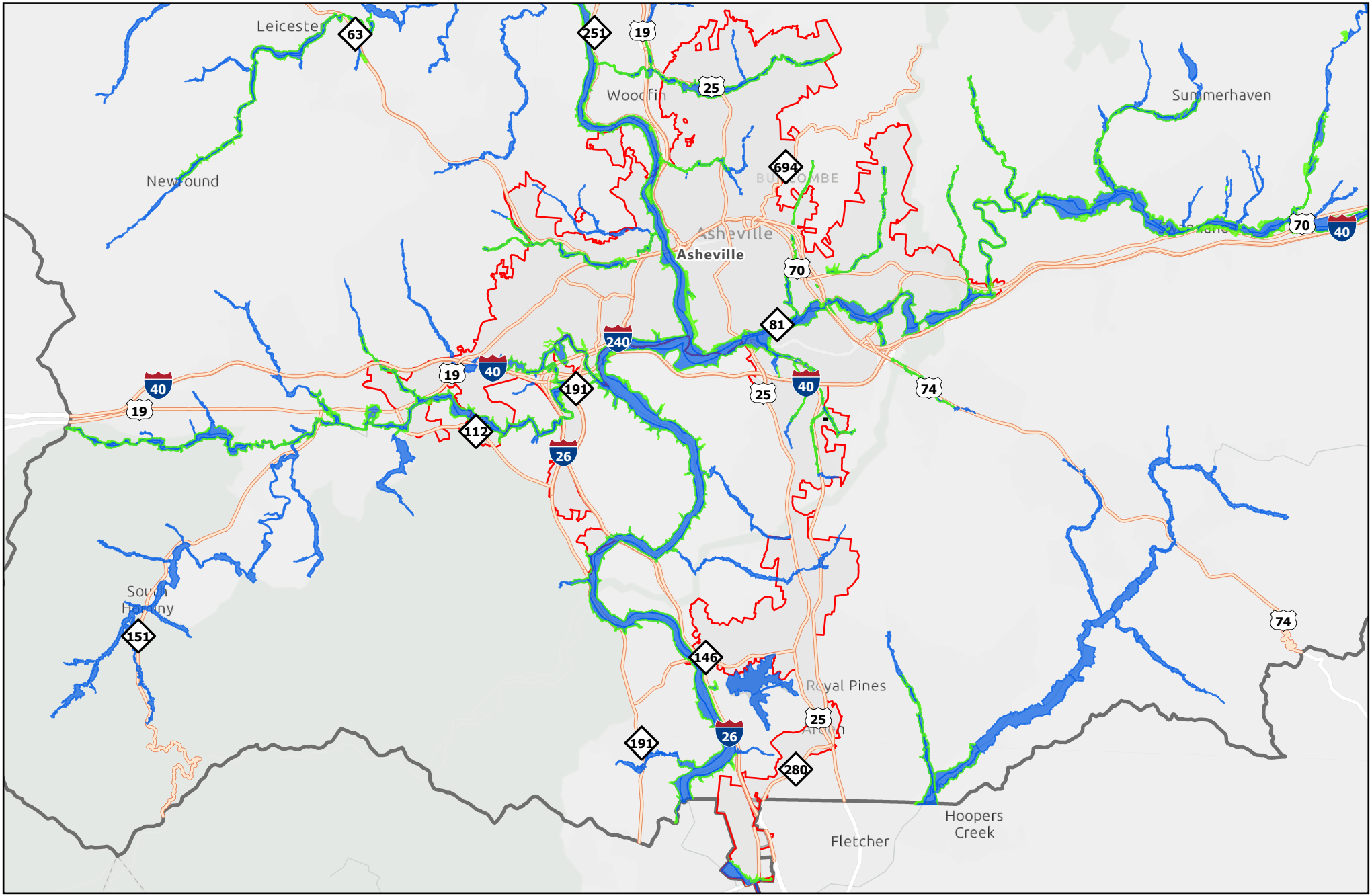
Location	USGS National Water Information System (NWIS) & NC FRIS
Buncombe County	**2,003.7 ft** (27.33 ft + 1,976.37 ft NAVD88 Datum, 9/27/2024, USGS)
Asheville	**1,974.75 ft** (24.82 ft + 1,949.93 ft NAVD88 Datum, 9/27/2024, USGS)
Biltmore Forest	No USGS gage data, approximate highest BFE = 2,192.5 ft
Black Mountain	No USGS gage data, approximate highest BFE = 2,526.3 ft
Montreat	No USGS gage data, approximate highest BFE = 3,351.3 ft
Weaverville	No USGS gage data, approximate highest BFE = 2,110.6 ft
Woodfin	No USGS gage data, approximate highest BFE = 2,176.1 ft
Madison County	**1,728.41 ft** (28.2 ft + 1,700.21 ft NAVD88 Datum, 9/27/2024, USGS)
Hot Springs	**1,333.4 ft** (22.3 ft + 1,311.1 ft NAVD88 Datum, 9/26/2024, USGS)
Marshall	**1,728.41 ft** (28.2 ft + 1,700.21 ft NAVD88 Datum, 9/27/2024, USGS)
Mars Hill	No USGS gage data, approximate highest BFE = 2,376.7 ft

Sources: USGS[1], NC FRIS[2]

[1] USGS Water Data: https://waterdata.usgs.gov/

[2] North Carolina Flood Risk Information System (FRIS): https://fris.nc.gov/

Asheville - Flood Hazard Areas



Legend

- Major Roads
- Asheville Boundaries
- Buncombe County Boundaries

Flood Zone

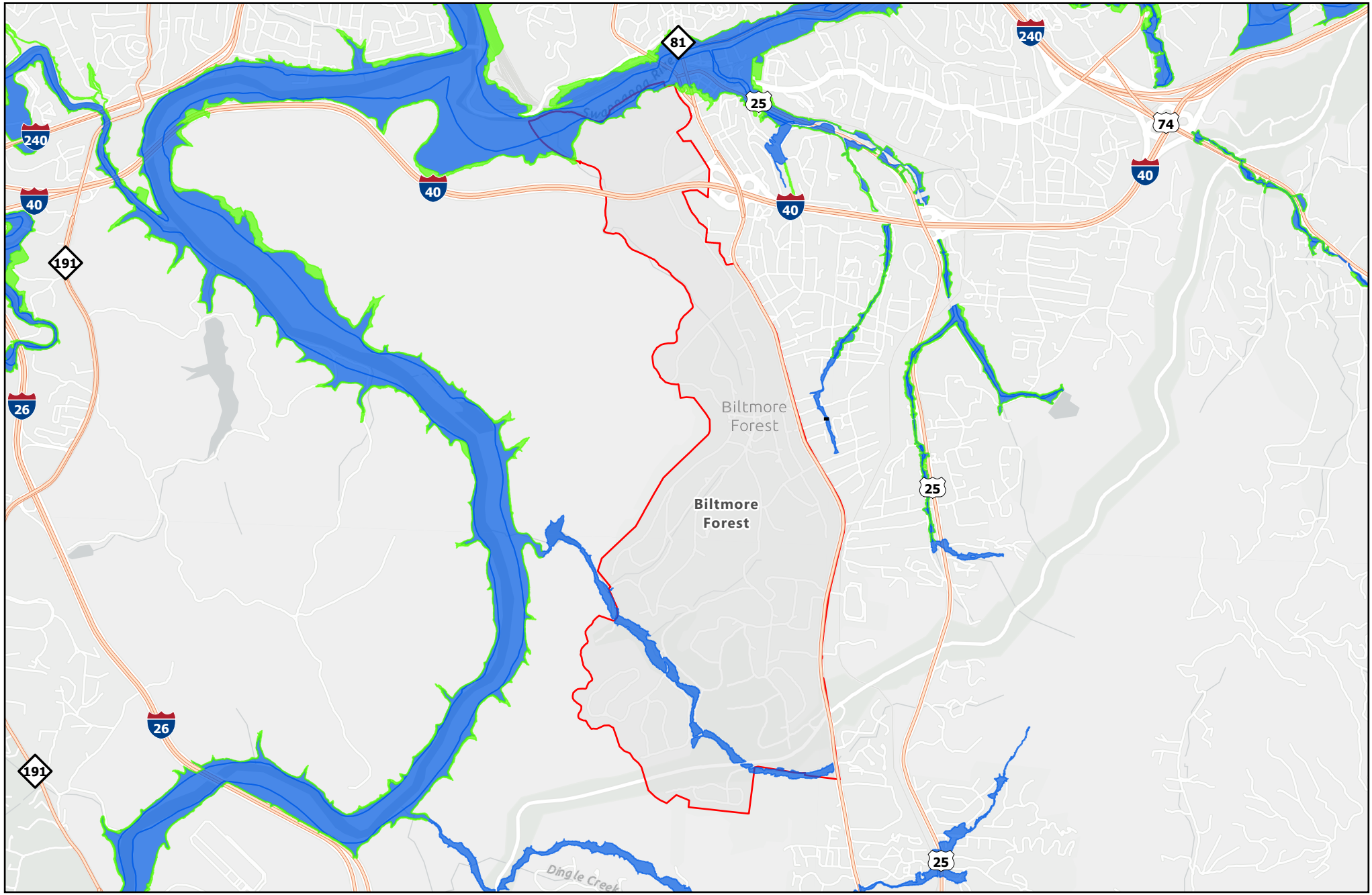
- 1% Annual Chance
- 0.2% Annual Chance

0 2 4 8 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

Biltmore Forest - Flood Hazard Areas



Legend

- Major Roads
- Biltmore Forest Boundaries
- Buncombe County Boundaries

Flood Zone

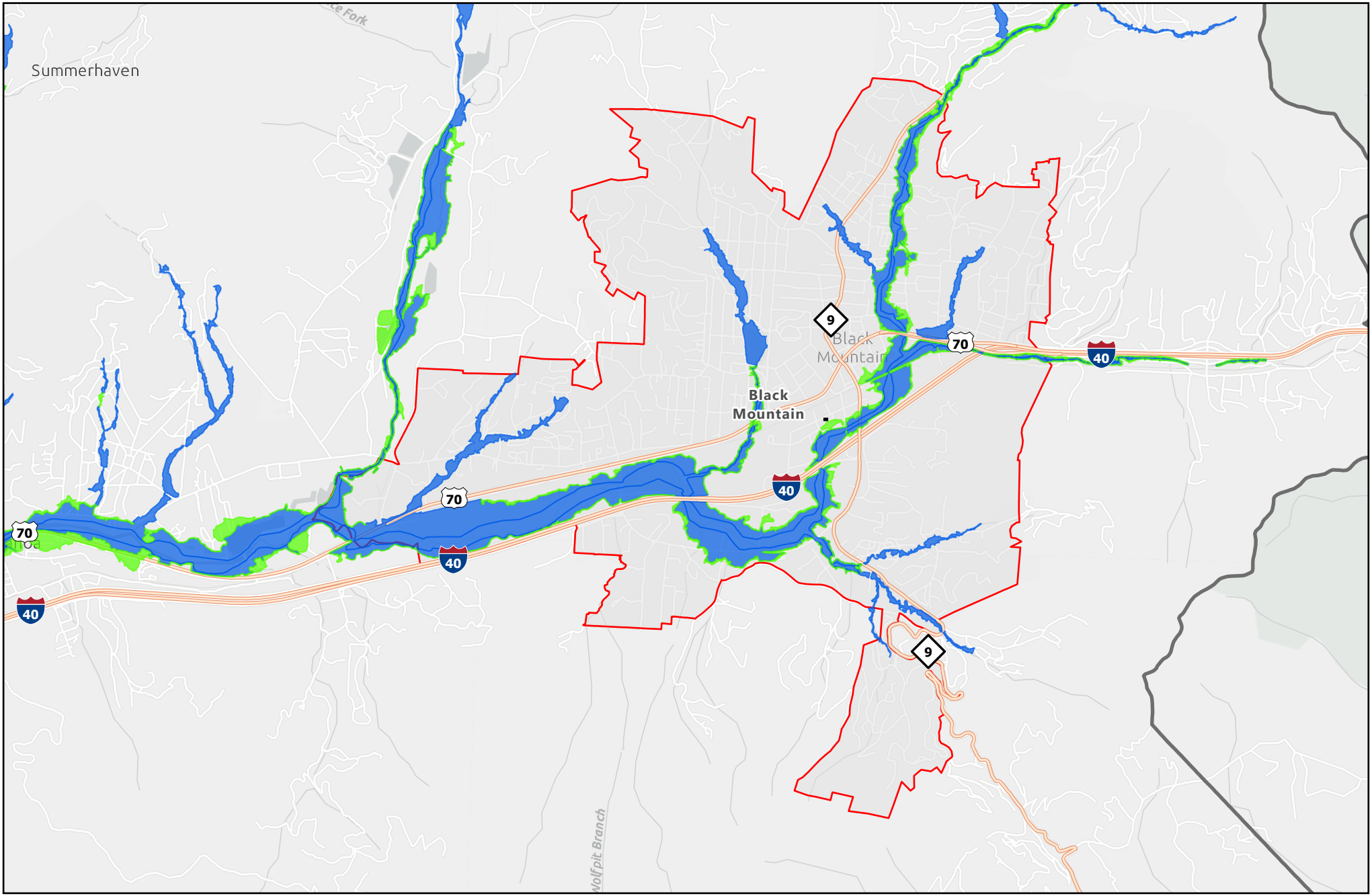
- 1% Annual Chance
- 0.2% Annual Chance

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

N

Black Mountain - Flood Hazard Areas



Legend

- Major Roads
- Black Mountain Boundaries
- Buncombe County Boundaries

Flood Zone

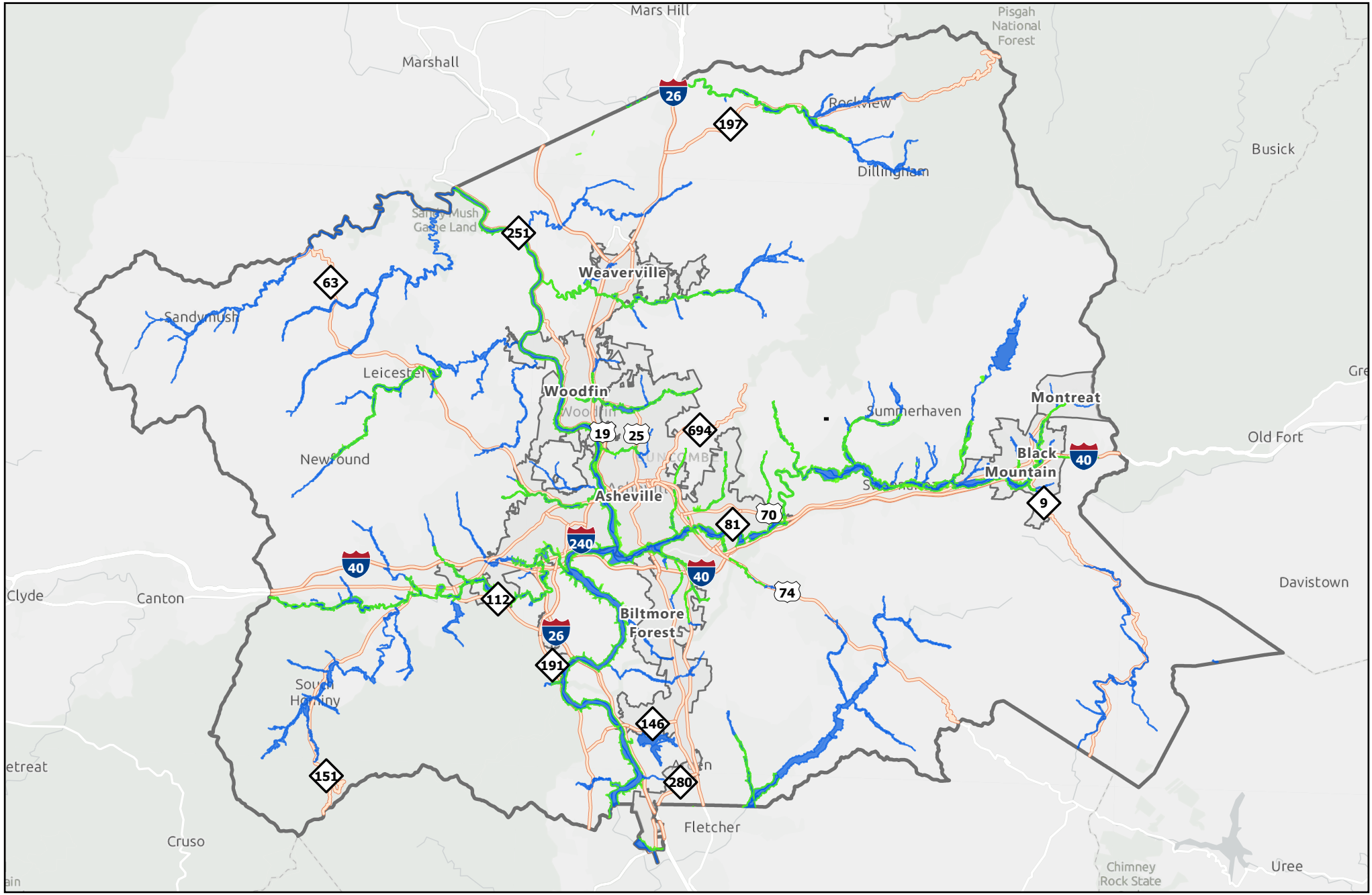
- 1% Annual Chance
- 0.2% Annual Chance

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

N

Buncombe County - Flood Hazard Areas



Legend

- Major Roads
- Buncombe County Municipal Boundaries
- Buncombe County Boundaries

Flood Zone

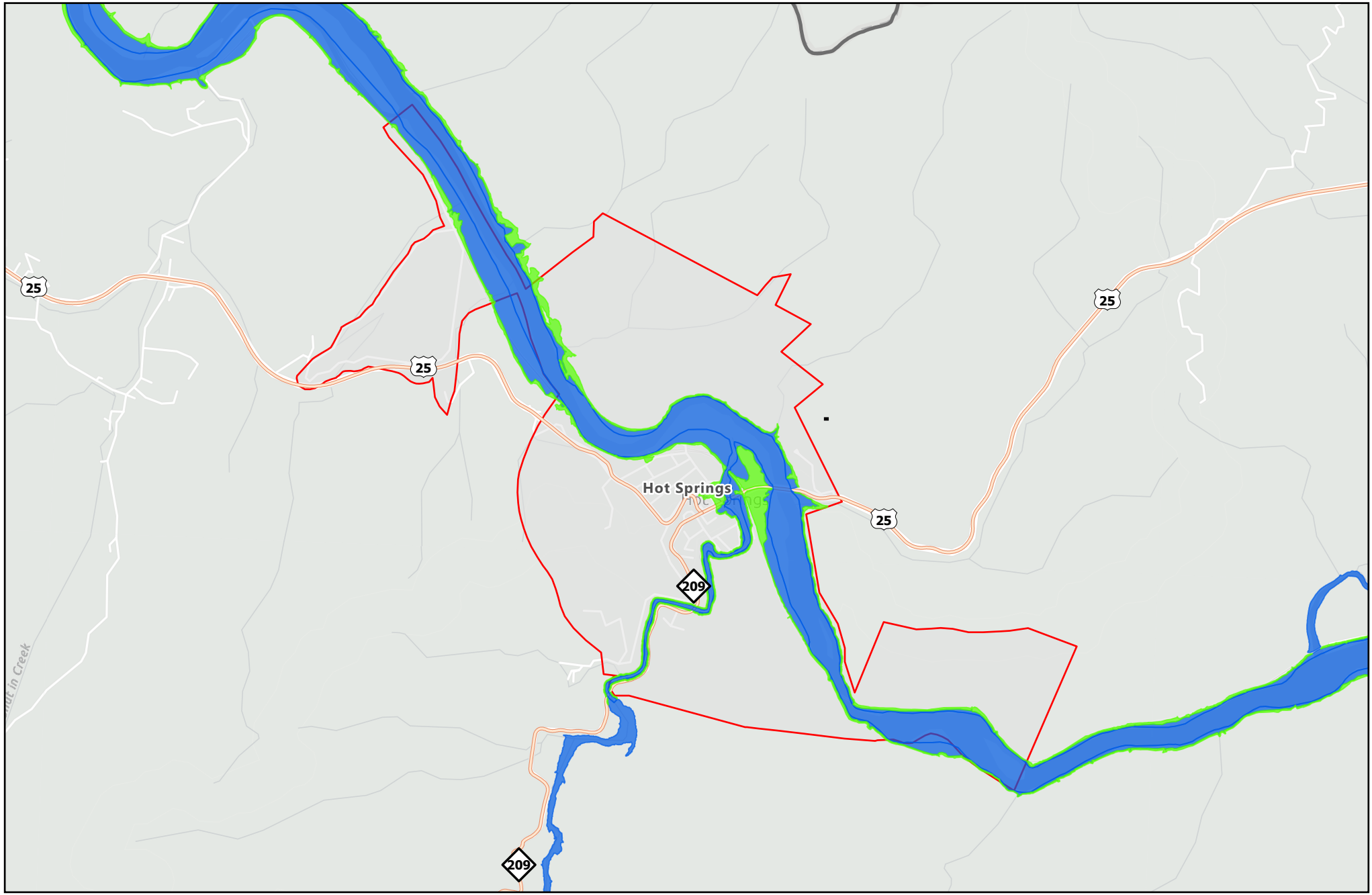
- 1% Annual Chance
- 0.2% Annual Chance

0 3.5 7 14 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

Hot Springs - Flood Hazard Areas



Legend

- Major Roads
- Hot Springs Boundaries
- Madison County Boundaries

Flood Zone

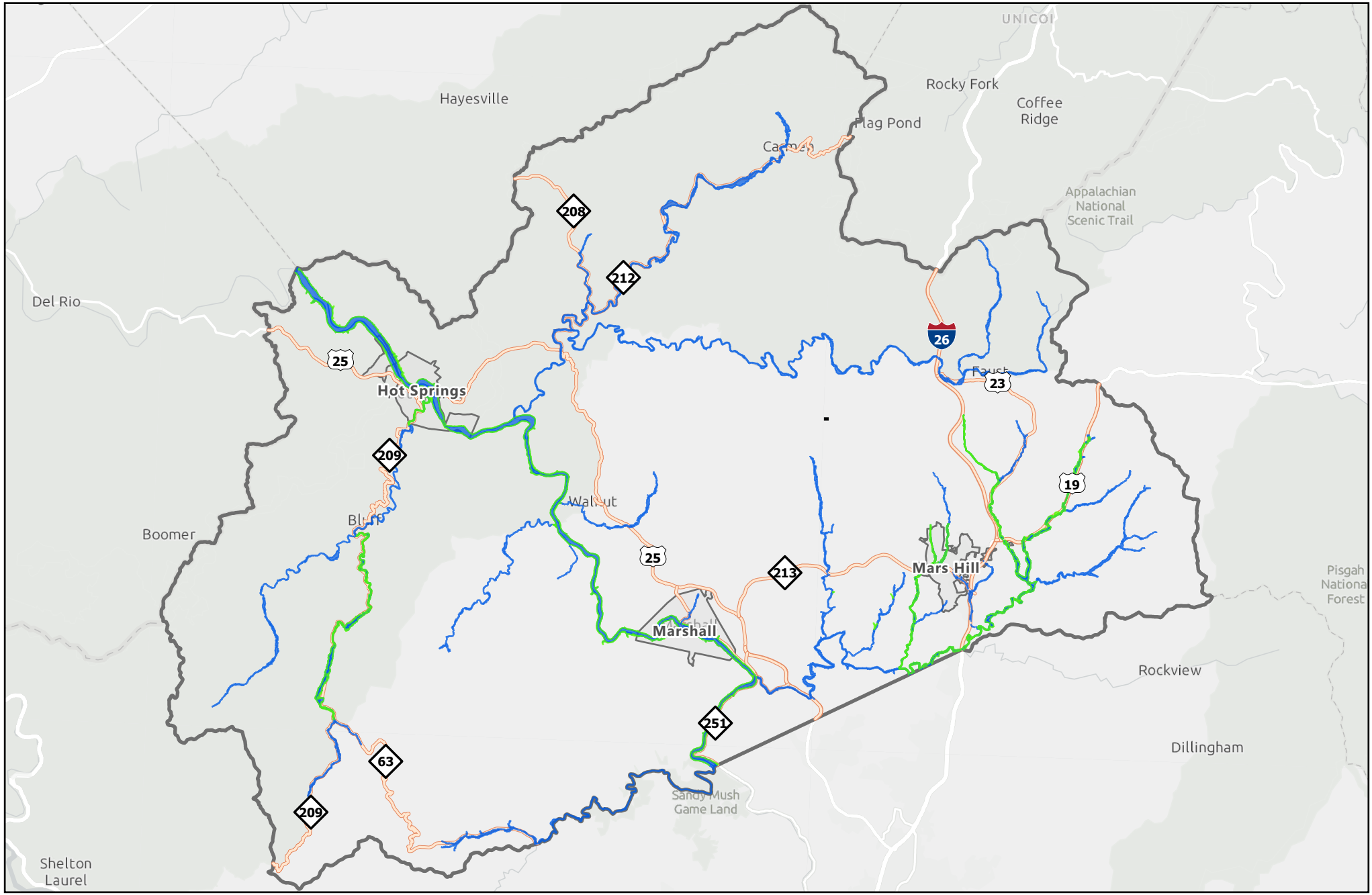
- 1% Annual Chance
- 0.2% Annual Chance

0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37115C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/1/2024

N

Madison County - Flood Hazard Areas



Legend

- Major Roads
- Madison County Municipal Boundaries
- Madison County Boundaries

Flood Zone

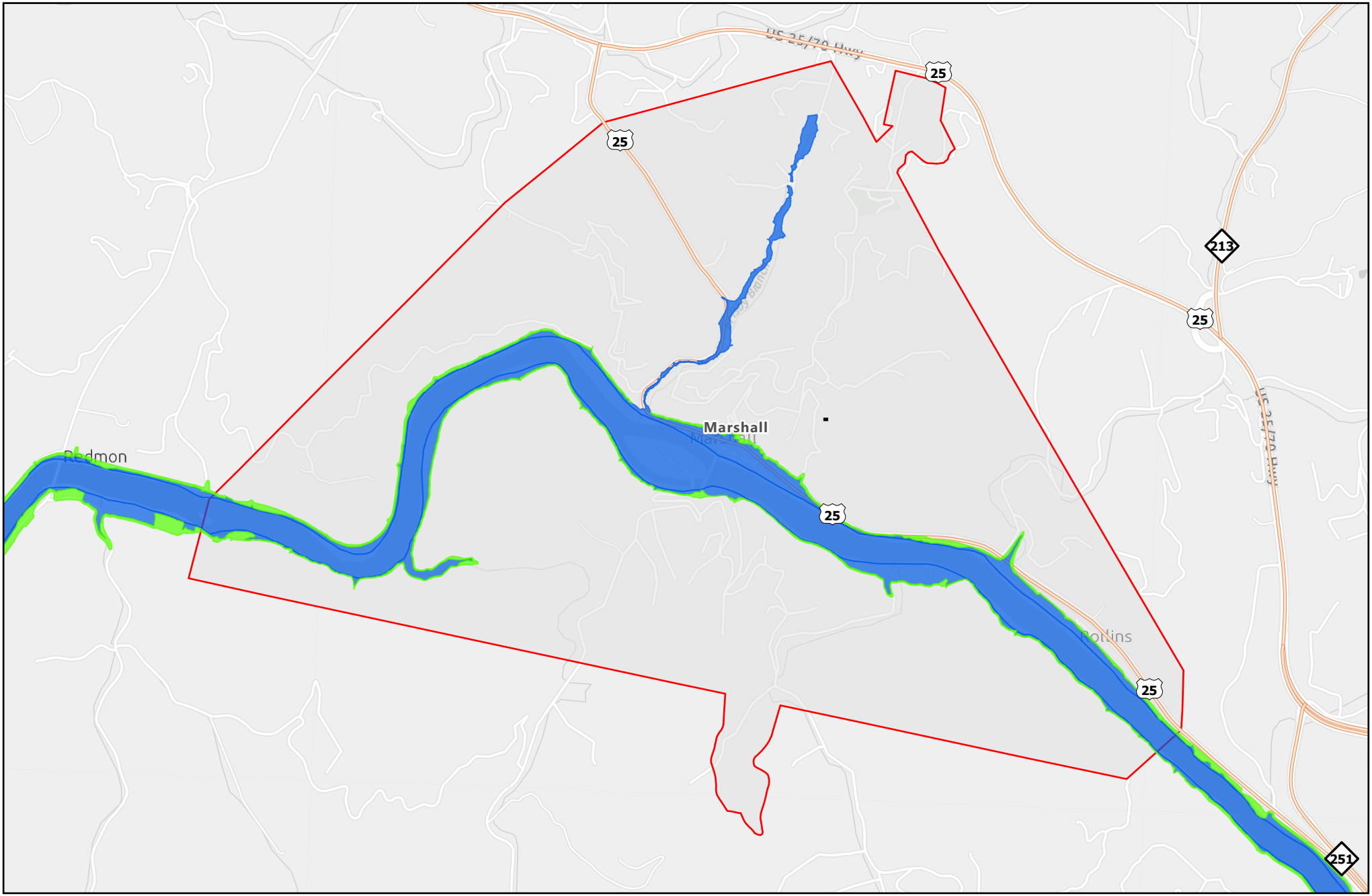
- 1% Annual Chance
- 0.2% Annual Chance

0 3.25 6.5 13 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37115C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/1/2024

Marshall - Flood Hazard Areas



Legend

- Major Roads
- Marshall Boundaries
- Madison County Boundaries

Flood Zone

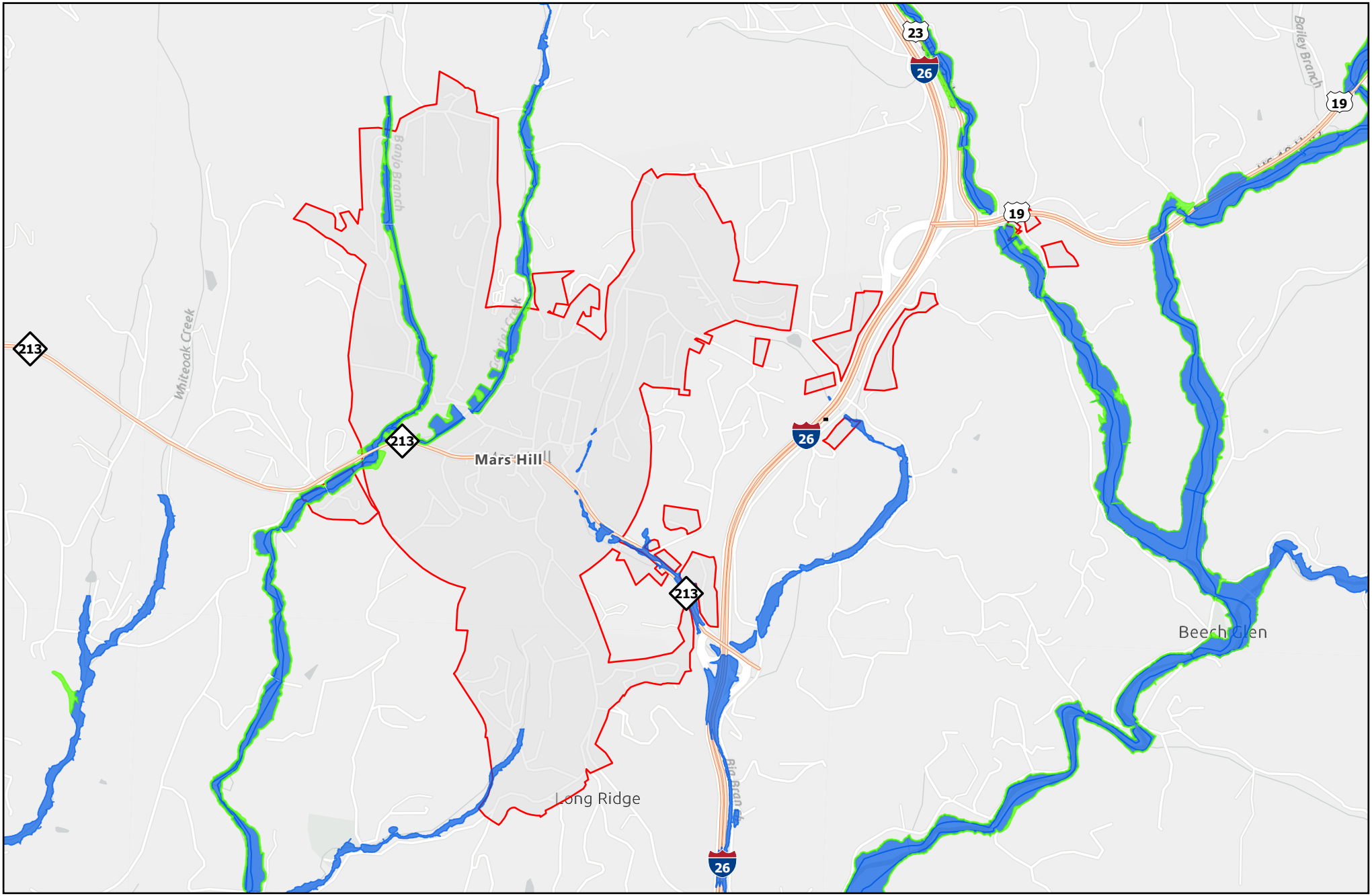
- 1% Annual Chance
- 0.2% Annual Chance

0 0.33 0.65 1.3 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37115C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/1/2024

Mars Hill - Flood Hazard Areas



Legend

- Major Roads
- Mars Hill Boundaries
- Madison County Boundaries

Flood Zone

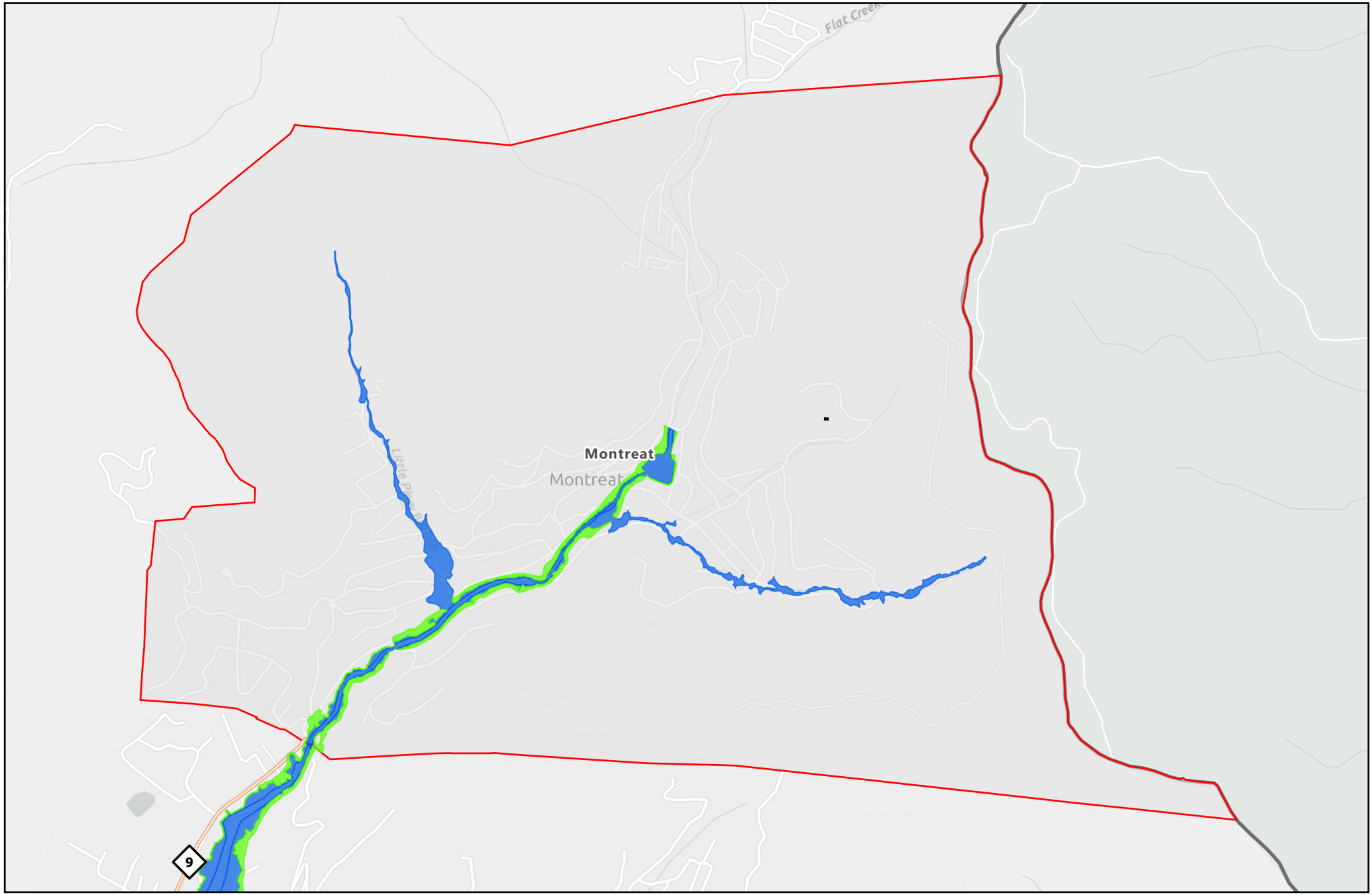
- 1% Annual Chance
- 0.2% Annual Chance

0 0.38 0.75 1.5 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37115C
Latest Study Effective Date: 1/6/2010
Latest LOMR Effective Date: 4/1/2024

N

Montreat - Flood Hazard Areas



Legend

- Major Roads
- Montreat Boundaries
- Buncombe County Boundaries

Flood Zone

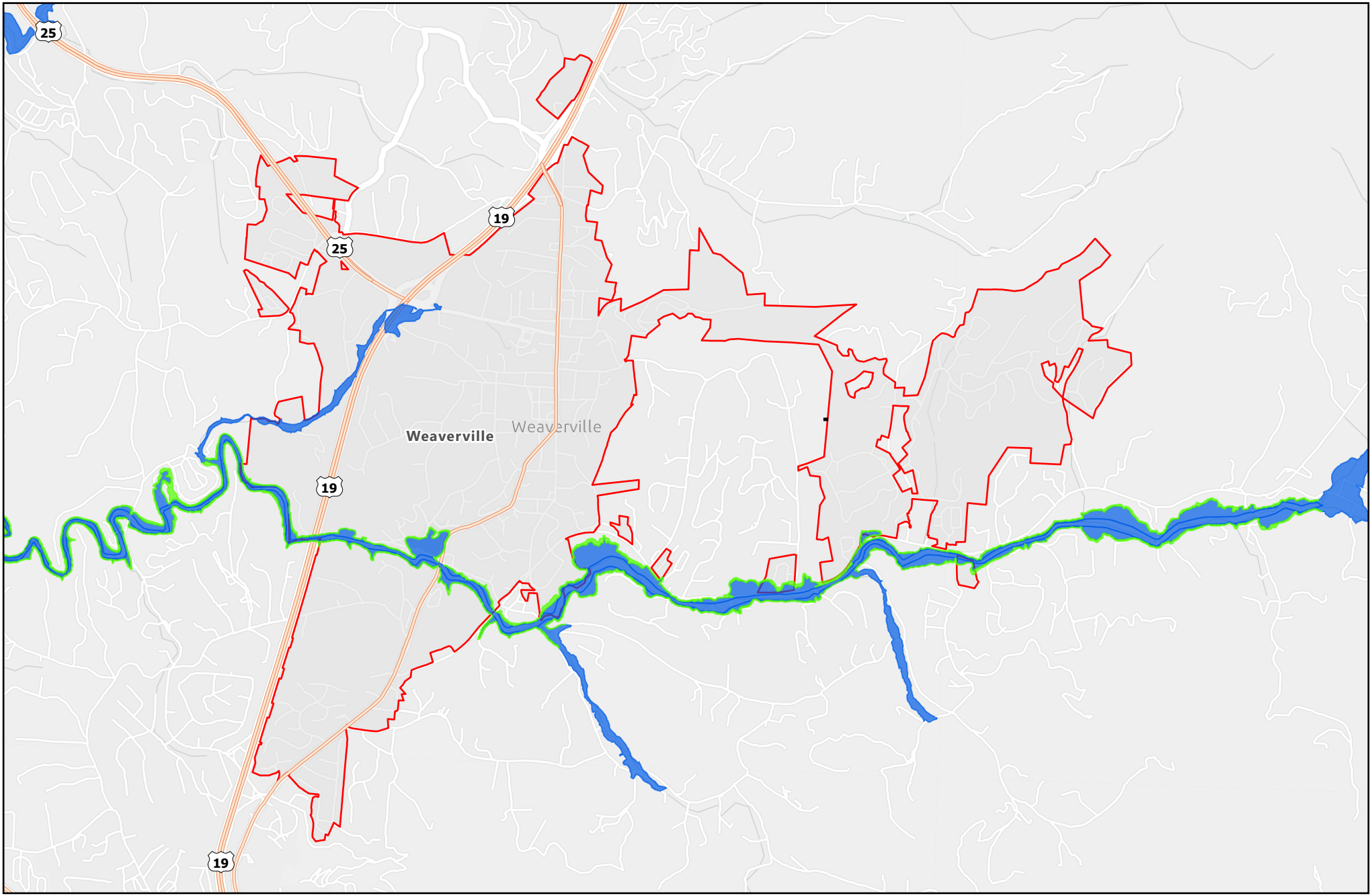
- 1% Annual Chance
- 0.2% Annual Chance

0 0.23 0.45 0.9 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

Weaverville - Flood Hazard Areas



Legend

- Major Roads
- Weaverville Boundaries
- Buncombe County Boundaries

Flood Zone

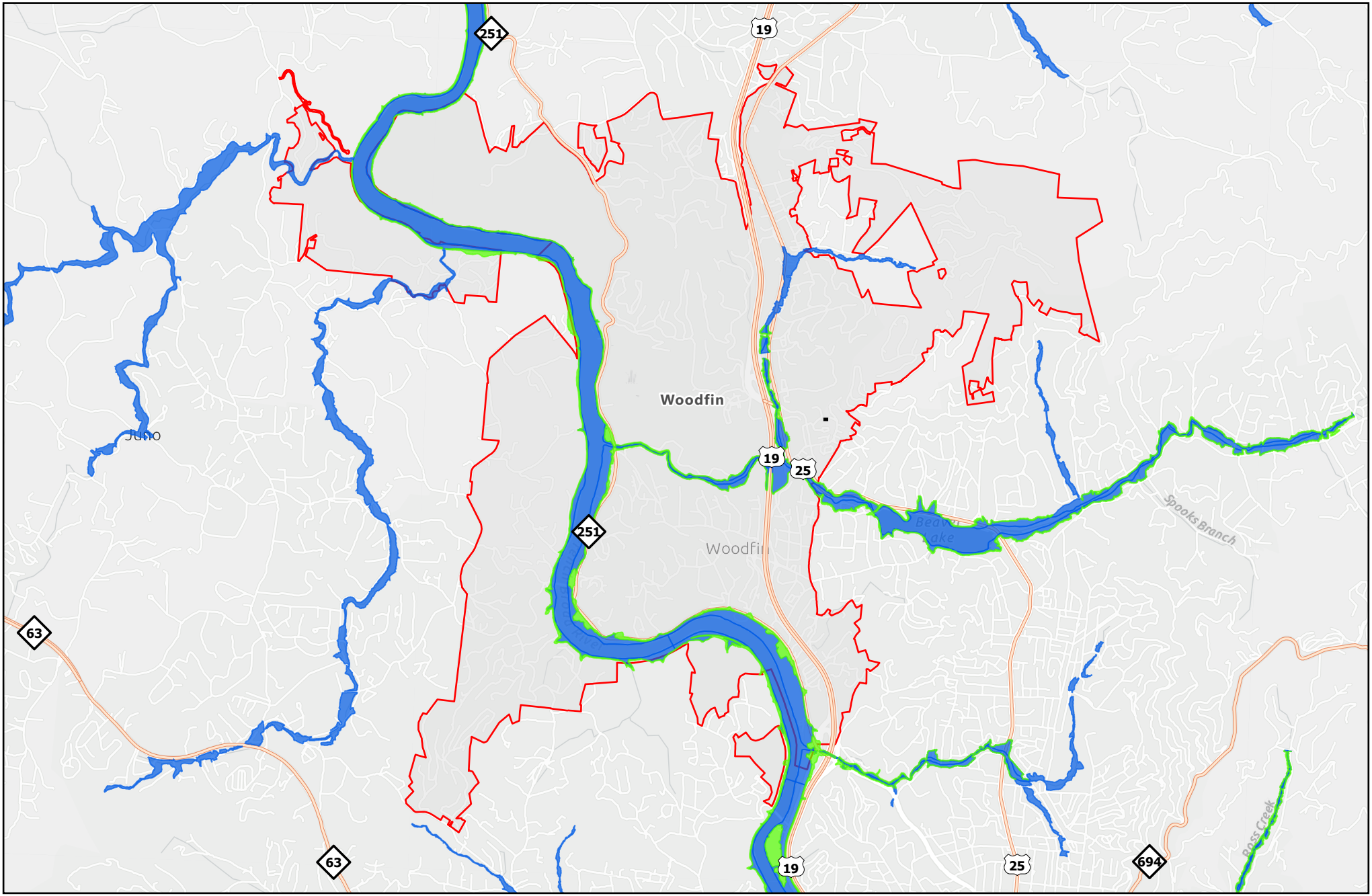
- 1% Annual Chance
- 0.2% Annual Chance

0 0.5 1 2 Miles

N

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

Woodfin - Flood Hazard Areas



Legend

- Major Roads
- Woodfin Boundaries
- Buncombe County Boundaries

Flood Zone

- 1% Annual Chance
- 0.2% Annual Chance

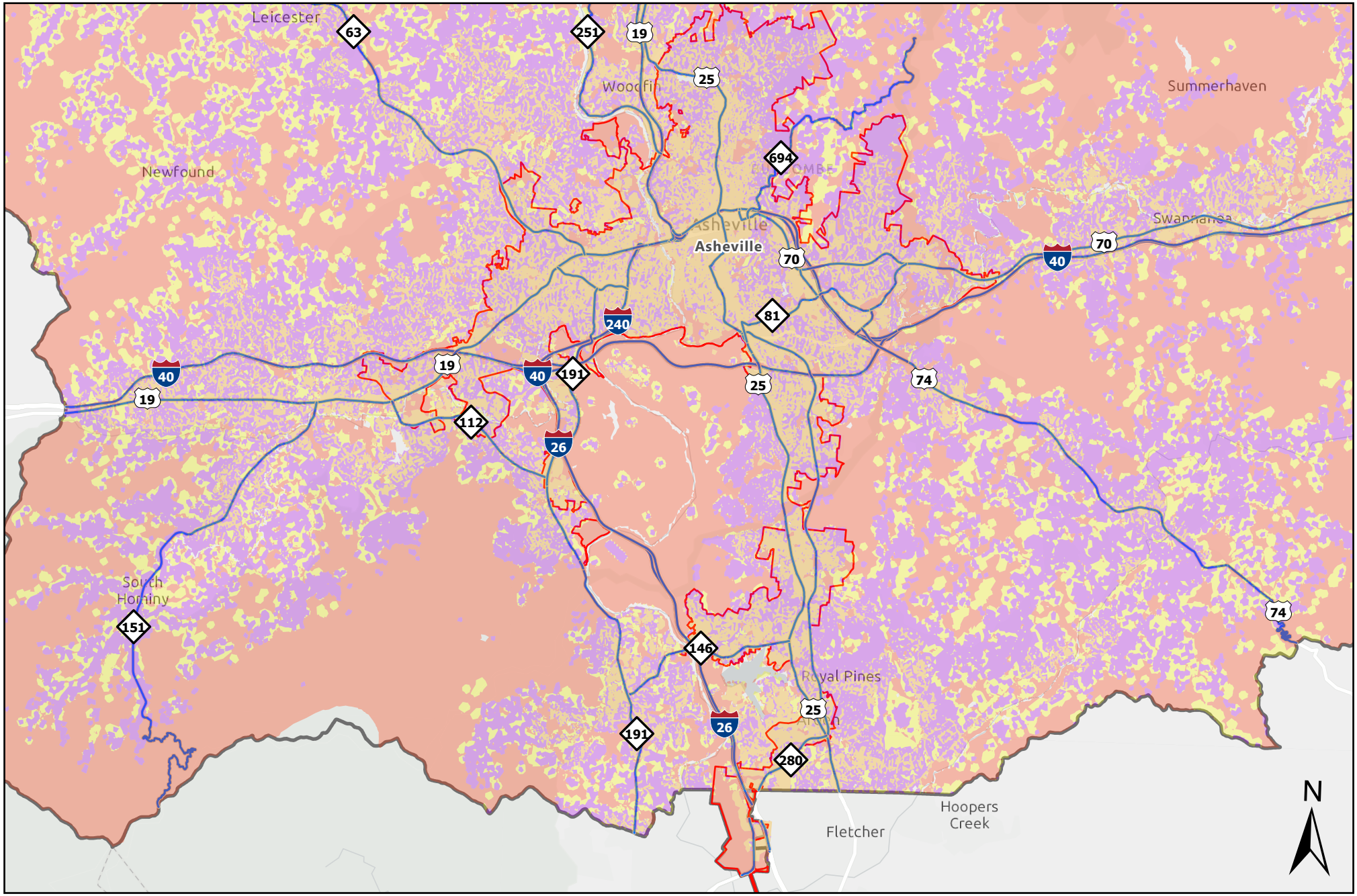
0 0.5 1 2 Miles

Data Source: Flood Map Service Center, Federal Emergency Management Agency
Product ID: NFHL_37021C
Latest Study Effective Date: 4/3/2012
Latest LOMR Effective Date: 4/9/2025

N

Appendix G
Wildfire Hazard Maps

Asheville - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Asheville Boundaries
- Buncombe County Boundaries

Functional WUI Classes

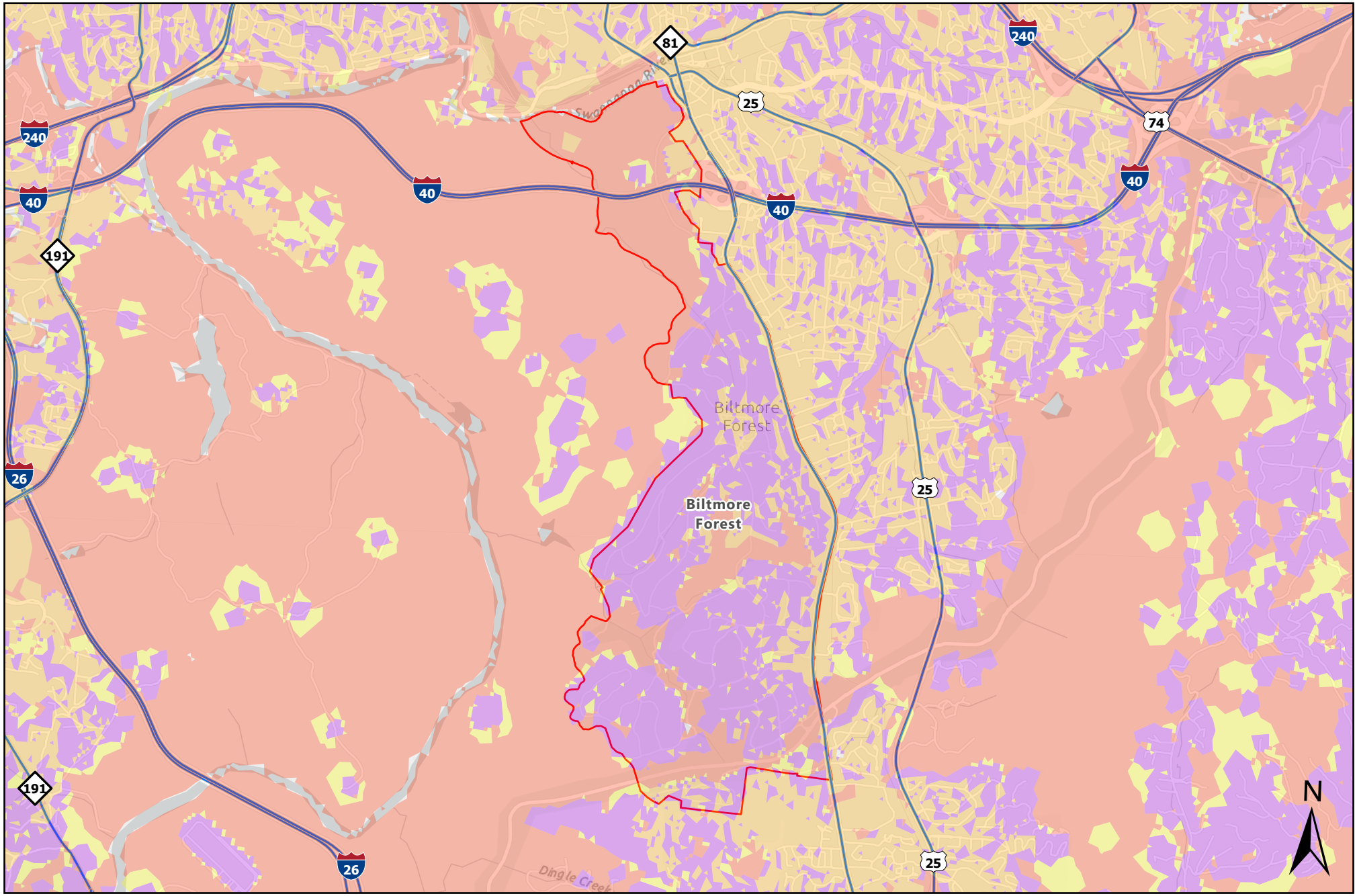
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 1.5 3 6 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Biltmore Forest - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Biltmore Forest Boundaries
- Buncombe County Boundaries

Functional WUI Classes

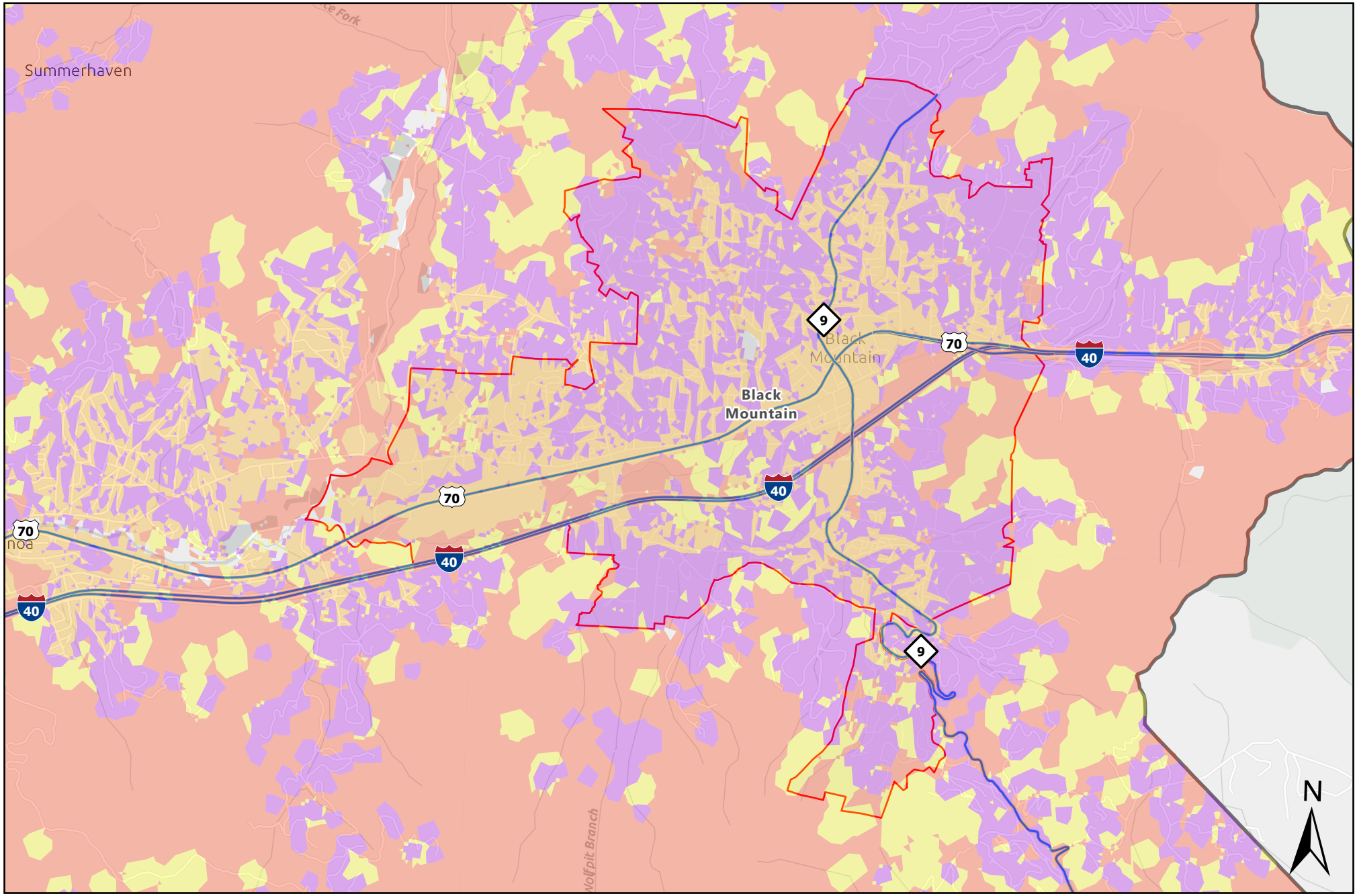
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.45 0.9 1.8 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Black Mountain - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Black Mountain Boundaries
- Buncombe County Boundaries

Functional WUI Classes

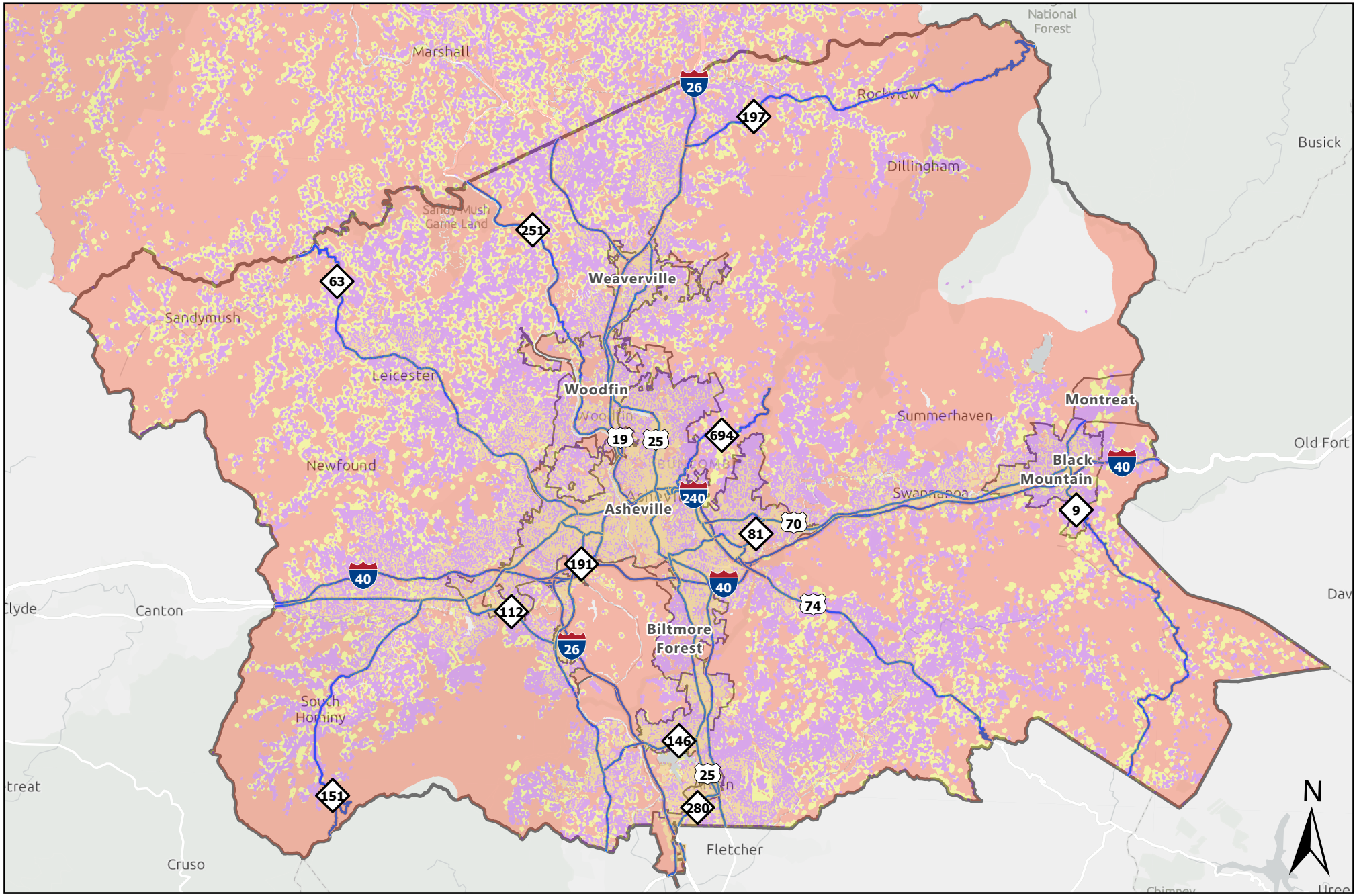
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.45 0.9 1.8 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Buncombe County - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Buncombe County Municipal Boundaries
- Buncombe County Boundaries

Functional WUI Classes

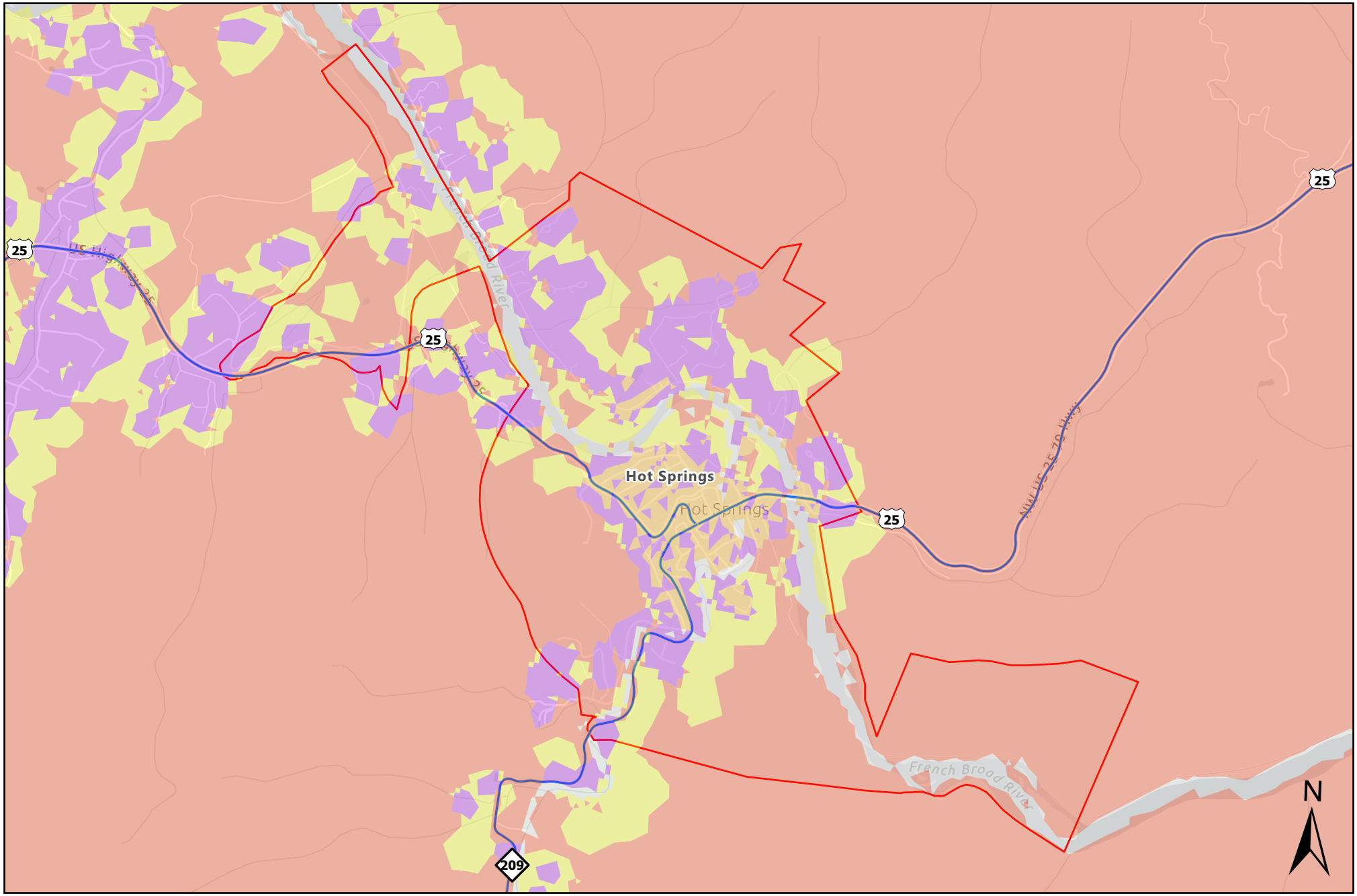
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 2.75 5.5 11 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Hot Springs - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Hot Springs Boundaries
- Madison County Boundaries

Functional WUI Classes

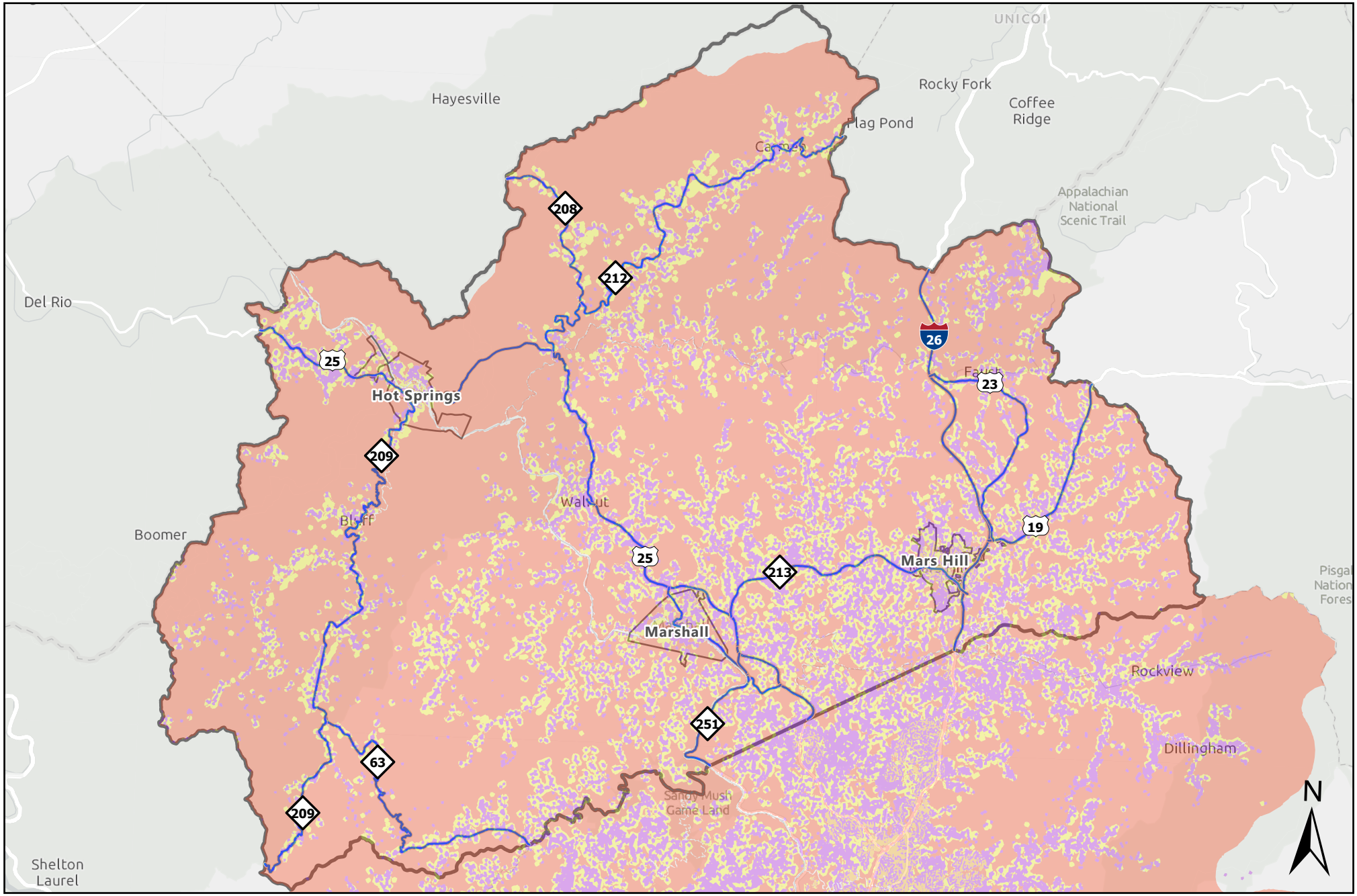
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.33 0.65 1.3 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Madison County - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Madison County Municipal Boundaries
- Madison County Boundaries

Functional WUI Classes

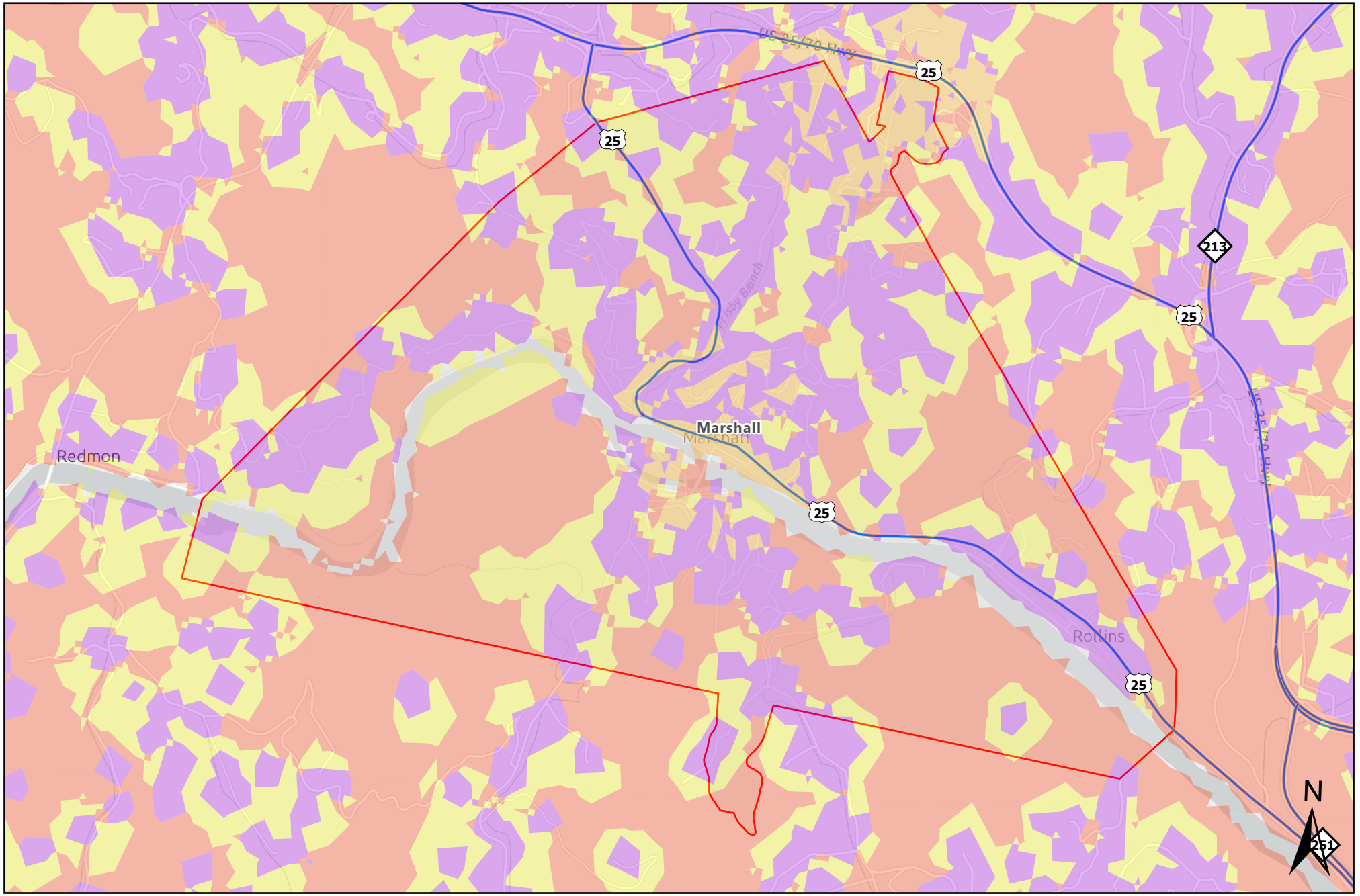
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 2.5 5 10 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Marshall - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Marshall Boundaries
- Madison County Boundaries

Functional WUI Classes

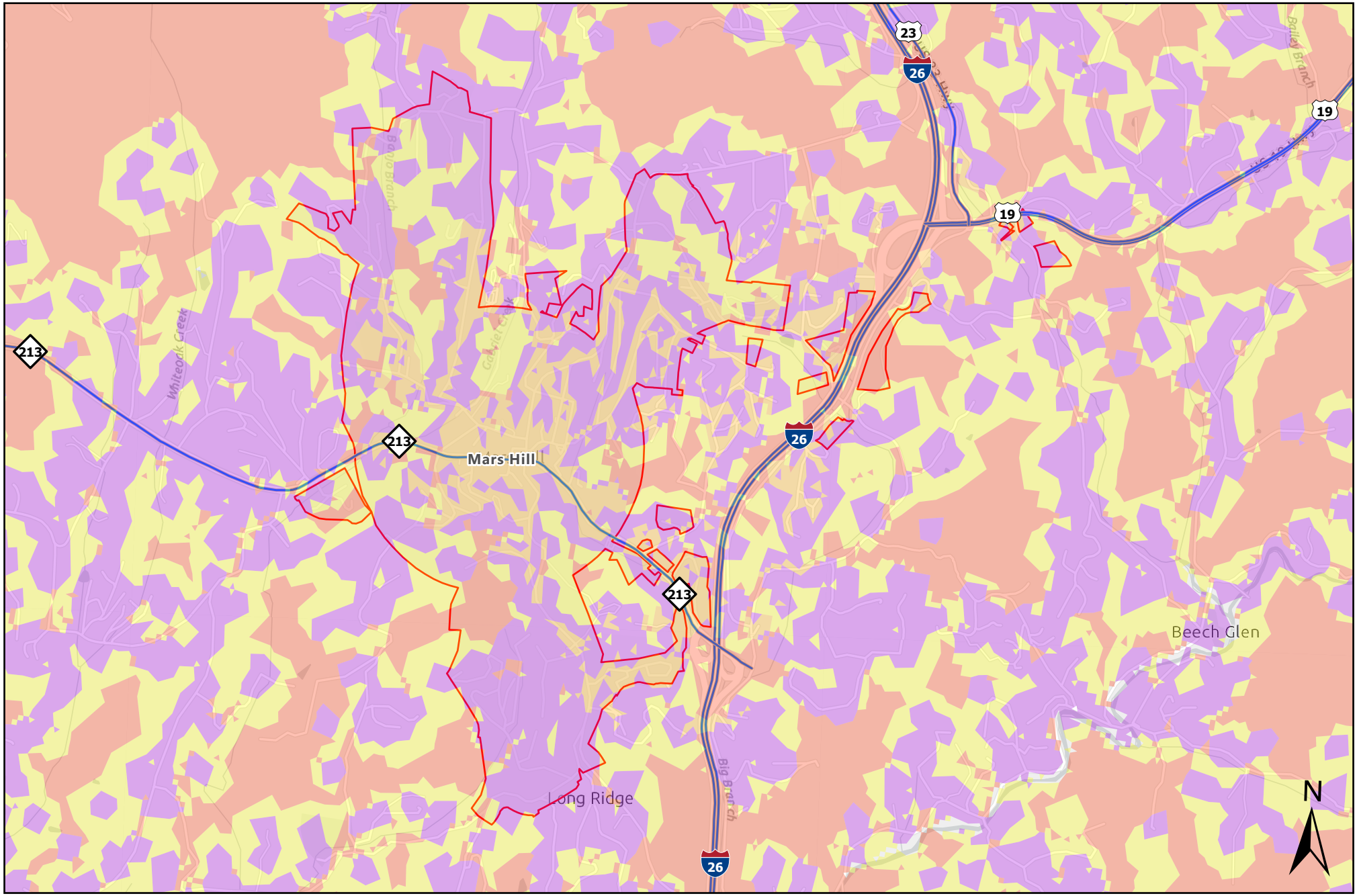
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.25 0.5 1 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Mars Hill - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Mars Hill Boundaries
- Madison County Boundaries

Functional WUI Classes

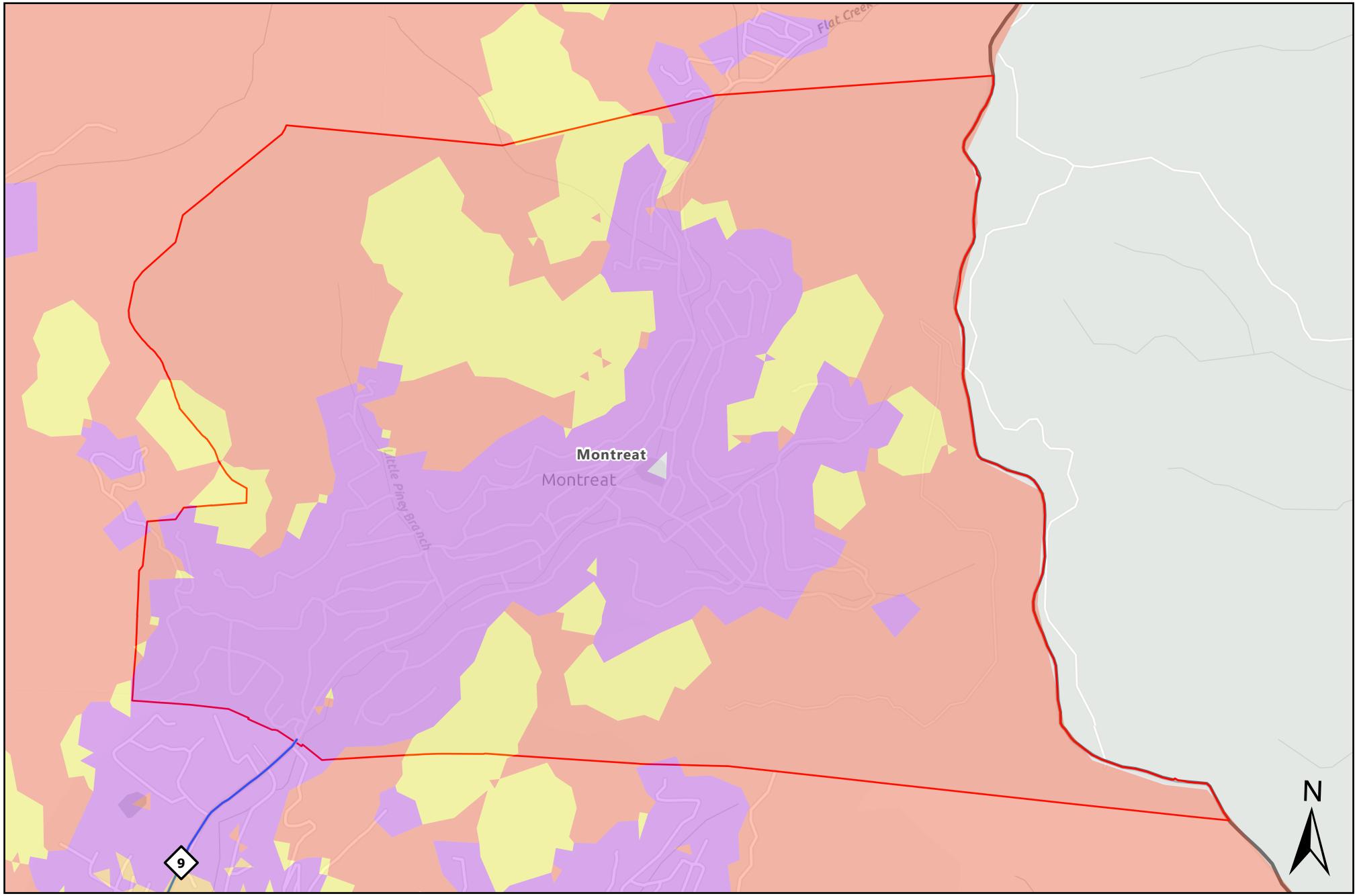
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.3 0.6 1.2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Montreat - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Montreat Boundaries
- Buncombe County Boundaries

Functional WUI Classes

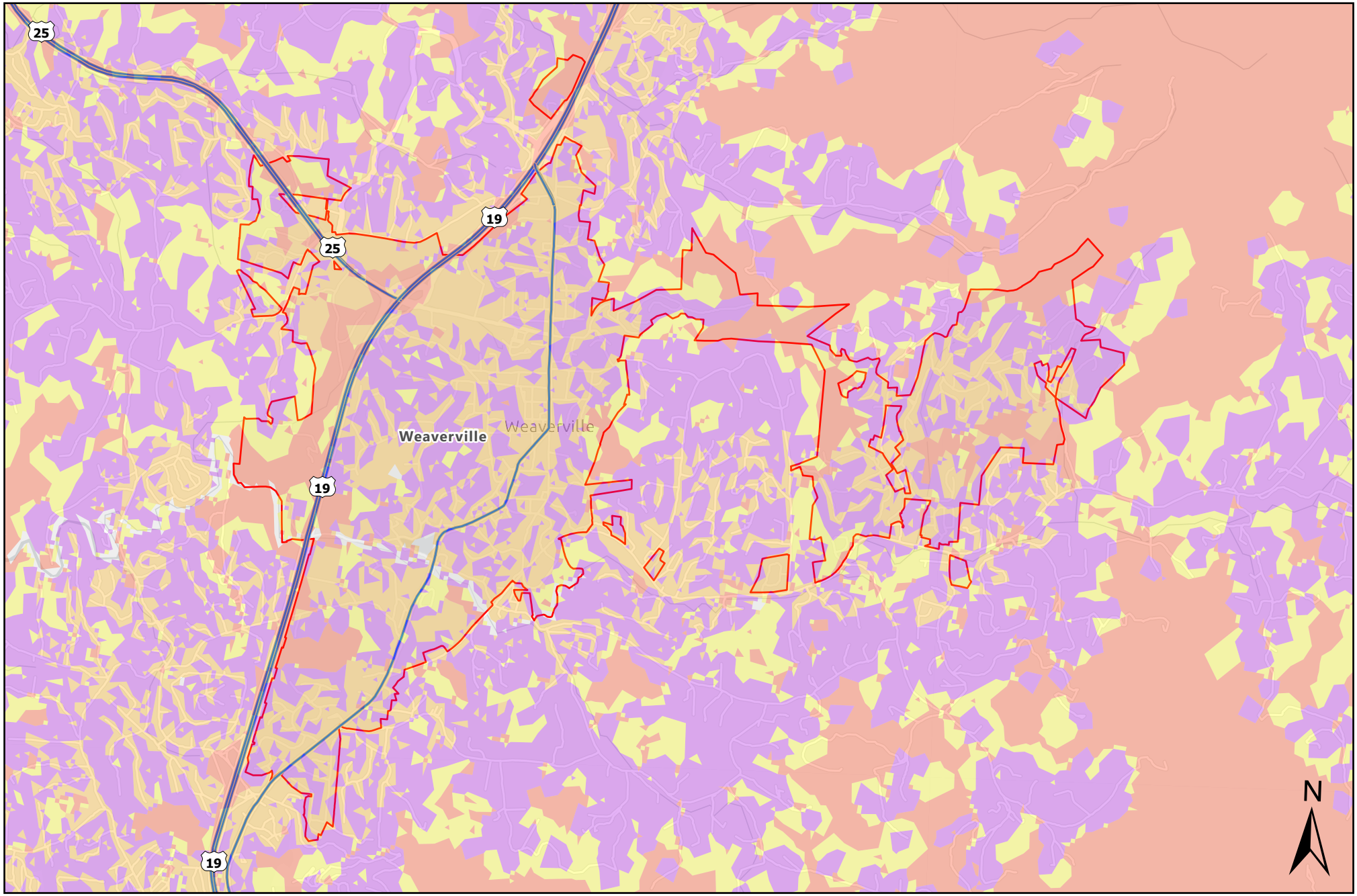
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.17 0.35 0.7 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Weaverville - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Weaverville Boundaries
- Buncombe County Boundaries

Functional WUI Classes

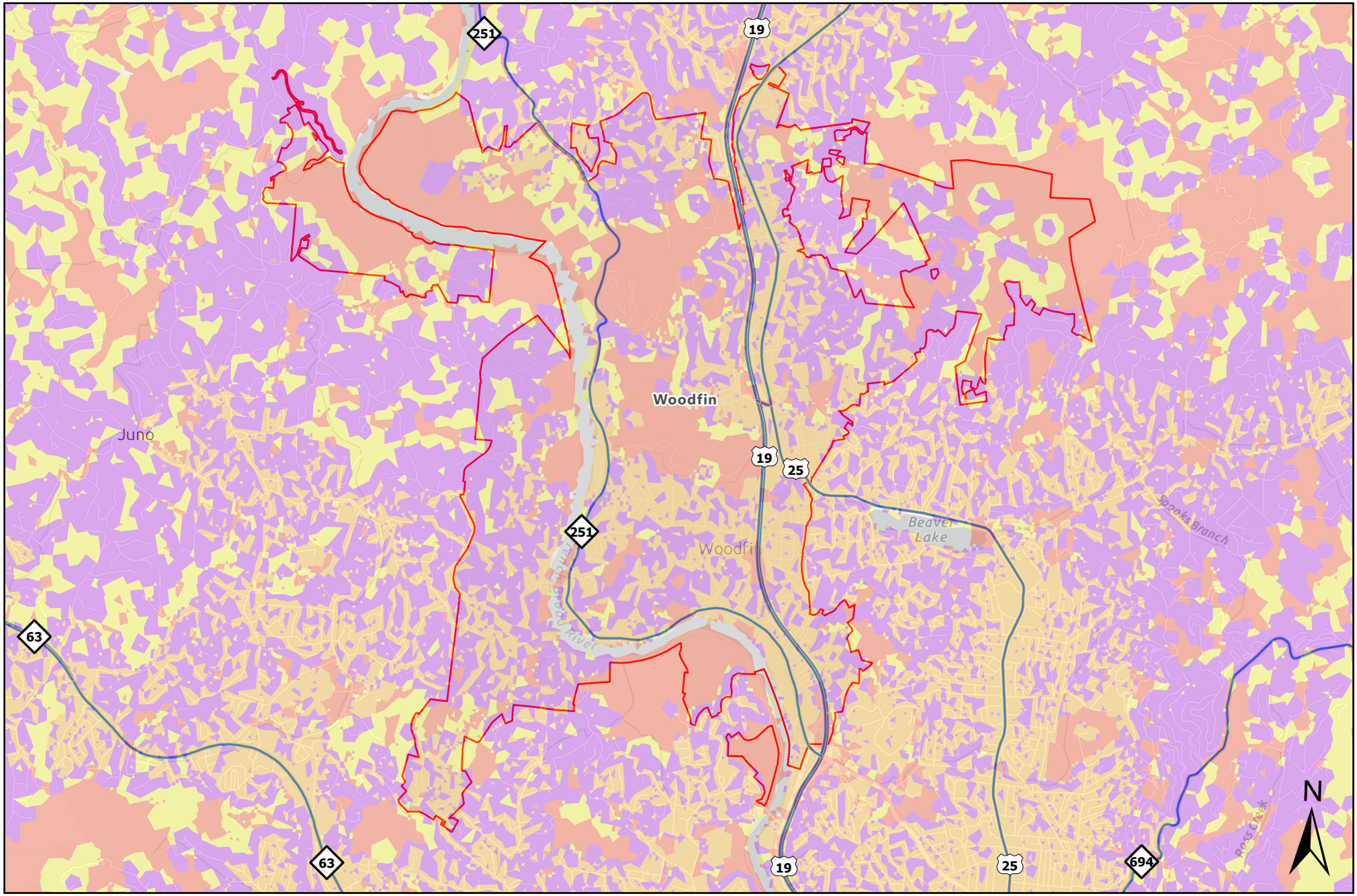
- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.38 0.75 1.5 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Woodfin - Functional Wildland Urban Interface (WUI)



Legend

- Major Roads
- Woodfin Boundaries
- Buncombe County Boundaries

Functional WUI Classes

- Primary Exposure (23% region area)
- Secondary Exposure (5% region area)
- Sources of Ember Load (56% region area)
- Wildfire Transmission Zone (18% region area)

0 0.5 1 2 Miles

Data Source: Southern Wildfire Risk Assessment
Data Layer: Functional Wildland Urban Interface (WUI)

Functional WUI represents a classification of the land near buildings (> 40 m2) into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Appendix H:
NCEI Storm Event Data

This section of the plan includes historic storm/hazard event data as reported through June 2025 to the Storm Events Database managed by the NOAA National Weather Service (NWS) and National Centers for Environmental Information (NCEI)[1].

- Table H.1 – Drought
- Table H.2 – Cold/Wind Chill
- Table H.3 – Flood/Flash Flood
- Table H.4 – Hail
- Table H.5 – Heavy Rain
- Table H.6 – Heavy Snow
- Table H.7 – High Wind
- Table H.8 – Ice Storm
- Table H.9 – Lightning
- Table H.10 – Thunderstorm Wind
- Table H.11 – Tornado
- Table H.12 – Winter Storm

[1] **Note for all NOAA NWS/NCEI data**: These records represent the best available data for a variety of natural hazards and may only represent a partial total of the actual number of events occurring within a given county or planning region due to inconsistencies in collection, validation, and entry of official records. These gaps in hazard event records will be supplemented with any local information or other authoritative sources where available.

TABLE H.1: DROUGHT EVENTS (1998-2025)

Date	Description
Buncombe County	
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	N/A
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.

Date	Description
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.
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 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.

Date	Description
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. 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

Date	Description
	couple of days of the month, spelling the start of a wetter period that brought an end to the more extreme drought conditions.
	Madison County
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.
11/1/2001	N/A
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

Date	Description
	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 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

Date	Description
	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. 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.

TABLE H.2: COLD/WIND CHILL EVENTS (2000-2025)

Date	Description
Buncombe County	
12/1/2000	December, 2000 will long be remembered for the brutal hold that cold weather had on the region. Temperatures ran 6 to 8 degrees below normal for the entire month. At Charlotte, it was the coldest month in 83 years.
1/23/2003	N/A
1/6/2014	An arctic cold front blasted through the mountains during the morning hours of the 6th, bringing strong gusty winds and the coldest air mass to have affected the region since 1994. By the evening hours, air temperatures within the mountain valleys had fallen to the single digits, while the high elevations were below zero. Winds that continued in the 20 to 30 mph range with higher gusts yielded life-threatening wind-chill values through the overnight of the 6th and the morning of the 7th. Low temperatures on the 7th ranged from 0 to -5 in the lowest valleys, to -15 to -25 above 5000 feet. Meanwhile, winds remained gusty through the morning hours of the 7th. Minimum wind chills of -20 to -30 were common in the valleys early on the 7th, while wind chills reached as low as -50 at the highest peaks. Although the winds diminished enough to bring wind chills above -15 in the valleys by early afternoon, high temperatures on the 7th did not warm out of the teens in many locations.
1/7/2015	An arctic cold front moved through Western North Carolina during the morning and afternoon of the 7th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 15 to 30 mph combined with air temperatures in the single digits and teens to yield wind chill values in the -5 to -15 range in the northern and central valleys. By daybreak on the 8th, while the gusty winds continued, air temperatures ranged from 0 to 10 above in the valleys, and as low as -15 on the high peaks and ridge tops of the northern mountains. Wind chill values during this time ranged from -10 to -20 in the valleys, while the high elevations likely saw values as low as -50, if not lower. The dangerous 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 Western North Carolina during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 15 to 30 mph combined with air temperatures in the single digits and teens to yield wind chill values in the -5 to -15 range in the valleys. By daybreak on the 19th, while the gusty winds continued, air temperatures ranged from 5 below to 5 above in the valleys, and as low as -20 on the high peaks and ridge tops of the northern mountains. Wind chill values during this time ranged from -15 to -20 in the valleys, while the high elevations likely saw values as low as -50, if not lower. The dangerous wind chills continued throughout the 19th, as air temperatures failed to warm above the teens in even the lowest valleys and the high elevations remained below 0, while most areas remained in the single digits. Wind chills remained no higher than 0 across most of the area until late morning on the 20th. Record lows were recorded at the Asheville Regional Airport on the 18th and the 19th.
1/7/2017	Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snowpacked 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 mountains 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.
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

Date	Description
	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.
12/23/2022	An arctic cold front swept across the North Carolina mountains during the morning of the 23rd and introduced the coldest air mass in more than 5 years. Valley temperatures in the single digits and lower teens combined with 10 to 20 mph winds to produce wind chill values in the 0 to -20 range throughout the 23rd and especially during the morning of Christmas Eve. Meanwhile, air temperatures around or below 0 across the high elevations resulted in wind chill values as low as -40 above 3500 feet. While winds abated throughout Christmas Eve into Christmas Day, the cold weather persisted, and even some valley locations saw air temperatures remained below freezing 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.
1/9/2025	Very cold air associated with arctic high pressure settled over the North Carolina mountains during the early morning hours of the 9th. Temperatures in the single digits and teens and winds gusting from 10 to 20 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
1/20/2025	An arctic cold front brought strong northwest winds and reinforced very cold air over the North Carolina mountains during the early morning hours of the 22nd. Temperatures in the single digits and teens and winds gusting from 15 to 25 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
1/22/2025	Strong northwest winds in the wake of another arctic cold front reinforced very cold air over the North Carolina mountains during the early morning hours of the 22nd. Temperatures in the single digits and teens and winds gusting from 20 to 30 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
2/20/2025	Very cold air and gusty winds from the northwest overspread the North Carolina mountains during the evening of the 20th in the wake of an arctic cold front. Air temperatures in the single digits and teens combined with winds gusting to 30 to 40 mph to produce wind chills of 0 to -10 in the valleys, and -10 to -20 above 3500 feet. Even colder temperatures and stronger winds produced wind chill of -20 and colder above 5000 feet.
Madison County	
12/1/2000	December, 2000 will long be remembered for the brutal hold that cold weather had on the region. Temperatures ran 6 to 8 degrees below normal for the entire month. At Charlotte, it was the coldest month in 83 years.

Date	Description
1/23/2003	N/A
1/6/2014	An arctic cold front blasted through the mountains during the morning hours of the 6th, bringing strong gusty winds and the coldest air mass to have affected the region since 1994. By the evening hours, air temperatures within the mountain valleys had fallen to the single digits, while the high elevations were below zero. Winds that continued in the 20 to 30 mph range with higher gusts yielded life threatening wind chill values through the overnight of the 6th and the morning of the 7th. Low temperatures on the 7th ranged from 0 to -5 in the lowest valleys, to -15 to -25 above 5000 feet. Meanwhile, winds remained gusty through the morning hours of the 7th. Minimum wind chills of -20 to -30 were common in the valleys early on the 7th, while wind chills reached as low as -50 at the highest peaks. Although the winds diminished enough to bring wind chills above -15 in the valleys by early afternoon, high temperatures on the 7th did not warm out of the teens in many locations.
1/7/2015	An arctic cold front moved through Western North Carolina during the morning and afternoon of the 7th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 15 to 30 mph combined with air temperatures in the single digits and teens to yield wind chill values in the -5 to -15 range in the northern and central valleys. By daybreak on the 8th, while the gusty winds continued, air temperatures ranged from 0 to 10 above in the valleys, and as low as -15 on the high peaks and ridge tops of the northern mountains. Wind chill values during this time ranged from -10 to -20 in the valleys, while the high elevations likely saw values as low as -50, if not lower. The dangerous 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 Western North Carolina during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 15 to 30 mph combined with air temperatures in the single digits and teens to yield wind chill values in the -5 to -15 range in the valleys. By daybreak on the 19th, while the gusty winds continued, air temperatures ranged from 5 below to 5 above in the valleys, and as low as -20 on the high peaks and ridge tops of the northern mountains. Wind chill values during this time ranged from -15 to -20 in the valleys, while the high elevations likely saw values as low as -50, if not lower. The dangerous wind chills continued throughout the 19th, as air temperatures failed to warm above the teens in even the lowest valleys and the high elevations remained below 0, while most areas remained in the single digits. Wind chills remained no higher than 0 across most of the area until late morning on the 20th. Record lows were recorded at the Asheville Regional Airport on the 18th and the 19th.
1/7/2017	Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snowpacked 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 mountains 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.
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

Date	Description
	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.
12/23/2022	An arctic cold front swept across the North Carolina mountains during the morning of the 23rd and introduced the coldest air mass in more than 5 years. Valley temperatures in the single digits and lower teens combined with 10 to 20 mph winds to produce wind chill values in the 0 to -20 range throughout the 23rd and especially during the morning of Christmas Eve. Meanwhile, air temperatures around or below 0 across the high elevations resulted in wind chill values as low as -40 above 3500 feet. While winds abated throughout Christmas Eve into Christmas Day, the cold weather persisted, and even some valley locations saw air temperatures remained below freezing 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.
1/9/2025	Very cold air associated with arctic high pressure settled over the North Carolina mountains during the early morning hours of the 9th. Temperatures in the single digits and teens and winds gusting from 10 to 20 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
1/20/2025	An arctic cold front brought strong northwest winds and reinforced very cold air over the North Carolina mountains during the early morning hours of the 22nd. Temperatures in the single digits and teens and winds gusting from 15 to 25 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
1/22/2025	Strong northwest winds in the wake of another arctic cold front reinforced very cold air over the North Carolina mountains during the early morning hours of the 22nd. Temperatures in the single digits and teens and winds gusting from 20 to 30 mph resulted in minimum wind chill values of 0 to -10 during this time. Stronger winds and temperatures at or below 0 caused wind chills of -15 or colder above 5000 feet.
2/20/2025	Very cold air and gusty winds from the northwest overspread the North Carolina mountains during the evening of the 20th in the wake of an arctic cold front. Air temperatures in the single digits and teens combined with winds gusting to 30 to 40 mph to produce wind chills of 0 to -10 in the valleys, and -10 to -20 above 3500 feet. Even colder temperatures and stronger winds produced wind chill of -20 and colder above 5000 feet.

TABLE H.3: FLOOD/FLASH FLOOD EVENTS (2000-2025)

Location	Date	Description
Buncombe County		
LEICESTER	3/20/2000	An area of precipitation which fell as rain in the low elevations, and snow in the higher elevations of the northern mountains , crossed western North Carolina early in the morning. Two to 4 inches of rain fell in a short time across portions of Buncombe and Henderson counties and caused small streams to flood briefly. Snowfall in the high elevations ranged between 2 and 3 inches, with 5 inches reported from the highest peaks.
SKYLAND	6/22/2001	A significant, classic flash flood developed when nearly-stationary thunderstorms dumped as much as 4 inches of rain on southern Buncombe County in a short period of time. Several creeks flooded, including Hominy and Avery creeks. The worst of the flooding occurred between 1245 pm and 145 pm EST. A mobile home park was flooded, businesses flooded and cars were caught in rapidly developing flood water. A number of rescues were required.
WEAVERVILLE	8/8/2001	Lake Louise filled with water from heavy rain of up to 3 inches early in the evening. The lake was near bankfull already due to heavy rain the night before. The lake flooded surrounding roads.
ASHEVILLE	6/5/2002	Some street flooding occurred, and water entered a few homes.
WEAVERVILLE	2/22/2003	Heavy rainfall resulted in flooding along several creeks, as well as mudslides in northern Buncome County. Some outdoor walls fell due to mudslides. A mobile home park flooded near Weaverville.
UNINCORPORATED AREA	5/6/2003	Early morning thunderstorms resulted in rapid rises and flash flooding along some small creeks and streams, mainly in the Asheville area. Mud and rock slides also developed. the basements of some businesses and homes were flooded in the Biltmore area of Asheville, resulting in significant property damage.
LEICESTER	7/13/2003	Numerous creeks overflowed their banks and flooded adjacent roads.
ASHEVILLE	8/4/2003	Slow-moving thunderstorms producing very heavy rainfall flooded several roads in Biltmore Village. Up to 3 feet of water covered some roads. Several businesses were also flooded. Also, Beaverdam Rd was flooded from Asheville to areas north of the city.
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	9/7/2004	Flooding began during the late afternoon across the county and gradually worsened during the evening and overnight hours, with near-record flooding observed along the Swannaoa and French Broad Rivers. Most valley communities across the county were affected by severe flooding along the rivers, or along smaller streams. Flooding along the Swannanoa devastated Asheville's Biltmore area, as well as the Black Mountain and Swannanoa communities. Numerous businesses and residences were damaged or destroyed by flood waters. Widespread damage to roads and bridges also occurred, either due to flooding or landslides.
UNINCORPORATED AREA	9/16/2004	After many hours of moderate to heavy rainfall, gradual rises on creeks and streams resulted in the second devastating flood across the county in just 9 days. Flooding first began around Candler, but eventually affected every valley community in the county. Flooding was actually more widespread than during the Frances flood, but was not quite as severe. Virtually every stream in the county flooded, including the French Broad River. Two males, ages 32 and 28, died in Leicester when they attempted to cross a flooded area in a pickup truck. Hundreds of roads were flooded and the bridge over highway 197 in Barnardsville was washed out. The French Broad flooded the studios and other businesses in the River District in downtown Asheville. At Enka, a motel was flooded, which necessitated the rescue of 40 people. Numerous homes were destroyed or severely damaged by flood water or landslides.
ARDEN	7/11/2005	Four families evacuated from an apartment complex due to flooding. One resident reported 6-8 inches of water entered his apartment.
SKYLAND	7/13/2005	Several creeks overflowed their banks in locations from Skyland to Asheville Regional Airport, flooding roads, including Mills Gap and Hendersonville Rds, and some buildings.
LEICESTER	7/19/2005	Two roads flooded near the Madison County line. A private bridge was also washed out near Leicester
WEAVERVILLE	5/21/2012	The Eden Glenn Mobile Home Park was flooded by Flat Creek after around 3 inches of rain fell in an hour. Approximately 30 people were evacuated from about 2 dozen mobile homes between 7 pm and midnight. One utility building floated away and there was underpinning damage to a few trailers. County officials reported that this same area flooded around 17 years ago.

Location	Date	Description
NEW BRIDGE	7/11/2012	Two to three inches of rain fell across the metro Asheville area, with an inch of that falling in around an hour. This caused widespread urban flooding with numerous roads in city covered by 1 to 2 feet of water. The flooding appears to have been almost entirely the result of poor drainage. Roads affected by urban flooding included Weaverville Rd, Riverside Dr, Charlotte St, Merrimon Ave, Druid Dr and the intersection of Haywood Rd and Patton Ave. Water entered the basements of some buildings and there were several vehicle accidents as well. Three homes were evacuated, not as a direct result of flooding, but out of concern that the embankment they are on would fail.
MURPHY JCT	1/30/2013	Urban flooding affected the Biltmore Village area, including Brook Street which was flooded by 2 to 3 feet of water. One car was stranded in the high water. Sweeten Creek Rd was closed near London Rd and Caribou Road in the same area. Rescuers had to pull people from a car stuck in flood waters on Sweeten Creek Rd. Two stores in the Biltmore Village had a few inches of water enter them. Probable urban flooding was reported at State St and Amboy Rd.
GROVEMONT	1/30/2013	A stream flooded Highway 70 west of Black Mountain, closing the road in both directions near it's intersection with Grovestone Rd. Martin Road was also flooded by a stream about a half mile west of Swannanoa.
FAIRVIEW	1/30/2013	Gap Creek Road was flooded by Gap Creek.
ELK MTN	5/5/2013	A mix of river and stream flooding affected the county after several inches of rain fell, mainly on the 5th. A few streams went out of their banks during the evening hours of the 5th. Charlotte Street was flooded by Flat Creak during this time. Starting during the early morning hours of the 6th, much of the French Broad and Swannanoa River systems went above flood stage. Several roads were affected around Asheville where the French Broad was above flood stage from 115 AM EDT on the 6th until 630 PM EDT that day. Flooded roads included Amboy Road, Swannanoa River Road, Riverside Drive from Craven Street to the I-26 on-ramp, Lyman Street and Azalea Road among others. Several rock and mud slides affected the county as well, particularly the south and east parts.
ASHEVILLE	7/4/2013	Tunnel Road was flooded by a creek near Kenilworth Road. A spotter a little north of this location reported a 24 hour rainfall total of 3.94 inches.
WOODFIN	7/4/2013	Several streets were flooded from the Biltmore Forest area northward to Asheville. Numerous roads were closed by flooding, landslides and fallen trees. Around 9 pm EDT a large debris flow took out part of Vance Gap Road, isolating several homes. Around a dozen residences had to be evacuated as a result of the slide.
BEECH	7/10/2013	Reems Creek Road was flooded by Reems Creek near where the road intersects with Many Branch and Sugar Cove Roads. After the creek subsided, a significant amount of debris was left on the road which had to be cleared by earth moving equipment causing the road to be closed for several hours. A couple nearby dirt roads were washed out, cutting off several houses.
NEW BRIDGE	7/10/2013	Flooding along Beaverdam Creek washed out a private access bridge on Pinecroft Road. The road itself was also flooded. The Beaverdam Fire Department was flooded to a depth of 3 feet, causing damage to the station and taking it out of service. Three families in this area were temporarily relocated due to the flooding threat. Flowing water was 1.5 feet deep over the roadway at Weaverville Highway and Breckenridge Parkway. Merrimon Avenue was also flooded at Beaverdam Creek in this same area.
LEICESTER	7/10/2013	Sandy Mush Creek flooded, affecting Turner Cove Road and blocking two homes. Four other roads in this area, and toward Leicester, were also flooded.
WEAVERVILLE	8/22/2015	County comms and FD reported localized flash flooding developed in the Weaverville area after 2 to 4 inches of rain fell in a short period of time. Several small creeks overflowed their banks and flooded roads as well as the basements of some homes on Woodland Hills Dr, Hamburg Mountain Rd, and Lakeshore Dr. In addition, water from a stream along Merrimon Rd resulted in stalling of a vehicle, with the driver requiring rescue. At least one small mudslide also occurred in the area.
AZALEA	12/29/2015	Emergency manager reported a bridge over Grassy Branch was washed out on Thomas Lee Dr after as much as 3 inches of rain fell across the Asheville area in just a few hours.
KENNWORTH	2/3/2016	After scattered to numerous showers produced up to an inch of rain across Buncombe 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. County comms center and the public reported flash flooding due to poor drainage and overflowing small streams developed during the late morning and early afternoon across the area. In Asheville, part of Tunnel Rd was flooded along with several streets in the Biltmore Village area. Lower Grassy Branch Rd was

Location	Date	Description
		flooded in East Asheville, probably due to stream flooding. Ivy Creek overflowed its banks at Glen Hill Dr in Barnardsville, blocking a mobile home park entrance. County comms reported about 20 roads closed across the county at the height of the event.
KENNWORTH	10/23/2017	Media and stream gauges reported flooding developed across southeastern sections of Buncombe County after widespread rainfall of 3 to 4 inches, with roughly half of that occurring over a period of just a couple of hours. Severe urban flooding and stream flooding along Sweeten Creek developed in the Biltmore Village area. Biltmore Ave and Sweeten Creek Rd were both largely impassable in spots due to deep water. Water also entered several businesses along Brook St and Sweeten Creek Rd. Minor stream flooding was also reported along Cane Creek in the Fairview area, where at least one road was flooded and impassable, and near the headwaters of the Swannanoa River, which flooded Veterans Park in Black Mountain.
BLUE RIDGE	5/17/2018	Public reported (via Social Media) more than a foot of water from an overflowing Garren Creek flooding the intersection of Garren Creek Rd and Morgan Hill Rd after more than three inches of rain fell in only a couple of hours.
BLACK MTN	5/29/2018	A stream gauge indicated and county comms confirmed flash flooding developed along the Swannanoa River in the Black Mountain area after 2 to 3 inches or rain fell across the area in just a few hours. This was after stream levels were already elevated due to heavy rain that fell on the 28th. The main impact was to areas around Veterans Park, including Veterans park Dr. The stream briefly fell below flood stage during late afternoon, but another round of heavy rain during the evening quickly sent it back above flood stage, where it crested at moderate flood stage before beginning to recede during late evening. Total rainfall of 4 to 6 inches was reported in the area on the 29th.
GROVEMONT	5/29/2018	Stream gauge on county comms reported flooding along the Swannanoa River basin. Backwater effects near the town of Swannanoa caused a tributary to flood Azalea Road. The river was also reported to be flooding low-lying areas in the Oteen community. Thr river crested just below moderate flood stage in Biltmore Village, sending water over portions of Swannanoa River Rd and flooding businesses between the river and the railroad tracks in the village. While only around 2 inches of rain fell in the Asheville area from the 29th through the 30th, the bulk of the flood water originated from the headwaters near Black Mountain, where as much as 10 inches fell during this time.
MONTREAT	9/16/2018	Law enforcement reported evacuation of a mobile home park after a tributary of Flat Creek flooded the area around Portman Villa Rd and David Dr in Black Mountain. Four to six inches of rain fell across the area throughout the 16th.
BLUE RIDGE	9/30/2018	Cocorahs observer reported flash flooding developed along tributaries of the rocky Broad River in buncombe county after 4 to 8 inches fell in the basin throughout the 29th and the early part of the 30th, with the bulk of that falling during the evening. Affected Streams included grice branch and duck branch, which was responsible for a washed out bridge.
BLACK MTN	10/11/2018	A stream gauge on the Swannanoa River at Black Mountain exceeded its established flood stage after 4 to 6 inches of rain fell in just a few hours. The main impact was to roads and trails in Veterans Park.
GROVESTONE	12/28/2018	Stream gauges along the Swannanoa River in Buncombe County exceeded their established flood stages after 3 to 4 inches of rain fell throughout the basin in about 24 hours. Low spots on the campus of Warren Wilson College were inundated. The primary impacts were in Biltmore Village in Asheville. The river, along with backwater effects into smaller tributaries flooded and closed multiple streets, including Garfield St, Decatur St, Caledonia Rd, Glendale Ave, Swannanoa River Rd, and Thompson St. Water entered the lower levels of a couple of businesses on Decatur St and Garfield St.
ROYAL PINES	4/19/2019	Flash flooding developed across central Buncombe County after 3.5 to 5.5 inches of rain fell across the area in just a few hours. Public first reported flooding of Cane Creek was inundating low-lying areas and some roads in the Fletcher and Fairview areas. The more significant issues were along the Swannanoa River from the Swannanoa community downstream to Biltmore Village in Asheville. Stream gauges along the river at Warren Wilson College and in Biltmore Village exceeded their established flood stages by 2-4 feet. Water inundated low lying areas of Warren Wilson College while multiple streets were flooded in Biltmore Village due to the Swannanoa but also due to backwater effects into Sweeten Creek. These included Swannanoa River Rd, Garfield St, Caledonia Rd, Glendale Ave, Thompson St, Decatur St, and Biltmore Ave. Water entered several businesses on Garfield St and Decatur St. Although waters began to recede in most areas by the evening of the

Location	Date	Description
		19th, the Swannanoa remained above flood stage at Biltmore Village through midnight. Minor to moderate river flooding also developed along the French Broad River at Fletcher and Asheville on the 19th, and persisted for a couple of days.
BLACK MTN	6/9/2019	Stream gauges on the Swannanoa River at Black Mountain and downstream at Warren Wilson exceeded their established flood stages after 4 to 5 inches of rain fell in the headwaters over a period of several hours. Veterans Park was flooded in Black Mountain, while several campus roads and low lying areas at Warren Wilson College also flodoed.
KENNWORTH	7/31/2020	Media reported flash flooding developed along a small tributary of the French Broad River in Asheville's River Arts district in Asheville after 2 to 3 inches of rain fell over a small area in less than an hour. A medical facility on Depot St was inundated with up to a foot of water, causing damage to equipment. Several vehicles were also submerged on Depot St.
BLACK MTN	8/17/2021	Stream gauges indicated flash flooding developed along the Swannanoa River after 6 to 10 inches of rain fell within the headwaters in around 24 hours, with much of that falling in just a few hours during the afternoon of the 17th. In Black Mountain, significant flooding of Veterans Park and some roads surrounding the park was observed. Flooding developed downstream to Biltmore Village in Asheville, where multiple roads and the first floors of some buildings were inundated. The rise of the Swannanoa contributed to rapid rises on the French Broad River downstream of the confluence of the two streams, with multiple roads inundated on the west side of downtown. Flooding actually worsened in the Biltmore Village area after heavy rainfall and flash flooding ended.
AZALEA	8/17/2021	Although heavy rainfall tapered off across Buncombe County during the late afternoon and evening, allowing flood waters to briefly begin receding, flooding actually worsened along the Swannanoa River in the Asheville area during the overnight, as backwater affects from a steadily rising French Broad River combined with the already elevated streams levels to result in moderate flooding in Biltmore Village and vicinity. In addition to continued inundation of multiple roads along the stream, the ground floors of a number of buildings were impacted on the south side of the river north of the railroad tracks.
NEW BRIDGE	9/25/2024	Public reported flash flooding developed across the city of Asheville and vicinity after 3 to 4 inches of rain fell in around three hours. Most of the flooding involved inundation of roads due to poor drainage. However, Reed Creek did overflow its banks in Woodfin, inundating portions of a golf course and flooding Elk Mountain Scenic Highway.
SHUMON	9/27/2024	Rainfall rates began to intensify as tropical rainbands near the center of Helene swept across the area during the morning hours after 10-17 inches of rain fell across much of the county, with amounts over 20 inches reported in the eastern part of the county. Devastating flash flooding developed along numerous streams, especially across the eastern half of the county. This included the French Broad River, which was already in moderate flood stage at Asheville, but began to rise rapidly during this time, culminating in historic and devastating flooding in the River Arts District, where numerous structures were inundated and damaged, and multiple structures were swept away. The Asheville gauge crested at just under 25 feet during early afternoon, exceeding the record stage by more than a foot, a record that had stood since the Great Flood of 1916. In addition, significant flooding was reported along the Ivy River in the Barnardsville community and vicinity, where multiple structures and numerous roads were inundated. The Broad River also saw significant flooding in the southeast part of the county, impacting several structures and multiple roads. Otherwise, numerous tributaries of these larger streams also overflowed their banks. More than 300 landslides were identified across Buncombe County, with some of those causing additional structural damage. Multiple fatalities were reported throughout the area, most due to drowning, but some due to landslide-related destruction. Damage to transportation infrastructure due to the combination of flooding and downed trees was widespread, with some communities inaccessible for days. Damage to the water infrastructure resulted in running water being unavailable in Asheville for days. Once the service was restored, boiling water advisories were in effect for almost two months.
RIDGECREST	9/27/2024	Historic and catastrophic flash flooding developed along the Swannanoa River basin during the early morning hours as rainfall rates began to intensify as tropical rainbands near the center of Helene swept across the area. Numerous structures and roads were inundated in the city of Black Mountain, the Swannanoa community and surrounding areas, with multiple homes and businesses and numerous roads destroyed. The most devastating flooding occurred in the Asheville area, as numerous businesses were damaged and some completely destroyed or swept away in Biltmore Village. The stream gauge on the Swannanoa River at Biltmore Village crested at just over 26 feet,

Location	Date	Description
		which was more than 5 feet higher than the crest during the Great Flood of 1916. Multiple landslides occurred throughout the Swannanoa Valley, with some of those damaging or destroying homes. Fourteen people died throughout the basin, mainly along the Swannanoa River. Almost all of these fatalities occurred in structures that were swept away in floodwaters, although at least one was attributed to a landslide. Three-day rainfall amounts ranged from 9-15 inches across much of the county to 15-22 inches with locally higher amounts across the far eastern part of the county, including in the Swannanoa headwaters.
SHUMON	9/27/2024	Although heavy rainfall tapered off across Buncombe County during the morning, major, historic flooding continued along most of the larger streams, including the Swannanoa, French Broad, and Broad Rivers through the afternoon and early evening. Although most of the streams receded to their banks during the evening, major flooding continued along main stem rivers into the afternoon of the 28th and didn't fall below flood stage until the morning of the 30th.
Madison County		
MARSHALL	6/27/2001	Walnut Creek and other smaller creeks flooded. Five county roads were closed. 150 people were evacuated. 3 homes and 1 business damaged. People were trapped in their homes by the flood water.
BIG PINE	6/29/2001	Road flooding, and two driveways washed out, along Spring Creek and its feeder tributaries in the western half of the county after nearly stationary thunderstorms affected the region.
MARSHALL	7/29/2001	"A significant flash flood occurred in Madison County on the 29th, the fourth major flash flood to affect Madison County in six weeks. Numerous roads were flooded, closing major commuter highways 208 and 212. Many private bridges were washed away. Damage to the tobacco crop alone was estimated at $400,000.
COUNTYWIDE	7/29/2001	Numerous roads remained flooded, and new ones began to flood as streams, creeks and rivers, already swollen from heavy rain earlier in the day, overflowed their banks. The French Broad River flooded River Road, near the state line north of Hot Springs, closing it for two days.
MARSHALL	7/30/2001	Another round of heavy rain brought Big Laurel creek out of its banks again. A house trailer was damaged this time, and parts of highways 19 and 23 leading into Yancey County were washed away or closed because of water, sand and debris. Bridges and roads were still closed in many of these same areas from flooding the day before. The Jarrett Cove bridge, which crosses Big Laurel, washed away between 430 AM EST and 515 AM EST.
MARSHALL	8/4/2001	The most severe of the recent flash floods to affect Madison County during the summer season developed rapidly Saturday morning. Flooding was swift and extensive, destroying highway bridges, private bridges and sweeping away structures and causing a large amount of property and crop damage. A state of emergency was declared for Madison County as a result of the flash flooding, the sixth major flash flood in Madison County in two months. Flooding lingered into the afternoon, damaging or destroying businesses, churches, homes and outside wells.
HOT SPGS	8/12/2001	Another round of heavy rain brought flooding to Hot Springs, where Silvermine Creek flooded a road and a bridge. Big Laurel Creek also had minor flooding.
UNINCORPORATED AREA	1/23/2002	Little Laurel Creek flooded - and perhaps some small tributaries. Highway 208 was partially closed with one lane flooded.
COUNTYWIDE	3/17/2002	Minor flooding occurred along Laurel Creek. Excessive rainfall also resulted in rock and mudslides near Marshall.
MARSHALL	3/18/2002	Flooding along small streams resulted in a road being washed out off of Highway 209. Several vehicles were involved in accidents as a result.
MARSHALL	6/4/2002	Rainfall amounts approaching 5 inches over a few hours were reported, resulting in flooding of small streams, washing away driveways, and cutting 6 inch deep gullies in roads.
MARSHALL	2/22/2003	Some roads were flooded in the vicinity of highway 209. Mudslides and downed trees also resulted from heavy rainfall.
HOT SPGS	5/6/2003	Numerous strong thunderstorms producing very heavy rainfall resulted in rapid rises and flash flooding along several small creeks and streams, mainly in the northwest portion of the county.
UNINCORPORATED AREA	5/6/2003	While flash flooding was ongoing across the northwest part of the county, the French Broad River began to respond to the persistent heavy rainfall, and flooded in several locations across the county. Water covered portions of highway 63.
MARS HILL	7/5/2003	The underpinning of a bridge was washed away on highway 19 at the Yancey/Madison County line.
PETERSBURG	7/6/2003	A section of Petersburg Road was covered with 6 feet of water near Petersburg. Several roads were flooded in and around Marshall. Mudslides also developed, one of which caused a tree to fall onto a

Location	Date	Description
		vehicle in Grapevine, crushing the vehicle, and killing a 63-year-old woman, and injuring a 12-year-old boy. The flooding also destroyed 300 of the 1800 acres of burley tobacco crop in the county.
MARSHALL	7/6/2003	Flooding developed along Little Pine Creek and Spring Creek in the western part of the county. Spring Creek flooded part of highway 63.
MARSHALL	7/9/2003	Little Pine Creek and Walnut Creek roads were flooded.
PETERSBURG	7/31/2003	Beetree Creek overflowed its banks and flooded adjacent fields.
UNINCORPORATED AREA	11/19/2003	Little Laurel Creek overflowed its banks and flooded several roads and highways, some of which required closing. The French Broad rose to flood stage at Hot Springs.
MARSHALL	6/12/2004	A small creek overflowed its banks, flooding highway 209 and Waldrop Rd. Some flooding also occurred in the Spring Creek area. Mudslides and flooding were also reported in Hot Springs.
WALNUT	7/26/2004	Heavy rainfall from a strong thunderstorm caused Walnut Creek, Brush Creek, Laurel Creek, and Little Pine Creek to overflow their banks and flood several roads, including highways 208 and 212. Several mud slides also occurred.
MARSHALL	8/2/2004	Big Pine Creek overflowed its banks and flooded adjacent roads.
UNINCORPORATED AREA	9/7/2004	Although rainfall over Madison County was much less than what occurred to the east and south, major flooding developed along the French Broad River, as runoff from the extremely heavy rainfall near the headwaters worked its way downstream. The river reached its highest level in over 25 years, resulting in significant damage to roads, bridges, and some private property.
UNINCORPORATED AREA	9/16/2004	After hours of heavy rain, gradual rises along creeks and streams culminated in flooding across the county by midnight. The first streams to flood were Spring Creek in Hot Springs and Big Pine Creek west of Marshall. By sunrise on the 17th, virtually every stream in the county had flooded. Flooding was quite severe, as most stream levels exceeded those of recent memory. Southwest of Marshall, 4 feet of water from Sandymush Creek entered the basement of a home located 100 feet north and 10 feet above the upper banks of the creek. Long-time residents described the flooding as the worst in at least 25 years.
LUCK	5/13/2005	Spring Creek left its banks and threatened 3 mobile homes in the Luck area.
MARSHALL	6/20/2005	Creeks came out of their banks around Marshall. Water covered portions of highway 213 at the junction of highways 25 and 70. Rollins Rd was also covered with water.
MARSHALL	6/27/2005	Big Pine Creek flooded several roads and trapped some residents in their homes. Several private bridges and culverts were washed out.
MARSHALL	7/19/2005	Long Branch creek overflowed and flooded Neds Chapel Rd.
FAUST	5/14/2009	Water entered a church on highway 23 due to flooding along Little Creek. Water flowed into several additional yards along the creek. Broadcast media reported residents said the water level was the highest it had been in at least 15 years. A few rock and mud slides were also reported in the area.
ENGLISH	8/17/2010	Flash flooding developed along smaller streams in northern Madison County, including the Cane River. Several roads were flooded or closed, including Wolf Laurel Rd, part of which was washed out, and Puncheon Fork Rd. Part of Village Ln was washed out and a covered bridge was destroyed in this area as well.
BIG LAUREL	6/19/2011	A series of thunderstorms produced very heavy rainfall that resulted in rapid rises along Big Laurel Creek, with flash flooding developing in a couple of spots. Big Laurel Rd, about 9 miles north northeast of Marshall, was under water for a while. A home was flooded on Laurel Valley Rd. In addition, a small stream overflowed its banks in the Walnut community, about 5 miles north northwest of Marshall, with water entering a home.
HOT SPGS	7/3/2013	Numerous roads were reportedly closed across the county due to flooding, including Highway 70/25. Some roads were heavily damaged by flooding and landslides.
BARNARD	7/3/2013	Two homes were damaged by flooded creeks in the Walnut community.
PETERSBURG	8/14/2017	County comms reported flash flooding developed in the Mars Hill area after as much as 3 inches of rain fell over the area in less than a couple of hours. The main area impacted was near the intersection of Highway 213 and I-26, where the Highway was impassable due to flooding along a tributary of Big Branch. Calvin Edney Rd was also flooded by a separate tributary to Big Branch. Stream flooding also extended to rural locations west of Mars Hill, where Bone Camp Creek overflowed its banks and flooded a portion of Bone Camp Creek Rd. Kelly Hunter Rd was also closed due to White Oak Creek overflowing its banks.
ROLLINS	4/19/2019	A stream gauge on the Ivy River near Marshall exceeded its established flood stage after widespread 2 to 3 inch rainfall fell through the basin, although some of the flooding was likely due

Location	Date	Description
		to backwater effects from moderate flooding along the French Broad River that developed as a result on much heavier rain falling upstream across Transylvania and Henderson Counties. Ivy River Rd was flooded in several spots. Although flooding along the Ivy was brief, river flooding continued along the French Broad at Marshall and Hot Springs for another day or so.
SEXTON	4/13/2020	Stream gauges on the Ivy River and French Broad River near Marshall indicated rapid rises and flash flooding developed after 3 to 4 inches of rain fell throughout the French Broad basin in just a few hours. The Ivy River inundated part of Ivy River Rd and the French Broad overflowed Rollins Rd. River flooding continued along the French Broad into late morning.
ROLLINS	8/17/2021	A stream gauge on the French Broad River near Marshall indicated flash flooding developed along the river in the town of Marshall after widespread heavy rainfall occurred throughout the basin over 24 hours, with a good bit of that falling in just a few hours during the afternoon of the 17th. Multiple roads were flooded throughout the Marshall area, while many buildings in downtown Marshall experienced at least some inundation. Although the rivers rapid rise leveled off during the late evening as heavy rainfall came to an end, runoff working its way downstream through the basin resulted in moderate flooding persisting along the river until around sunrise on the 18th, while the river didnt return to its banks until late morning. This was the worst flooding that developed along this portion of the French Broad River since Hurricane Ivan in September 2004.
ROLLINS	9/27/2024	Stream gauges indicated devastating flash flooding developed along the French Broad River and some of its tributaries, including Ivy River in Madison County during the morning. A stream gauge on the French Broad at Marshall exceeded major flood stage during this time, with water inundating most structures in downtown Marshall. Some smaller structures, including a manufactured home and some camping vehicles were swept away, especially along Rollins Rd just upstream of Marshall. Numerous roads along the river and its tributaries were inundated. Four people died in Madison County, mostly along the French Broad, but one person died after being swept into the Ivy River.
ROLLINS	9/27/2024	Although heavy rain ended across Madison County by early afternoon, flooding continued to steadily worsen along the French Broad River and some tributaries throughout the afternoon and evening. The river crested at 20 feet in Marshall, and just over 20 feet at Hot Springs, which were the highest crests at those gauges since the Great Flood of 1916. Numerous structures in the Marshall area and multiple structures in Hot Springs were inundated and damaged. Otherwise, numerous roads remained inundated, with some damaged throughout the watershed.

TABLE H.4: HAIL EVENTS (2000-2025)

Location	Date	Size (inches)	Description
Buncombe County			
FAIRVIEW	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. 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.
CANDLER	8/10/2000	0.75	A strong mesoscale convective system which originated in the Ohio River Valley was able to sustain itself while moving through the central and southern Appalachians. This intense squall line moved north to south through western North Carolina during the wee hours of the morning on the 10th. Wind damage was reported from just about every county in western North Carolina and a few occurrences of hail up to quarter size were reported as well. Wind damage was mainly limited to downed trees and power lines although some light structural damage did occur too.
ASHEVILLE	9/4/2000	0.75	An isolated severe thunderstorm produced dime size hail on the Blue Ridge Parkway and Hwy 25.
ASHEVILLE	10/25/2000	0.25	Abundant pea size hail fell from a few showers and thunderstorms in northeast Buncombe county during the afternoon. Traffic accidents occurred on the Blue Ridge Parkway near Craggy Gardens at an elevation of 4900 feet due to the icy road.
ASHEVILLE	6/22/2001	1.75	N/A
LEICESTER	6/25/2001	1	Quarter-sized hail observed by police officer.
ASHEVILLE	6/4/2002	1.25	N/A
SANDYMUSH	6/4/2002	1	N/A
ASHEVILLE	6/4/2002	0.75	N/A
ASHEVILLE	6/4/2002	0.75	N/A
LEICESTER	6/4/2002	1.75	N/A
WEAVERVILLE	6/4/2002	1.75	N/A
MONTREAT	6/4/2002	0.75	N/A
LEICESTER	6/20/2002	0.75	N/A
SWANNANOA	7/1/2002	0.88	N/A
ENKA	7/2/2002	0.75	N/A
WEAVERVILLE	5/15/2003	1.75	N/A
ASHEVILLE	5/15/2003	1	N/A
ASHEVILLE	5/15/2003	1	N/A
ASHEVILLE	5/15/2003	1.75	Hail fell on Flat Top Mountain.
FAIRVIEW	5/15/2003	1.75	Hail covered the ground.
WEAVERVILLE	5/15/2003	0.75	N/A
SWANNANOA	7/12/2003	0.75	N/A

Location	Date	Size (inches)	Description
ASHEVILLE	7/21/2003	0.75	Hail fell at Asheville Regional Airport.
WEAVERVILLE	8/4/2003	0.75	Several trees were blown down. Widespread power outages were reported across much of the northern portion of the county. Hail up to the size of pennies also covered the ground in portions of Weaverville.
ENKA	8/4/2003	1.75	N/A
BLACK MTN	5/9/2004	0.88	N/A
ASHEVILLE	6/5/2005	0.88	Spotter in the Beaucatcher Mountain area reported mostly pea size hail, with a few stones up to nickel size.
AVERY CREEK	7/27/2005	0.75	N/A
ASHEVILLE	7/27/2005	0.88	N/A
LEICESTER	8/4/2005	0.75	N/A
ALEXANDER	4/3/2006	1	N/A
WEAVERVILLE	4/3/2006	0.88	N/A
ASHEVILLE	4/3/2006	0.75	N/A
BLACK MTN	4/3/2006	0.75	N/A
ASHEVILLE AIRPARK AR	4/19/2006	0.75	N/A
BLACK MTN	5/13/2006	0.75	N/A
ASHEVILLE	6/11/2006	0.75	Penny size hail on Flat Top Mountain.
ASHEVILLE	6/11/2006	0.88	N/A
BLACK MTN	7/20/2006	0.75	Penny size hail reported near the McDowell County line.
CANDLER	8/10/2006	1	N/A
WEAVERVILLE	8/10/2006	0.75	Numerous trees blown down near the Madison County line. Also, penny size hail in Weaverville around this time.
WEAVERVILLE	3/28/2007	0.75	An isolated severe thunderstorm produced large hail in Buncombe County.
BLACK MTN	4/19/2007	1	Hail covered the ground.
FAIRVIEW	6/8/2007	1.75	Reported on Shumont Rd.
WEAVERVILLE	6/12/2007	1	Hail covered the ground in many areas.
ASHEVILLE	6/12/2007	0.88	Scattered severe storms developed over western North Carolina for a second day in a row. The storms mainly produced large hail.
ASHEVILLE	6/12/2007	1.75	Golfball size hail at exit 37 on I-40. Also, quarter to golfball size hail in the Candler area.
BARNARDSVILLE	6/15/2007	0.75	Severe storms produced multiple instances of large hail and wind damage over Buncombe County in the mountains of North Carolina during the late afternoon hours.
WEAVERVILLE	6/15/2007	0.88	Hail covered the ground in some areas.
ASHEVILLE	6/15/2007	1	Hail reported along I-240.
CANDLER	6/24/2007	1.5	Numerous severe storms affected western North Carolina beginning in the early afternoon and lasting well into the night.
CANDLER	6/24/2007	0.88	Numerous severe storms affected western North Carolina beginning in the early afternoon and lasting well into the night.
FAIRVIEW	6/24/2007	0.88	Numerous severe storms affected western North Carolina beginning in the early afternoon and lasting well into the night.
BARNARDSVILLE	6/27/2007	0.75	Several severe storms affected western North Carolina during the afternoon and evening hours.
WEAVERVILLE	7/10/2007	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
SKYLAND	7/19/2007	0.75	A few severe storms affected the western Foothills and mountains of North Carolina during the afternoon and evening hours.
ASHEVILLE	8/24/2007	0.88	Several severe storms affected western North Carolina during the afternoon hours.
BLACK MTN	6/7/2008	0.75	Reported along I-40 near exit 59.
ASHEVILLE	6/10/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.

Location	Date	Size (inches)	Description
CANDLER	6/10/2008	1	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
CANDLER	6/10/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
WEAVERVILLE	6/26/2008	0.88	Scattered severe storms affected parts of western North Carolina during the afternoon hours.
ROYAL PINES	9/30/2008	0.75	Hail was reported on Four Oaks Dr.
MIDWAY	4/24/2009	0.75	Hail was reported on highway 25.
SHUMON	5/9/2009	0.75	Hail was reported on Shumont Rd.
JUPITER	5/28/2009	0.75	Hail was reported on Palmer Ford Rd.
GROVEMONT	6/2/2009	0.75	Hail reported in the Grovemont community.
FAIRVIEW	6/2/2009	1.25	NCDC employee reported hail up to 1.25 inches in diameter along highway 74 just south of town. A spotter reported penny size hail in the same area.
FAIRVIEW	6/8/2009	1	Nickel to quarter size hail was reported on Sugar Hollow Rd.
BLACK MTN	6/9/2009	0.75	Widely scattered multicell storms produced a few areas of wind damage and large hail over western North Carolina.
MIDWAY	6/10/2009	1	Several clusters of thunderstorms produced areas of severe weather over parts of western North Carolina during the afternoon and evening hours. Some flash flooding was also observed over the region.
ASHEVILLE AIRPARK AR	6/18/2009	0.88	A fast moving line of thunderstorms produced wind damage as it crossed the mountains and foothills of North Carolina.
WEAVERVILLE	7/20/2009	0.75	Hail covered the ground.
PAINT FORK	7/20/2009	0.88	Scattered severe storms affected the mountains and foothills of North Carolina, as well as the Piedmont east of Charlotte, during the early evening hours.
ARDEN	8/5/2009	0.75	A cold front triggered thunderstorms over the North Carolina Mountains starting in the early afternoon hours. The storms organized into a slow moving mesoscale convective system as they moved across the foothills and western piedmont. Quite a bit of wind damage, and some large hail, was produced.
STOCKSVILLE	8/5/2009	0.75	A cold front triggered thunderstorms over the North Carolina Mountains starting in the early afternoon hours. The storms organized into a slow moving mesoscale convective system as they moved across the foothills and western piedmont. Quite a bit of wind damage, and some large hail, was produced.
WEAVERVILLE	9/9/2009	0.75	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.
MURPHY JCT	9/9/2009	0.75	Hail was reported on Patton Ave on the southwest side of Asheville.
DILLINGHAM	5/14/2010	1	A cold front stalled over eastern Tennessee. Storms developed ahead of the front over the North Carolina Mountains. Some of the storms produced large hail as they moved off of the high terrain.
WEST ASHEVILLE	5/14/2010	1	A cold front stalled over eastern Tennessee. Storms developed ahead of the front over the North Carolina Mountains. Some of the storms produced large hail as they moved off of the high terrain.
BEVERLY HILLS	5/14/2010	0.75	Dime size hail was reported on Tunnel Rd.
FAIRVIEW	5/14/2010	0.75	A cold front stalled over eastern Tennessee. Storms developed ahead of the front over the North Carolina Mountains. Some of the storms produced large hail as they moved off of the high terrain.
GROVEMONT	5/14/2010	1	A cold front stalled over eastern Tennessee. Storms developed ahead of the front over the North Carolina Mountains. Some of the storms produced large hail as they moved off of the high terrain.
FAIRVIEW	5/14/2010	1	Quarter size hail was reported near Old Fort Rd.

Location	Date	Size (inches)	Description
DUNSMORE	7/26/2010	1	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.
WEAVERVILLE	4/9/2011	1	Hail up to quarter size was reported by an NCDC employee.
WEAVERVILLE	4/9/2011	0.88	Nickel size hail was reported in Weaverville.
BARNARDSVILLE	4/9/2011	0.75	Thunderstorms initiated over the mountains of North Carolina during the afternoon hours. As the afternoon progressed, several supercell thunderstorms developed which tracked southeast across the foothills and piedmont along a slow moving surface cold front. With unusually steep lapse rates over the region, several of the storms produced large hail. Fortunately the supercells were a little elevated in nature, and only one, brief, weak tornado developed. Still, hail ranging up to the size of a softballs did quite a bit of damage over the region.
BARNARDSVILLE	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.
RIDGECREST	4/9/2011	0.88	Nickel size hail fell on I-40 near the Ridgecrest community.
WALKERTOWN	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.
BLACK MTN	5/3/2011	0.75	Clusters of fast moving thunderstorms developed ahead of a strong cold front. Some of the storms produced damaging winds as they tapped strong gradient winds over the western Carolinas.
AVERY CREEK	5/12/2011	0.75	Numerous reports of penny size hail were received along Avery Creek Rd.
FAIRVIEW	5/13/2011	1	An approaching upper low helped trigger numerous thunderstorms over western North Carolina during the afternoon hours and into the overnight. Some of the storms produced large hail and damaging winds.
ASHEVILLE	5/13/2011	1	Quarter size hail was reported on Patton Ave on on the west side of Asheville.
STONY FORK	6/2/2011	1	Quarter size hail fell at the Mt Pisgah Campground.
CANDLER	6/8/2011	0.75	Numerous thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds.
SAND HILL	6/8/2011	1	Numerous thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds.
BOSWELL	6/8/2011	1	Numerous thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds.
BEVERLY HILLS	6/9/2011	1	Quarter size hail fell at Tunnel Rd and I-240.
FLAT CREEK	6/10/2011	0.75	Scattered thunderstorms developed over the mountains as a hot, humid airmass remained over the region. A few of the storms produced damaging winds and large hail.
BILTMORE	6/15/2011	1.75	Half dollar to golf ball size hail fell in the Biltmore Forest area.
AVERY CREEK	6/21/2011	1.25	NCDC employee reported up to half dollar size hail in the Bent Creek community.
BOSWELL	6/21/2011	1	Quarter size hail was reported at the intersection of Brevard Rd and I-40.
WILSON	4/5/2012	1	Thunderstorms developed over the mountains during the afternoon hours. A couple of the storms produced hail up to the size of quarters.

Location	Date	Size (inches)	Description
ASHEVILLE	4/5/2012	1	Several reports of hail up to the size of quarters were received from the north side of Asheville.
ASHEVILLE	4/17/2012	0.88	A long lived multicell severe storm developed over the central mountains of North Carolina during the afternoon hours and moved into the foothills before dissipating.
SWANNANOA	4/26/2012	0.88	A well organized MCS moved into the North Carolina Mountains around 8 a.m. EDT. The line weakened as it crossed the mountains, though it still downed a number of trees and produced small hail. The line did not produce any additional severe weather after emerging into the foothills, though it did hold together as it moved across the foothills and western piedmont and even produced periodic small hail.
BLACK MTN	4/26/2012	0.88	A well organized MCS moved into the North Carolina Mountains around 8 a.m. EDT. The line weakened as it crossed the mountains, though it still downed a number of trees and produced small hail. The line did not produce any additional severe weather after emerging into the foothills, though it did hold together as it moved across the foothills and western piedmont and even produced periodic small hail.
CANDLER	4/26/2012	1	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.
CANDLER	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.
SKYLAND	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.
BILTMORE	4/26/2012	1.75	Multiple reports of quarter to golf ball size hail were received from the west side of Asheville, across the south side of town and across the Fairview area.
LEICESTER	4/30/2012	1	Quarter to half dollar size hail fell from Leicester to New Stock Rd about 2 miles west of Weaverville.
STOCKSVILLE	4/30/2012	0.75	Penny size hail fell along Forest Knoll Court, about a mile east of Weaverville.
WEAVERVILLE	4/30/2012	1	Scattered thunderstorms developed over the North Carolina Mountains during the late afternoon and evening hours. Some of the storms produced large hail.
WEAVERVILLE	5/17/2012	1	An isolated thunderstorm produced a little large hail over the central French Broad Valley.
WEST ASHEVILLE	5/17/2012	0.75	An isolated thunderstorm produced a little large hail over the central French Broad Valley.
MIDWAY	5/19/2012	1	Quarter size hail was reported at the Asheville Regional Airport.
WEAVERVILLE	5/21/2012	0.75	Slow moving thunderstorms produced around 3 inches of rain in an hour to the north of Asheville causing a small area of flash flooding.
BLACK MTN	6/22/2012	1	Scattered thunderstorms developed over the Blue Ridge Moutains starting in the late morning hours. The storms caused scattered wind damage and produced a few reports of large hail as they moved out into the foothills and Piedmont.
BILTMORE FOREST	6/22/2012	0.88	Nickel size hail was reported in the Biltmore Forest area.
SHUMON	7/3/2012	1	Scattered, pulse-type thunderstorms developed over western North Carolina during the afternoon hours. With a very unstable airmass in place over the region, several of the storms produced large hail and wind damage.
SHUMON	7/3/2012	1	Scattered, pulse-type thunderstorms developed over western North Carolina during the afternoon hours. With a very unstable airmass in place over the region, several of the storms produced large hail and wind damage.
MONTREAT	8/10/2012	0.88	A cold front crossed the mountains during the late evening hours, triggering scattered thunderstorms. The wind shear was a little stronger than normal for the summer months, and a couple of the storms reached severe limits causing wind damage.
FAIRVIEW	5/21/2013	0.88	A few minutes of dime to nickel size hail were reported just north of Fairview.
FAIRVIEW	5/21/2013	1	Quarter size hail was reported on Wrights Cove Road.
AVERY CREEK	5/22/2013	0.88	Nickel size hail fell near Lake Powhatan.
WALKERTOWN	6/16/2014	1	Public reported lots of hail up to quarter size at the North Fork Dam.
LEICESTER	6/18/2014	1	Public reported quarter size hail near Leicester.

Location	Date	Size (inches)	Description
WEAVERVILLE	6/19/2014	0.75	Multiple public reports of dime to penny size hail were received from the Weaverville area.
WEAVERVILLE	7/2/2014	1	Public reported dime to quarter size hail in the Weaverville area.
NEW BRIDGE	7/2/2014	1	Public reported nickel to quarter size hail.
WEST HAVEN	6/18/2015	1.75	Cocorahs observer reported golf ball size hail 1 NE Avery Creek. Public reported golf ball size hail in Biltmore Park.
WILSON	6/19/2015	0.75	Public reported 3/4 inch hail at Warren Wilson College.
DILLINGHAM	5/1/2016	1	Public reported quarter size hail via Social Media.
MONTREAT	5/1/2016	1.5	Public and CoCoRahs observer reported quarter to ping pong ball size hail in the Montreat area. The hail accumulated an inch or more in some areas.
BLUE RIDGE	5/2/2016	0.75	Spotter reported 3/4 inch hail.
JUPITER	5/12/2016	0.75	Public reported 3/4 inch hail along Eller Ford Rd.
GROVESTONE	7/8/2016	0.75	Spotter reported 3/4 inch hail.
GROVESTONE	7/8/2016	1.75	Media, spotters, and NWS Employee reported quarter to golf ball size hail across the Black Mountain area.
SHILOH	7/14/2017	0.75	Public reported 3/4 inch hail.
GROVEMONT	5/5/2018	0.75	Public reported 3/4 inch hail.
SKYLAND	8/19/2019	0.88	Up to nickel size hail covered the ground at Lake Julian Park.
BLACK MTN	3/27/2021	0.75	Public reported a brief period of penny size hail.
FAIRVIEW	8/14/2021	0.88	Fire dept reported nickel size hail.
AZALEA	5/4/2022	0.75	Public reported penny sized hail in the Little Cedar Mountain area.
WOODFIN	5/19/2022	0.88	Fire dept reported dime to nickel sized hail in Woodfin. Spotter reported 3/4 inch hail in east Asheville.
FLAT CREEK	5/19/2022	0.75	Public reported 3/4 inch hail on Jupiter Rd near I-26.
BARNARDSVILLE	5/19/2022	1	Public reported quarter size hail near Barnardsville.
HOMINY	7/1/2023	1	Public reported (via Social Media) quarter size hail in the Candler area.
WEST HAVEN	7/18/2023	0.75	NWS employee reported 3/4 inch hail.
BARNARDSVILLE	5/8/2024	2.5	Emergency manager and public reported 2-inch diameter to tennis ball size hail broke more than a dozen car windshields in the Barnardsville area.
FAIRVIEW	5/8/2024	1.25	Public reported half dollar size hail near Fairview.
STOCKSVILLE	5/26/2024	0.88	Public reported nickel size hail on Water Leaf Drive.
VOLGA	2/6/2025	0.75	Spotter reported 3/4 inch hail along Bear Creek Rd.
SANDYMUSH	5/8/2025	1	Public reported quarter size hail.
LEICESTER	5/8/2025	1	Public reported quarter size hail.
CRAGGY	5/8/2025	1.75	Numerous reports were received from the public, spotters, and media of nickel to golf ball size hail from Woodfin, across the north side, downtown, and east side of Asheville.
GROVESTONE	5/8/2025	1.75	Media relayed viewer report of golf ball size hail near Swannanoa.
WEST ASHEVILLE	6/24/2025	0.75	Public reported 3/4 inch hail in west Asheville.
Madison County			
SPRING CREEK	6/4/2002	1	Hail accumulated to depths of 2 inches.
MARSHALL	6/4/2002	1	
MARSHALL	6/4/2002	1.25	A long duration hailstorm resulted in roof damage to a few homes at Meadow Forks.
SPRING CREEK	7/2/2002	0.75	
MARS HILL	7/3/2002	1.75	
MARS HILL	7/22/2002	1.25	
MARSHALL	5/15/2003	1.75	
MARSHALL	5/15/2003	0.75	
MARSHALL	4/22/2005	0.75	
MARSHALL	8/3/2005	0.75	

Location	Date	Size (inches)	Description
MARSHALL	8/5/2005	0.75	
HOT SPGS	3/14/2006	0.88	
MARSHALL	4/3/2006	0.75	
MARSHALL	5/3/2007	1	Isolated severe thunderstorms affected the French Broad Valley during the afternoon hours.
MARSHALL	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.
MARS HILL	6/27/2007	0.75	Several severe storms affected western North Carolina during the afternoon and evening hours.
MARSHALL	5/20/2008	0.75	Several clusters of severe thunderstorms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.
MARSHALL	6/9/2008	0.75	Several severe storms developed over western North Carolina during the afternoon and evening hours ahead of a cold front.
MARS HILL	6/27/2008	0.75	Scattered severe storms affected western North Carolina during the afternoon and evening hours.
HOT SPGS	5/8/2009	0.75	Scattered severe stroms produced large hail and damaging winds over the North Carolina mountains.
BARNARD	6/3/2009	0.75	Scattered severe storms developed over western North Carolina ahead of a cold front. There was also an isolated instance of flash flooding.
PETERSBURG	6/3/2009	0.75	Hail reported on Cody Rd.
MARS HILL	7/20/2009	0.75	Scattered severe storms affected the mountains and foothills of North Carolina, as well as the Piedmont east of Charlotte, during the early evening hours.
BELVA	9/9/2009	0.75	This storm produced quite a bit of hail over the north central part of the county, including near the intersection of highways 208 and 12 where hail was reported to be 3 inches deep.
WORLEY	5/15/2010	1	Hail up to quarter size fell on Big Pine Rd. Also, a tree was blown down in this area.
HALLS STORE	4/9/2011	1.75	Quarter to golf ball size hail fell to the north of Mars Hill.
BARNARD	4/9/2011	1.5	Hail 1.5 inches in diameter was reported in the Walnut area.
PAINT FORK	4/9/2011	1	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.
WALNUT	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.
WALNUT	5/22/2011	1.75	Hail up to the size of golf balls was reported from the north side of Marshall to the Mars Hill area.
WALNUT	5/22/2011	0.75	Penny size hail was reported on the highway 25 bypass.
BETHEL	5/22/2011	2	Two inch diameter hail was reported along highway 19.
MARSHALL	5/22/2011	1	Quarter size hail was reported in downtown Marshall.
MARS HILL	5/22/2011	1.75	A second consecutive severe thunderstorm affected the Mars Hill area with hail up to the size of golf balls.
BARNARD	6/5/2011	1	Quarter size hail fell in the Walnut community.
MARS HILL	6/8/2011	0.75	Numerous thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds.
MARSHALL	6/9/2011	1	Quarter size hail was reported on the northeast side of Marshall.

Location	Date	Size (inches)	Description
WALNUT	6/21/2011	1	Quarter size hail fell in Marshall.
WALNUT	8/14/2011	1	Hail up to quarter size fell at the 911 center.
GRAPEVINE	3/2/2012	1.25	Two supercell thunderstorms entered the North Carolina mountains during the evening hours. One of the storms produced a strong tornado in the town of Murphy in Cherokee County. The supercell remained surprisingly strong as it crossed the southern mountains, producing large hail and eventually another weak tornado in Jackson County. Later at night, storms organized into a broken line across Upstate South Carolina. The northern part of the line crossed the southern North Carolina piedmont where it produced a strong, brief tornado on the northeast side of Charlotte. The storm did not exhibit supercell characteristics, and the tornado spun up quite quickly as the line intersected a low level boundary.
BETHEL	3/2/2012	1	Quarter size hail was reported near the Yancey County line.
IVY	3/15/2012	0.75	A warm, unstable airmass supported the development of scattered thunderstorms over the North Carolina mountains. A couple of the storms produced large hail.
MARS HILL	3/15/2012	1	Numerous reports of up to quarter size hail were received northeast of Mars Hail, generally on and near Interstate 26.
BIG LAUREL	5/19/2013	1	Quarter size hail fell along Chapel Hill Rd.
MARSHALL	4/3/2014	0.75	Public reported 3/4 inch hail near Marshall.
HOT SPGS	5/11/2015	0.88	Spotter reported nickel size hail.
BLUFF	7/16/2021	0.75	Public reported 3/4 inch hail in the Bluff community.
MARSHALL	7/2/2023	1	Public reported nickel to quarter size hail in Marshall.
MARSHALL	5/8/2024	1	County comms relayed a report of quarter size hail in Marshall.
MARS HILL	5/8/2024	1.75	Public reported golf ball size hail in the Mars Hill area. Retired meteorologist reported quarter size hail on Meadow Creek Dr southeast of Mars Hill.
BARNARD	5/26/2024	1	Spotter reported nickel to quarter size hail between Marshall and Hot Springs.
ROLLINS	2/6/2025	1.5	Public measured ping-pong ball sized hail near the intersection of Meadows Town Rd and Sandy Mush Rd.
LUCK	5/8/2025	1.25	CoCoRahs observer reported pea-to-half-dollar size hail in the Canto community.

TABLE H.5: HEAVY RAIN EVENTS (2000-2025)

Location	Date	Description
Buncombe County		
ARDEN	8/7/2001	Heavy rain caused the roof of a school to partially collapse, ruining new carpet and furniture. Water also entered through some of the doors.
COUNTYWIDE	12/19/2002	Heavy rain caused a few North Carolina mountain streams to rise to near bank-full. In addition, the wet soil combined with gusty winds to cause some drought weakened trees to fall across the area.
BARNARDSVILLE	2/22/2003	Mudslides resulting from heavy rainfall blocked some roads near Barnardsville.
ARDEN	6/15/2004	A stopped-up storm drain caused flooding to develop at an apartment complex during a heavy thunderstorm.
FAIRVIEW	8/26/2008	A combination of gusty winds and wet ground resulting from very heavy rainfall caused a tree to fall on a house, destroying a screen porch.
WEST HAVEN	5/27/2009	A combination of heavy rain and a damaged culvert caused the dirt beneath a section of Brevard Rd to wash away, collapsing the road.
WEAVERVILLE	5/21/2012	Heavy rain resulted in some urban flooding in Weaverville, closing Main St for a brief period of time.
WOODFIN	4/29/2014	Fire Department reported that a little over 2 inches of rain that fell in around an hour combined with a blocked culvert to cause a small tributary of Beaverdam Creek to flood 6 homes to a depth of around 5 feet in the Brookdale Dr/Woodfin Ave area. Up to 30 people required rescue. The homes were heavily damaged by the flooding. Local COCORAHS reports showed storm total rainfall of 4 to 5 inches in this area, most of which fell in a fairly short period of time.
Madison County		
MARSHALL	6/4/2002	3.5 inches of rain fell in one-and-a-half hours at Meadow Forks.
COUNTYWIDE	12/19/2002	Heavy rain caused a few North Carolina mountain streams to rise to near bankfull. In addition, the wet soil combined with gusty winds to cause some drought weakened trees to fall across the area.
MARS HILL	7/25/2004	California Creek overflowed its banks.
MARSHALL	8/3/2005	Report of 1.75 inches of rain in 20 minutes, with Bull Creek beginning to come out of its banks.
ROLLINS	5/16/2009	High water on Sandymush Creek washed out a private bridge and eroded the soil beneath a section of Sandymush Creek Rd.
PAINT ROCK	6/5/2013	Parts of Upper Shut-In road were further damaged by high stream levels after very heavy rain. An earlier flood had significantly under-cut parts of the road. Water was also reported over parts of River Road in this same area. Several small landslides also affected River Road and Upper Shut-In road in this same area.

TABLE H.6: HEAVY SNOW EVENTS (2000-2025)

Date	Description
Buncombe County	
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.
1/26/2000	An upper level disturbance and northwest flow combined to produce varying amounts of snow across the mountains from early evening on the 25th through noon on the 26th. One to three inches of snow fell from Macon county to Buncombe and Yancey counties. Heavy snow accumulated 4 to 6 inches across most of the Tennessee border counties from Graham to Avery.
2/4/2000	A cold and moist northwest flow produced snow showers for about 24 hours across mainly the Tennessee border counties. Snow accumulations of 1 to 3 inches occurred as far east as northern Buncombe county. Four inches of snow fell across the northern part of Mitchell county.
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 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. 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. Heavy rain, with embedded thunderstorms, crossed the region from late morning through the afternoon on the 16th. Cold air trapped in some valleys of the northern mountains never completely scoured out, resulting in a light glaze south and west of Newland. Just as surface temperatures rose above freezing in the northern mountains, thunderstorms pushed out ahead of the strong front, with numerous small hail reports. Nickel-sized hail was reported 8 miles north of Sylva in Jackson County. As the front, and attendant pressure gradient, pushed its way into western North Carolina, winds increased into the 50 to 60 mph range, resulting in numerous downed trees and power lines. Nearly every county in the mountains reported some wind damage. The high winds eventually affected the foothills and piedmont. In Charlotte, numerous trees were downed and furniture was blown off porches. An unsturdy building in Spencer collapsed.

Date	Description
	In the wake of the frontal passage, much colder air invaded the region, and as another shortwave affected the region on the 17th, a wide swath of 1 to 3 inch snow blanketed the higher terrain. Flurries were reported as far east as Hickory and Gastonia.
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.
1/8/2001	A weak upper level disturbance crossed the mountains early on the 8th, producing a light blanket of fresh snow.
1/8/2001	Another round of light snow occurred, adding another inch or two accumulation. In Buncombe and Madison Counties, neither episode yielded much accumulation, but there was enough to cause slick roads until 10 am.
1/20/2001	N/A
3/6/2001	N/A
3/15/2001	A cold front, accompanied by abundant low level moisture, crossed the region early on the 15th, resulting in a light blanket of fresh snow.
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.
4/1/2001	A potent upper level disturbance rotating across the southeast states behind a strong cold front that crossed the area late in March interacted with cold, moist air remaining over the mountains to produce a light blanket of snow early on the 1st.
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.
1/23/2003	Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid morning. Otherwise, snow accumulations were generally in the 3 to 6 inch range.
2/6/2003	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

Date	Description
	were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border.
3/30/2003	Snow intensified across the southern and central mountains during the pre-dawn hours, and by sunrise, heavy snow accumulations were realized. Valley locations received anywhere from a trace to 6 inches, while up to 8 inches accumulated in the highest elevations. The heavy, wet snow caused widespread power outages, especially in Haywood County. Three hikers required rescue in Haywood County, and one was hospitilazed with hypothermia.
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.
12/18/2003	A prolonged period of snow produced heavy accumulations over a 2-day period across much of the North Carolina mountains. Most valley locations received total accumulations of 6 inches or less. However, most of the high elevation areas along the Tennessee border received between 1 and 2 feet. Northwest winds of 20 to 30 mph caused blowing and drifting snow.
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.
2/12/2004	Snow began during the late evening hours across the northern and central mountains, and continued overnight. By sunrise on the 12th, accumulations of 3 to 6 inches were common. The heaviest amounts occurred in the highest elevations 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.
12/11/2004	Heavy snow fell across the mountains and accumulated in the high elevations to 3 to 6 inches. The heavy snow level in most locations was 4000 feet, but dropped off to as low as 3000 feet in the southwest mountains. Elevations between 2500 feet and 3500 feet generally had and inch or two.
12/19/2004	Heavy snow fell for about 7 hours, along with wind gusts to near 50 mph. The highest accumulations were along the Tennessee border, especially in Graham County where some drifts reached a reported 2 feet. The snow and wind was accompanied by very cold weather. The Asheville Regional Airport reached a record low of 7 degrees the morning of the 20th. Buncombe County had heavy snowfall in the western and northern part of the county, although areas from Asheville south to the Henderson County line only had a trace to an inch. The temperature fell to below zero overnight in parts of the northern mountains, even the valleys, with single digits common elsewhere.
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.
2/28/2005	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.
2/11/2006	Northwest flow, a very cold airmass, and upper air disturbances combined to produce an unusually strong upslope snow event across the far western counties of North Carolina. Widespread, heavy snow showers began to develop during the early evening of the 11th, and by late evening, heavy snowfall accumulations were common across the area. The snow lasted for a very long period, continuing through the 12th and the early morning hours of the 13th before finally tapering off. Combined with the light snow that fell across the area on the morning of the 11th, storm total accumulations of 5 to 10 inches occurred within the valleys near the Tennessee border. Meanwhile, accumulations were generally in the 1-2 foot range across the higher elevations. There were unofficial reports of as much as 4 feet in the Smoky Mountains. This event was unusual in that heavy snowfall extended as far east as the higher elevations of eastern Buncombe county, while the valleys of northern Buncombe received 3 to 6 inches.
1/16/2008	Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening.|Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills.

Date	Description
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.
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.
1/29/2010	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.
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.

Date	Description
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.
1/22/2016	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 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.
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.
Madison County	
1/18/2000	Low pressure moved east across Tennessee and weakened as it ran into a surface high pressure ridge along the East Coast. Nevertheless, enough moisture was available to cause heavy snow to fall from Avery county, east across the northern foothills and northwest piedmont. Precipitation began as light rain in the mid-evening hours on the 17th, but quickly turned to snow as the atmosphere cooled to below freezing. Snowfall ranged between 3 and 6 inches across the area by noon on the 18th, with a narrow band of 1 to 3 inch accumulation of snow and sleet to the immediate south.
1/20/2000	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

Date	Description
	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.
1/26/2000	An upper level disturbance and northwest flow combined to produce varying amounts of snow across the mountains from early evening on the 25th through noon on the 26th. One to three inches of snow fell from Macon county to Buncombe and Yancey counties. Heavy snow accumulated 4 to 6 inches across most of the Tennessee border counties from Graham to Avery.
1/31/2000	Northwest flow produced a light snowfall of 1 to 3 inches.
2/4/2000	A cold and moist northwest flow produced snow showers for about 24 hours across mainly the Tennessee border counties. Snow accumulations of 1 to 3 inches occurred as far east as northern Buncombe county. Four inches of snow fell across the northern part of Mitchell county.
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 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. 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. Heavy rain, with embedded thunderstorms, crossed the region from late morning through the afternoon on the 16th. Cold air trapped in some valleys of the northern mountains never completely scoured out, resulting in a light glaze south and west of Newland. Just as surface temperatures rose above freezing in the northern mountains, thunderstorms pushed out ahead of the strong front, with numerous small hail reports. Nickel-sized hail was reported 8 miles north of Sylva in Jackson County. As the front, and attendant pressure gradient, pushed its way into western North Carolina, winds increased into the 50 to 60 mph range, resulting in numerous downed trees and power lines. Nearly every county in the mountains reported some wind damage. The high winds eventually affected the foothills and piedmont. In Charlotte, numerous trees were downed and furniture was blown off porches. An unsturdy building in Spencer collapsed. In the wake of the frontal passage, much colder air invaded the region, and as another shortwave affected the region on the 17th, a wide swath of 1 to 3 inch snow blanketed the higher terrain. Flurries were reported as far east as Hickory and Gastonia.
12/19/2000	N/A
12/30/2000	A strong northwest flow into the western facing slopes of the North Carolina mountains produced heavy snow in Graham and Madison counties. Accumulations ranged from 3 to 5 inches with most of the heavy snowfall reported in the extreme western halves of both counties. There was one unverified report of 8 inches along the Skyway in Graham County, with drifts as high as 3 feet reported there.
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.
1/8/2001	A weak upper level disturbance crossed the mountains early on the 8th, producing a light blanket of fresh snow.
1/8/2001	Another fast-moving upper level disturbance produced more light snow, mostly in areas near the Tennessee border.
1/20/2001	Strong, northwest winds on the backside of a developing surface cylcone along the Carolina coast advected much colder air into the North Carolina mountains on the 20th, resulting in heavy snow along the slopes with a western exposure. Highest accumulations were in Avery and Mitchell counties, with Poplar reporting 5 to 6 inches, and Elk Park 5 to 8 inches.
1/25/2001	A cold front crossed the mountains early on the 25th, producing additional light snow accumulations in the northern North Carolina mountains.

Date	Description
3/20/2001	N/A
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.
4/1/2001	A potent upper level disturbance rotating across the southeast states behind a strong cold front that crossed the area late in March interacted with cold, moist air remaining over the mountains to produce a light blanket of snow early on the 1st.
1/6/2002	Snow began in the early morning, reaching accumulations of 4 to 8 inches by 3 pm. The highest accumulations were in the high elevations. Some sleet was mixed in with the snow.
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.
2/26/2002	Snow fell overnight into the morning hours, as an upper level storm system moved across the area, and was followed by strong northwest winds. Most of the snow fell immediately along the Tennessee border, but extended east of there in some cases. Some of the higher elevations of Graham, Madison, and Avery Counties received as much as 5 inches of snow. In addition to the snow, wind chill values fell to zero and below in some locations.
11/17/2002	The first snow of the season brought an inch or two of accumulation to the higher elevations of the North Carolina mountains. Winds also gusted to 45 mph in some loactions.
11/22/2002	Snow accumulated to as much as 5 inches on the highest peaks along the Tennessee border. Also, wind gusts resulted in scattered tree damage across the area.
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.
1/23/2003	Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid morning. Otherwise, snow accumulations were generally in the 3 to 6 inch range.
2/6/2003	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.
3/30/2003	Snow intensified across the southern and central mountains during the pre-dawn hours, and by sunrise, heavy snow accumulations were realized. Valley locations received anywhere from a trace to 6 inches, while up to 8 inches accumulated in the highest elevations. The heavy, wet snow caused widespread power outages, especially in Haywood County. Three hikers required rescue in Haywood County, and one was hospitilazed with hypothermia.
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

Date	Description
	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.
12/18/2003	A prolonged period of snow produced heavy accumulations over a 2-day period across much of the North Carolina mountains. Most valley locations received total accumulations of 6 inches or less. However, most of the high elevation areas along the Tennessee border received between 1 and 2 feet. Northwest winds of 20 to 30 mph caused blowing and drifting snow.
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.
2/12/2004	Snow began during the late evening hours across the northern and central mountains, and continued overnight. By sunrise on the 12th, accumulations of 3 to 6 inches were common. The heaviest amounts occurred in the highest elevations 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.
12/11/2004	Heavy snow fell across the mountains and accumulated in the high elevations to 3 to 6 inches. The heavy snow level in most locations was 4000 feet, but dropped off to as low as 3000 feet in the southwest mountains. Elevations between 2500 feet and 3500 feet generally had and inch or two.
12/19/2004	Heavy snow fell for about 7 hours, along with wind gusts to near 50 mph. The highest accumulations were along the Tennessee border, especially in Graham County where some drifts reached a reported 2 feet. The snow and wind was accompanied by very cold weather. The Asheville Regional Airport reached a record low of 7 degrees the morning of the 20th. Buncombe County had heavy snowfall in the western and northern part of the county, although areas from Asheville south to the Henderson County line only had a trace to an inch. The temperature fell to below zero overnight in parts of the northern mountains, even the valleys, with single digits common elsewhere.
3/1/2005	Snow developed during the evening across the northern mountains, as strong northwest winds developed in the wake of a cold front. 2 to 4 inches of snow accumulated in addition to that which fell across the area on the morning of the 28th.
3/1/2005	Snow developed during the evening across the northern mountains, as strong northwest winds developed in the wake of a cold front. 2 to 4 inches of snow accumulated in addition to that which fell across the area on the morning of the 28th.
1/14/2006	As snow showers continued across the western mountains, accumulations reached 2-5 inches across the area by early afternoon. There were locally heavier amounts in the higher elevations.
2/11/2006	Northwest flow, a very cold airmass, and upper air disturbances combined to produce an unusually strong upslope snow event across the far western counties of North Carolina. Widespread, heavy snow showers began to develop during the early evening of the 11th, and by late evening, heavy snowfall accumulations were common across the area. The snow lasted for a very long period, continuing through the 12th and the early morning hours of the 13th before finally tapering off. Combined with the light snow that fell across the area on the morning of the 11th, storm total accumulations of 5 to 10 inches occurred within the valleys near the Tennessee border. Meanwhile, accumulations were generally in the 1-2 foot range across the higher elevations. There were unofficial reports of as much as 4 feet in the Smoky Mountains. This event was unusual in that heavy snowfall extended as far east as the higher elevations of eastern Buncombe county, while the valleys of northern Buncombe received 3 to 6 inches.
3/25/2006	An extended period of upslope flow and an unstable airmass resulted in numerous snow showers across the western mountains of North Carolina. The snow showers began on the evening of the 24th and continued through the evening of the 25th. Snowfall accumulated to 4 to 8 inches in the higher elevations along the Tennessee border. Although snowfall totals in the valleys were lower, 2 to 3 incehs did accumulate at the lower end of the French Broad valley, and in the Pigeon River gorge. In many cases, heavy bursts of snow would cause a quick inch or so to accumulate in the valleys before melting rapidly under the influence of warm temperatures. Therefore, actual snowfall in the valleys was probably higher than reported.
12/26/2006	Snow showers developed during the afternoon hours across the western North Carolina mountains. They became more widespread and heavy during the evening hours, with a few locations experiencing heavy snowfall, mainly in areas above 3000 feet. Two to 4 inch totals were common along the higher elevations of the Cherohala Skyway in Graham County and in the higher elevations of Madison County. The valleys generally received less than an inch.
1/9/2007	An upper level disturbance brought fairly uniform 1 to 4 inch snowfall amounts across the mountains during the late morning. The snow was quite heavy in spots and accumulated rapidly. Roads became slick and hazardous, especially in the higher elevations. Quite a few traffic accidents occurred in Madison County, including 1 fatal accident. Highway 441 was closed through the Smoky Mountains. Once the upper disturbance moved east of the area, scattered to numerous snow showers continued to affect the mountains through much of the afternoon and evening. Most areas along the Tennessee border began to see heavy snowfall accumulations by early evening. Total accumulations in the higher elevations were fairly uniform in the 3 to 5-inch range, although some locations right along the Tennessee border saw up

Date	Description
	to 7 inches, particularly along the Cherohala Skyway in Graham County, and across the northern mountains. The valleys saw less snow, with generally 1 to 2 inches observed south of the French Broad River, and 1 to 4 inches observed from the French Broad north.
1/9/2007	An upper level disturbance brought fairly uniform 1 to 4-inch snowfall amounts across the mountains during the late morning. The snow was quite heavy in spots and accumulated rapidly. Roads became slick and hazardous, especially in the higher elevations. Quite a few traffic accidents occurred in Madison County, including 1 fatal accident. Highway 441 was closed through the Smoky Mountains. Once the upper disturbance moved east of the area, scattered to numerous snow showers continued to affect the mountains through much of the afternoon and evening. Most areas along the Tennessee border began to see heavy snowfall accumulations by early evening. Total accumulations in the higher elevations were fairly uniform in the 3 to 5-inch range, although some locations right along the Tennessee border saw up to 7 inches, particularly along the Cherohala Skyway in Graham County, and across the northern mountains. The valleys saw less snow, with generally 1 to 2 inches observed south of the French Broad River, and 1 to 4 inches observed from the French Broad north.
2/17/2007	Light to moderate snow developed in areas from the Smokies to the lower French Broad valley during the early evening and continued into the early morning hours. By 3 AM, snowfall amounts of 1-3 inches were fairly uniform across the area. Snow continued through the pre-dawn hours in areas from the northern Smokies, through the Piegeon River gorge, to the lower French Broad valley and surrounding areas. By the time the snow tapered off to flurries during mid-morning, snowfall totals ranged from 2-4 inches in the valleys, including Waynesville, Marshall, and Mars Hill, to 4-6 inches across the higher elevations near the Tennessee border. Snow showers continued to produce sporadic light accumulations in the higher elevations through much of the day.
4/6/2007	A record-setting cold airmass, northwest flow, and a strong upper air disturbance resulted in a late season snow shower event across the North Carolina mountains. By 3 am, snow had accumulated to as much as 2 inches in the valleys, with as much as 6 inches reported in the higher elevations. Snow showers continued through the morning hours, with heavy snowfall totals reported during the pre-dawn hours. Snowfall was highly variable across the region, with generally only 2-3 inches accumulating in the lower elevations. However, some of the higher elevations of the northern mountains saw as much as 10 inches.
4/15/2007	As a strong cold front moved across the mountains and snow levels dropped rapidly, rain showers changed to snow showers and caused rapid accumulation of heavy snow, mainly in the higher elevations along the Tennessee border. Total accumulations generally ranged from 2-5 inches, mainly in areas above 3500 feet, while the valleys saw amounts ranging from a trace up to an inch.
1/1/2008	Snow showers developed New Yearï¿½ï¿½ï¿½s Evening across the western slopes of the Appalachians. As snow showers, heavy at times, continued across the western Mountains of North Carolina, accumulations began to pile up during the pre-dawn hours of the 2nd. Many locations reported 2-4 inches of accumulation by sunrise. By the time the snow tapered off to flurries (during late morning), total accumulations ranged from a couple of inches in the valleys away from the Tennessee border, to 4-6 inches in areas along the state line. Although accumulating snow tapered off during mid-morning, flurries continued for much of the day, while very windy conditions resulted in blowing and drifting snow.
2/26/2008	Snow showers developed across the western mountains during the late evening. The snow showers increased in coverage and intensity through the early morning hours of the 27th, resulting in heavy snow accumulations across much of the western mountains before sunrise. Snow continued through the day and evening hours and did not begin tapering off until the early morning hours on the 28th. Total accumulations were highly variable across the area. While locations such as Bryson City and Waynesville saw less than 2 inches, areas along the Tennessee border received as much as a foot. Even the valley floors near the state line received as much as 8 inches.
12/1/2008	Snow showers developed during the early morning hours and continued through much of the day across the Tennessee border counties. Snow showers, heavy at times, continued near the Tennessee border, with heavy snowfall accumulations reported by early evening. The snow tapered off to flurries during the early morning hours. Total snowfall amounts ranged from an inch or 2 along the Blue Ridge, to as much as 6-7 inches in the higher elevations near the state line.
1/8/2009	Snow showers developed across the Tennessee border counties around sunrise, and persisted until the late afternoon hours. Snowfall amounts ranged from 2-5 inches, mainly in elevations above 3000 feet or so. Some locally higher amounts were reported on the higher peaks.
1/18/2009	Snow showers developed over the western mountains during the late evening of the 18th, and continued off and on through the evening hours of the 20th. Snowfall totals ranged from 4 to 6 inches at the higher elevations of the southwest and central mountains, to 1 to 3 inches in the valleys. Over the northern mountains totals ranged from 4 to 7 inches, with 1 to 3 inches along the eastern slopes of the Blue Ridge.
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

Date	Description
	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.
4/7/2009	After an extended period of snow showers, heavy snowfall accumulations were reached across the higher elevations of the southern and central mountains near the Tennessee border. Total accumulations in areas above 3500 feet generally ranged from 3-6 inches, although some of the higher elevations of the Smokies, the Newfound Mountains, and along the Cherohala Skyway received amounts of 10 inches or more.
1/7/2010	A very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains during the evening of the 7th. The snow showers continued across much of the Tennessee border counties through the day on the 8th, with heavy accumulations reached in some areas by late morning. Total accumulations ranged from 1-3 inches over the lower French Broad Valley, to 3-6 inches across the northern mountains. Over the southwest mountains, total snowfall accumulations ranged from trace amounts in the valleys beneath the Smokies, to 2-4 inches in the higher elevations along the Tennessee border.
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.
2/15/2010	Northwest flow snow showers developed over the northern mountains during the evening and persisted over the next 24 hours. By the evening of the 16th, accumulations of 5-6 inches were common near the Tennessee border, while only an inch or so had fallen in areas closer to the Blue Ridge. The snow continued off and on for almost two more days, before finally tapering off during the morning of the 18th. Accumulations along the Tennessee border totaled a foot or more in some areas. Meanwhile, locations closer to the Blue Ridge only saw a couple of inches. Over Avery County, total accumulations were higher, with 1-2 feet near the Tennessee border.
2/24/2010	Northwest flow snow showers developed during the evening across the northern mountains, and continued along the Tennessee border through much of the 25th, with heavy snowfall accumulations reached across much of the area shortly after sunrise. Total accumulations ranged from only a couple of inches along the Blue Ridge, to 7 inches in the lower valleys along the Tennessee border. Meanwhile, some of the higher elevations received a foot or more of snowfall.
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.
11/5/2010	Moist northwest flow resulted in widespread snow showers near the Tennessee line, beginning around mid-morning on the 5th. Snow showers continued off and on across the higher elevations of the Smokies, Newfound Mountains and surrounding areas through the day. By early afternoon, 3 to 5 inches had accumulated above 3500 feet. By the morning of the 6th, some areas had as much as 8 inches. While periods of snow showers, flurries, and rain mixed with snow were reported in the valleys, little or no accumulation occurred below 3500 feet.
12/12/2010	Light snow began falling over the northern mountains and Madison County during the early morning hours of the 12th. By mid-morning, accumulations of 1 to 3 inches were observed across the area. After a strong cold front swept through the mountains, northwest winds resulted in development of numerous snow showers by early afternoon. By mid-evening, snowfall totals ranged from 1 to 5 inches across the area.||As snow showers continued in the northwest flow, snow continued to gradually accumulate in the higher elevations along the Tennessee border. By the time the snow tapered off early on the 14th, accumulations generally ranged from 4 to 8 inches in the higher elevations, generally above 3500 feet, although some areas saw as much as 20 inches. The lower elevations saw considerably lower amounts, generally in the 2-5 inch range. Very windy conditions and very 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 northern mountains beginning shortly after sunrise on Christmas. Snow, heavy at times, continued through the afternoon across the northern mountains and surrounding areas. By Christmas evening, most locations had 3 to 6 inches of fresh snowpack. A brief lull in snowfall occurred overnight. However, snowfall began to increase again during the morning of the 26th, as strong northwest flow resulted in development of numerous snow showers along the Tennessee border. The snow showers continued until the afternoon of the 27th. This resulted in additional accumulations that ranged from

Date	Description
	2 to 6 inches in the valleys to a foot or more in the higher elevations. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, especially in the high elevations.
1/7/2010	A very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains during the evening of the 7th. The snow showers continued across much of the Tennessee border counties through the day on the 8th, with heavy accumulations reached in some areas by late morning. Total accumulations ranged from 1-3 inches over the lower French Broad Valley, to 3-6 inches across the northern mountains. Over the southwest mountains, total snowfall accumulations ranged from trace amounts in the valleys beneath the Smokies, to 2-4 inches in the higher elevations along the Tennessee border.
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.
2/15/2010	Northwest flow snow showers developed over the northern mountains during the evening and persisted over the next 24 hours. By the evening of the 16th, accumulations of 5-6 inches were common near the Tennessee border, while only an inch or so had fallen in areas closer to the Blue Ridge. The snow continued off and on for almost two more days, before finally tapering off during the morning of the 18th. Accumulations along the Tennessee border totaled a foot or more in some areas. Meanwhile, locations closer to the Blue Ridge only saw a couple of inches. Over Avery County, total accumulations were higher, with 1-2 feet near the Tennessee border.
2/24/2010	Northwest flow snow showers developed during the evening across the northern mountains, and continued along the Tennessee border through much of the 25th, with heavy snowfall accumulations reached across much of the area shortly after sunrise. Total accumulations ranged from only a couple of inches along the Blue Ridge, to 7 inches in the lower valleys along the Tennessee border. Meanwhile, some of the higher elevations received a foot or more of snowfall.
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.
11/5/2010	Moist northwest flow resulted in widespread snow showers near the Tennessee line, beginning around mid-morning on the 5th. Snow showers continued off and on across the higher elevations of the Smokies, Newfound Mountains and surrounding areas through the day. By early afternoon, 3 to 5 inches had accumulated above 3500 feet. By the morning of the 6th, some areas had as much as 8 inches. While periods of snow showers, flurries, and rain mixed with snow were reported in the valleys, little or no accumulation occurred below 3500 feet.
12/12/2010	Light snow began falling over the northern mountains and Madison County during the early morning hours of the 12th. By mid-morning, accumulations of 1 to 3 inches were observed across the area. After a strong cold front swept through the mountains, northwest winds resulted in development of numerous snow showers by early afternoon. By mid-evening, snowfall totals ranged from 1 to 5 inches across the area.||As snow showers continued in the northwest flow, snow continued to gradually accumulate in the higher elevations along the Tennessee border. By the time the snow tapered off early on the 14th, accumulations generally ranged from 4 to 8 inches in the higher elevations, generally above 3500 feet, although some areas saw as much as 20 inches. The lower elevations saw considerably lower amounts, generally in the 2-5 inch range. Very windy conditions and very 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 northern mountains beginning shortly after sunrise on Christmas. Snow, heavy at times, continued through the afternoon across the northern mountains and surrounding areas. By Christmas evening, most locations had 3 to 6 inches of fresh snowpack. A brief lull in snowfall occurred overnight. However, snowfall began to increase again during the morning of the 26th, as strong northwest flow resulted in development of numerous snow showers along the Tennessee border. The snow showers continued until the afternoon of the 27th. This resulted in additional accumulations that ranged from 2 to 6 inches in the valleys to a foot or more in the higher elevations. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, especially in the high elevations.
1/7/2011	Light to moderate snow developed ahead of a cold front across the western mountains of North Carolina around noon, and continued through the afternoon. After the cold front passed during the early evening, snow showers, some of which were heavy developed within a moist northwest flow, adding to accumulations across the Tennesse border counties. Snow showers continued into the overnight and through much of the 8th before tapering off during the evening and the early morning hours of the 9th. Total accumulations were highly variable across the area and depended

Date	Description
	largely upon terrain. Storm total amounts ranged from 3 to 5 inches in the southwest mountain valleys, to 4 to 8 inches in the lower French Broad Valley and the northern mountain valleys. The high elevations along the state line received as much as 2 feet.
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.
2/11/2012	Snow showers developed over much of the North Carolina mountains during the early morning hours, and continued throughout the day. Snow showers continued off and on across the Tennessee border counties during the evening and early part of the overnight. Total accumulations ranged from a couple of inches in the lower valleys, to as much as 8 inches in the higher elevations of the Newfound Mountains and northern mountains.
10/29/2012	As ï¿½ï¿½ï¿½Superstorm Sandyï¿½ï¿½ï¿½ï¿½ moved across New England and stalled over the northern Mid-Atlantic region, abundant moisture was transported into the mountains. The first snow showers of the season developed within this moist northwest flow across the northern mountains of North Carolina during the pre-dawn hours of the 29th. Snow showers, some heavy continued through the day and overnight, and by the pre-dawn hours of the 30th, heavy snowfall accumulations were observed, mainly across the higher elevations of the northern mountains and Madison County. By the time the snow showers tapered off during the early morning hours of the 31st, 1 to 3 feet of snow was reported in the high elevations (above 4000 feet or so), with the heaviest amounts occurring at the peaks along the Tennessee border. Meanwhile, the lower valleys saw storm totals of only a few inches.
2/2/2013	Snow developed across Madison and Yancey counties during the early evening and continued off and on through the morning of the 3rd. By the late morning, heavy snowfall accumulations were reported in many locations. Snow showers, heavy at times continued through much of the 3rd before tapering off by during the evening. Total accumulations ranged from 3-5 inches in most valley locations to as much as a foot in the higher elevations.
11/26/2013	As cold air spilled into the North Carolina mountains in the wake of an arctic cold front, rain quickly changed to snow after midnight. Periods of moderate and briefly heavy snow were reported. Northwest flow snow showers continued across the higher elevations of the Newfound Mountains and northern Smokies through the day. While most lower valley areas saw total accumulations of less than a couple of inches, 3-6 inches fell above about 3500 feet. However, accurate accumulations were difficult to report owing to wind gusts up to 50 mph causing considerable blowing and drifting snow.
1/21/2014	Widespread snow showers developed along the Tennessee border along and immediately behind a cold front during the late morning and continued through the evening hours across the Tennessee border counties. Heavy snowfall accumulations were realized in the favored northwest flow locations by late evening. Total accumulations ranged from 3 to 6 inches across much of the area, although the valleys southwest of the French Broad generally saw less. Locally higher amounts up to 10 inches were observed in the high elevations of the northern mountains.
11/1/2014	Precipitation associated with a strong upper level disturbance and associated strong cold front changed to snow at the highest peaks and ridge tops by early evening Halloween evening, with snow levels dropping rapidly to the valley floors by the end of the evening as an arctic air mass infiltrated the region behind the front. By the pre-dawn hours of the 1st, snow accumulation ranged from a dusting to a couple of inches on the valley floors, to a foot or more in the high elevations along the Tennessee border. Snow became more showery and sporadic in nature during the morning of the 1st, especially across the valleys, but not before heavy snowfall totals were reached within much of the Tennessee border counties. 2-6 inches of snowfall accumulated across many valley areas by daybreak. Meanwhile, snow showers, heavy at times continued across the high elevations into early afternoon. Total accumulations of 1-2 feet were reported in locations above 4000 feet along the state line, mainly across the Smokies and the Newfound Mountains.
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.

Date	Description
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	Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days.
12/1/2020	Snow that began during the evening of the 30th continued to fall into the first as strong northwest winds pushing moisture up the western slopes of the Appalachians resulted in development of numerous to widespread snow showers near the Tennessee border. Heavy accumulations were reported in the higher elevations of the Tennessee border counties, where totals were generally in the 3 to 5 inch range above 3500 feet, with locally higher amounts of up to 8 inches along the immediate Tennessee border. Accumulations in the valleys ranged from a dusting to around 3 inches.
12/24/2020	Precipitation associated with an area of low pressure and attendant cold front moved across western North Carolina throughout Christmas Eve into Christmas morning. Snow levels dropped quickly across the mountains during the evening hours, resulting in rain changing to snow. While much of the accumulating snow ended by around sunrise on Christmas Day, continuing snow showers produced additional light snowfall amounts throughout the day, especially in the higher elevations along state line. Snowfall totals were generally in the 3 to 6 inch range, although amounts of around a foot were reported in the higher elevations, and even in portions of the lower French Broad Valley. This was the first Christmas heavy snow event to impact western North Carolina since 2010.
2/1/2021	Snow showers developed across the Tennessee border counties of North Carolina as strong northwest winds developed in the wake of a cold front, pushing moist and cold air up the western slopes of the mountains. The snow showers were heavy at times during the overnight and early morning hours, particularly in the higher elevations along the state line. The snow showers finally tapered off to flurries and light snow showers late on the 2nd. Total snow accumulations varied widely depending upon elevation and proximity to the Tennessee border, with valley totals ranging from only an inch or two in the valleys below the Smokies, to 3 to 6 inches, with locally higher amounts in the valleys of Madison County and the northern mountains. Meanwhile, totals in the high elevations were generally in the 8-12 inch range.
1/2/2022	Snow levels fell quickly during the evening across the North Carolina mountains as a strong cold front crossed the area. Moisture increased as an area of developing low pressure passed south of the region, resulting in snow developed by midnight first across the higher elevations and eventually across the valleys as the colder air infiltrated. Snow showers continued through the morning of the 3rd as developing strong northwest winds pushed lingering moisture up the western slopes. By the time the snow tapered off during late morning, total snowfall ranged from 2 to 5 inches across Madison County and from 4 to 7 inches across Avery County. Locally higher amounts of up to a foot were reported on the higher peaks.
1/16/2022	Moisture overspread the southern Appalachians early on the 16th as strengthening low pressure moved across the Deep South. Strong northeast winds supplied ample cold air for the precipitation to begin as light snow. 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 throughout the 16th and into the 17th. Total snow accumulations ranged from 7 to 12 inches across much of the area, with locally higher amounts of 18-24 inches above 4000 feet.
1/28/2022	Snow developed across the North Carolina mountains during the afternoon of the 28th as a cold front swept through the area. Snow showers persisted through the early morning hours in the wake of the front near the Tennessee border as northwest winds pushed moisture up the western slopes of the Appalachians. By the time the snow tapered off around sunrise on the 29th, accumulations of 2 to 5 inches were widespread across the Tennessee border counties, from roughly I-40 northeast. Meanwhile, locations above 4000 feet or so reported amounts of up to a foot.
3/12/2022	Rain developed across the North Carolina mountains late on the 11th in association with a cold front. Snow levels quickly lowered in the wake of the front, allowing lingering precipitation to transition to snow during the early morning hours of the 12th. The snow transitioned to snow showers that continued into the afternoon as brisk northwest winds pushed moisture up the western slopes. Heavy snowfall accumulations of 3 to 7 inches were reported across the higher elevations along the Tennessee border, with locally higher amounts of up to 10 inches. Winds gusting to 35 to 50 mph from the northwest in the wake of the front resulted in periods of blizzard-like conditions. Although the transition to snow was somewhat brief in the lower elevations, 1 to 3 inches also managed to accumulate in many valley locations before the precipitation ended.

Date	Description
1/13/2023	As a cold air mass overspread the western Carolinas in the wake of an arctic cold front, strong northwest winds interacting with moisture across the Tennessee Valley and the western slopes of the Appalachians resulted in snow shower development near the Tennessee border. Snow showers remained widespread throughout the 13th before steadily tapering off through the morning of the 14th. Snowfall totals were highly variant based upon exposure and elevation, with amounts generally ranging from only 1 to 3 inches in the valleys. Meanwhile, totals above 3500 feet were mainly in the 4 to 8 inch range, while spotty amounts of 1 to 2 feet were reported above 5000 feet along the Tennessee border.

TABLE H.7: HIGH WIND EVENTS (2000-2025)

Date	MPH	Description
Buncombe County		
1/13/2000	52	Strong and damaging northwest winds behind a strong cold front, gusted to 60 mph or more. Many trees and power lines were blown down which resulted in power outages for some mountain residents. The highest winds in the foothills occurred near the Blue Ridge Parkway.
3/19/2000	55	High gradient winds blowing from the south knocked down numerous trees and power lines across the mountains. Only light structural damage occurred, except in Avery county. Roofs were blown off several houses around Banner Elk, Beech Mountain police reported the door of their office was nearly blown off, and there was an unofficial measurement of a 135-mph wind gust on Beech Mountain. The highest winds occurred between 11 pm and 4 am.
3/28/2000	50	High winds following a cold front caused a number of problems during the afternoon. Numerous trees and power lines were downed and some light structural damage occurred. Several thousand people were without power for a while too. A man was injured when a wall toppled over onto him in Concord. Streets were blocked by the downed trees and power lines in Charlotte.
4/8/2000	50	High winds following a cold front blew down a number of trees and power lines. Scattered power outages occurred as well.
12/16/2000	55	N/A
3/6/2001	55	N/A
3/20/2001	55	N/A
7/4/2001	40	Mesoscale high wind event developed behind a line of strong to severe thunderstorms. Numerous trees were blown down countywide during a time of persistent 30 to 40 mph winds. Later, an off-duty weather observer estimated wind gusts of between 40 and 50 mph.
10/13/2001	50	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.
11/24/2001	50	A marginal high wind event developed, with most mountain counties reporting winds below damaging levels., However, in these 4 zones, winds gusted to a high enough level to cause scattered trees to be downed, with some power outages resulting.
11/29/2001	50	N/A
2/4/2002	50	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	50	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.
11/6/2002	50	High winds behind a cold front caused numerous trees to fall across portions of the mountains and foothills of North Carolina.
11/30/2002	50	Numerous trees and large tree limbs were blown down. Power outages were also reported.
12/13/2002	65	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.
12/25/2002	50	Very strong winds developed during the late morning across the mountains and foothills. Wind gusts reached an estimated 60 to 75 mph across the higher elevations. Damage to trees and power lines was widespread, and power outages were numerous. Some trees fell on vehicles and structures.
1/23/2003	60	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.
2/23/2003	50	A number of trees were blown down, especially in Asheville.
10/14/2003	50	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	50	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

Date	MPH	Description
		elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged.
11/18/2003	50	High winds developed ahead of a cold front, mainly across the higher elevations of the North Carolina mountains. Scattered trees and power lines were blown down in most counties. However, damage was most extensive in Madison, Swain, and Macon counties. Numerous downed trees and power outages occured in these counties.
3/7/2004	50	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	55	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.
9/16/2004	55	High winds developed across the mountains, as the remants 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	50	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	60	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.
1/22/2005	60	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.
3/8/2005	60	High winds developed across portions of the mountains during the morning, mainly from the French Broad Valley north. Trees and power lines were blown down, resulting in some power outages. Several gusts were measured in the 60-70 mph range by home weather equipment. The most significant winds/damage occurred around Black Mountain.
3/8/2005	60	High winds developed across portions of the mountains during the morning, mainly from the French Broad Valley north. Trees and power lines were blown down, resulting in some power outages. Several gusts were measured in the 60-70 mph range by home weather equipment. The most significant winds/damage occurred around Black Mountain.
4/2/2005	60	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 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	60	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.
1/25/2006	55	High winds developed across the mountains and the foothills during the overnight hours, and continued through about mid-morning. The hardest hit areas were locations along and near the Blue Ridge from I-40 north, and Jackson county in North Carolina. In Avery County, a steeple was blown off of a church. Scattered to widespread tree damage occurred, with quite a few power outages, mainly concentrated along the I-40 corridor from Black Mountain to Old Fort.
11/15/2006	50	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.
4/15/2007	70	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

Date	MPH	Description
		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	65	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 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	55	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	60	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	50	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	55	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.
10/29/2012	50	As superstorm Sandy 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	55	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.
1/30/2013	50	Strong winds over the mountains became damaging near the eastern Blue Ridge during the afternoon, as a line of weakening rain showers moved across the area. Multiple trees and large limbs were blown down in a short period of time.
3/29/2014	56	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	50	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	50	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

Date	MPH	Description
		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	50	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	50	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.
3/16/2025	60	Very strong S/SE winds developed across the North Carolina mountains early in the morning in advance of a dynamic frontal system. The strongest winds occurred between 3 AM and 5 AM, possibly assisted by a band of rain with embedded heavy showers and isolated thunderstorms that mixed higher winds from aloft to the valley floors. Some minor structural damage was reported to houses across the region, while numerous trees were blown down, some onto structures, vehicles, and power lines. One tree fell on a trailer in the Conestee community of Transylvania County, killing a 13-year-old male and an 11-year-old male who were sleeping inside. Multiple outbuildings were damaged or destroyed in Haywood County. Power outages numbered in the tens of thousands at the peak of the event. The highest reliable measured gust across the area was at the Asheville Regional Airport, where official NWS obs measured a gust of 59 mph at 422 AM. However, damage reports suggest gusts likely reached as high as 70 mph in some locations. The band of showers and storms strengthened as it moved into the Piedmont later in the morning, with a small area of damaging wind gusts developing in northeast Union County in association with a short line of storms.
Madison County		
3/19/2000	55	High gradient winds blowing from the south knocked down numerous trees and power lines across the mountains. Only light structural damage occurred, except in Avery county. Roofs were blown off several houses around Banner Elk, Beech Mountain police reported the door of their office was nearly blown off, and there was an unofficial measurement of a 135 mph wind gust on Beech Mountain. The highest winds occurred between 11 pm and 4 am.
12/16/2000	55	N/A
3/6/2001	55	N/A
10/13/2001	50	The wind began blowing hard around midnight, causing numerous trees to fall. Widespread power outages occurred in some cases.
11/29/2001	50	N/A
2/4/2002	50	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	50	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.
11/30/2002	50	Numerous trees and large tree limbs were blown down. Power outages were also reported.
12/25/2002	50	Very strong winds developed during the late morning across the mountains and foothills. Wind gusts reached an estimated 60 to 75 mph across the higher elevations. Damage to trees and power lines was widespread, and power outages were numerous. Some trees fell on vehicles and structures.
1/23/2003	60	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	50	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	50	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.
11/18/2003	50	High winds developed ahead of a cold front, mainly across the higher elevations of the North Carolina mountains. Scattered trees and power lines were blown down in most counties. However, damage was most

Date	MPH	Description
		extensive in Madison, Swain, and Macon counties. Numerous downed trees and power outages occurred in these counties.
3/7/2004	50	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	55	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.
9/16/2004	55	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	50	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	50	The counties reported damage from high winds, mainly trees and power lines, with some structural damage possible, mainly from falling trees.
12/23/2004	50	In Graham County, a garage was blown down in the Sweetwater district. In Madison County, a large sign was blown onto a pickup truck along I-26. Trees were also downed. The strongest winds occurred just before daybreak.
1/22/2005	60	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.
1/22/2005	60	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.
3/8/2005	60	High winds developed across portions of the mountains during the morning, mainly from the French Broad Valley north. Trees and power lines were blown down, resulting in some power outages. Several gusts were measured in the 60-70 mph range by home weather equipment. The most significant winds/damage occurred around Black Mountain.
3/8/2005	60	High winds developed across portions of the mountains during the morning, mainly from the French Broad Valley north. Trees and power lines were blown down, resulting in some power outages. Several gusts were measured in the 60-70 mph range by home weather equipment. The most significant winds/damage occurred around Black Mountain.
2/7/2007	55	A brief period of high wind gusts knocked down trees and power lines in the Marshall area. Wind equipment in the 7 Mile Ridge area measured a peak wind gust of 63 mph.
4/15/2007	55	Strong winds developed behind a cold front during the evening hours of the 15th. Numerous trees and power lines were blown down across the area. However, damage was much more widespread toward the Blue Ridge.
4/16/2007	60	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	55	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.

Date	MPH	Description
5/11/2008	60	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.
12/9/2009	55	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.
1/30/2013	50	Strong winds over the mountains became damaging near the eastern Blue Ridge during the afternoon, as a line of weakening rain showers moved across the area. Multiple trees and large limbs were blown down in a short period of time.
3/16/2025	65	Very strong S/SE winds developed across the North Carolina mountains early in the morning in advance of a dynamic frontal system. The strongest winds occurred between 3 AM and 5 AM, possibly assisted by a band of rain with embedded heavy showers and isolated thunderstorms that mixed higher winds from aloft to the valley floors. Some minor structural damage was reported to houses across the region, while numerous trees were blown down, some onto structures, vehicles, and power lines. One tree fell on a trailer in the Conestee community of Transylvania County, killing a 13-year-old male and an 11-year-old male who were sleeping inside. Multiple outbuildings were damaged or destroyed in Haywood County. Power outages numbered in the tens of thousands at the peak of the event. The highest reliable measured gust across the area was at the Asheville Regional Airport, where official NWS obs measured a gust of 59 mph at 422 AM. However, damage reports suggest gusts likely reached as high as 70 mph in some locations. The band of showers and storms strengthened as it moved into the Piedmont later in the morning, with a small area of damaging wind gusts developing in northeast Union County in association with a short line of storms.

TABLE H.8: ICE STORM EVENTS (2000-2025)

Date	Description
Buncombe County	
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.
12/15/2005	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.
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.
12/24/2009	Light freezing rain developed late on Christmas Eve and continued throughout the overnight before becoming heavier shortly before sunrise. Light ice accretion occurred, mainly on elevated surfaces during this time. Quite a few slick spots also developed, mainly on bridges and overpasses. Freezing rain continued through the morning hours along the eastern escarpment of the Blue Ridge, and became heavy at times by mid-morning. By the time the precipitation tapered off, ice accretion ranged from .25 to .5 inch across much of the area. The combination of ice and wind gusts up to 60 mph (with gusts up to 80 mph in the higher elevations) caused numerous trees and power lines to fall. The resultant widespread power outages exacerbated the problems for areas that had yet to recover from the December 18th snowstorm.
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.
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

Date	Description
	foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area.
Madison County	
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.

TABLE H.9: LIGHTNING EVENTS (2000-2025)

Location	Date	Description
Buncombe County		
ENKA	8/18/2000	Lightning struck a nearby tree, ran into a house, and ignited a fire which burned the house and its contents.
ASHEVILLE	6/20/2001	Lightning struck an unoccupied house, causing a fire that resulted in serious damage.
SKYLAND	7/3/2001	Lightning started a fire at a power transformer, destroying the building which was located at a power plant and a car belonging to one of the power plant employees.
BLACK MTN	6/3/2002	Lightning struck the Public Safety building, City Hall, the Fire Station, and 4 residences. One residence suffered a major fire and considerable damage.
WEAVERVILLE	7/12/2003	A man was seriously injured when he was struck by lightning while standing next to a tree at Reems Creek.
ASHEVILLE	7/14/2006	Four people, 3 adults and 1 child, received minor injuries from a lightning strike at the Biltmore Estate.
FAIRVIEW	6/8/2009	A 65-year-old man was struck and killed by lightning on highway 74E just south of Fairview.
AVERY CREEK	2/28/2011	Lightning struck a home on Owenby Lane, igniting a fire.
Madison County		
MARS HILL	7/14/2000	A cluster of severe thunderstorms produced damaging wind and hail close to midnight. Numerous downed trees and power lines were reported along with the usual associated power outages. A lot of hail fell in Weaverville but the size was unknown. Lightning struck a home in Mars Hill, destroying the home and its contents.
MARSHALL	7/2/2002	Lightning ignited a housefire.
JOE	6/4/2010	A 25-year-old woman was struck and killed by lightning while hiking on Max Patch.

TABLE H.10: THUNDERSTORM WIND EVENTS (2000-2025)

Location	Date	MPH	Description
Buncombe County			
FAIRVIEW	5/13/2000	52	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.
CANDLER	5/25/2000	70	A mesoscale convective system crossed western North Carolina during the morning. Thunderstorms along the leading edge produced winds reported as high as 94 mph in Candler. These winds picked up and a vacant mobile home and blew it into an occupied mobile home, destroying both. There were no injuries. Trees were also blown down. More than an hour later the thunderstorms intensified and became severe over the foothills and western piedmont.
CANDLER	6/3/2000	50	A severe thunderstorm produced damaging winds which blew down power lines and one tree in Candler. Another severe storm produced a considerable amount of dime size hail in the Greenlee community outside of Marion.
ASHEVILLE, WEAVERVILLE, BLACK MOUNTAIN	6/25/2000	50	Strong to severe thunderstorms developed in the mountains during the early afternoon and rumbled east across the foothills and into the western piedmont by early evening. All of the damage was produced by straight-line winds estimated almost as high as 70 mph that downed trees and power lines. In the Asheville, Biltmore, and Skyland areas 3300 people were left without power. A couple of houses were damaged by falling trees in Weaverville and Barnardsville. Fifteen to twenty trees were downed in Black Mountain - with some on cars. In Union county, sections of a church roof blew off, doors blew out, nails were pulled out the wall, and shingles were blown away. Gusty winds between 40 and 45 mph blew down one tree which landed on and flattened a car near Stony Point. Lightning struck a tree in a picnic area on top of Roan Mountain. A family was shocked as the lightning spread through the adjacent ground and pavement. One man fell back and hit his head on the pavement. He died five days later from a blood clot in his brain. The other five people suffered minor burns, cuts, and bruises.
WEAVERVILLE	7/14/2000	50	A cluster of severe thunderstorms produced damaging wind and hail close to midnight. Numerous downed trees and power lines were reported along with the usual associated power outages. A lot of hail fell in Weaverville but the size was unknown. Lightning struck a home in Mars Hill, destroying the home and its contents.
CANDLER	8/10/2000	60	Numerous trees were blown down across Hwys 19 and 23, as well as on other side roads. A utility building was blown over and a couple of sheriff's department cars were blown off the road.
JUPITER	4/1/2001	55	The first reported wind damage in the episode came from northern Buncombe County. Most of the roof of a house was blown off into the road. The residents reported that all was calm, then rain and wind hit suddenly. The wind flow may have been increased by a funnelling effect through a narrow mountain pass.
CANDLER	5/19/2001	50	Spotter reported two trees blown down in Candler.
SKYLAND	5/19/2001	50	The Emergency Operations Center relayed reports of trees blown across roads at both Skyland and Fairview.
FAIRVIEW	5/19/2001	50	N/A
ASHEVILLE	6/22/2001	55	Numerous reports of quarter-sized to golfball-sized hail in southern Buncombe County, along with several downed trees and power lines. Very heavy rainfall was also associated with this batch of storms, eventually resulting in a classic flash flood at Skyland.
ASHEVILLE	7/3/2001	50	Trees down in the Bent Creek area, blocking Brevard Road for a short time.
SKYLAND	7/8/2001	55	10 trees down between Skyland and the Henderson County line.
ASHEVILLE	7/8/2001	70	Cooperative observer at Flat Top Mountain reported a measured wind gust to 81 mph.
WEAVERVILLE	7/8/2001	50	Numerous trees and power lines blown over.
ASHEVILLE	7/8/2001	65	Power poles were snapped in half and numerous roads were blocked by downed trees. Widespread power outages reported.

Location	Date	MPH	Description
LEICESTER	7/8/2001	60	Trees blown down across Interstate 40, six miles west of Asheville. One tree was blown onto a house, and several fell on cars and roofs. Damage was far greater in the western half of Buncombe County than in the eastern half.
LEICESTER	10/25/2001	50	Trees and power lines blown over in the Leicester area, resulting in about 400 power outages.
ASHEVILLE	3/17/2002	50	A few trees were reported blown down.
ASHEVILLE	5/2/2002	51	Measured by ASOS at the Asheville Regional Airport.
SKYLAND	5/2/2002	55	Numerous trees were blown down.
JUPITER	5/2/2002	55	Several trees were blown down.
COUNTYWIDE	5/13/2002	50	Trees and powerlines were blown down.
LEICESTER	6/4/2002	50	A few trees were blown down.
ASHEVILLE	6/5/2002	50	A few trees were blown down. One tree fell on an automobile, trapping the occupants.
BLACK MTN	6/13/2002	50	Some trees and powerlines were blown down.
ASHEVILLE	7/2/2002	50	Trees were blown down near the intersection of Interstates 26 and 40.
WEAVERVILLE	7/4/2002	50	Several trees were blown down, and one injury resulted from a falling tree.
ASHEVILLE	5/2/2003	50	Numerous trees and power lines were blown down, many of which fell on cars and homes.
LEICESTER	5/2/2003	50	Numerous trees and power lines were blown down.
BLACK MTN	5/2/2003	50	Numerous trees and power lines were blown down.
ARDEN	6/8/2003	50	Several trees were blown down.
WEAVERVILLE	6/15/2003	50	A tree, several large tree limbs, and power lines were blown down
FAIRVIEW	7/12/2003	60	Numerous trees and power lines were blown down.
LEICESTER	7/13/2003	50	
BARNARDSVILLE	7/22/2003	50	Trees were blown down.
ARDEN	8/1/2003	50	Several trees were blown down. One tree fell on a mobile home.
ENKA	8/4/2003	60	Numerous trees and power lines were blown down. Part of the tin roof was blown off of an auto shop. Part of the roof was blown off of a warehouse, causing a wall to collapse. Numerous power outages were reported in areas from Asheville to Black Mountain.
WEAVERVILLE	8/4/2003	50	Several trees were blown down. Widespread power outages were reported across much of the northern portion of the county. Hail up to the size of pennies also covered the ground in portions of Weaverville.
CANDLER	5/22/2004	50	A large tree was blown down onto an automobile, crushing the vehicle.
LEICESTER	5/31/2004	50	Some trees were blown down.
LEICESTER	6/12/2004	60	Numerous trees were blown down in the Sandymush area. The roof was blown off a mobile home.
LEICESTER	7/5/2004	50	Several trees were blown down.
ASHEVILLE	8/11/2004	52	N/A
COUNTYWIDE	5/20/2005	50	Wind blew down 3 trees at scattered locations across the county.
COUNTYWIDE	5/20/2005	50	Wind blew down 3 trees at scattered locations across the county.
ASHEVILLE	7/27/2005	50	Several trees down in town.
ASHEVILLE	7/27/2005	50	Several trees down in town.
ENKA	5/20/2006	50	Several trees blown down in the Enka area.
CANDLER	5/30/2006	50	Several trees blown down.
ASHEVILLE	6/11/2006	55	Numerous trees down southeast of Asheville.
ASHEVILLE	6/11/2006	50	Part of a fallen tree fell on a house southwest of Asheville, while another tree leaned into power lines southeast of Asheville.
CANDLER	7/4/2006	50	Trees down in the Beaverdam community.
ASHEVILLE	8/10/2006	60	Numerous trees blown down near the Madison County line. Also, penny size hail in Weaverville around this time.
ASHEVILLE	6/15/2007	50	A tree fell on power lines in south Asheville, causing widespread power outages in the Kenilworth Rd area.

Location	Date	MPH	Description
BLACK MTN	6/26/2007	50	Three large tree limbs blown down.
ASHEVILLE	6/28/2007	50	Several trees blown down near the intersection of North Bear Creek Rd and Old Country Home Rd.
SKYLAND	7/19/2007	50	Three trees blown down.
ASHEVILLE	7/27/2007	50	Four trees blown down.
WOODFIN	8/21/2007	50	A couple of trees blown down.
LEICESTER	1/30/2008	50	A few trees were blown down between Leicester and Enka.
ASHEVILLE	3/4/2008	50	Quite a few trees blown down around the county, with a few blocking roads.
OAKLEY	5/3/2009	75	Numerous trees were blown down on the east side of Asheville and some buildings suffered roof damage. Damage was most concentrated in the area around Glendale Ave and Swannanoa River Rd. These roads and several side streets were closed due to falling trees. In addition, large tree limbs were blown down on I-240 near Fairview Rd and on Tunnel Rd.
FAIRVIEW	6/8/2009	50	Two trees were blown down near the intersection of Upper Brush Creek Rd and highway 74.
LEICESTER	6/11/2009	50	A few trees were blown down from Leicester to Woodfin to the west side of Asheville.
FORKS OF IVY	6/16/2009	50	Large trees were blown down on Locust Grove Rd.
LEICESTER	6/17/2009	50	Trees were blown down on Bear Creek Rd and Newfound Rd.
ASHEVILLE AIRPARK AR	6/18/2009	55	Numerous trees were blown down across West Asheville. A tree fell on a home on State St. Other affected streets included Louisiana Ave and Frances St.
ROYAL PINES	7/28/2009	50	Trees were blown down in the Concord Mountain area.
ROYAL PINES	7/28/2009	50	Trees were blown down on Mills Gap road a little east of Skyland.
ROCKVIEW	8/5/2009	50	Several large tree limbs and at least one tree were blown down.
FAIRVIEW	8/5/2009	50	Three trees were blown down around Fairview.
BEVERLY HILLS	6/21/2010	55	Trees and power lines were blown down across the city.
BEVERLY HILLS	6/21/2010	55	Trees and power lines were blown down across the city.
JUGTOWN	7/20/2010	50	Several large tree limbs were blown down.
JUGTOWN	7/20/2010	50	Several large tree limbs were blown down.
ROYAL PINES	7/25/2010	50	Several trees were blown down in the Skyland area.
ROYAL PINES	7/25/2010	50	Several trees were blown down in the Skyland area.
MIDWAY	8/5/2010	50	Large tree limbs were blown down on Christ School Rd.
MIDWAY	8/5/2010	50	Large tree limbs were blown down on Christ School Rd.
BINGHAM HGTS	8/5/2010	55	Multiple trees were blown down on Adams Hill Rd, on the northwest side of Asheville. Some trees fell on vehicles.
BINGHAM HGTS	8/5/2010	55	Multiple trees were blown down on Adams Hill Rd, on the northwest side of Asheville. Some trees fell on vehicles.
MURPHY JCT	4/4/2011	50	Two trees were blown down near the intersection of I-26 and I-240. Other trees were blown down in the Asheville area, including on Wanoca Ave on the southeast side of town.
SWANNANOA	5/3/2011	60	Numerous trees and large limbs were blown down in the Swannanoa area and around Black Mountain. Some trees fell on and blocked roads in Black Mountain. Two people received minor injuries near Black Mountain due to falling trees, one on Goldmont Rd and the other on Old Toll Rd. A couple of small structures also received damage due to falling trees.
BOSWELL	6/8/2011	50	Large tree limbs were blown down on the west side of Asheville.
BEVERLY HILLS	6/9/2011	50	A few trees were blown down on the east side of Asheville, with one tree causing minor damage to a home.
FLAT CREEK	6/10/2011	50	At least two trees were blown down about 3 miles north of Weaverville.
SKYLAND	6/12/2011	50	Multiple trees were blown down in the Skyland area.
CANTO	6/18/2011	50	A couple of trees were blown down in the Weaverville and Leicester area with other trees blown down in the Riceville and Swannanoa areas. Also, part of the roof was reportedly blown off a building on Majestic Mountain Dr. A couple of trees were blown down along

Location	Date	MPH	Description
			the Blue Ridge Parkway east of Asheville, causing the Parkway to be closed for a while. Several trees were also blown down in the Black Mountain area.
WEAVERVILLE	7/4/2011	50	A tree was blown down on Clarks Chapel Rd. Large limbs were also blown down in the same area.
BILTMORE	9/2/2011	50	Trees were down in the Biltmore Forest area, including along Vanderbilt Rd.
JUPITER	4/1/2012	55	Trees and power lines were blown down along Indian Camp Rd and long Monticello Rd about two miles west of Weaverville.
ASHEVILLE	4/26/2012	50	Trees were blown down from about 2 miles northwest of Asheville, across the city, down to the Fairview area. Trees reportedly fell on homes on Future Dr., Reddick Rd and Mountain View Rd.
WOODFIN	6/22/2012	55	Multiple trees and power lines were blown down from Weaverville Road on the north side of the city, across the west side, down to the Biltmore Forest and Arden areas. Some affected roads included Vanderbilt Rd, Sweeten Creek Rd, and Overlook Rd. A tree fell on a home on Lancelot Lane.
SHUMON	7/3/2012	55	Multiple trees were snapped by the downburst winds.
LEICESTER	7/5/2012	50	A couple trees were blown down in the Leicester area.
VOLGA	7/6/2012	50	A few trees were blown down along Bear Creek Rd about 3 miles north of Leicester.
WOODFIN	7/6/2012	50	A tree and power lines were blown down on a mobile home on Powers Rd, with one person trapped inside. Multiple trees were also down on Gorman Bridge Rd with another tree down on Wolf Park Circle. All of these events were very close together.
WEAVERVILLE	7/6/2012	50	Trees were blown down on several roads northwest of Weaverville, including New Stock Rd, Greenridge Rd, Monticello Rd and Gill Branch Rd.
BARNARDSVILLE	8/10/2012	50	Multiple trees and large limbs were blown down along highway 197 near the Barnardsville community.
AVERY CREEK	5/22/2013	50	A former NWS employee estimated winds gusting to 60 mph. Also, a large tree limb was blown down nearby on Ledbetter Rd.
FAIRVIEW	6/9/2013	50	A few trees were blown down near Fairview.
BARNARDSVILLE	7/9/2013	55	Numerous trees were blown down in the Barnardsville area.
ASHEVILLE	5/23/2014	55	Media reported multiple trees blown down in the Riceville Community (4 E Asheville), with some trees on homes and one tree falling on a moving vehicle on Lower Grassy Branch Rd. Spotter also reported numerous trees down west of Black Mountain. The wind damage was the result of outflow from a dissipating line of thunderstorms.
WEAVERVILLE	7/2/2014	50	Public reported multiple trees and large limbs were blown down in and around Weaverville.
OTEEN	7/27/2014	50	County comms reported multiple trees blown down across East Asheville and trees down on Wilson Ave in Swannanoa.
WEAVERVILLE	7/27/2014	50	County comms reported trees blown down just northwest of Weaverville.
BINGHAM HGTS	7/27/2014	55	NWS employee estimated up to 70 mph winds near downtown Asheville. Fire Dept reported multiple trees blown down from the city of Asheville south toward the Arden area.
NEW BRIDGE	9/1/2014	50	County comms reported multiple trees and power lines blown down on I-26 near mile marker 21.
MIDWAY	6/21/2015	50	County comms reported trees and power lines blown down on Fair Oaks Rd.
OAK FOREST	7/14/2015	50	Media reported multiple trees blown down on Sweeten Creek Rd near Biltmore Forest. FD reported multiple trees and power lines down in the Fairview area.
KENNWORTH	7/20/2015	50	Newspaper reported multiple trees and some power lines were blown down in west Asheville, particularly along Riverview Dr, Grandview Dr, and Lamb Ave.
SAND HILL	8/14/2015	50	HAM radio operator reported multiple trees and large limbs blown down along Pond Rd, with one tree down on an unoccupied vehicle.
BEVERLY HILLS	8/22/2015	50	County comms reported multiple trees and power lines blown down on Chunns Cove Rd near Tunnel Rd.
JUPITER	6/4/2016	60	Public reported multiple trees uprooted or snapped centered in the area around Jupiter Rd and Lower Flat Creek Rd.

Location	Date	MPH	Description
NEW BRIDGE	7/5/2016	50	Public reported (via Social Media) multiple trees blown down and power outages along Riverside Dr.
FAIRVIEW	7/6/2016	50	County comms reported multiple trees and power lines blown down near Highway 74 and Old Fort Rd.
LEICESTER	7/6/2016	50	County comms reported numerous trees blown down across the county from north through east of Asheville.
LEICESTER	7/7/2016	50	Public and spotters reported multiple trees and power lines blown down throughout the county. One tree fell on a home on Middlemont Ave in Asheville.
WEAVERVILLE	7/14/2016	40	Public reported (via Social Media) a tree fell on a vehicle.
CANDLER HGTS	4/3/2017	60	County comms reported roof damage to a building and damage to an adjacent building on Smoky Park Highway.
JUGTOWN	5/27/2017	50	County comms and public reported multiple trees blown down across the western part of the county.
WEST ASHEVILLE	7/5/2017	50	Public reported a few trees and large limbs blown down west of Asheville.
FAIRVIEW	7/14/2017	50	County comms reported several trees blown down along Emmas Grove Rd near Old Gap Creek Rd.
BOSWELL	7/14/2017	50	Media reported two trees blown down on Talmadge St near Talmadge Ct.
SHILOH	7/14/2017	50	Public reported multiple trees, large limbs, and power lines blown down. Highway 74A was closed for a while due to debris over the road.
CANDLER	5/31/2018	55	County comms reported numerous trees and some power lines blown down between Candler and Enka.
OTEEN	6/24/2018	50	NWS volunteer student relayed report of multiple trees blown down along the Swannanoa River in East Asheville.
LEICESTER	6/25/2018	50	County comms reported a couple trees blown down in the Leicester area.
LEICESTER	6/26/2018	50	County comms reported numerous trees blown down along Leicester Highway near Leicester and numerous trees and power lines down in the Candler area. One tree fell on a home in Candler.
ROCKVIEW	8/8/2018	50	Public reported multiple large tree limbs blown down along North Fork Road.
SANDYMUSH	6/21/2019	50	County comms reported scattered trees blown down across the county.
SKYLAND	8/19/2019	55	Up to 20 trees were blown down and some boats damaged to in the marina at Lake Julian Park.
SANDYMUSH	8/22/2019	50	Public reported trees blown down on Hemlock Ridge.
BEAVERDAM	1/11/2020	50	Buncombe County comms reported numerous trees blown down across the county.
FAIRVIEW	7/17/2020	50	County comms reported trees blown down off Whitaker Rd.
FAIRVIEW	8/14/2021	50	Fire dept reported several trees and numerous tree limbs blown down throughout Fairview and vicinity.
BARNARDSVILLE	5/19/2022	50	Public reported trees blown down on power lines in the Barnardsville area.
LEICESTER	6/17/2022	50	County comms reported a few trees blown down in the Leicester and Candler areas.
BILTMORE	6/17/2022	40	Media reported gusty winds associated with a weakening line of showers and thunderstorms blew down a tree onto a vehicle at Biltmore Estate, killing an occupant.
FAIRVIEW	7/5/2022	50	Public reported the tops blown out of trees and power lines blown down on Upper Brush Creek Rd.
NEW BRIDGE	7/6/2022	50	County comms reported trees blown down on Elk Mountain Scenic Highway.
ALEXANDER	7/23/2022	50	Public reported four trees blown down near Shepard Branch Road and south toward Jenkins Valley Road.
BARNARDSVILLE	8/9/2022	50	County comms reported a tree blown down and blocking the road on Barnardsville Highway and another tree down on Dillingham Rd.
WEAVERVILLE	3/3/2023	50	Public reported multiple trees and power lines blown down in the Weaverville area and a large tree down on Elk Mountain Rd near the center of Woodfin.
FORKS OF IVY	3/25/2023	50	County comms reported a tree blown down on Locust Grove Rd at Robert Allman Rd, another tree down on Flat Creek Rd at Jupiter Rd, and multiple trees and power lines down on Reems Creek Rd.
AVERY CREEK	5/7/2023	50	County comms reported numerous trees blown down across southern Buncombe County, including in the Arden area.

Location	Date	MPH	Description
LEICESTER	5/16/2023	50	County comms reported sporadic downed trees from Leicester Highway to the Enka area.
CANDLER HGTS	7/1/2023	50	Fire dept and public reported multiple trees blown down in Candler and vicinity, including on Justice Ridge Rd, Highway 19/23, Old Highway 19/23, and Sand Hill Rd. A tree fell on a car on Justice Ridge Rd.
SAND HILL	7/18/2023	50	County comms reported multiple trees blown down from Enka south toward Avery Creek.
JUGTOWN	8/7/2023	50	Utility company reported multiple trees blown down on power lines throughout Buncombe County.
MONTREAT	5/8/2024	50	NWS storm survey found an area of straight line wind damage north of a tornado path in the city of Black Mountain. Multiple trees and large branches were blown down along Montreat Rd from Mountain View Ave to 7th St.
LEICESTER	5/26/2024	50	Multiple sources reported multiples trees and power lines blown down from Leicester, across Alexander, to Weaverville.
VOLGA	7/22/2024	60	NWS storm survey found an area of downburst damage along Snelson Cemetery Rd in the Leicester area, with one tree down on a house and another crushing a vehicle.
SAND HILL	8/1/2024	50	Public reported (via Social Media) one tree and several large limbs blown down in the Enka area.
NEW BRIDGE	8/2/2024	50	Spotter and utility company reported a couple of trees blown down in the Woodfin area, including a tree down on power lines.
WEAVERVILLE	8/17/2024	50	County comms reported a couple of trees blown down on Moore St.
WEAVERVILLE	8/30/2024	50	Non-NWS meteorologist reported several trees blown down in the Weaverville area.
MIDWAY	5/8/2025	50	The ASOS at the Asheville Regional Airport measured a wind gust of 58 mph (50 kts).
LEICESTER	5/17/2025	50	Utility company reported several trees blown down on power lines and causing outages near East Wonder Rd.
BARNARDSVILLE	6/24/2025	50	Public reported several trees blown down in the Barnardsville area.
ACTON	6/24/2025	50	Fire dept reported multiple trees blown down on roads in the Candler/west Asheville area.
BLUE RIDGE	6/25/2025	50	Utility company reported trees blown down on power lines and causing an outage near Patricia Rd.
NEW BRIDGE	6/25/2025	50	Utility company reported trees blown down on power lines, resulting in an outage.
JUPITER	6/27/2025	50	Public reported (via Social Media) several trees blown down.
NEW BRIDGE	6/28/2025	50	Utility company reported trees blown down on power lines and causing an outage in the Woodfin area.
Madison County			
HOT SPGS	7/6/2000	50	A severe thunderstorm produced damaging winds which downed trees and power lines.
MARS HILL	7/14/2000	50	A cluster of severe thunderstorms produced damaging wind and hail close to midnight. Numerous downed trees and power lines were reported along with the usual associated power outages. A lot of hail fell in Weaverville but the size was unknown. Lightning struck a home in Mars Hill, destroying the home and its contents.
MARSHALL	8/10/2000	50	Numerous trees were blown down across the northern part of the county. Crews were out all night cleaning up.
HOT SPGS	7/8/2001	60	Numerous trees and power lines down in northern, and eastern, Madison County. A tree was blown onto a house at Hot Springs.
MARSHALL	7/8/2001	60	Numerous trees and power lines down. A roof blown off a barn at Mars Hill. Some trees fell onto structures.
SPRING CREEK	7/9/2001	55	Gas station personnel reported numerous trees and power lines down across roads overnight.
MARSHALL	1/24/2002	50	A few trees were blown down.
MARS HILL	1/24/2002	50	A few trees were blown down.
COUNTYWIDE	5/2/2002	60	Numerous trees were blown down, and a tin roof was blown off of a home.
MARS HILL	7/2/2002	50	Several trees were blown down.
MARSHALL	7/2/2002	50	Several trees were blown down.
MARSHALL	7/4/2002	50	Several trees were blown down at the intersection of Highway 19 and Main St.
ENGLISH	5/2/2003	50	Trees and power lines were blown down at Wolf Laurel.

Location	Date	MPH	Description
HOT SPGS	5/26/2004	50	Some trees were blown down.
MARSHALL	5/26/2004	50	Trees were blown down.
SPRING CREEK	6/12/2004	50	Some trees were blown down.
SPRING CREEK	7/5/2004	50	Trees were blown down.
MARS HILL	7/25/2004	55	Several trees were blown down and the roof was blown off a barn.
MARSHALL	8/2/2004	55	Numerous trees were blown down along highway 208 in the Shelton Laurel area.
HOT SPGS	5/10/2005	50	Report of 3 trees blown down in the Luck area.
HOT SPGS	5/10/2005	50	Report of 3 trees blown down in the Luck area.
BIG LAUREL	5/20/2005	50	Trees down along highway 64.
BIG LAUREL	5/20/2005	50	Trees down along highway 64.
MARSHALL	4/2/2006	55	Numerous trees downed, mainly across the eastern part of the county. One tree fell on a house and another fell on and totaled an automobile.
SPRING CREEK	4/19/2006	50	Several trees down.
MARSHALL	5/18/2006	50	Five trees down from the Spring Creek area to the Doggett Mountain area.
MARS HILL	5/20/2006	50	A tree down on highway 212, and another on highway 23, both along the Tennessee border.
MARS HILL	5/31/2006	50	Several trees blown down and pea size hail covering the ground.
MARSHALL	8/10/2006	50	Two trees blown down.
MARSHALL	9/28/2006	55	Part of the roof blown off a barn.
MARSHALL	4/3/2007	50	Trees blown down on Worley Cove Rd.
HOT SPGS	1/30/2008	50	A few trees were blown down between Hot Springs and Marshall.
HOT SPGS	6/9/2008	50	Two trees blown down.
MARSHALL	6/26/2008	50	Two large trees were blown down along Rector Corner Rd.
HOT SPGS	6/28/2008	50	Scattered trees were blown down throughout the county.
HOT SPGS	7/21/2008	50	A tree was blown down on Frisbee Court in Hot Springs and another blown down on highway 209 just west of Hot Springs.
ALLENSTAND	2/11/2009	55	Numerous trees blown down throughout the county.
BARNARD	6/18/2009	55	Multiple trees were blown down in and around Marshall.
BARNARD	6/18/2009	50	Several trees were blown down along highway 25/70 between Walnut and Marshall, and another tree blown down on Skyway Dr in Marshall.
BARNARD	8/4/2009	50	Three trees were blown down.
REVERE	8/11/2009	50	Two small trees were snapped off on Revere Rd in the northeast part of the county.
ALLEGHENY	8/4/2010	55	Several trees were blown down along highway 212, about 13 miles north of Marshall.
ALLEGHENY	8/4/2010	55	Several trees were blown down along highway 212, about 13 miles north of Marshall.
BIG LAUREL	8/5/2010	50	A tree was blown down on Big Laurel Rd.
BIG LAUREL	8/5/2010	50	A tree was blown down on Big Laurel Rd.
PETERSBURG	8/5/2010	50	A tree was blown down on Petersburg Rd, about 4 miles northeast of Marshall.
PETERSBURG	8/5/2010	50	A tree was blown down on Petersburg Rd, about 4 miles northeast of Marshall.
ANTIOCH	10/25/2010	55	Numerous trees were blown down across the northern portion of the county.
ANTIOCH	10/25/2010	55	Numerous trees were blown down across the northern portion of the county.
ANTIOCH	4/27/2011	65	NWS storm survey found that a tornadic thunderstorm over Greene County, TN produced an area of downburst damage just across the state line from the Grassy Creek Rd area to U.S. Highway 25/70 in far western Madison County. Numerous trees were blown down. The roof of one home on Azalea Lane was damaged by a falling tree. Another home had part of its roof removed. A couple of outbuildings were also destroyed.
FAUST	5/10/2011	50	Two trees were blown down on Puncheon Fork Rd, about 5 miles north of Mars Hill.
WALNUT	5/22/2011	50	Several trees were blown down between Marshall and Mars Hill, with a tree on a house in the Mars Hill area. Additional trees were blown down on highway 19 east of Mars Hill.
REDMON	6/5/2011	50	Several small trees and some large limbs were blown down on Riddle Farm Rd.
LONE RIDGE	6/8/2011	50	Several trees and large limbs were blown down on Bull Creek Rd.

Location	Date	MPH	Description
HOT SPGS	4/1/2012	60	Numerous trees were blown down across the county. A 300 foot radio antenna was blown down in Marshall.
LUCK	7/1/2012	50	Several large tree limbs were blown down in the Canto community.
FAUST	7/5/2012	50	Multiple trees and power lines were blown down in the Wolf Laurel area. The damaging winds were associated with an outflow boundary from thunderstorms over East Tennessee.
BELVA	9/2/2012	60	Numerous trees were blown down in the Shelton and Laurel communities in the northeast part of the county. Tobacco, cane and corn crops were flattened in this area as well. The winds caused a barn to collapse along highway 212.
ALLEGHENY	6/13/2013	50	At least two trees were blown down in the Laurel community, with one tree down on Cutshall Town Rd.
PAINT ROCK	6/27/2013	50	Several trees were blown down on Paint Rock Rd.
ENGLISH	2/19/2014	50	Multiple trees were blown down in the Wolf Ridge area.
MARS HILL	5/23/2014	50	Spotter reported a large tree and mutliple large limbs down in the Mars Hill area. Other spotters estimated 60 mph winds in the area.
BLUFF	7/27/2014	50	County comms reported multiple trees blown down across the county, primarily in the Spring Creek area.
ALLEGHENY	5/11/2015	50	Public reported damage to a porch and several tin tiles removed from a home.
ROLLINS	5/27/2015	50	FD and county comms reported multiple trees blown down just south of Marshall.
ROLLINS	7/13/2015	50	County comms reported multiple trees blown down southeast of Marshall.
PAINT ROCK	7/13/2015	50	Spotter reported multiple trees blown down near the Tennessee border.
MARSHALL	8/10/2015	50	County comms reported multiple trees blown down, with about a half dozen blocking roads from near Marshall to I-26 between Mars Hill and the Tennessee border.
MARS HILL	7/6/2016	50	County comms reported multiple trees blown down near Mars Hill.
BLUFF	7/6/2016	50	Spotter reported multiple trees blown down between Hot Springs and the Spring Creek community.
SANDY BOTTOM	7/8/2016	50	County comms reported multiple trees blown down off Highway 25.
GRAPEVINE	7/27/2016	50	County comms reported multiple trees blown down on Grapevine Rd.
PETERSBURG	7/27/2016	50	County comms reported trees blown down on Silvers Mill Rd and on Wind Swept Bridge Rd.
PETERSBURG	8/27/2016	50	County comms reported multiple trees blown down between Marshall and Mars Hill.
EBBS MILL	5/27/2017	50	County comms reported numerous trees and power lines blown down throughout Madison County.
ANTIOCH	5/31/2018	55	County comms reported numerous trees blown down, with the damage roughly paralleling the French Broad River.
BARNARD	6/17/2018	50	County comms reported a few trees blown down in the Walnut area.
HOT SPGS	6/24/2018	50	County comms reported multiple power lines blown down in the Hot Springs area.
HOT SPGS	7/20/2018	50	Public reported (via Social Media) a few trees blown down between Hot Springs and Jupiter.
EBBS MILL	6/21/2019	50	County comms reported scattered trees blown down across the county.
SPRING CREEK	7/31/2020	50	County comms reported trees and power lines blown down from the western part of the county into the Marshall area.
HOT SPGS	3/27/2021	55	County comms reported multiple trees blown down and minor damage to a few buildings from Hot Springs to Marshall.
GRAPEVINE	8/15/2021	50	County comms reported at least a couple of trees blown down in the central part of the county.
HOT SPGS	6/17/2022	50	Emergency manager reported several trees blown down in and around Hot Springs.
HURRICANE	1/12/2023	50	County comms reported multiple trees blown down across Madison County. Additionally, a tiny home was knocked off its base off of Highway 212.
SPRING CREEK	3/25/2023	50	County comms reported multiple power lines blown down in the Spring Creek community.
BARNARD	6/26/2023	50	County comms reported a few trees blown down about halfway between Marshall and Hot Springs.

Location	Date	MPH	Description
HOT SPGS	8/7/2023	50	County comms reported numerous trees blown down throughout Madison County, from Hot Springs and Spring Creek, across Marshall and Mars Hill.
HOT SPGS	8/12/2023	50	County comms reported numerous trees blown down across Madison County.
MARSHALL	5/26/2024	50	County comms reported trees blown down and blocking multiple roads in Marshall and vicinity.
MARSHALL	6/9/2024	50	County comms reported one tree blown down in the Marshall area and another down closer to Mars Hill.
ROLLINS	7/22/2024	60	NWS storm survey found downburst damage in the area centered around Graham Rd near the Buncombe County line. Numerous trees and large limbs were blown down in this area.

TABLE H.11: TORNADO EVENTS (2000-2025)

County	Location	Date	Scale	Description
Buncombe County				
BUNCOMBE	WALKERTOWN	5/8/2024	EF0	NWS storm survey found the path of a EF0 tornado that touched down along north Fork Road where several trees were uprooted. The tornado moved southeast across Allen Mountain and across the Black Mountain golf course where additional trees were uprooted along with large limbs snapped. The most concentrated damage occurred from Laurel Ave to just north of downtown Black Mountain where multiple trees were uprooted along with numerous large limbs snapped. Several homes sustained damage from falling trees. A radio tower at the Black Mountain Fire Department was also toppled. The tornado lifted along East State St.
Madison County				
MADISON	ANTIOCH	4/27/2011	EF0	A short path of tornado damage was found embedded within a larger area of downburst wind damage. However, the damage associated with this path was no more severe than the damage associated with the downburst. Multiple large trees were blown down, a shed was destroyed and another tossed, and the roof was peeled from an outbuilding. One fallen tree clipped a home in this area as well.

TABLE H.12: WINTER STORM EVENTS (2000-2025)

Date	Description
Buncombe 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.
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.
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.
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 southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. ||The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.||Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.||Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well.
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.
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.
2/12/2014	A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the mountains of western North Carolina. Total accumulations generally ranged from 5-9 inches across the area, although locations above 4000 feet or so saw 1-1.5 feet.
2/16/2015	Sleet and snow overspread the mountains and foothills of North Carolina during the afternoon and began to accumulate. 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 early 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. The valleys of southwest North

Date	Description
	Carolina saw more freezing rain than sleet, with about one quarter inch of ice reported. Scattered power outages were therefore more concentrated there. Meanwhile, the northern foothills saw mostly sleet, with many areas reporting 2 to 3 inches of accumulation. Roads became very treacherous and impassable in many areas until melting began on the afternoon of the 17th.
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.
12/8/2017	As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight.
Madison 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.
2/2/2009	Snow showers developed during the evening of the 2nd along the Tennessee border and continued off and on through the overnight hours and through much of the 3rd. One to four inches had accumulated in many areas by the evening of the 3rd. Numerous traffic accidents were reported on I-40 through the Pigeon River gorge in Haywood County. Snow showers increased in coverage and intensity during the late evening, then continued for much of the overnight hours. Snow persisted off and on through much of the 4th. Total accumulations ranged from 1 to 4 inches in the lower valleys, to as much as 8 inches in the higher elevations along the Tennessee border.
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 southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. ||The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.||Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.||Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well.
3/5/2013	Snow showers developed across the mountains during the evening of the 5th and continued through the morning of the 6th. By the time the snow tapered off during early evening, total snowfall ranged from an inch or two in southern Madison County to as much as 8 inches in the higher elevations along the Tennessee border. Very gusty winds also resulted in considerable blowing and drifting of the snow.
3/25/2013	Snow showers developed during the early morning hours of the 25th and continued off and on throughout the day. Synoptically enhanced northwest flow snow showers became heavy overnight across the western mountains, and by the afternoon hours of the 26th storm total snowfall amounts of 4 to 8 inches were common across the area. Snow showers continued through the early morning hours of the 27th across the higher elevations near the Tennessee border, where

Date	Description
	totals of a foot or more were prevalent. Heavy snowfall was mainly confined to areas above 3000 feet or so in the southern and central mountains, but was a little more widespread in the northern mountains.
1/2/2014	After a strong cold front introduced much colder air to the mountains, snow showers developed near the Tennessee border during mid-evening. The snow showers lasted through the pre-dawn hours, resulting in heavy accumulations across mainly the higher elevations of the northern and central mountains. Total accumulations were generally in the 3-5 inch range above 3500 feet near the Tennessee border. Locally higher amounts were observed on the high peaks and ridge tops, while most lower valley areas saw anywhere from a dusting to less than two inches. Very strong northwest winds resulted in considerable blowing and drifting snow.
2/12/2014	A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the mountains of western North Carolina. Total accumulations generally ranged from 5-9 inches across the area, although locations above 4000 feet or so saw 1-1.5 feet.
2/16/2015	Sleet and snow overspread the mountains and foothills of North Carolina during the afternoon and began to accumulate. 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 early 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. The valleys of southwest North Carolina saw more freezing rain than sleet, with about one quarter inch of ice reported. Scattered power outages were therefore more concentrated there. Meanwhile, the northern foothills saw mostly sleet, with many areas reporting 2 to 3 inches of accumulation. Roads became very treacherous and impassable in many areas until melting began on the afternoon of the 17th.
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.
12/8/2017	As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight.

National Risk Index

August 21, 2025

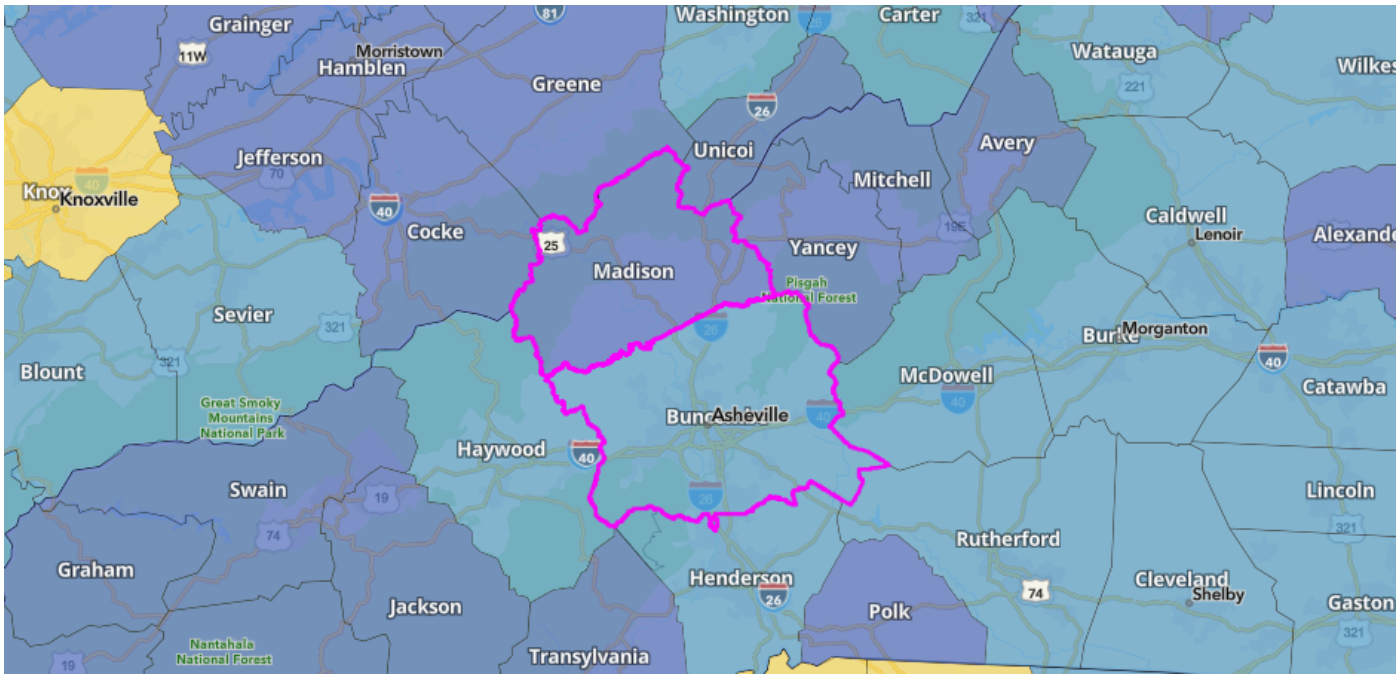
Risk Comparison Report

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	Buncombe County	NC	Relatively Low	81.48	0 100
2	Madison County	NC	Very Low	34.58	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$18,991,176	Relatively Moderate	Relatively Moderate	1.16	$22,033,180	81.48
2	Madison County	NC	$3,535,981	Relatively Low	Relatively Moderate	1.15	$4,073,990	34.58

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
	Buncombe County	NC	Not Applicable		
	Madison County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Buncombe County	NC	N/A	Relatively Moderate	Relatively Moderate	1.16	N/A	N/A
	Madison County	NC	N/A	Relatively Low	Relatively Moderate	1.15	N/A	N/A

Coastal Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Buncombe County	NC	Not Applicable		
	Madison County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Buncombe County	NC	N/A	Relatively Moderate	Relatively Moderate	1.16	N/A	N/A
	Madison County	NC	N/A	Relatively Low	Relatively Moderate	1.15	N/A	N/A

Cold Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively High	93.25	0 100
2	Madison County	NC	Relatively Moderate	71.52	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$943,202	Relatively Moderate	Relatively Moderate	1.16	$1,074,520	93.25
2	Madison County	NC	$207,825	Relatively Low	Relatively Moderate	1.15	$237,802	71.52

Drought

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Very Low	44.35	0 100
2	Madison County	NC	Very Low	22.27	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$16,030	Relatively Moderate	Relatively Moderate	1.16	$16,585	44.35
2	Madison County	NC	$1,037	Relatively Low	Relatively Moderate	1.15	$1,237	22.27

Earthquake

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Low	85.33	0 100
2	Madison County	NC	Very Low	45.12	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$1,508,276	Relatively Moderate	Relatively Moderate	1.16	$1,780,168	85.33
2	Madison County	NC	$102,289	Relatively Low	Relatively Moderate	1.15	$117,177	45.12

Hail

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Low	49.35	0 100
2	Madison County	NC	Very Low	30.32	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$91,995	Relatively Moderate	Relatively Moderate	1.16	$104,476	49.35
2	Madison County	NC	$37,979	Relatively Low	Relatively Moderate	1.15	$43,452	30.32

Heat Wave

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Buncombe County	NC	No Rating	0	0 100
	Madison County	NC	No Rating	0	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Buncombe County	NC	$0	Relatively Moderate	Relatively Moderate	1.16	$0	0
	Madison County	NC	$0	Relatively Low	Relatively Moderate	1.15	$0	0

Hurricane

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Low	66.58	0 100
2	Madison County	NC	Very Low	32.75	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$798,479	Relatively Moderate	Relatively Moderate	1.16	$909,461	66.58
2	Madison County	NC	$47,382	Relatively Low	Relatively Moderate	1.15	$54,399	32.75

Ice Storm

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively High	91.37	0 100
2	Madison County	NC	Relatively Moderate	67.62	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$641,900	Relatively Moderate	Relatively Moderate	1.16	$733,090	91.37
2	Madison County	NC	$136,199	Relatively Low	Relatively Moderate	1.15	$155,600	67.62

Landslide

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively High	97.33	0 100
2	Madison County	NC	Relatively Moderate	91.26	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$448,428	Relatively Moderate	Relatively Moderate	1.16	$479,672	97.33
2	Madison County	NC	$157,729	Relatively Low	Relatively Moderate	1.15	$184,669	91.26

Lightning

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively High	94.69	0 100
2	Madison County	NC	Relatively Low	59.36	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$897,345	Relatively Moderate	Relatively Moderate	1.16	$1,029,624	94.69
2	Madison County	NC	$123,969	Relatively Low	Relatively Moderate	1.15	$142,419	59.36

Riverine Flooding

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively High	96.44	0 100
2	Madison County	NC	Relatively Moderate	84.06	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$8,736,210	Relatively Moderate	Relatively Moderate	1.16	$10,280,717	96.44
2	Madison County	NC	$2,034,203	Relatively Low	Relatively Moderate	1.15	$2,351,078	84.06

Strong Wind

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Moderate	79.83	0 100
2	Madison County	NC	Relatively Low	39.04	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$874,542	Relatively Moderate	Relatively Moderate	1.16	$1,003,904	79.83
2	Madison County	NC	$239,964	Relatively Low	Relatively Moderate	1.15	$274,329	39.04

Tornado

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Moderate	82.44	0 100
2	Madison County	NC	Very Low	26.31	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$3,828,342	Relatively Moderate	Relatively Moderate	1.16	$4,379,506	82.44
2	Madison County	NC	$327,417	Relatively Low	Relatively Moderate	1.15	$374,190	26.31

Tsunami

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Buncombe County	NC	Not Applicable		
	Madison County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Buncombe County	NC	N/A	Relatively Moderate	Relatively Moderate	1.16	N/A	N/A
	Madison County	NC	N/A	Relatively Low	Relatively Moderate	1.15	N/A	N/A

Volcanic Activity

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
	Buncombe County	NC	Not Applicable		
	Madison County	NC	Not Applicable		

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
	Buncombe County	NC	N/A	Relatively Moderate	Relatively Moderate	1.16	N/A	N/A
	Madison County	NC	N/A	Relatively Low	Relatively Moderate	1.15	N/A	N/A

Wildfire

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Buncombe County	NC	Relatively Low	72.48	0 100
2	Madison County	NC	Very Low	61.95	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Buncombe County	NC	$198,751	Relatively Moderate	Relatively Moderate	1.16	$232,621	72.48
2	Madison County	NC	$79,714	Relatively Low	Relatively Moderate	1.15	$91,528	61.95

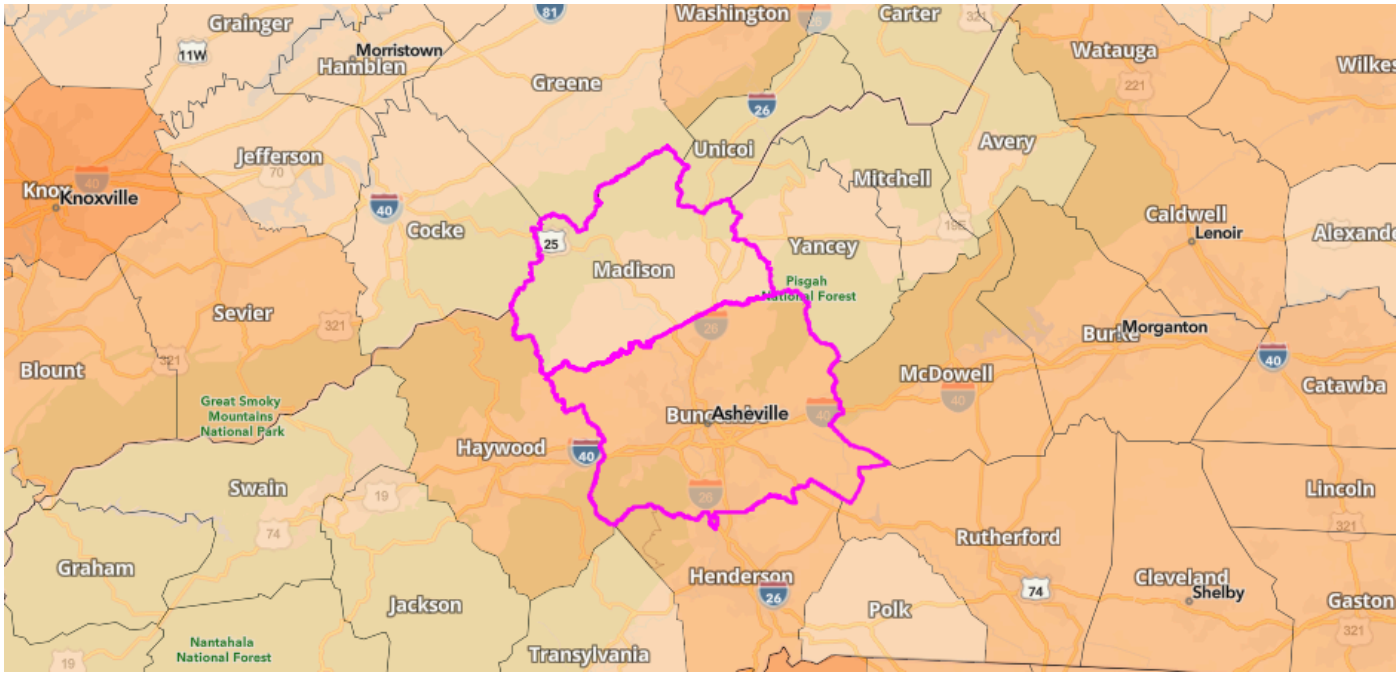
Winter Weather

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Madison County	NC	Relatively Low	43.59	0 100
2	Buncombe County	NC	Very Low	12.57	0 100

Rank	Community	State	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
1	Madison County	NC	$40,274	Relatively Low	Relatively Moderate	1.15	$46,110	43.59
2	Buncombe County	NC	$7,677	Relatively Moderate	Relatively Moderate	1.16	$8,837	12.57

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	Buncombe County	NC	$18,991,176	80.59
2	Madison County	NC	$3,535,981	34.05

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
	Buncombe County	NC	N/A	--
	Madison County	NC	N/A	--

Coastal Flooding

Rank	Community	State	EAL Value	Score
	Buncombe County	NC	N/A	--
	Madison County	NC	N/A	--

Cold Wave

Rank	Community	State	EAL Value	Score
1	**Buncombe County**	NC	$943,202	93.1
2	**Madison County**	NC	$207,825	71.5

Drought

Rank	Community	State	EAL Value	Score
1	**Buncombe County**	NC	$16,030	47.0
2	**Madison County**	NC	$1,037	23.7

Earthquake

Rank	Community	State	EAL Value	Score
1	**Buncombe County**	NC	$1,508,276	83.3
2	**Madison County**	NC	$102,289	44.8

Hail

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$91,995	51.4
2	Madison County	NC	$37,979	33.3

Heat Wave

Rank	Community	State	EAL Value	Score
	Buncombe County	NC	$0	0.0
	Madison County	NC	$0	0.0

Hurricane

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$798,479	65.0
2	Madison County	NC	$47,382	32.2

Ice Storm

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$641,900	91.3
2	Madison County	NC	$136,199	68.0

Landslide

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$448,428	97.4
2	Madison County	NC	$157,729	90.5

Lightning

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$897,345	94.4
2	Madison County	NC	$123,969	61.1

Riverine Flooding

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$8,736,210	96.5
2	Madison County	NC	$2,034,203	84.2

Strong Wind

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$874,542	80.1
2	Madison County	NC	$239,964	42.2

Tornado

Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$3,828,342	83.6
2	Madison County	NC	$327,417	28.4

Tsunami

Rank	Community	State	EAL Value	Score
	Buncombe County	NC	N/A	--
	Madison County	NC	N/A	--

Volcanic Activity

Rank	Community	State	EAL Value	Score
	Buncombe County	NC	N/A	--
	Madison County	NC	N/A	--

Wildfire

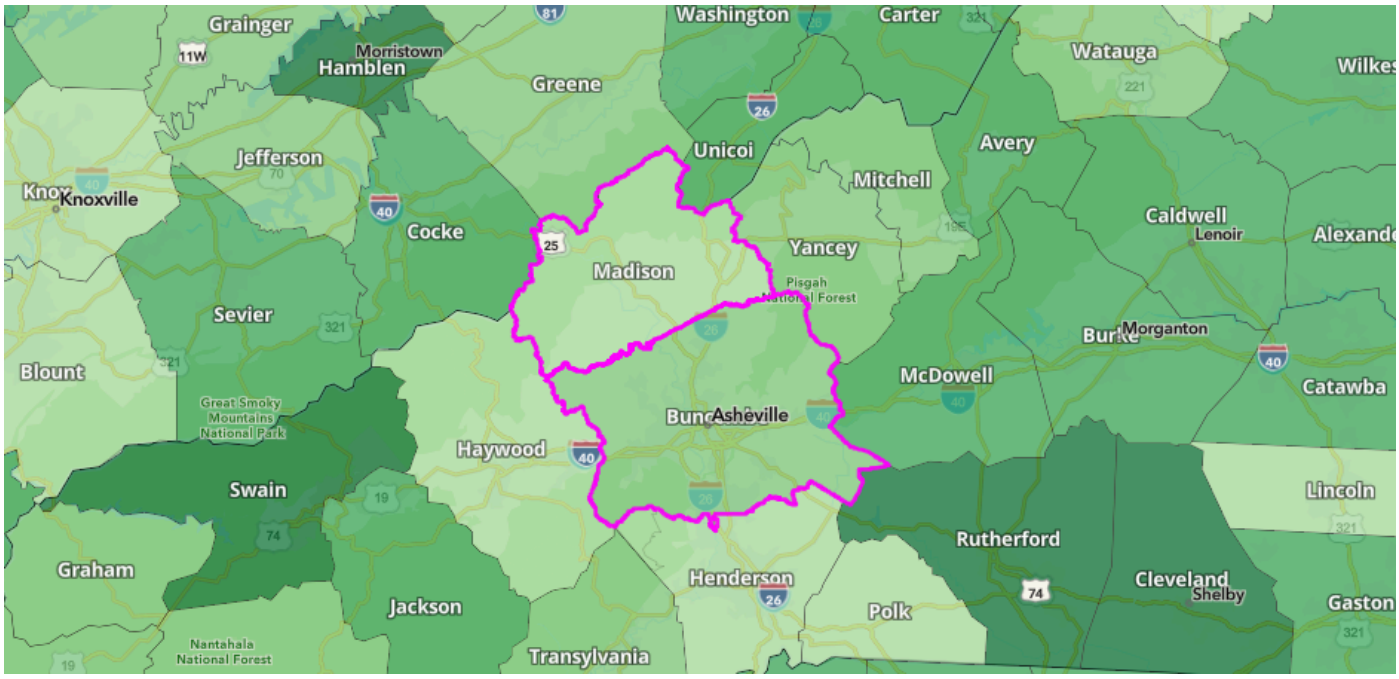
Rank	Community	State	EAL Value	Score
1	Buncombe County	NC	$198,751	72.1
2	Madison County	NC	$79,714	61.6

Winter Weather

Rank	Community	State	EAL Value	Score
1	Madison County	NC	$40,274	46.3
2	Buncombe County	NC	$7,677	15.7

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.



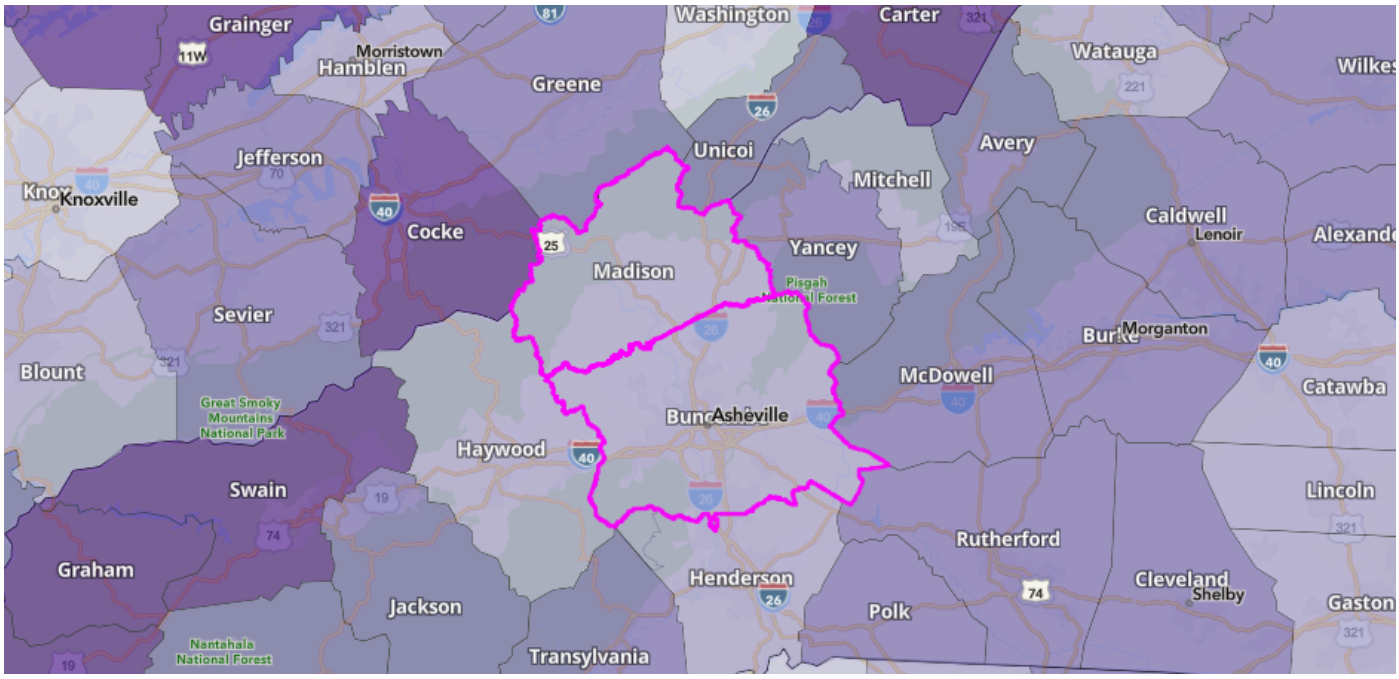
Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

Rank	Community	State	Rating	Score
1	Buncombe County	NC	Relatively Moderate	54.0
2	Madison County	NC	Relatively Low	36.6

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	Buncombe County	NC	Relatively Moderate	59.6
2	Madison County	NC	Relatively Moderate	41.3

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 values are calculated using an equation* that combines values for Expected Annual Loss (EAL) due to natural hazards, with the Community Risk Factor (CRF), which is a function of Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Community Risk Factor}$$

$$\text{where Community Risk Factor} = f\left(\frac{\text{Social Vulnerability}}{\text{Community Resilience}}\right)$$

*County-level risk values are derived by summing the risk values of all Census tracts within that county.

Risk is presented as a composite value and score for all 18 hazard types, as well as individual values and scores for each hazard type.

For more information, visit **hazards.fema.gov/nri/determining-risk**.

Calculating Expected Annual Loss

Expected Annual Loss values are calculated using an equation* that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

*Excluding Avalanche, Drought, Earthquake, and Tornado, EAL values for each hazard are calculated at the Census block level and summed together to determine Census tract and county-level hazard type EAL values.

Expected Annual Loss is presented as a composite value and score for all 18 hazard types, as well as individual values and 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**.

Values, Scores, and Ratings

The National Risk Index provides three different types of results for Risk and each component used to derive Risk: EAL, Social Vulnerability, and Community Resilience:

Values. Values for Risk and EAL are in units of dollars, representing the community's average economic loss from natural hazards each year. For Social Vulnerability and Community Resilience, values are the index values for the community provided by the source data sets.

Scores. Scores represent the national percentile ranking of the community's component value compared to all other communities at the same level (county or Census tract).

Ratings. Ratings refer to the qualitative terms that describe the relative risk of an area within the same geographic level. These rating categories range from "Very Low" to "Very High". Ratings for Social Vulnerability and Community Resilience are based on quintiles of those components' scores, while Risk and EAL ratings are based on more advanced statistical calculations on values . As a result, there is no fixed range of scores or values that correspond to the rating categories.

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 risk profiles for the vast majority of hazard types are based on historical frequency and loss data. They represent risk and expected annual loss based on average past conditions, not future predictions. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

For comprehensive details about how the Risk Index can help you and its limitations, see the **National Risk Index Technical Documentation**

Assumption of Risk

In view of the identified limitations of the National Risk Index associated data, by using the data, you acknowledge and agree that FEMA makes no representations or warranties about the accuracy, completeness, or fitness for any particular purpose of the data; that the data is provided “as is” without warranty of any kind; that you assume full responsibility for any consequences that may arise, including financial losses, legal disputes, or other adverse outcomes; and that you release FEMA and the federal government from any liability that may arise to the extent allowable by law.

Attribution, No Endorsement

Please attribute your use of the National Risk Index and its associated data to the Federal Emergency Management Agency.

However, you acknowledge and agree that nothing herein constitutes and endorsement of you or your work by FEMA or the federal government, and you shall not imply through use of the National Risk Index or its associated data or through providing attribution, that FEMA or the federal government endorses you.

Preferred citation for the National Risk Index:

Zuzak, C., E. Goodenough, C. Stanton, M. Mowrer, A. Sheehan, B. Roberts, P. McGuire, and J. Rozelle. 2023. National Risk Index Technical Documentation. Federal Emergency Management Agency, Washington, DC.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.

Appendix J:
Regional Post-Helene Report

Event Summary

Hurricane Helene caused massive devastation across Buncombe County, Madison County, and many other counties of Western North Carolina. The hurricane, classified as a Category 4 at its peak, made landfall in Florida on September 26, 2024, and subsequently brought record-breaking rainfall to Western North Carolina, resulting in catastrophic flooding (e.g., 1,000-year or 0.1% annual chance floods) and massive landslides[1]. Direct hazard impacts from this event included severe flooding, widespread geological destabilization (e.g., landslides, mudslides, and erosion), disruptions to various community networks, and increased wildfire fuel loads in the aftermath, making it one of the deadliest and costliest storms in history. Intense rainfall of the storm led to extreme overflows of riverine systems, exacerbating historic flooding across multiple communities, damaging homes and infrastructure, and disrupting power and communications for extended periods. The storm resulted in at least 107 reported fatalities and total damages in excess of $59 billion in North Carolina[2].

- **Key Event Numbers**:
    - **140+ miles per hour** maximum sustained winds (Category 4)
        - **92+ miles per hour** peak wind gusts in North Carolina (Category 1)
    - **31.33+ inches** 3-day total rainfall peak (recorded at NCFS RAWS station in Busick, NC)
    - **$78+ billion** damage nationwide
        - **$59+ billion** damage in North Carolina
    - **250+ fatalities** nationwide
        - **107+ fatalities** in North Carolina[3]
            - **42** in Buncombe County[4]
            - **4** in Madison County
    - **1+ million** residents without power in North Carolina
    - **125,000+ housing units** damaged or destroyed in North Carolina
    - **822,000+ acres** of timberland damaged in North Carolina

[1] National Weather Service (https://www.weather.gov/ilm/Helene2024) and North Carolina State Climate Office (https://climate.ncsu.edu/blog/2024/09/rapid-reaction-historic-flooding-follows-helene-in-western-nc/)
[2] National Weather Service (https://www.nhc.noaa.gov/data/tcr/AL092024_Helene.pdf) and North Carolina Office of State Budget and Management (https://www.osbm.nc.gov/hurricane-helene-dna/open)
[3] North Carolina Department of Health and Human Services (https://www.ncdhhs.gov/assistance/disaster-preparation-and-recovery/hurricane-helene-recovery-resources)
[4] Buncombe County reported the greatest number of fatalities for the event, along with heavy damage to thousands of housing units and businesses.

- **Figures J.1 and J.2** illustrate some of the landscape and infrastructure damage caused by Helene in Buncombe County.

FIGURE J.1: FLOODING IN ASHEVILLE RIVER ARTS DISTRICT



Source: North Carolina State Climate Office, Photo by Jordan Kudisch, 2024

FIGURE J.2: LANDSLIDE IN BUNCOMBE COUNTY



Source: North Carolina State Climate Office, Photo by NCDOT, 2024

- Impacts to Madison County were also severe, with widespread flooding and damage to infrastructure and residential areas. The storm had a particularly devastating impact on the Town of Marshall, which caused severe damage to the historic downtown, the county seat's post office, and other distinctive landmarks. **Figures J.3 and J.4** illustrate some of the landscape and infrastructure damage caused by Helene in Madison County.

FIGURE J.3: FLOODING IN DOWNTOWN MARSHALL



Source: North Carolina State Climate Office, Photo by Old Marshall Joil Hotel), 2024

FIGURE J.4: GROUND SUBSIDENCE IN HOT SPRINGS



Source: WRAL, 2024

Impact Assessment & Response

Many regional jurisdictions in Western North Carolina faced immediate challenges in securing essential supplies, restoring community services/infrastructure, and continuing evacuations following Helene. Emergency support services were activated at all levels, along with a large influx of community-based support, to provide shelter, supplies, critical services, and other forms of assistance. Following the immediate response effort, recovery funding requests and programs across the federal, state, regional, and local levels have continued to move forward.

FEMA Disaster Declaration (2024)

FIGURE J.5: HELENE DISASTER DECLARATION (FEMA, 2024)

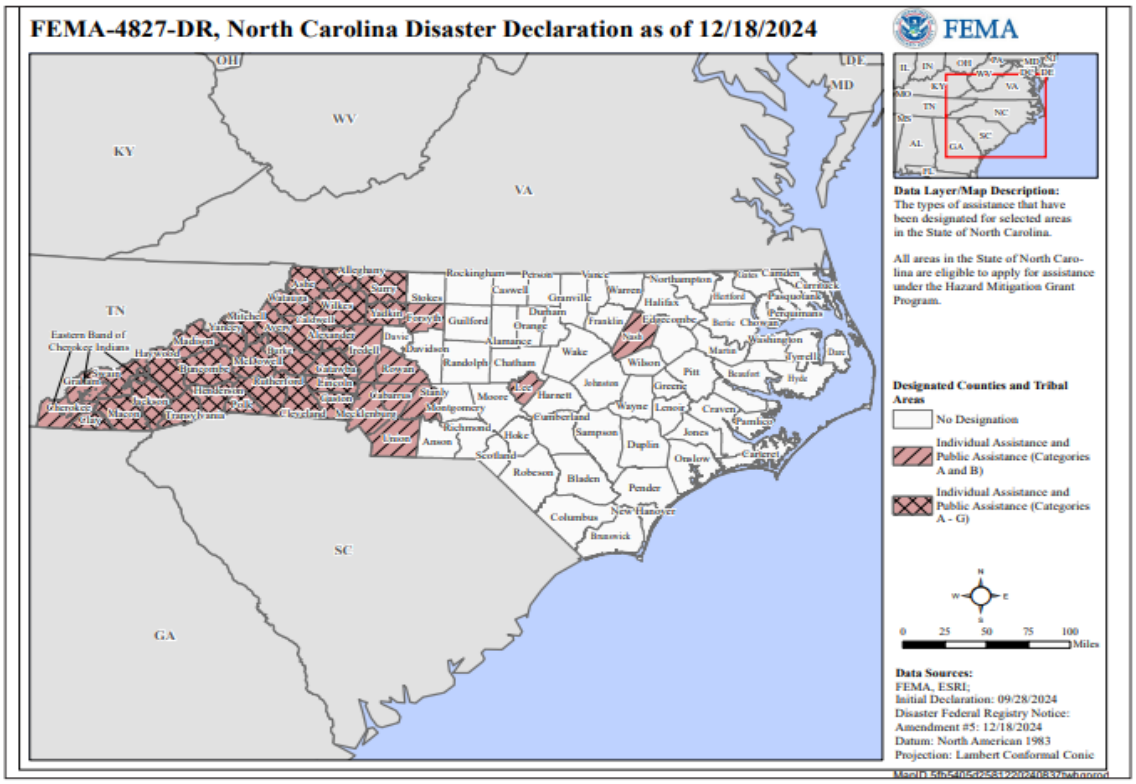


Figure 3: A map of Designated Counties and Tribal Areas in North Carolina for DR-4827 NC.

- The Federal Emergency Management Agency (FEMA) declared Tropical Storm Helene a major disaster in North Carolina as of September 28, 2024[5]. The declaration page outlines the federal assistance available for disaster recovery efforts. The declaration covers areas in 39 counties (including Buncombe County and Madison County, as shown in **Figure J.5**).
- Disaster funding obligations published by FEMA as of April 2026 include:
    - Individual Assistance
        - **Total Housing Assistance (HA) - Dollars Approved**: $291,687,622.26
        - **Total Other Needs Assistance (ONA) - Dollars Approved**: $272,883,043.09

[5] FEMA Disaster Declaration *DR-4827-NC* (https://www.fema.gov/disaster/4827)

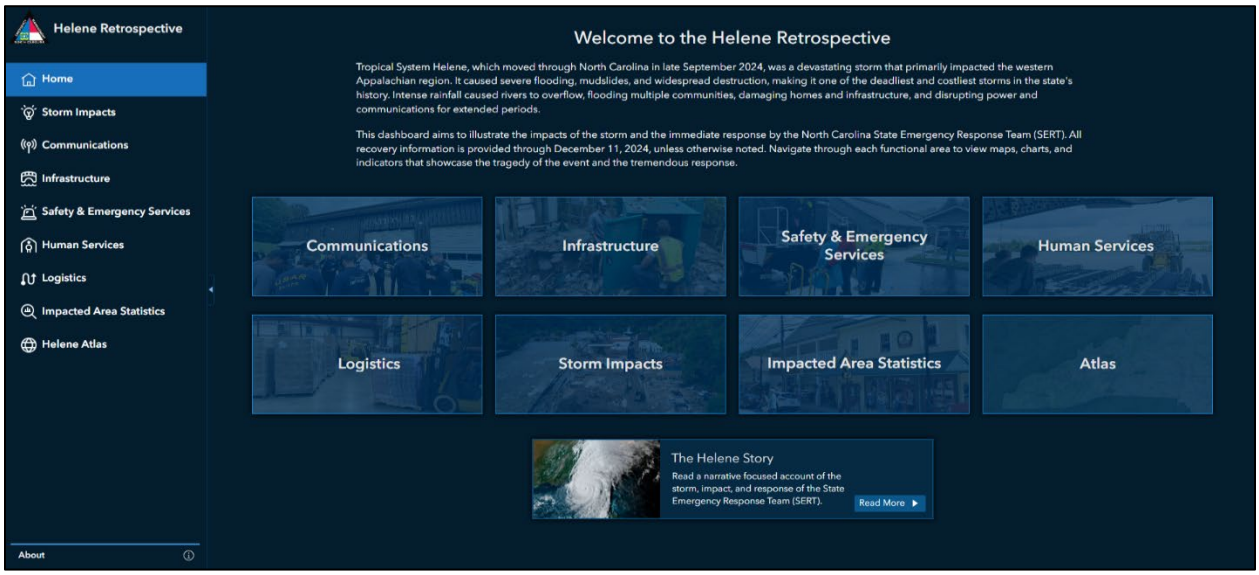
        - **Total Individuals & Households Program - Dollars Approved**: $564,570,665.35
        - **Individual Assistance Applications Approved**: 161,023
    - Public Assistance
        - **Emergency Work (Categories A-B) - Dollars Obligated**: $870,173,795.64
        - **Permanent Work (Categories C-G) - Dollars Obligated**: $710,475,820.04
        - **Total Public Assistance Grants - Dollars Obligated**: $1,617,772,644.97
    - Hazard Mitigation Assistance
        - **Hazard Mitigation Grant Program (HMGP) - Dollars Obligated**: $93,450,776.86
- Disaster resources published by FEMA as of April 2026 include:
    - **Disaster Assistance**: http://www.disasterassistance.gov/
    - **Housing Assistance**: https://www.fema.gov/fact-sheet/direct-temporary-housing-assistance-0
    - **U.S. Army Corps of Engineers (USACE) Debris Removal Assistance**: https://www.fema.gov/fact-sheet/debris-clearance-and-removal
    - **Volunteer and Donate**: https://www.fema.gov/disasters/volunteer-donate and https://www.nvoad.org/volunteer/

Helene Damage and Needs Assessment (2024)

- More information regarding assessed damages and needs in the aftermath of Helene is available through the North Carolina Office of State Budget and Management (OSBM)[6]. Updates on funding requests and quarterly reports continue to be published as recovery efforts continue.

Helene Retrospective Dashboard & StoryMap (2024-2025)

FIGURE J.6: HELENE RETROSPECTIVE DASHBOARD (NCEM)



Source: North Carolina Emergency Management (NCEM)

[6] North Carolina Office of State Budget and Management (https://www.osbm.nc.gov/budget/hurricane-helene-damage-needs-assessment)

- More information regarding assistance programs, support numbers, and additional resources is available through the North Carolina Department of Public Safety (NCDPS) and North Carolina Emergency Management (NCEM)[7].
- The *Helene Retrospective* dashboard (**Figure J.6**), published by the North Carolina State Emergency Response Team (SERT), provides an interactive overview of Helene's impacts and the subsequent actions of SERT[8]. It consolidates storm damage, flooding effects, and response activities into maps, charts, and key indicators, helping users understand the scale of the disaster and evaluate the state's immediate response efforts as recorded through December 11, 2024.
    - **Table J.1** below provides an impact comparison between Buncombe County and Madison County based on the dashboard data.
- A comprehensive StoryMap developed by NCEM detailing the event timeframe, impacts, and community responses is also publicly available[9].

TABLE J.1: HELENE IMPACTS COMPARISON BY COUNTY

Impact Type	Buncombe County	Madison County
County Rainfall Totals	18 inches	8 inches
Peak Streamgage Stage	48.11 inches (Swannanoa River)	21.74 inches (Ivy River)
Damaged Water or Wastewater Systems	12	0
Damaged Dams	3 overtopped, 4 damaged	0 overtopped, 0 damaged
Damaged Roads	511	309
Damaged Bridges	50	13
Ground Failure Points	319	9
Total Structures Damaged or Destroyed	49,525	2,231
Customers Without Power	220,000	1,001
Sheltered Population[10]	5,577	242

Source: Helene Retrospective Dashboard

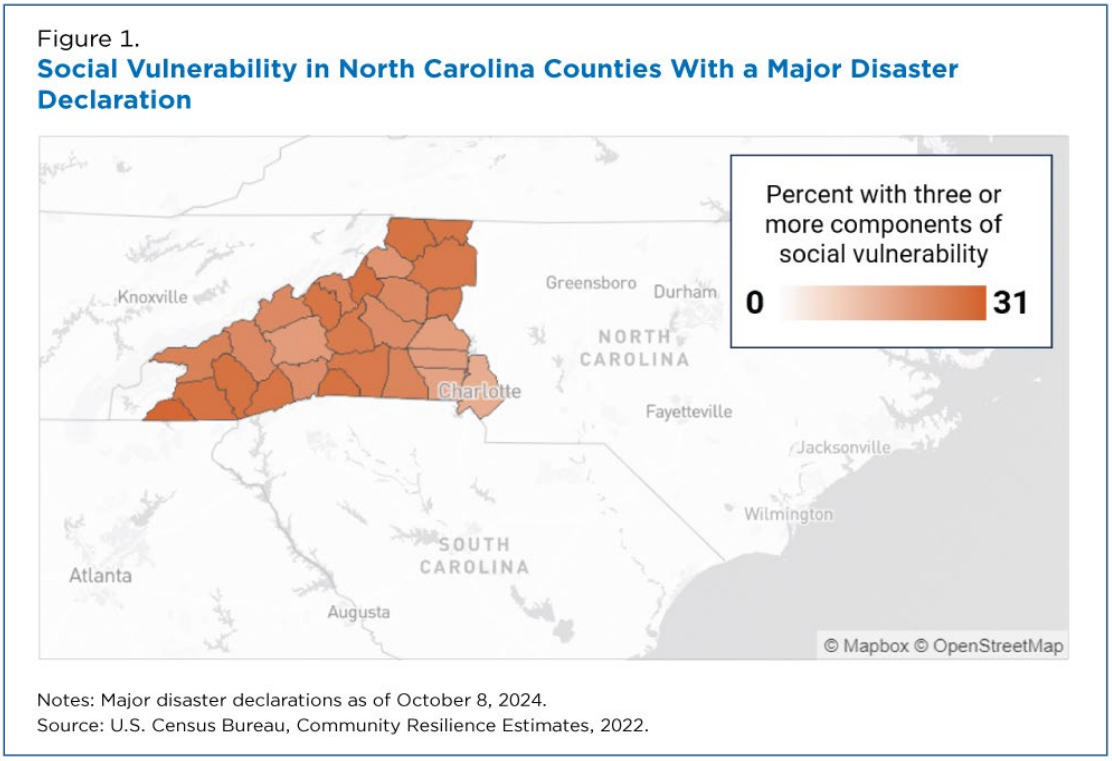
[7] North Carolina Department of Public Safety (https://www.ncdps.gov/our-organization/emergency-management/tropical-storm-helene)
[8] NCEM *Helene Retrospective* Dashboard (https://experience.arcgis.com/experience/7892f669bb0e442981b15009c7f2b5f0/page/Helene-Retrospective?views=Home)
[9] NCEM *Tropical Storm Helene* StoryMap (https://storymaps.arcgis.com/stories/e8b069fa5bab418db1e64b032e920550)
[10] Buncombe County had 1 state shelter and 3 non-state shelters listed for this population. Madison County had 2 non-state shelters listed for this population.

Social Vulnerability

Social vulnerability, defined by FEMA as "*the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood*," is an important determinant of subpopulations that may face the greatest risk of hazards due to various compounding factors. Key categorical factors of social vulnerability may include socioeconomic status, household characteristics, racial and ethnic minority status, and housing type/transportation.

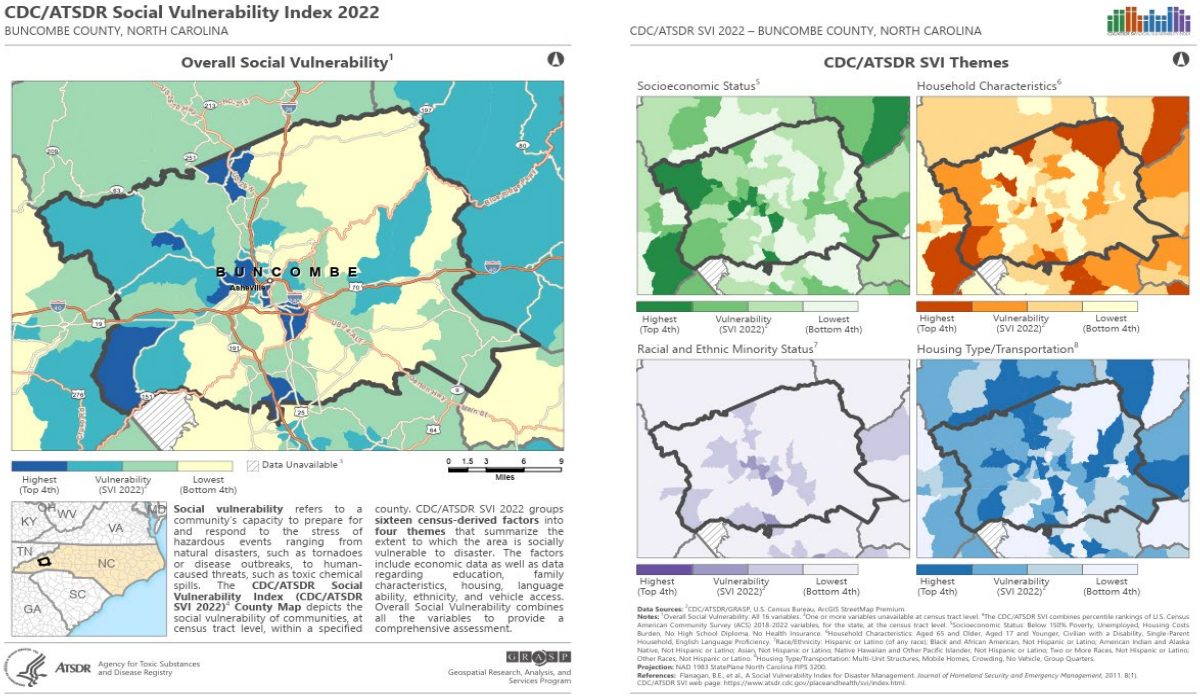
- As of 2025, the FEMA National Risk Index (NRI) rates social vulnerability in Buncombe County as 34.99 on a scale of 0 (lowest) to 100 (highest) points compared to 37.44 for Madison County[11].
- **Figure J.7** below illustrates the distribution of social vulnerability across North Carolina counties that received a major disaster declaration[12]. The map highlights counties shaded in varying tones of orange, representing the percentage of residents exhibiting 3 or more components of social vulnerability, based on U.S. Census Bureau Community Resilience Estimates. Darker shades correspond to higher concentrations of socially vulnerable populations, indicating communities that may face greater challenges in disaster preparedness, response, and recovery.
- **Figures J.8** and **J.9** show the 2022 Social Vulnerability Index[13] of Buncombe/Madison County.

FIGURE J.7: SOCIAL VULNERABILITY OF DISASTER COUNTIES (U.S. CENSUS)



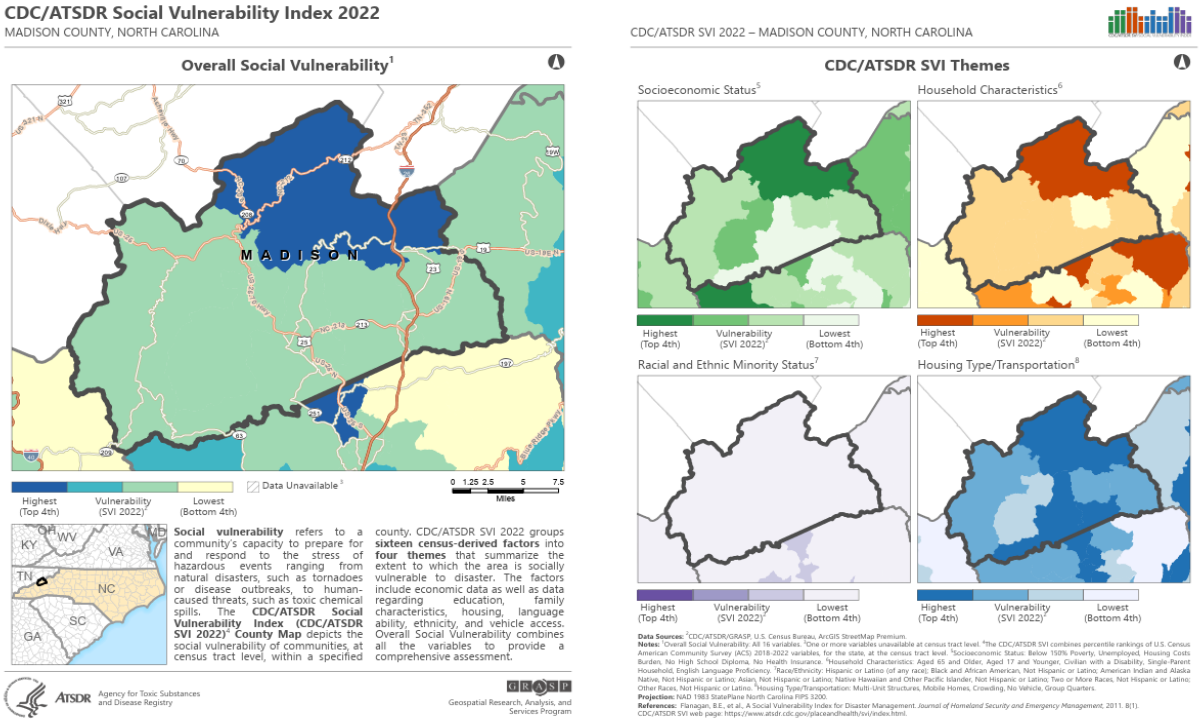
[11] FEMA National Risk Index (NRI) datasets are now housed within the Resilience Analysis and Planning Tool (RAPT) (https://www.fema.gov/emergency-managers/practitioners/resilience-analysis-and-planning-tool)
[12] U.S. Census Bureau (https://www.census.gov/library/stories/2024/10/hurricane-helene.html)
[13] Centers for Disease Control and Prevention (https://www.atsdr.cdc.gov/place-health/php/svi/index.html)

FIGURE J.8: SOCIAL VULNERABILITY INDEX OF BUNCOMBE COUNTY (CDC, 2022)



Source: Centers for Disease Control and Prevention

FIGURE J.9: SOCIAL VULNERABILITY INDEX OF MADISON COUNTY (CDC, 2022)



Source: Centers for Disease Control and Prevention

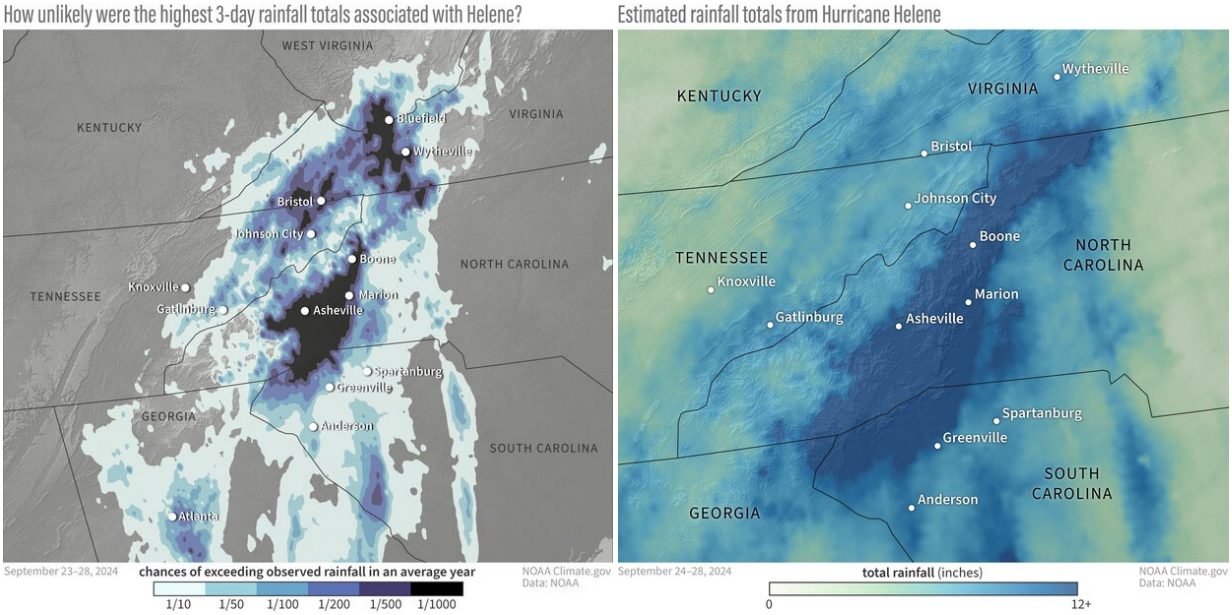
Hazard Vulnerability

Key natural hazards of concern in the wake of Helene include (1) flooding, (2) landslides, and (3) wildfires. Many floods caused by this event were considered record-breaking and surpassed the 500-year (0.2% annual chance) floodplain as 1,000-year (0.1% annual chance) or greater floods. Severe landslides were also widespread across Western North Carolina before, during, and after the storm as slopes, soils, and vegetation became increasingly destabilized. Both hazards irreversibly altered the regional landscape and created new hydrological and topological conditions that may ultimately affect how future hazard risks develop. Huge swaths of damaged vegetation across the Southeast U.S. have also increased the risk of wildfires, as decaying organic matter continues to dry out and become fuel. Other hazards, such as supply chain disruptions, hazardous substances exposure, and environmental degradation, are additional regional considerations of importance as disaster-affected areas continue to rebuild for the future.

Flooding

Figures J.10 and J**.11** below detail the extreme extent of regional rainfall and flooding during Helene. Rainfall around Asheville and other jurisdictions was considered a 1-in-1,000-year event and directly contributed to a similarly extreme extent of flooding as determined by high-water marks, streamgages, and other sources. More information about the impacts of rainfall and flooding from the event is available in published resources from the National Oceanic and Atmospheric Administration (NOAA)[14].

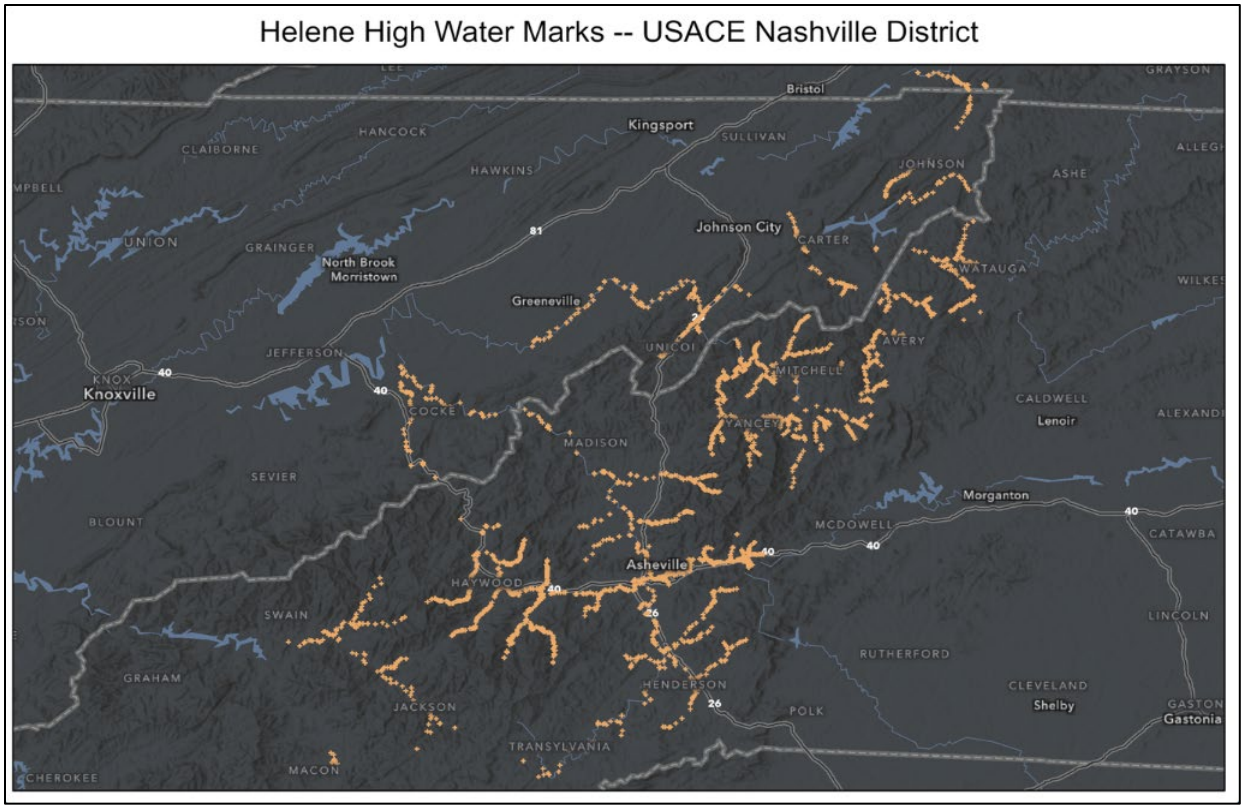
FIGURE J.10: HELENE EXTREME RAINFALL (NOAA)



Source: NOAA Climate.gov

FIGURE J.11: HELENE HIGH WATER MARKS (USACE)

[14] NOAA *Helene in Southern Appalachia* StoryMap (https://storymaps.arcgis.com/stories/8887acbd2dbd4d28a68e79fe53cbfaa3) and NOAA *Climate.gov* (https://www.climate.gov/news-features/event-tracker/hurricane-helenes-extreme-rainfall-and-catastrophic-inland-flooding)



Source: USACE, NOAA

Flooding hazards of various types (e.g., riverine, flash, and urban) remain a significant risk throughout the Buncombe Madison Region and should be planned for accordingly through continued assessment of risks and implementation of feasible mitigation actions and projects.

Landslides

The U.S. Geological Survey's (USGS) landslide hazard estimate data for Hurricane Helene (**Figure J.12**) shows that Buncombe and Madison counties were located within one of the most at-risk corridors for storm-triggered landslides in Western North Carolina. The map illustrates a dense band of high-hazard zones stretching directly through both counties, particularly concentrated around Asheville, Weaverville, Marshall, and the mountainous terrain running north into Madison County. This region's steep slopes, saturated soils, and extensive rainfall during Helene created ideal conditions for slope failures, increasing the probability of landslides capable of damaging homes, blocking roadways, and isolating rural communities. Madison County's remote mountain areas, already challenged by limited road infrastructure, faced amplified vulnerability due to the concentrated pockets of elevated hazard. More information about the impacts of landslides from the event is available in published resources from the U.S. Geological Survey (USGS)[15].

[15] USGS *Hurricane Helene's Deadly Landslide Legacy* (https://www.usgs.gov/news/featured-story/hurricane-helenes-deadly-landslide-legacy) and USGS *Hurricane Helene Landslide Observations Inventory* (https://www.arcgis.com/apps/dashboards/01b4f51fc0b64002bf7722a9acfc181d)

FIGURE J.12: HELENE LANDSLIDE HAZARD ESTIMATE (USGS)

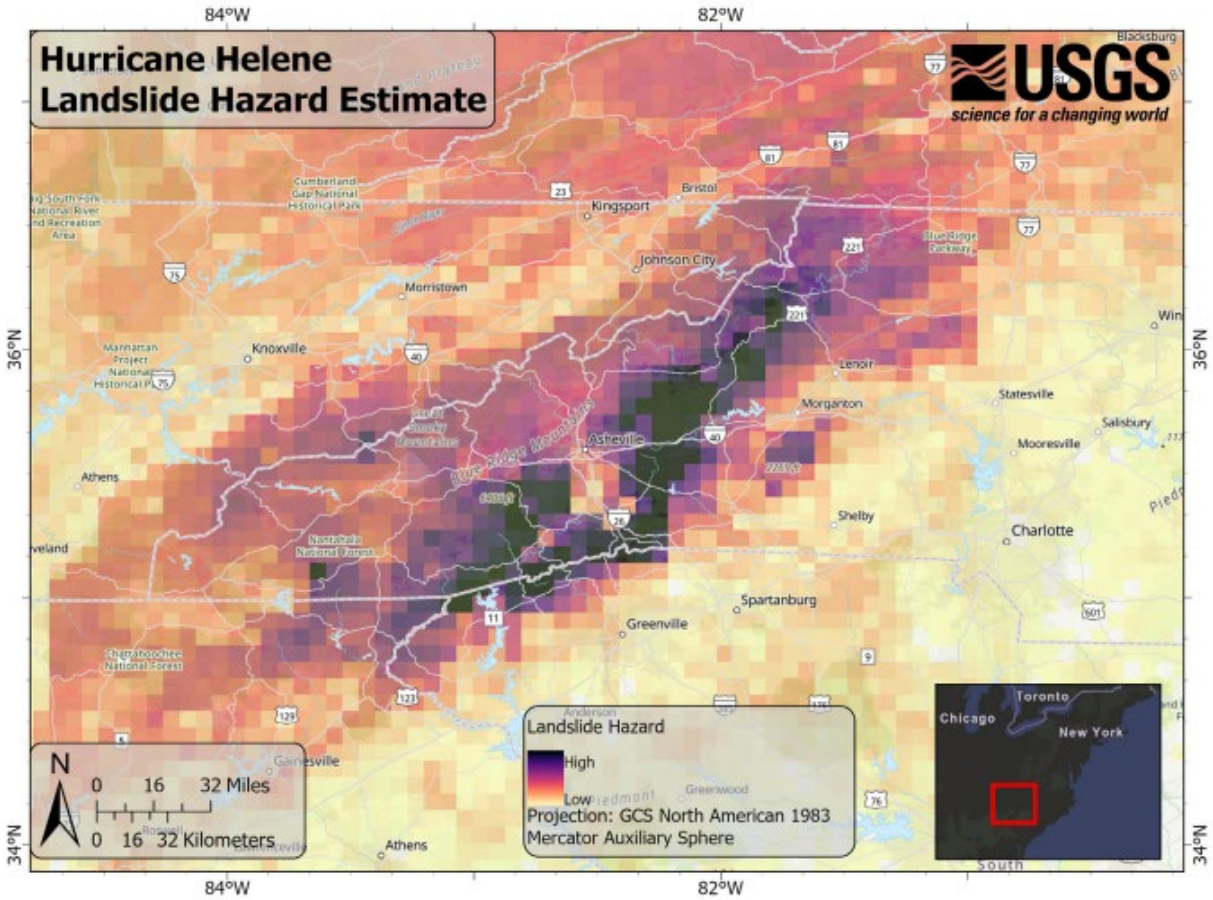


Figure 6: U.S. Geological Survey Hurricane Helen Landslide Hazard Estimate.

Source: USGS

For both counties, the widespread high-risk designations indicate that landslides posed a major threat to transportation access, emergency response, and long-term recovery, compounding the storm's already significant impacts on housing, utilities, and community safety. Landslide hazards remain a significant risk throughout the Buncombe Madison Region and should be planned for accordingly through continued assessment of risks and implementation of feasible mitigation actions and projects.

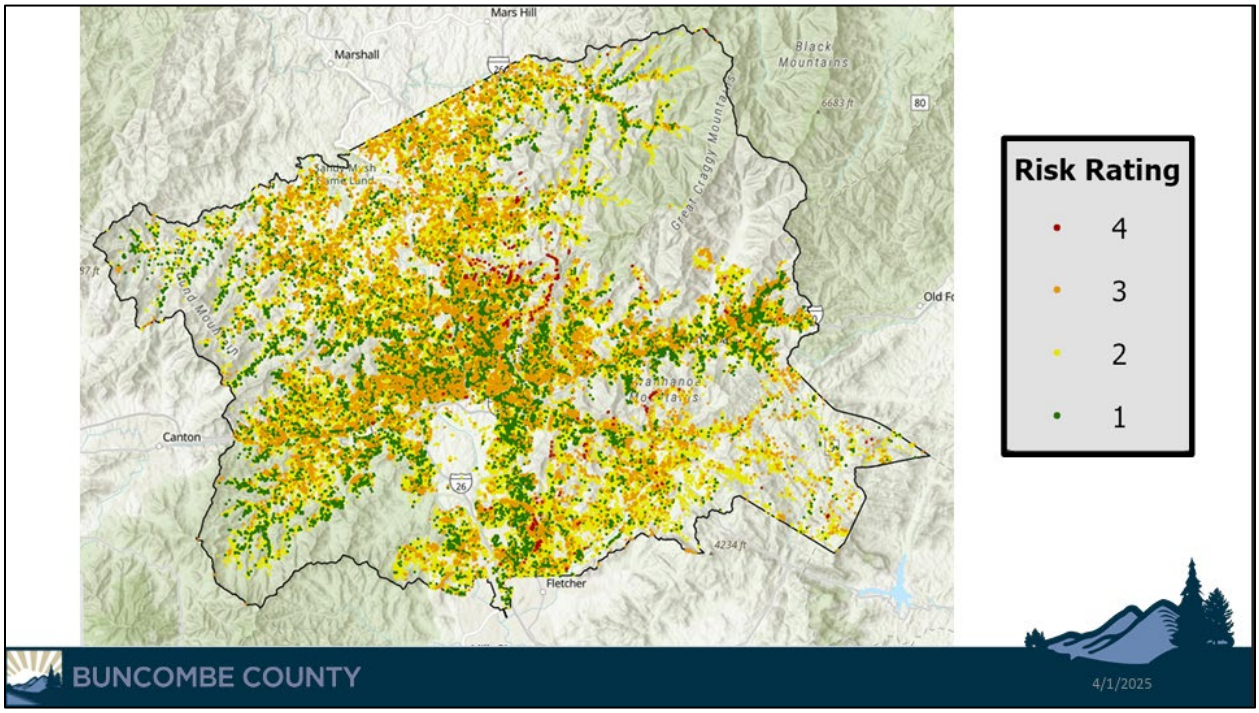
Wildfires

Hundreds of thousands of trees were knocked down across the Buncombe Madison Region during Helene, resulting in extensive ecological damage. An estimated 17% of Buncombe County's forest was severely damaged, and nearly all recreation sites of Pisgah National Forest were damaged, among other notable impacts[16]. This widespread tree loss significantly increases the likelihood of more intense fire seasons in the coming years (**Figure J.13**), both in scale and severity, due to the accumulation of downed

[16] The Guardian. 2025. (https://www.theguardian.com/us-news/2025/mar/09/asheville-trees-hurricane-helene-north-carolina) and U.S. Forest Service (https://www.fs.usda.gov/r08/northcarolina/about-area/helene)

timber and debris that now serve as abundant fuel sources. For instance, 2025 wildfire activity within the area surrounding Pisgah National Forest was the highest level observed in over a decade[17]. Additionally, the North Carolina Forest Service notes that Helene debris could influence fire risks for the next 10-20 years based on current estimates. More information about the impacts of wildfires from the event is available in published resources from the Southern Fire Exchange (SFE)[18].

FIGURE J.13: POST-HELENE WILDFIRE RISK RATINGS (BUNCOMBE COUNTY)



Source: Buncombe County Board of Commissioners Helene Update, April 2025[19]

Wildfire hazards remain a significant risk throughout the Buncombe Madison Region and should be planned for accordingly through continued assessment of risks and implementation of feasible mitigation actions and projects.

Other Hazards

Other hazards of concern related to the impacts of Helene include the following:

1. **Critical facilities/services access** continues to be restored as quickly as possible, although regional capacity remains diminished compared to pre-Helene facilities and operations.
2. **Regional supply chain disruptions** were widespread, and some networks may need additional time, resources, and/or planning to reestablish or reroute logistics for critical dependencies.

[17] U.S. Forest Service (https://www.fs.usda.gov/r08/northcarolina/about-area/helene)
[18] Southern Fire Exchange, *Resources for Understanding Hurricane Helene Impacts on Prescribed Fire and Wildfire* (https://southernfireexchange.org/resources-for-understanding-hurricane-helene-impacts-on-prescribed-fire-and-wildfire/)
[19] Buncombe County Board of Commissioners Helene Update. 2025. (https://www.buncombecounty.org/common/Commissioners/20250401/BRIEFING_Helene%20Update.pdf)

3. **Additional geological hazards** (e.g., sinkholes, soil erosion, and land subsidence) were observed at various points and may present future risks to people and property.
4. **Exposure to hazardous substances** remains a risk as large quantities of chemicals, heavy metals, fuels, sewage, and other debris have entered waterways and spilled from industrial sites.
5. **Environmental degradation** following the storm has led to significant challenges regarding regional habitat damage/loss, pollution, and long-term ecological stability.

Future Restoration & Resilience



Restoration work remains ongoing across communities of the Buncombe Madison Region and broader areas of Western North Carolina at the time of this plan update to ensure greater stability, hazard mitigation, and community resilience in the context of an increasingly uncertain future. Online resources related to response, restoration, and recovery efforts are shared below. As development of this plan continues along with the region, these findings and resources will be revisited by the Regional Hazard Mitigation Planning Committee in future updates.

Helene Recovery Resources

- Federal
  - **FEMA**: https://www.fema.gov/disaster/current/hurricane-helene
    - FEMA Disaster Declaration: https://www.fema.gov/disaster/4827
  - **USDA**: https://www.usda.gov/hurricane-helene
  - **NOAA StoryMap**: https://storymaps.arcgis.com/stories/8887acbd2dbd4d28a68e79fe53cbfaa3
- State
  - **WNC Recovery Hub**: https://www.wncrecovery.nc.gov/resources/recovery-resources
  - **NCDPS**: https://www.ncdps.gov/our-organization/emergency-management/tropical-storm-helene
    - NCEM Helene Retrospective Dashboard: https://experience.arcgis.com/experience/7892f669bb0e442981b15009c7f2b5f0/page/Helene-Retrospective?views=Home
  - **NC State Climate Office Resources**: https://climate.ncsu.edu/heleneresources/
  - **NCDEQ**: https://www.deq.nc.gov/news/key-issues/storm-season/hurricane-helene-response
  - **NCDOI**: https://www.ncdoi.gov/hurricane-helene-response-and-recovery#DisasterResources-3184
  - **UNC**: https://www.sog.unc.edu/resources/microsites/nc-emergency-management/hurricane-helene-resources
- Regional
  - **ARC**: https://www.arc.gov/hurricane-helene-resources/